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D4.2 Comparative Analysis of National Legal Case Studies

On the emerging technologies of climate engineering, neurotechnologies and digital extended reality

Draft version submitted to the European Commission for review



D4.2 Comparative Analysis of National Legal Case Studies

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Lead Partner	Trilateral Research (TRI UK)		
Contributing Partners	AIRI, AIT, CEA, DMU, EUREC, UT, TRI IE		
Author(s)	Julie Vinders (TRI UK); Ben Howkins (TRI UK); Nicole Santiago (TRI IE); Iva-Nicole Mavrlja (TRI IE); Rowena Rodrigues (TRI UK); Wenzel Mehnert (AIT); Domenico Piero Muscillo (Airi); Gustavo Gonzalez (Airi); Marco Liut (Airi); Sara Morisani (Airi); Andrea Porcari (Airi); Laurynas Adomaitis (CEA); Alexei Grinbaum (CEA); Kathleen Richardson (DMU); Nitika Bhalla (DMU); Lisa Häberlein (EUREC); Bennet Francis (UT); Dominic Lenzi (UT)		
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Bennet Francis (UT)	14 December 2022
Andrea Porcari (AIRI)	16 December 2022
Domenico Piero Muscillo (AIRI)	16 December 2022

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The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Augmented reality (AR)	Overlay of digital information or objects with a person's current view of reality; enhancement of reality by computer-generated perceptual information across multiple sensory, visual or auditory modalities.
Carbon dioxide removal (CDR)	A type of climate engineering, also known as “negative emissions techniques”, that removes atmospheric CO ₂ and stores it in geological, terrestrial, or oceanic reservoirs.

Climate engineering	Also known as geoengineering, refers to the deliberate large-scale intervention in the Earth's climate system, in order to moderate global warming.
Digital extended reality	Refers to a collection of technologies that are related to each other, with a common functionality to emulate and imitate human traits and social circumstances: language, appearance, lived spaces, objects, experiences, etc. XR is also known as a mix of virtual reality (VR), augmented reality (AR) and mixed reality.
Mixed reality	Blending the real and virtual worlds to create new digital or manufactured realities, where physical and digital objects co-exist and interact in real-time.
Neurotechnologies	Refers to devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons.
Solar radiation management (SRM)	A type of climate engineering that aims to reflect some sunlight and heat back into space.
Virtual reality	Environment that is completely simulated by digital means, completely obscuring the view of their existing reality.

Table 2: List of Abbreviations

Term	Explanation
AIA	Artificial Intelligence Act (AIA)
AR	Augmented Reality
BCI	Brain-computer interface
BECCS	Bioenergy with carbon capture and storage
BMI	Brain-machine interface
CAT	Convention Against Torture
CBD	Convention on Biological Diversity
CCS	Carbon capture and storage
CCUS	Carbon capture, utilisation and storage
CDR	Carbon dioxide removal
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CERD	International Convention on the Elimination of All Forms of Racial Discrimination
CFREU	Charter of Fundamental Rights of the European Union
CO ₂	Carbon dioxide

CoE	Council of Europe
COP	Conference of Parties (UNFCCC)
CPRMW	Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
Cth	Commonwealth
DACCS	Direct Air Carbon Capture and Storage
DBS	Deep brain stimulation
DMA	Digital Markets Act (EU)
DNA	Deoxyribonucleic acid
DoA	Description of Action
DSA	Digital Services Act (EU)
EC	European Commission
ECHR	European Convention on Human Rights
ECtHR	European Court of Human Rights
EEG	Electroencephalogram
EIA	Environmental Impact Assessment
EOR	Enhanced recovery of oil and gas
EP	European Parliament
ETS	Emission trading scheme
EU	European Union
FDA	Food and Drug Administration (US)
fMRI	Functional magnetic resonance imaging
FRA	Fundamental Rights Agency (EU)
GDPR	General Data Protection Regulation (EU)
GGR	Greenhouse gas removal
GHG	Greenhouse gas

ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
IEA	International environmental agreement
IEEE	Institute of Electrical and Electronics Engineers
IPCC	Intergovernmental Panel on Climate Change
LC/LP	London Convention / London Protocol
LULUCF	Land use, land use change & forestry
MEA	Multilateral environmental agreement
MR	Mixed Reality
MRI	Magnetic Resonance Imaging
MtCO _{2e}	Metric tonnes of carbon dioxide equivalent
NDC	Nationally Determined Contributions
NET	Negative emissions technologies
NGO	Non-governmental organisation
NLP	Natural language processing
OECD	Organisation for Economic Co-operation and Development
R&D	Research and development
SAI	Stratospheric aerosol injection
SRM	Solar radiation management
UDHR	Universal Declaration of Human Rights
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VR	Virtual Reality
WP	Work package
XR	Digital extended reality

Executive Summary

Climate engineering, neurotechnologies, and digital extended reality (XR) present many significant legal issues that impact socio-economic equality and fundamental rights. In most cases, there is only limited amount of comprehensive or dedicated national laws governing these technology families, though many elements of the technologies are subject to existing national legal frameworks.

This report explores and analyses relevant national laws in nine case studies for the three technology families (three national case studies per technology family). Together with TechEthos Deliverable 4.1,¹ this analysis will serve as the basis for future work in the TechEthos project involving the development of recommendations for the adjustment or enhancement of legal frameworks at the national and/or international level, as well as policy briefs on the possible need for dedicated legislation at the EU level. The following table outlines the nine national legal case studies and legal frameworks considered in the report.

Table 3: List of national legal case studies and legal frameworks analysed

Climate engineering	Neurotechnologies	Digital extended reality
<ul style="list-style-type: none"> ○ Australia ○ Austria ○ United Kingdom 	<ul style="list-style-type: none"> ○ Germany ○ Ireland ○ United States 	<ul style="list-style-type: none"> ○ France ○ Italy ○ United Kingdom
<ul style="list-style-type: none"> ○ Human rights law ○ Environmental law ○ Climate change law 	<ul style="list-style-type: none"> ○ Human rights law ○ Privacy and data protection law ○ Use in legal systems ○ Liability for harms 	<ul style="list-style-type: none"> ○ Human rights law ○ Privacy and data protection ○ Consumer rights law ○ Liability for harms

For the purposes of the TechEthos project and this report, we have used the following definitions for the three technology families:

- **Climate engineering**, also known as geoengineering, refers to “... the deliberate large-scale intervention in the Earth’s climate system, in order to moderate global warming.”²
- **Neurotechnologies** refers to devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons.³
- **Digital Extended Reality (XR)** refers to AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs (e.g., voice, gestures, language, movement, emotions, and other elements of human communication), allowing extended or mixed virtual scenarios (e.g., visual, audio, linguistic or haptic) to be tailor-made or

¹ Santiago, N., et al. (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.

² Shepherd, J., Caldeira, K., Cox, P., Haigh, J., Keith, D., Launder, B., & Mace, G. (2009) *Geoengineering the Climate: Science, Governance, and Uncertainty*. Available at: <http://royalsociety.org>.

³ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

“customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices).⁴

Climate engineering

Whilst the objective of climate engineering is to avoid dangerous levels of climate change, climate engineering technologies by themselves may also present certain risks and regulatory challenges. Three national legal case studies on Australia, Austria and the United Kingdom, were conducted to assess the regulatory implications of climate engineering in these countries.

Table 4: Highlights from the national legal case studies of Australia, Austria and the UK

Australia	Austria	United Kingdom
Net-zero target by 2050	Net-zero target by 2040	Net-zero target by 2050
CDR as part of emission reduction strategy; SRM on small-scale	Policy focus on decarbonisation; climate engineering as last resort solution	Explicit policy commitment to CDR in addition to emission reductions
CDR scheme and local-scale SRM project underway	Moratorium on CCS subject to 5-year review	Variety of CDR programmes; no plans regarding SRM

Table 5: Climate engineering-specific regulatory challenges

Key regulatory challenge	Explanation
Legal status of climate engineering	Regulation must clarify the legality of different climate engineering technologies and the extent to which their use is or should be restricted.
Defining climate engineering technologies	Regulation must be adequately capable of governing a variety of climate engineering techniques based on their distinct characteristics, particularly with regard to the CDR and SRM categories.
Legal status of the removals	Regulation must clarify whether climate engineering removals count towards a country’s emission reduction targets. Due consideration must be given towards the issue of equivalence, and whether removals can and should indeed be treated as the negative equivalent of emissions.
International collaboration for removal accounting	To avoid double counting and legal uncertainty, accounting carbon removals is likely to require strong international collaboration and standardisation.
The need for comprehensive regulatory frameworks	A comprehensive regulatory framework would help normalise operations, regulate environmental risks, provide public participation and access to justice.

⁴ TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.

Neurotechnologies

Whilst offering potentially significant healthcare treatment benefits to patients in clinical contexts, neurotechnologies also present a number of regulatory challenges, particularly in relation to human rights law and data protection frameworks. Three national legal case studies on Germany, Ireland and the United States of America (USA/US) were conducted to assess the regulatory implications of and regulation applicable to neurotechnologies in these jurisdictions.

Table 6: Highlights from the national legal case studies of Germany, Ireland and the USA

Germany	Ireland	USA
Ongoing research into both neurotechnologies and neuroscience through programmes such as the Bernstein Network Computational Neuroscience.	Availability under Treatment Abroad Scheme (TAS) of neurotechnologies such as deep brain stimulation (DBS) to treat neurological disorders, such as dystonia.	Flagship Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative involves various public and private sector partners, including federal bodies such as DARPA and the FDA.
Use of neurotechnologies such as brain computer interfaces (BCIs) as communication tools and equal treatment law.	The unenumerated constitutional right to bodily integrity interpreted to also include the more neuro-specific aspect of psychological integrity.	The privilege against self-incrimination, the protections against discrimination, and the unenumerated First Amendment right to freedom of thought.
Constitutional right to informational self-determination, coupled with statutory data protection law expanding on the EU GDPR.	The Health Research Regulations and the balance between ensuring the viability of healthcare research, while also safeguarding the privacy and data protection rights of participants.	Narrow, consumer-focused, sector-specific data privacy laws at the federal level, coupled with unenumerated privacy rights and the absence of an equivalent right to data protection.

Table 7: Neurotechnology-specific regulatory challenges

Key regulatory challenge	Explanation
Regulating emerging consumer and dual use neurotechnology applications	Existing medical device regulation and international weapons conventions may not or only in a limited way be applicable to emerging neurotechnology applications.
Privacy and protection of brain and other neural data	Various limits in and caveats to existing data protection frameworks, coupled with heightened expectations of (mental) privacy due to the distinctiveness and potential sensitivity of the data collected.
Neurodiscrimination and neuroenhancement	Neurotechnology-based discrimination may arise in various socio-economic contexts, both through misuse of brain and other neural data, as well as via inequitable access.

Neurorights	Limits of existing human rights frameworks to respond to the challenges posed by neurotechnologies may necessitate the extension of existing rights or the creation of a novel set of neuro-specific rights-based protections.
Appropriate regulatory forum(s) and framework(s)	Emergence of targeted legislative initiatives at the national level, but the increasingly global market for neurotechnologies may necessitate regulatory measures on a broader basis.

Digital Extended Reality (XR)

The legal issues pertaining to XR technologies are primarily focused on privacy and data protection, the regulation of artificial intelligence and harmful online content, freedom of expression, non-discrimination, and the protection of special categories of persons, including children. Three national legal case studies, France, Italy and the United Kingdom, were conducted to assess the regulatory implications of XR in these countries.

Table 8: Highlights from the national legal case studies of France, Italy and the UK

France	Italy	United Kingdom
Human rights enhancements; dignity; autonomy; bias; protection of minors	Non-discrimination; accessibility; protection of special category groups	Human Rights Act; Equality Act; protection of special category groups
Impact of GDPR, proposed AI Act, Digital Services Act	Impact of GDPR, proposed AI Act, Digital Services Act	Impact of Online Safety Bill; Data Protection and Digital Information Bill
Regulation of mis/disinformation; online identity; digital sovereignty	Regulating harmful content; special category data originating from XR	Regulation of harmful online content; hate speech; role of XR providers

Table 9: XR-specific regulatory challenges

Key regulatory challenge	Explanation
Privacy and data protection	XR poses significant risks to the human rights to privacy and data protection through the breadth and depth of data collected.
Regulation of harmful online content	A careful balance must be struck between regulating potentially harmful online content, the effects of which may be exacerbated by the immersive and increasingly realistic nature of XR technologies, and the protection of the right to freedom of expression.
Online identity	Anonymous online identity raises challenges regarding identity verification and tracing illegal online activity. It also raises challenges regarding the protection of certain groups, such as children, from accessing harmful online content.

Role of online platform providers	Legislative developments indicate greater responsibility of providers for content moderation.
AI regulation	The risk classification under the EU's AI Act will impact the ways in which XR may be developed, marketed and used.
Divergent approaches to the regulation of the metaverse	The creation of a single virtual world raises challenges to the applicable regulation with users worldwide accessing content online subject to region-specific, potentially conflicting, regulation.

Cross-cutting regulatory challenges

The analysis of the national legal case studies has highlighted the regulatory challenges specific to these technology families in the countries studied. Importantly, however, as emerging technology families, they also share some cross-cutting regulatory challenges. The table below sets out the key cross-cutting challenges in relation to the regulation of all three technology families.

Table 10: Overview of cross-cutting regulatory challenges

Key regulatory challenge	Details
Defining emerging technologies	The emerging and rapidly evolving nature of the studied technologies makes defining them challenging. There is a risk that regulation becomes outdated, if not sufficiently comprehensive or unable to keep up with and adapt to technological developments.
Mitigating risk versus stifling innovation	There is a need to consider and strike a balance between the protection of individuals and society against associated risks, on the one hand, and avoiding stifling innovation, on the other.
Protecting and enhancing existing human rights or creating new ones	All three technology families have given rise to the debate around the adequacy of the existing human rights framework, and the emergence of novel rights.
Limits of existing privacy and data protection frameworks	XR and neurotechnologies raise particular risks to privacy and data protection due to the combination of the significant volume of data collected and processed, the sensitivity and/or variety of such data, and the potential for both end-users and/or bystanders to have their data captured.
Interconnections between new and emerging technologies	Neurotechnologies and XR combined with AI may exacerbate existing regulatory gaps and challenges, particularly in relation to privacy. The convergence between these new and emerging technologies brings them within the purview of ongoing regulatory developments in relation to the governance of AI.

1. Introduction

Climate engineering, neurotechnologies, and digital extended reality (XR) present many significant legal issues that impact socio-economic equality and fundamental rights at the national level. In most cases, there is only a limited amount of comprehensive or dedicated national laws governing these technology families, though several aspects are subject to existing national legal frameworks.

Climate engineering, neurotechnologies, and XR are three new and emerging technologies that will be deployed in Europe and worldwide in the next five to ten years, which were selected by the TechEthos project for their expected socio-economic impact. Collectively, they present various legal issues that impact socio-economic equality and fundamental rights, and which challenge the implementation of existing regulatory frameworks. Given their emerging character, in most cases they are not explicitly addressed by existing EU and national laws. However, there are several elements of existing national legal frameworks that concern the application of these technologies, and there are ongoing debates on the possible need to undertake specific actions for their regulatory oversight.

This report provides a comparative analysis of nine national legal case studies conducted for the three technology families (three national legal case studies per technology family, annexed to this report). It is targeted towards policymakers and regulators at the national level. It also seeks to provide insights into the regulatory challenges surrounding climate engineering, neurotechnologies and XR for policymakers and regulators at the regional and international level. Together with TechEthos Deliverable 4.1,⁵ this analysis will serve as the basis for future work in the TechEthos project involving the development of recommendations for the adjustment or enhancement of legal frameworks at the national and/or international level, as well as policy briefs on the possible need for dedicated legislation at the EU level. While there are some overlapping and cross-cutting issues, each technology family is subject to different legal frameworks. The following table outlines the nine national legal case studies and legal frameworks considered in this report.

Table 11: List of national legal case studies and most relevant legal frameworks identified by our study

Climate engineering	Neurotechnologies	Digital extended reality
<ul style="list-style-type: none"> ○ Australia ○ Austria ○ United Kingdom 	<ul style="list-style-type: none"> ○ Germany ○ Ireland ○ United States 	<ul style="list-style-type: none"> ○ France ○ Italy ○ United Kingdom
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⁵ Santiago, N., et al. (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.

1.1 Defining the technology families

For the purpose of the TechEthos project and this report, we have used the following definitions for the three technology families:

- **Climate engineering**, also known as geoengineering, refers to "... the deliberate large-scale intervention in the Earth's climate system, in order to moderate global warming."⁶
- **Neurotechnologies** refers to devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons.⁷
- **Digital Extended Reality (XR)** refers to AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs (e.g., voice, gestures, language, movement, emotions, and other elements of human communication), allowing extended or mixed virtual scenarios (e.g., visual, audio, linguistic or haptic) to be tailor-made or "customized" based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user's behaviour or nudge their choices).⁸

The definitions for each of these technology families is based on the TechEthos factsheets, developed by work package 1 team members as part of the initial horizon scan.⁹ For more information about the technology families and their innovation ecosystems, visit: <https://www.techethos.eu/resources/>.

1.2 Structure of report

Following this introduction, **Section 2** describes the methodology used in the research and preparation of this report. The three sections that follow are dedicated to the comparative analysis of legal issues and challenges identified in the national legal case studies for each of the technology families. Each section first provides a comparative summary overview, before setting out the key regulatory challenges specific to each technology family. **Section 3** focuses on climate engineering, **Section 4** on neurotechnologies, and **Section 5** on digital extended reality. **Section 6** presents the cross-cutting regulatory challenges across all three technology families. **Section 7** contains the report's conclusion and outlook, and **Section 8** provides a reference list. The nine national legal case studies are annexed to the report, in **section 9**.

⁶ Shepherd, J., Caldeira, K., Cox, P., Haigh, J., Keith, D., Launder, B., & Mace, G. (2009) *Geoengineering the Climate: Science, Governance, and Uncertainty*. Available at: <http://royalsociety.org>.

⁷ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

⁸ TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.

⁹ TechEthos (2022) *Technology Factsheet: Climate Engineering / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Climate-Engineering_website.pdf; TechEthos (2022) *Technology Factsheet: Neurotechnologies / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Neurotechnologies_website.pdf; TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.

2. Methodology

This report is part of the policy, legal and regulatory analysis conducted in the TechEthos project. This section details the methodological approach that was taken in the development of nine national legal case studies and the comparative analysis presented in this report.

2.1 Research methodology

This report presents a summary of the legal issues and challenges identified in the nine national legal case studies, based on which a comparative analysis of technology-specific and cross-cutting regulatory challenges have been identified. This report builds on the analysis of the same legal domains at the international and EU level, which constitutes deliverable 4.1 of the TechEthos project, published in June 2022.¹⁰ The nine national legal case studies focused on the state of the law and current legal responses on the identified topic (as evidenced in policy, legislative developments and case law, procedural frameworks, role of ethics committees and other advisory and regulatory structures). The case studies were developed using a common questionnaire template, to enable the comparative analysis presented in this report. The nine national legal case studies are annexed.

The overall approach to this legal analysis, in particular the human rights analysis, was informed by and builds on past work in the EU-funded SHERPA and SIENNA projects, which also looked at the ethical and human rights implications of new and emerging technologies.¹¹ Some TechEthos partners with legal expertise were partners in the SHERPA and SIENNA projects and contributed to the legal analysis work in those projects.

For each technology family, we began by compiling a list of key legal issues. To identify legal issues, we used the TAPP legal analysis method:

- T: Things (What are the relevant objects?)
- A: Actions (What actions are done or not done?)
- P: People (Who is involved or impacts by the action?)
- P: Places (Where (physical space or domain) does the action take place?)¹²

With a TAPP list, we identified the corresponding legal frameworks governing the things, actions, people, and/or places relevant to the three technologies areas. To select the issues discussed in this report, we were guided by the language in the TechEthos Description of Action (DoA) to “focus on those affecting/contributing to the stimulation of innovation, socio-economic inequalities including, in health treatment, social status and social inclusion, and gender equality and fundamental human rights and freedoms of individuals.” Additionally, we considered which legal issues were particularly significant and timely, and worked in parallel to an ethical analysis of the three technologies in the project.

We carried out the research for this report from March to December 2022, primarily through desk-based research. To best understand the legal context, we looked at hard (binding) law and soft (non-binding) law, as well as policies and judicial jurisprudence. Our analysis of the laws has been made with reference to legal and academic scholarship. To understand how the law may develop, we also looked at proposed

¹⁰ Santiago, N., et al. (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.

¹¹ For SHERPA, the technology focus was smart information systems (a combination of artificial intelligence (AI) and Big Data). See: <https://www.project-sherpa.eu/>. For SIENNA, the three technologies families analysed were genomics, human enhancement, and AI and robotics. See: <https://www.sienna-project.eu/>.

¹² See, Danner, R.A. (1987) ‘From the Editor: Working with Facts’, *Law Library Journal*, 79.

laws and policies, and consulted where possible with national legal experts within the partners' networks.

As the three technology families are new and emerging, the legal scholarship does not always use the same terminology. Furthermore, different terminology is used in different countries. For climate engineering, our search terms also included the search terms and translations of 'geoengineering' and the specific types of climate engineering (e.g., solar radiation management, marine cloud brightening). For neurotechnologies, we also used the search terms and translations of 'neuroscience', 'brain-computer interfaces', and 'brain-machine interfaces', as well as specific forms of neurotechnology (e.g., EEG, fMRI). For digital extended reality, we used the search terms and translations of 'extended reality', 'virtual reality', 'augmented reality', and 'mixed reality'.

The gaps and challenges identified in this report will serve as the basis for legal and policy recommendations at the national level in the next phase of the TechEthos project (forthcoming Summer 2023).

2.2 Country selection

This report is the product of a combined effort from seven TechEthos partners. The selection of countries for the national legal case studies was informed by partners' location and/or connections to the selected country, to take advantage where possible of direct knowledge of the national context. National resources have been extensively used for the analysis, including resources in the national language. The panel of authors includes partners with expertise in both social, legal and technology assessment.

In selecting the countries for the national legal case studies, at least one common law jurisdiction and at least one civil law jurisdiction were selected for each of the three technology families, to ensure a full range of legal frameworks would inform the comparative legal analysis. As an extensive study of EU law and international law in relation to the technology families was completed in June 2022,¹³ it was also judged advantageous to represent both EU and non-EU jurisdictions in the national case studies, in order to explore both how EU law is operationalised at a national level, and how non-EU frameworks differ from EU approaches.

Furthermore, it was ensured that, in the split between technology families, there would be at least one civil law and one common law jurisdiction, as well as one EU Member State and one non-EU country. In combination with an assessment of partners' competencies, this resulted in the selection of Australia, Austria, France, Germany, Italy, Ireland, United Kingdom and the United States of America and the following split between technology families:

Table 12: List of national legal case studies and legal frameworks

Characteristics	Climate engineering	Neurotechnologies	Digital extended reality
Common law	UK; Australia	Ireland; USA	UK
Civil law	Austria	Germany	France; Italy
EU	Austria	Germany; Ireland	France; Italy
Non-EU	UK; Australia	USA	UK

¹³ Santiago, N., et al. (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.

Sections 3.1, 4.1 and 5.1 provide comparative summary overviews per technology family for each of the national legal case studies. In order to contextualise the developments in relation to each of the identified national legal case studies, each section includes a brief overview of noteworthy international approaches to the regulation of each technology family. The selection of these noteworthy approaches was informed by the existence and accessibility of specific legal and policy developments in these countries in relation to the relevant technology family. The complete case studies are annexed to this report.

2.3 Scope and limitations

The research conducted for this report is not an exhaustive analysis of legal issues pertaining to the three technology families in the nine legal case studies. The scope of the research focused on those legal issues pertaining to socio-economic equality and fundamental rights. In health treatment, for instance, these include social status and social inclusion, gender equality, fundamental human rights and individual freedoms. Furthermore, the ability to consider a range of jurisdictions, including the analysis of noteworthy international approaches, was limited to that falling within the competencies of the project partners. The selection of the countries was partially revised from the project's Description of Action (DoA) on the basis of appropriate partner competencies at the time of the research and writing of this report. More fine-grained legal research into primary legal sources would further complement the findings of this report on the nine national legal case studies and the associated comparative analysis.

3. Comparative analysis – Climate engineering

This section examines the legal issues and challenges identified in the three national legal case studies considered in relation to climate engineering. First, it provides a comparative summary overview of Australia, Austria and the United Kingdom, before highlighting some noteworthy international approaches. It then sets out the key challenges concerning the regulation of climate engineering.

3.1 Comparative summary overview

Climate engineering technologies can help mitigate climate change on a local and global scale and detect and respond to global threats due to the climate crisis. It represents a group of technologies that act on the Earth's climate system by reducing greenhouse gases (GHG) in the atmosphere and other anthropic emissions or directly changing physical or chemical processes in the biosphere to achieve direct control of climate. This technology family includes, for example, Carbon Dioxide Removal (CDR) technologies, such as bioenergy carbon capture, and storage (BECCS), and direct air carbon capture and storage (DACCS). Such applications can help reduce the cumulative anthropogenic carbon dioxide (CO₂) emissions, with consequences on the planet's temperature regulation. Solar Radiation Management (SRM) technologies are another example, raising the possibility of modifying the biosphere's interaction with solar radiation, such as by creating a dense cloud of particles in the stratosphere to reflect part of the solar radiation.¹⁴

Whilst the objective of climate engineering is to avoid dangerous levels of climate change, climate engineering technologies by themselves may also present certain risks and regulatory challenges. The use of certain chemicals in carbon capture and storage (CCS) or in SRM techniques such as stratospheric aerosol injection (SAI) may negatively affect local environments and result in pollution. Furthermore, anthropogenic intervention with the Earth's climate system may affect biodiversity in ways we do not yet fully understand. Climate engineering may both positively and negatively affect fundamental human rights. For example, the right to participate in public affairs may be affected by the challenges of consulting with all communities and persons potentially affected by interventions to moderate the global climate. Furthermore, climate engineering may enhance and protect human rights by mitigating climate change, whilst the associated risks of climate engineering may negatively affect the right to life and quality of life.

Three national legal case studies, Australia, Austria and the United Kingdom, were conducted to assess the regulatory implications of climate engineering in these countries. In particular, these case studies focused on the current state of climate engineering, ongoing legal and policy developments, human rights law, environmental law and climate change law. The complete case study reports can be found in annexes 8.1, 8.2 and 8.3. This section provides a comparative summary overview, drawing out the most prominent legal issues regarding the regulation of climate engineering in these jurisdictions.

¹⁴ Buchinger, E., et al. (2022). *TechEthos technology portfolio: Assessment and final selection of economically and ethically high impact technologies. Deliverable 1.2 to the European Commission*. TechEthos Project Deliverable. Available at: www.techethos.eu, p. 36.

3.1.1 Australia

Table 13: Overview of the Australian legal system

Characteristics	Details
Legislative arm	Australian Parliament comprising a House of Representatives and a Senate
Constitutional governance	Commonwealth of Australia Constitution Act 1900 (Act of Parliament of the United Kingdom) establishing a federal system, six States and two territories
Sources of law	<ul style="list-style-type: none"> ○ The Commonwealth of Australia Constitution Act 1900 ○ Common law (case law) ○ Statute law, including: <ul style="list-style-type: none"> ○ Commonwealth (federal) statute law (Cth) ○ State statute law ○ Local government law ○ Indigenous customary law ○ International treaties (implemented through domestic statute law)

Current state of climate engineering in Australia

There is at least one ongoing project in Australia which involves Solar Radiation Management (SRM) research, the Reef Restoration and Adaption Project (RRAP), which received initial funding in 2018, and began its 'R&D phase' in 2020.¹⁵ This project involves field testing of Marine Cloud Brightening and Ground-Based Albedo Modification technologies.¹⁶ It is funded by the Commonwealth Government via the Reef Trust Partnership.

There is also at least one Carbon Dioxide Removal (CDR) scheme using novel technology at an advanced stage of planning: *AspiraDAC*. This is a Direct Air Capture with Carbon Capture and Storage (DACCS) project that has secured funding via the Commonwealth Government and an advanced purchase from the Frontier Fund, an organisation backed by major corporations including Meta and Alphabet.¹⁷ The project will use solar energy to power the facility and will use geological storage in partnership with ongoing Carbon Capture and Storage (CCS) schemes.¹⁸

¹⁵ 'The Program' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/the-program/> (Accessed: 3 October 2022).

¹⁶ 'Interventions' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/interventions/> (Accessed: 30 July 2022).

¹⁷ Readfearn, G. (2022) 'Australian company secures \$700,000 deal for carbon capture and storage machine', *The Guardian*, 1 July. Available at: <https://www.theguardian.com/environment/2022/jul/02/australian-company-secures-700000-deal-for-carbon-capture-and-storage-machine> (Accessed: 3 October 2022).

¹⁸ *DAC company launches with first purchases from Frontier* (June 2022) *AspiraDAC*. Available at: <https://www.aspiradac.com/dac-company-launches-with-first-purchases-from-frontier> (Accessed: 3 October 2022).

Australian policy on climate engineering

The Australian government does not have a policy on SRM for the purpose the large-scale intervention in the Earth's climate system. SRM can, however, also be deployed at a small scale, with aims other than moderating global warming. Australia is unique in the testing for such a small-scale SRM as part of the RRAP. The RRAP aims to use SRM techniques (among other interventions) to protect the Great Barrier Reef (GBR) from heat-induced degradation, including bleaching.

Furthermore, Australia has active policy on CDR through the Emissions Reduction Fund (ERF). This scheme allows individuals and firms to earn Australian Carbon Credit Units (ACCUs) for every tonne of CO₂ equivalent (tCO₂e) 'avoided' or 'stored'.¹⁹ The scheme thus actively promotes both abatement and CDR. The ERF envisages that new CDR schemes coming onstream will be eligible for carbon credits, including those involving innovative technologies.²⁰

Australia has also awarded advanced R&D funding for CDR through the *Carbon Capture, Use and Storage Development Fund*.²¹ One of the successful projects was a CDR by Direct Air Capture project: *AspiraDAC*, which was awarded AU\$4 million.²²

Laws explicitly covering climate engineering

Australia does not have domestic laws that explicitly govern climate engineering (CE) research, field-testing or deployment.²³ Australia does have some laws specifically regulating CCS. The Emission Reduction Fund (ERF), which actively promotes CDR, was established by the *Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth)*,²⁴ and the *Carbon Credits (Carbon Farming Initiative) Rule 2015 (Cth)*.²⁵ The *Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth)* regulates offshore CCS at a national level (which has implications for Direct Air Carbon Capture and Storage (DACCS) and Bioenergy Carbon Capture and Storage (BECCS)).²⁶ There are also some state-level statutes for onshore CCS, for example the *Greenhouse Gas Storage Act 2009 (Qld)*.²⁷

¹⁹ *Emissions Reduction Fund - DCCEEW* (no date). Available at: <https://www.dcceew.gov.au/climate-change/emissions-reduction/emissions-reduction-fund> (Accessed: 3 October 2022).

²⁰ Ibid.

²¹ *Carbon Capture Use and Storage Development Fund* | *business.gov.au* (2022). Available at: <https://business.gov.au/grants-and-programs/carbon-capture-use-and-storage-development-fund> (Accessed: 3 October 2022).

²² Ibid.

²³ McDonald, J. et al. (2019) 'Governing geoengineering research for the Great Barrier Reef', *Climate Policy*, 19(7), p. 805. Available at: <https://doi.org/10.1080/14693062.2019.1592742>.

²⁴ *Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth)*. Available at: <https://www.legislation.gov.au/Details/C2022C00257> (Accessed: 3 October 2022).

²⁵ *Carbon Credits (Carbon Farming Initiative) Rule 2015* (no date). Attorney-General's Department. Available at: <https://www.legislation.gov.au/Details/F2022C00403/Html/Text>, <http://www.legislation.gov.au/Details/F2022C00403> (Accessed: 3 October 2022).

²⁶ *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (no date). Attorney-General's Department. Available at: https://www.legislation.gov.au/Details/C2022C00175/Html/Volume_1, <http://www.legislation.gov.au/Details/C2022C00175> (Accessed: 3 October 2022).

²⁷ *Greenhouse Gas Storage Act 2009 - Queensland Legislation - Queensland Government* (no date). Available at: <https://www.legislation.qld.gov.au/view/html/inforce/current/act-2009-003> (Accessed: 3 October 2022).

Ongoing legal and policy developments

The current government has signalled a higher level of attention to climate policy than previous administrations,²⁸ which may point to a greater willingness to engage with the issue of climate engineering regulation. Australia's Nationally Determined Contributions (NDCs) under the Paris Agreement were updated to a reduction of 43% of 2005 levels by 2030, compared to the previous target of 26-28%.²⁹ Furthermore, the current government is reviewing the Emission Reduction Fund (ERF) and the Australian Carbon Credit Unit(s) (ACCU) scheme, following criticism regarding the scheme's integrity,³⁰ as well as a statutory review of the Environmental Protection and Biodiversity Conservation Act 1999 (Cth) (EPBCA), Australia's central piece of environmental legislation at the Commonwealth level.³¹

Implications for Australian human rights law

Australia is a jurisdiction with no explicit constitutional Bill of Rights or a Human Rights Act. Many human rights in Australian law are implicit and international treaties are not always explicitly transposed into Australian law via specific instruments.

The current human rights framework has some ability to regulate climate engineering research and deployment. Arguably, of most significance in the Australian context is the domain of indigenous rights, which are considered an integral part of the human rights system in Australia.³² The right of indigenous peoples to 'participate in decision-making in matters which would affect their rights'³³ is especially salient of climate engineering regulation in Australia, given Australia's acknowledgement of native title claims. Furthermore, the *Native Title Act (1993) (Cth)* states that the content of these rights is to be determined by the traditional laws and customs of the relevant indigenous group.³⁴

²⁸ Australian Government Department of Industry, Science, Energy and Resources. (2022) *Australia's Nationally Determined Contribution Communication 2022*. Available at:

<https://unfccc.int/sites/default/files/NDC/2022-06/Australias%20NDC%20June%202022%20Update%20%283%29.pdf>.

²⁹ Ibid.

³⁰ See, *Emissions Reduction Fund - DCCEEW* (no date). Available at: <https://www.dcceew.gov.au/climate-change/emissions-reduction/emissions-reduction-fund> (Accessed: 3 October 2022); *Independent Review of ACCUs / Ministers* (2022). Available at: <https://minister.dcceew.gov.au/bowen/media-releases/independent-review-accus> (Accessed: 3 October 2022); Andrew Macintosh *et al.* (2022) *Fixing the integrity problems with Australia's carbon market* *Fixing the Integrity Problems with Australia's Carbon Market*. Australian National University. Available at: https://law.anu.edu.au/sites/all/files/erf_-_problems_and_solutions_final_6_april_2022.pdf.

³¹ See, Samuel, G. (2020) *Independent Review of the EPBC Act – Final Report*. Canberra: Department of Agriculture, Water and the Environment. Available at: <https://epbcactreview.environment.gov.au/resources/final-report>; Commonwealth of Australia (2021). *A pathway for reforming national environmental law*. Canberra: Department of Agriculture, Water and the Environment. Available at: <https://www.dcceew.gov.au/sites/default/files/documents/pathway-reforming-national-environmental-law.pdf>.

³² *Australian Human Rights Commission Act 1986 (Cth)*. Attorney-General's Department. Available at: <https://www.legislation.gov.au/Details/C2017C00143>, Part IIA.

³³ UN General Assembly, *United Nations Declaration on the Rights of Indigenous Peoples : resolution / adopted by the General Assembly*, 2 October 2007, A/RES/61/295, Art.18

³⁴ Crommelin, M. (2018) 'Tenure, Title and Property in Geological Storage of Greenhouse Gas in Australia', in Havercroft, I. Macrory, R. and Stewart, R. (eds.) *Carbon Capture and Storage: Emerging Legal and Regulatory Issues*. Rochester, NY: Hart Publishing. Available at: <https://papers.ssrn.com/abstract=3495334> (Accessed: 3 October 2022).

The Australian Government recognises Aboriginal Australians and Torres Strait Islanders as traditional owners of the Great Barrier Reef (GBR).³⁵ Climate engineering in this area is therefore likely to interact with the body of human rights law that relates to indigenous peoples. Activities on the GBR require representation of indigenous communities in the processes of issuing permissions for activities of all kinds on the GBR, which would include climate engineering field testing such as the tests being conducted under the RRAP. Similar constraints would apply to any other climate engineering activities conducted on lands of which indigenous people had traditional title claims. 40% of Australia's land mass has some indigenous land rights over it.³⁶ This has implications, for instance, for land-based CDR, such as CCS and BECCS.

The Australian human rights framework itself has been subject to important challenges, calling into question its fitness for responding to emerging fields of law like climate engineering regulation. A national enquiry indicated that new legislation may be required to better protect human rights in Australia. The most relevant for climate engineering is the recommendation that 'an agreement or framework for negotiations with Indigenous Australians should be developed, to recognise and address the structural inequalities brought about by colonisation and the consequences of past and ongoing injustices.'³⁷ The recommended changes to human rights law would give a more definite structure to this kind of involvement, potentially allowing for a range of indigenous voices to influence policy in a more substantive way. Furthermore, legislation may be required to circumscribe the relationship between publicly held land rights and private enterprise. Such legislation would help strengthen the participatory rights of indigenous groups in determining whether proposed geological storage projects interfere with native title claims. Finally, some scholars have suggested that legal reform may be required to strengthen the independence of research and scientific freedom in Australia, which would have implications for climate engineering science and research as well.³⁸

Implications for Australian environmental law

Environmental law in Australia is split between major pieces of Commonwealth law, and a wide range of piecemeal regulations at a state/territory and local level. The central piece of Commonwealth environmental legislation is the *Environment Protection and Biodiversity Conservation Act* (1999) (Cth) (EPBCA). The EPBCA would likely be triggered for a wide range of potential climate engineering interventions.

It has been argued that the EPBCA has some capacity to place legal limits on the implementation of BECCS projects.³⁹ However, an assessment of the environmental impacts of BECCS initiatives on a case-by-case basis may fail to take into account the overall and cumulative impact on biodiversity.⁴⁰ A 'programmatic approach' to planning and approval is to be preferred, such as the assessment of a national BECCS programme.⁴¹

Furthermore, whilst the RRAP activities are not aimed at affecting the global climate but rather the protection of the local environment, its activities are not considered part of the Convention on

³⁵ *Reef Traditional Owners / gbrmpa* (no date). Available at: <https://www2.gbrmpa.gov.au/learn/traditional-owners/reef-traditional-owners> (Accessed: 3 October 2022).

³⁶ National Indigenous Australians Agency. (no date) *Land and Housing*. Available at: <https://www.niaa.gov.au/indigenous-affairs/land-and-housing> (Accessed: 3 October 2022).

³⁷ Australian Human Rights Commission (2019) *Discussion Paper: A model for Positive Human Rights Reform*, p. 19. Available at: <https://humanrights.gov.au/our-work/rights-and-freedoms/publications/discussion-paper-model-positive-human-rights-reform-2019>.

³⁸ 'Australia must abolish law that allows politicians to veto research grants' (2022) *Nature*, 605(7908), pp. 7–7. Available at: <https://doi.org/10.1038/d41586-022-01200-5>.

³⁹ Brent, K. *et al.* (2018) 'Carbon dioxide removal geoengineering', *Australian Law Journal*, 92(10), p.835.

⁴⁰ *Ibid*, p.835.

⁴¹ *Ibid*, p.835.

Biological Diversity's moratorium on geoengineering.⁴² As such, even CDR or SRM activities, whose purpose is not to affect the global climate, might nevertheless need to be monitored and regulated. Indeed, SRM for local adaptation gives rise to many of the same ethical challenges as SRM for global climate modification. This is because the techniques and data generated by local deployment of SRM could be used by researchers investigating SRM for global climate modification, leading to ethical and legal concerns including institutional lock-in and moral hazard.

Finally, the legal status of certain climate engineering activities involving the placement of matter into Australian waters is ambiguous.⁴³ The London Protocol is implemented into Australian domestic law via the *Environment Protection (Sea Dumping) Act 1981* (Cth) (SDA).⁴⁴ The question is whether the placement of materials into the ocean, such as CO₂ storage, qualifies as dumping under the Act and the London Protocol.⁴⁵ If it does, such activities would be prohibited unless legislative change is made to allow for such activities to be permissible.

Implications for Australian climate change law

Australia is a state party to the United Nations Framework Convention on Climate Change (UNFCCC), and a signatory to the 2015 Paris Agreement.⁴⁶ The recently enacted *Climate Change Bill 2022* requires Australia to reduce greenhouse gas emissions to 43% from 2005 levels by 2030, and to net-zero by 2050.⁴⁷

Whilst the Climate Bill 2022 does not explicitly mention climate engineering, it is possible that international climate law has implications for the interpretation of Australia's commitments to certain means of pursuing mitigation targets. The Paris Agreement commits parties to 'achiev[ing] a balance between anthropogenic emissions by sources *and removals by sinks* [emphasis added]'.⁴⁸ This can be interpreted as an implied commitment to pursuing negative emissions strategies. The UNFCCC framework may also have implications for SRM regulation. Scholars differ as to the compatibility of SRM under the UNFCCC, suggesting that clarification is required at the international climate law level.⁴⁹

⁴² Tollefson, J. (2010) 'Geoengineering faces ban', *Nature*, 468(7320), pp. 13–14. Available at: <https://doi.org/10.1038/468013a>; Walsh, B. (2010) 'Climate: Why It's a Mistake to Ban Research on Geoengineering', *Time*, 2 November. Available at: <https://science.time.com/2010/11/02/climate-why-its-a-mistake-to-ban-research-on-geoengineering/>.

⁴³ Brent, K. et al. (2018) 'Carbon dioxide removal geoengineering', *Australian Law Journal*, 92(10), pp. 830–838.

⁴⁴ *Environmental Protection (Sea Dumping) Act 1981* (Cth). Available at: <https://www.legislation.gov.au/Series/C2004A02478> (Accessed: 3 October 2022).

⁴⁵ Brent, K. et al. (2018) 'Carbon dioxide removal geoengineering', *Australian Law Journal*, 92(10), p.836

⁴⁶ United Nations Framework Convention on Climate Change (entry into force 21 March 1994) 1771 UNTS 107 (UNFCCC); Paris Agreement (entry into force 4 November 2016) 3156 UNTS (Paris Agreement), signed by Australia 22 April 2016, ratified on 9 November 2016.

⁴⁷ *A Bill for an Act to set out Australia's greenhouse gas emissions reductions targets, to provide for annual climate change statements, to confer advisory functions on the Climate Change Authority, and for related purposes 2022* (Cth) (*Climate Change Bill*). Available at: <http://www.legislation.gov.au/Details/C2022B00055> (Accessed: 3 October 2022), s 10.

⁴⁸ Conference of the Parties, Adoption of the Paris Agreement (Paris Agreement) (entry into force 4 November 2016) 3156 UNTS, Art.4(1) (emphasis added). Available at: https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf.

⁴⁹ Brent, K.A. (2021) 'Solar Geoengineering Is Prohibited under International Law', in A. Zahar and B. Mayer (eds) *Debating Climate Law*. Cambridge: Cambridge University Press, pp. 274–284. Available at: <https://doi.org/10.1017/9781108879064.021>; Reynolds, J.L. (2021) 'Solar Geoengineering Could Be Consistent with International Law', in A. Zahar and B. Mayer (eds) *Debating Climate Law*. Cambridge: Cambridge University Press, pp. 257–273. Available at: <https://doi.org/10.1017/9781108879064.020>.

Australia's Emission Reduction Fund (ERF) has been the object of criticism because of 'serious integrity issues',⁵⁰ with a high proportion of ACCUs being awarded for schemes that do not represent 'real' or 'additional' abatement. A recent public inquiry indicates an openness to reforming the ERF, which would impact the possible inclusion of CDR going forward.

Gaps and challenges

Australia is something of a test case for CCS, with the feasibility and effectiveness of CCS across the world being a major factor determining the degree to which continued use of fossil fuels will be compatible with the obligation under international law to keep global average temperature rises below 2C. Thus, there are global lessons to be drawn from Australia in this sphere.

RRAP is another globally significant experiment which will be instructive to other countries. It provides strong evidence for the widely-held view that it is important climate engineering governance frameworks are put in place as soon as possible, either at a national level or internationally, so that governments and wider civil society do not find themselves trying to catch up with actors in the research and development community. A clear definition of the kinds of technologies that should activate regulatory oversight needs to be in place as early as possible, to avoid ambiguities of interpretation leading to potential conflicts with civil society.

3.1.2 Austria

Table 14: Overview of the Austrian legal system

Characteristics	Details
Legislative arm	Two-chamber parliamentary system comprising the <i>Nationalrat</i> (National Council) and <i>Bundesrat</i> (Federal Council)
Constitutional governance	Constitution of Austria 1920 establishes Austria as a democratic, federal republic consisting of nine provinces.
Sources of law	<ul style="list-style-type: none"> ○ International law ○ EU law ○ Constitution of Austria ○ Regional constitutional law ○ National law (federal level) ○ Regional law (provincial level)

Current state of climate engineering activities in Austria

At the time of writing, there are no known activities or projects specifically involving climate engineering in Austria. There are, however, various reports and activities that foster climate-friendly

⁵⁰ Andrew Macintosh *et al.* (2022) *Fixing the integrity problems with Australia's carbon market* *Fixing the Integrity Problems with Australia's Carbon Market*. Australian National University. Available at: https://law.anu.edu.au/sites/all/files/erf_-_problems_and_solutions_final_6_april_2022.pdf.

technologies in general.⁵¹ The “**Masterplan Umwelttechnologie**”(2019)⁵² was written and developed by the *Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology*. The plan sets out a vision of Austria taking the lead in environmental technology and services within the EU. Despite this vision, most technologies referred to concern decarbonisation, and there is no mention of climate engineering specifically, although this may be considered in the future.⁵³

Austria is investing in green technology development. Climate engineering, however, does not currently seem to be part of the mix of climate mitigation measures.

Austrian policy on climate engineering

The two most important policy papers regarding the strategy of Austria to achieve that goal are the “**Long-Term Strategy 2050**” (LTS)⁵⁴ and the “**Government Programme 2020 – 2024**”.⁵⁵ The LTS contains Austria’s target to become carbon neutral by 2050. The Government Programme 2020 – 2024 can be seen as an update to the LTS as it brought the carbon neutrality target forward by 10 years to 2040.

The Long-Term Strategy 2050 mentions Carbon Capture and Usage (CCU) and Carbon Capture and Storage (CCS) as possible approaches to achieving net-zero. Austria does, however, recognise substantial hurdles and uncertainties with such technologies,⁵⁶ and furthermore considers that storage capacity in Austria is limited.⁵⁷ For these reasons, CCS/CCU is recognised only as an emergency solution, which is to be avoided if possible.

As an alternative to CE, the LTS presents natural sinks, like swamp lands or forests, as a more environmentally friendly solution which might cover some of the remaining emissions. Furthermore, whilst the LTS explicitly mentions climate engineering as an activity to achieve emission neutrality, the Government Programme 2020 – 2024 no longer lists this as a technological field for further exploration.

⁵¹ See, for example, Schneider, H.W., Pöchlacker-Tröscher, G., Demiroglu, D., Luptáček, P., & Wagner, K. (2020). ‘Österreichische Umwelttechnik-Wirtschaft Österreichische Umwelttechnik-Wirtschaft’ *ecotechnology.at* https://www.ecotechnology.at/sites/default/files/green-innovation/downloads/41a-2020_Umwelttechnik-Erhebung2020_ExecutiveSummary-de-web.pdf; Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (2015). ‘Climate Technology Centre & Network – Progress Report’ *bmk.gv.at*

https://www.bmk.gv.at/themen/klima_umwelt/nachhaltigkeit/green_jobs/umwelttechnologien/ctcn.html; Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (2016). ‘Greentech Innovation’ *bmk.gv.at* https://www.bmk.gv.at/themen/klima_umwelt/nachhaltigkeit/green_jobs/umwelttechnologien/innovation_en.html.

⁵² Bundeskanzleramt (2019). ‘Masterplan Umwelttechnologie und Exportinitiative Umwelttechnik’ *bundeskanzleramt.gv.at* <https://www.bundeskanzleramt.gv.at/themen/nachhaltige-entwicklung-agenda-2030/erfolgsgeschichten-agenda-2030/masterplan-umwelttechnologie-und-exportinitiative-umwelttechnik.html>.

⁵³ Schneider, H.W., Pöchlacker-Tröscher, G., Demiroglu, D., Luptáček, P., & Wagner, K. (2020). ‘Österreichische Umwelttechnik-Wirtschaft Österreichische Umwelttechnik-Wirtschaft’ *ecotechnology.at* https://www.ecotechnology.at/sites/default/files/green-innovation/downloads/41a-2020_Umwelttechnik-Erhebung2020_ExecutiveSummary-de-web.pdf, p. 220.

⁵⁴ Federal Ministry for Sustainability and Tourism (2019). ‘Long-Term Strategy 2050 – Austria’ *unfcc.int* https://unfcc.int/sites/default/files/resource/LTS1_Austria.pdf.

⁵⁵ Federal Republic of Austria (2020a). ‘Aus Verantwortung für Österreich. Regierungsprogramm 2020 – 2024’ *bundeskanzleramt.gv.at* <https://www.bundeskanzleramt.gv.at/dam/jcr:7b9e6755-2115-440c-b2ec-cbf64a931aa8/RegProgramm-lang.pdf>.

⁵⁶ Federal Ministry for Sustainability and Tourism (2019). ‘Long-Term Strategy 2050 – Austria’ *unfcc.int* https://unfcc.int/sites/default/files/resource/LTS1_Austria.pdf, p. 37, p. 15.

⁵⁷ *Ibid*, p. 37, p. 17.



Laws explicitly covering climate engineering

In 2011 the National Assembly passed the **Federal Act on the Prohibition of the Geological Storage of Carbon Dioxide**⁵⁸, a moratorium that bans the storage of carbon within geological structures in the federal territory of Austria. The only exception to this moratorium is for projects that are explorative in character and follow a research purpose for the development or testing of new products or processes.

The moratorium follows on from the EU CCS Directive, which allows for individual Member States to ban or otherwise restrict the geological storage of CO₂ in their territory.⁵⁹ The Act on the prohibition of the geological storage of carbon dioxide will be re-evaluated every five years, meaning that the moratorium may be lifted in the future.⁶⁰

Ongoing legal and policy developments

Ongoing debates in Austria focus primarily on climate change policies, which may incorporate climate engineering in the future. A current grassroots campaign advocates for a referendum to inscribe the protection of the climate as one of the main principles in the Austrian constitution.⁶¹ Such constitutional protection of the climate may impact climate engineering in the sense that would raise the need for possible solutions.

Implications for Austrian human rights law

Austrian human rights law is inspired by international and European law, including the United Nations Universal Declaration of Human Rights, the European Convention on Human Rights (ECHR), and the Charter of Fundamental Rights of the European Union.⁶² Furthermore, various human rights are contained within the Austrian Constitution.⁶³

The pending case of *Mex M v Austria* invokes human rights in the complaint filed to the European Court of Human Rights (ECtHR). The complainant suffers from temperature-induced Multiple Sclerosis (MS) and is therefore “directly affected by Climate-Crisis induced increase in average temperature and heatwaves since 2003.”⁶⁴ Climate protection is not guaranteed by law, yet this case illustrates how human rights are invoked to seek such protection. Whilst not directly involving climate engineering, the outcome of such cases may inform the relation between human rights and climate engineering in Austria.

⁵⁸ Federal Republic of Austria (2011b). ‘On the ban of geological storage of carbon dioxide and amendment of the Environmental Impact Assessment Act 2000, the Federal Environmental Liability Act, the Industrial Code 1994 and the Mineral Resources Act (title translated with DeepL)’, [Online]. Available at: <http://extwprlegs1.fao.org/docs/pdf/aut147621.pdf>.

⁵⁹ Directive 2009/31/EC Of The European Parliament And Of The Council of 23 April 2009 on the geological storage of carbon dioxide (OJ L 140, 5.6.2009, OJ L140/114); Report from the Commission to the European Parliament and the Council on implementation of Directive 2009/31/EC on the geological storage of carbon dioxide (2014). (52014DC0099) <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52014DC0099>.

⁶⁰ See also Federal Ministry for Sustainability and Tourism (2019). ‘Long-Term Strategy 2050 – Austria’ *unfccc.int* https://unfccc.int/sites/default/files/resource/LTS1_Austria.pdf, p. 37.

⁶¹ Klimavolksbegehren (n.a.) <https://klimavolksbegehren.at/forderungen/>.

⁶² Universal Declaration of Human Rights (8 December 1948), G.A. Res. 217(A) III; European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950; Charter of Fundamental Rights of the European Union (entry into force 18 December 2009), 2000/C 364/01 (CFREU).

⁶³ See for instance, Constitution of Austria 1920, articles 7 (1), 26 (1), 45, 85.

⁶⁴ Krömer, P. (2021). ‘New application: <blank> v Austria and request for expedite proceedings under Rule 41 (expedite proceedings)’ http://climatecasechart.com/climate-change-litigation/wp-content/uploads/sites/16/non-us-case-documents/2021/20210325_13412_complaint.pdf.



Implications for Austrian environmental law

In Austria, nature conservation, land use and planning are regulated at the provincial/state level, whereas most other environmental matters, including water, waste, forestry, mineral raw materials, are regulated at the national/federal level.⁶⁵

The Austrian **Abfallwirtschaftsgesetz** manages the waste disposal in Austria. The **Umweltförderungsgesetz**, updated in 2020, provides substantial funds for domestic environmental promotion, including environmental and climate protection targets and the restoration and conservation of biodiversity.⁶⁶ As CDR specifically does touch upon such climate protection targets defined in this law, it may be considered eligible for funding under this law in the future.

Nuclear energy was banned in Austria in 1978, meaning that alternative routes to decarbonising the energy sector will not involve nuclear power production, and may support the future use of CCU and CCUS technologies.⁶⁷

Implications for Austrian climate change law

Climate laws are mainly concerned with decarbonising Austria's industry and follow the objectives of the 2015 Paris Agreement⁶⁸ and the EU regulation 2018/1999⁶⁹ to realise carbon neutrality by 2050.

The Austrian **Climate Protection Act (Klimaschutzgesetz)**⁷⁰ defines the greenhouse gas emission thresholds for six major sectors and establishes a National Climate Protection Committee.⁷¹ The goal of the committee is to advise on fundamental issues, particularly on the long-term reduction of greenhouse gas emissions towards a low-carbon society. The Act makes no specific mention of climate engineering, and a recent evaluation criticised the Act for lacking substantive governance and accountability mechanisms in respect of the emission reduction targets.⁷² The analysis in the legal case study found that climate engineering could become important in the near future to achieve the goals of CO₂ reduction.

The **Climate and Energy Fund Act**⁷³ supports climate neutrality by funding the transition of areas of energy and mobility transition, climate change and awareness raising. The Fund offers potential finances for the research & development of climate engineering in Austria.

⁶⁵ Federal Republic of Austria. (1995) 'Austria's Constitution of 1920, with Amendments through 2021'. Bd. NOR11001371. <https://www.ris.bka.gv.at/eli/bqbl/1930/1/P0/NOR11001371>, Art. 10 & 11.

⁶⁶ Federal Republic of Austria (2020b). 'Umweltförderungsgesetz' (NOR40242558) [ris.bka.gv.at https://www.ris.bka.gv.at/Dokumente/Bundesnormen/NOR40242558/NOR40242558.pdf](https://www.ris.bka.gv.at/Dokumente/Bundesnormen/NOR40242558/NOR40242558.pdf).

⁶⁷ Federal Republic of Austria (1999). 'Federal Constitutional Act for a Nonnuclear Austria' [ris.bka.gv.at https://www.ris.bka.gv.at/Dokumente/ErV/ERV_1999_1_149/ERV_1999_1_149.pdf](https://www.ris.bka.gv.at/Dokumente/ErV/ERV_1999_1_149/ERV_1999_1_149.pdf).

⁶⁸ Paris Agreement (entered into force 4 November 2016) 3156 U.N.T.S., signed by Austria on 22 April 2016, ratified on 5 October 2016.

⁶⁹ Regulation (EU) 2018/1999 of the European Parliament and of the Council of 11 December 2018 on the Governance of the Energy Union and Climate Action, amending Regulations (EC) No 663/2009 and (EC) No 715/2009 of the European Parliament and of the Council, Directives 94/22/EC, 98/70/EC, 2009/31/EC, 2009/73/EC, 2010/31/EU, 2012/27/EU and 2013/30/EU of the European Parliament and of the Council, Council Directives 2009/119/EC and (EU) 2015/652 and repealing Regulation (EU) No 525/2013 of the European Parliament and of the Council (OJ L 328).

⁷⁰ Federal Republic of Austria (2011a). 'Bundesgesetz zur Einhaltung von Höchstmengen von Treibhausgasemissionen und zur Erarbeitung von wirksamen Maßnahmen zum Klimaschutz (Klimaschutzgesetz – KSG)' [ris.bka.gv.at https://www.ris.bka.gv.at/eli/bqbl/I/2011/106](https://www.ris.bka.gv.at/eli/bqbl/I/2011/106).

⁷¹ Climate Protection Act (Klimaschutzgesetz), article 4.

⁷² Schulev-Steindl, E., Hofer, M. & Franke, L. (2020). 'Evaluierung des Klimaschutzgesetzes' Graz.

⁷³ Climate and Energy Fund Act 2007 (Klima- und Energiefondsgesetz 2007).



The recent **Ökosoziale Steuerreformgesetz 2022**⁷⁴ reforms the current tax system in Austria and introduces a carbon levy of 30 euros per tonne. Whilst the Act does not currently incorporate climate engineering, additional regulation may be required in the future to clarify whether removals are included if Austrian policy regarding climate engineering changes.

Gaps and challenges

On the one hand, Austria's position on CCS technology is very clear. Through the moratorium, the government has spoken out against the development and use of CCS and instead supports and funds alternative pathways to reach the zero emissions goal. Although decarbonisation strategies are being pursued, they are aimed more at the transformation of industrial sectors - either by promoting sustainable technologies or by taxing CO₂ emissions.

On the other hand, the ambitious goals of becoming CO₂-neutral by 2040, and Austria's emission reduction targets and measures, indicate room for the possible inclusion of and need for climate engineering. Particularly CCUS seems to be a feasible technology. The evaluation of the Climate Change Act, criticised the Act for failing to provide a pathway that meets Austria's net-zero emission goals.⁷⁵ Furthermore, the aforementioned court cases claiming a lack of climate action in Austria, put pressure on the Government to reconsider its current stance on climate engineering, and may make the technology a necessary part of a carbon neutral country.

3.1.3 United Kingdom

Table 15: Overview of the UK legal system

Characteristics	Details
Legislative arm	Two-chamber parliamentary system comprising the House of Commons and House of Lords
Constitutional governance	Unitary State with devolved administrations in Scotland, Northern Ireland and Wales, resting on the principle of Parliamentary Sovereignty.
Sources of law	<ul style="list-style-type: none"> ○ Common law / case law ○ UK legislation (Acts of Parliament or the Parliaments of devolved administrations) ○ Retained EU law ○ International law

Current state of climate engineering in the UK

The UK Government generally refers to the terms greenhouse gas removal (GGR) and Solar Radiation Management (SRM) as technologies that "aim to counteract human-caused climate change by deliberate large-scale intervention in the Earth's natural systems. They are sometimes referred to as

⁷⁴ Federal Republic of Austria (2022). 'Ökosoziales Steuerreformgesetz 2022 Teil III' *ris.bka.gv.at* <https://www.ris.bka.gv.at/eli/bqbl/I/2022/12/20220214>.

⁷⁵ Schulev-Steindl, E., Hofer, M. & Franke, L. (2020). 'Evaluierung des Klimaschutzgesetzes' Graz.

'geo-engineering' or 'climate engineering'.⁷⁶ GGR as a group of technologies includes Carbon Dioxide Removal (CDR), with GGR referring the possibility of removing other greenhouse gases as well.⁷⁷

Since the 2019 amendment to the Climate Change Act 2008 reflecting the net-zero by 2050 target,⁷⁸ the UK Government has taken various steps to investigate what role GGR technologies can play in meeting its climate targets. It has been estimated that the GGR sector will need to be scaled up to remove between 60 and 150 MtCO₂e by 2050 if the UK is to reach its net zero target by 2050.⁷⁹

In pursuit of developing an evidence base for GGR, the UK government is funding various GGR research programmes.⁸⁰ This led to the successful delivery of Europe's first Bioenergy Carbon Capture and Storage (BECCS) pilot in February 2019, which was co-funded by the UK Energy Innovation Programme.⁸¹ A further £31.5 million GGR demonstrator programme (GGR-D) funded by the UK Research and Innovation Fund (UKRI) launched in April 2021 and runs until October 2025.⁸²

UK policy on climate engineering

In addition to funding GGR research and pilots, the UK Government has been investigating policy options to support GGR deployment in the UK.⁸³

⁷⁶ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

⁷⁷ Ibid.

⁷⁸ The Climate Change Act 2008 (2050 Target Amendment) Order 2019, No. 1056, s. 2.

⁷⁹ Simon R., et al (2021) *Greenhouse gas removal methods and their potential UK deployment: A report published for the Department for Business, Energy and Industrial Strategy by Element Energy and the UK Centre for Ecology and Hydrology*. Element Energy and the UK Centre for Ecology & Hydrology, [Online]. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026988/ggr-methods-potential-deployment.pdf, p. 76.

⁸⁰ See, for example, Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>; UKRI (2021), *UK invests over £30m in large-scale greenhouse gas removal* / UK Research and Innovation, [Online]. Available at: <https://www.ukri.org/news/uk-invests-over-30m-in-large-scale-greenhouse-gas-removal/>; Department for Business, Energy & Industrial Strategy (2022) *Notice: Hydrogen BECCS Innovation Programme: successful projects* / Gov.uk, [Online]. Available at:

<https://www.gov.uk/government/publications/hydrogen-beccs-innovation-programme-successful-projects>.
⁸¹ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>; Drax (2019) *Carbon dioxide now being captured in first of its kind BECCS pilot* / Drax [Online]. Available at: https://www.drax.com/press_release/world-first-co2-beccs-ccus/.

⁸² *GGR Directorate CO₂RE Hub / UK Research and Innovation*, [Online]. Available at: <https://gtr.ukri.org/projects?ref=NE%2FV013106%2F1#/tabOverview>.

⁸³ See, for example, Vivid Economics (2019) *Greenhouse Gas Removal (GGR) policy options – Final Report*. London: Vivid Economics, [Online]. Available at: <https://www.gov.uk/government/publications/greenhouse-gas-removal-policy-options>; HM Treasury (2020) *Policy Paper: NIC Greenhouse Gas Removal Technologies Study: Terms of Reference* / Gov.uk, [Online]. Available at: <https://www.gov.uk/government/publications/national-infrastructure-strategy/nic-greenhouse-gas-removal-technologies-study-terms-of-reference>.

Whilst the UK's priority is to reduce GHG emissions, it recognises the role GGR will need to play in meeting the UK's net zero targets.⁸⁴ This position was informed by the Committee on Climate Change (CCC), which was established under the 2008 Climate Change Act to act as the government's independent advisor on climate change.⁸⁵ The CCC advised that, on the basis of the UK's updated legal commitment to tackling climate change, GGR will be necessary to offset emissions from sectors where it will be difficult to reduce emissions.⁸⁶

Laws explicitly covering climate engineering

Whilst there is no comprehensive body of law governing climate engineering in the UK, there are a few laws directly concerned with specific technologies. Regulation of CCS is most developed, with the Energy Act 2008 providing a licensing regime for offshore storage of CO₂.⁸⁷ The North Sea Transition Authority (NSTA and formerly the Oil and Gas Authority) is generally the licensing authority for offshore CO₂ storage in the UK.⁸⁸

Ongoing legal and policy developments

The Energy Bill (previously Energy Security Bill) introduced to the House of Lords (HoL) in 2022 establishes a regulatory framework for CCUS and seeks to remove market barriers to attract private investment.⁸⁹

Furthermore, the bill proposes to amend the meaning of 'removals' under the Climate Change Act 2008, to include 'engineered' removals, so that such removals will count towards carbon budgets within the meaning of the Climate Change Act 2008.⁹⁰

Implications for UK human rights law

The UK human rights law framework contains various rights which may be affected by climate engineering activities. The primary piece of UK human rights law is the Human Rights Act 1998. Victims

[removal-technologies-study-terms-of-reference](#); and Simon R., et al (2021) *Greenhouse gas removal methods and their potential UK deployment: A report published for the Department for Business, Energy and Industrial Strategy by Element Energy and the UK Centre for Ecology and Hydrology*. Element Energy and the UK Centre for Ecology & Hydrology, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026988/ggr-methods-potential-deployment.pdf.

⁸⁴ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

⁸⁵ Climate Change Act 2008, s. 32.

⁸⁶ Committee on Climate Change (2016) *UK climate action following the Paris Agreement*. Committee on Climate Change, [Online]. Available at: <https://www.theccc.org.uk/publication/uk-action-following-paris/>, p. 42.

⁸⁷ The Energy Act 2008; Department for Business, Energy & Industrial Strategy (published 2013, updated 2019) *Guidance: UK carbon capture, usage and storage / Gov.uk*, [Online]. Available at: <https://www.gov.uk/guidance/uk-carbon-capture-and-storage-government-funding-and-support#international-collaboration-on-ccus>.

⁸⁸ Energy Act 2016, part 2, s. 78

⁸⁹ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022); House of Lords (2022) *Energy Bill [HL] / Parliamentary Bills UK Parliament*, [Online]. Available at: <https://bills.parliament.uk/bills/3311>; Department for Business, Energy & Industrial Strategy (2022) *Guidance: Energy Security Bill factsheet: Carbon dioxide transport and storage regulatory investment model*, [Online]. Available at: <https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-carbon-dioxide-transport-and-storage-regulatory-investment-model>.

⁹⁰ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022), s. 111.



of alleged human rights violations have access to legal recourse through the UK courts and tribunals, and ultimately also through the European Court of Human Rights (ECtHR).⁹¹ Furthermore, the Government has a positive obligation to protect human rights in exercising its duties and functions.⁹² In the context of climate engineering, this means that human rights must be given due regard, such as when approving planning permission for a CO₂ storage site.⁹³ The right to respect for family and private life is particularly significant, as the threshold for determining infringement of this right has been established to be lower than the threshold for determining infringement of the right to life. The right to respect for private and family life can be interfered with when the *quality* of life is affected, as has been seen in ECtHR case law concerning harm caused by industrial activities.⁹⁴

The flipside to this is that climate engineering seeks to prevent climate change, which in itself is likely affect life and the quality of life of present and future generations on a global scale. As such, one could argue that climate engineering can protect and enhance human rights. A recent UK case, however, illustrated that invoking human rights to demand greater climate action is not self-evident, let alone invoking them to mandate climate engineering.⁹⁵

Implications for UK environmental law

The UK environmental law framework is primarily concerned with the protection of today's environment and human health and consists of various laws and regulations governing planning, biodiversity, waste, chemicals regulation, pollution regulation, etc.

The UK Government considers climate engineering an 'essential' mitigation tool to help achieve the UK's climate targets.⁹⁶ As such, climate engineering will need to be deployed to prevent future harm to the environment and human health caused by dangerous climate change. Yet, the UK environmental law framework has various implications for climate engineering deployment.

Climate engineering is concerned with the prevention of global effects of climate change, whereas UK environmental regulation is primarily concerned with local impacts, such as on air quality, soil, water, waste and local communities. Environmental law principles tell us to take a precautionary approach to deploying technologies for which there is a limited scientific knowledge base.⁹⁷ On the other hand, urgent climate action is needed, and climate engineering is considered essential if climate targets are

⁹¹ Human Rights Act 1998; European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950, article 13 and 34; *The Human Rights Act / Equality and Human Rights Commission*, [Online]. Available at:

<https://www.equalityhumanrights.com/en/human-rights/human-rights-act#:~:text=Article%2013%20makes%20sure%20that,to%20make%20sure%20this%20happens.>

⁹² Human Rights Act 1998, s. 6 (1); *Article 2: Right to life / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/human-rights-act/article-2-right-life>.

⁹³ See, for instance, *Case of Önerildiz v. Turkey*, 30 November 2004, No. 48939/99, ECLI:CE:ECHR:2004:1130JUD004893999, paras 90 and 160; ECtHR (2022) *Guide to the case-law of the European Court of Human Rights: Environment*. Council of Europe/European Court of Human Rights, [Online]. Available at: https://echr.coe.int/Documents/Guide_Environment_ENG.pdf, p. 10.

⁹⁴ See, for instance, *Fadeyeva v. Russia*, 9 June 2005, No. 55723/00, ECLI:CE:ECHR:2005:0609JUD005572300; *Factsheet – Environment and the European Convention on Human Rights*. European Court of Human Rights, Press Unit, [Online]. Available at: https://www.echr.coe.int/documents/fs_environment_eng.pdf, p. 14.

⁹⁵ *R (on the application of Friends of the Earth, ClientEarth, Good Law Project and Joana Wheatley) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (18 July 2022), para. 265.

⁹⁶ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

⁹⁷ See, for instance, IMO. (2022) *Marine geoengineering techniques for climate change mitigation – LP/LC evaluates potential for marine environment effects* / International Maritime Organisation, [Online]. Available at: <https://www.imo.org/en/MediaCentre/PressBriefings/pages/Marine-geoengineering.aspx>.

to be achieved.⁹⁸ As such, there is a tension between environmental law objectives and the need for climate engineering to help meet the UK's climate targets. This tension might need to involve amendments to environmental law to incorporate the future interests of the environment and human health.

Climate engineering technologies may have negative environmental consequences, depending on the way they are deployed and operated. Furthermore, scientific uncertainty means that some risks to the environment and human health are not yet fully understood. Developing criteria for the sustainable operation of climate engineering, such as whole life-cycle assessments, would help assess these risks and account for possible negative externalities.⁹⁹ Developing such criteria will not be a straightforward exercise, and must be able to account for the specific characteristics of various climate engineering technologies in different contexts.¹⁰⁰

Greater clarity is needed regarding the scope and requirements for the Net Biodiversity Gain as introduced by the Environment Act 2021.¹⁰¹ Climate engineering technologies may have various local and context-specific impacts on biodiversity and are therefore likely to require a case-by-case assessment within the framework of the Environment Act 2021.¹⁰² Furthermore, impacts on biodiversity may differ between the short and long term. Scientific uncertainty means that measuring and quantifying actual gains, as well as establishing a causal link between the climate engineering activity and the impact on biodiversity may not be straightforward.

It may be argued that CO₂ is essentially a waste gas that results from energy production.¹⁰³ Whilst amendments to international waste regulations seek to clarify that CO₂ storage in offshore sites is compatible with international waste regulations, ambiguity concerning the difference between the permanent disposal of CO₂ at a storage site and the definition of waste remains.¹⁰⁴ It is recommended

⁹⁸ See, Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>; IPCC (2018) *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Cambridge University Press, Cambridge, UK and New York, USA, [Online]. Available at: <https://doi.org/10.1017/9781009157940>, 4.1; Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf, p. 21 and 126-128.

⁹⁹ Broad O., Butnar I. and Cronin J. (2021) *Can BECCS help us get to net zero?* / *The Bartlett*, UCL, [Online]. Available at: <https://www.ucl.ac.uk/bartlett/news/2021/jul/can-beccs-help-us-get-net-zero>.

¹⁰⁰ Broad O., Butnar I. and Cronin J. (2021) *Can BECCS help us get to net zero?* / *The Bartlett*, UCL, [Online]. Available at: <https://www.ucl.ac.uk/bartlett/news/2021/jul/can-beccs-help-us-get-net-zero>.

¹⁰¹ Environment Act 2021, part 6; Reid, C. (2022) 'Environment Act 2021', *Scottish Planning and Environmental Law*, 209, 16-17, [Online]. Available at:

<https://discovery.dundee.ac.uk/ws/portalfiles/portal/71696149/EnvironmentAct21dec.pdf>, p. 17.

¹⁰² Broad O., Butnar I. and Cronin J. (2021) *Can BECCS help us get to net zero?* / *The Bartlett*, UCL, [Online]. Available at: <https://www.ucl.ac.uk/bartlett/news/2021/jul/can-beccs-help-us-get-net-zero>.

¹⁰³ Sheridan P. (2009) *Carbon Capture and Storage – don't ignore the waste connections* / *CMS Law-Now*, [Online]. Available at: https://www.cms-lawnow.com/ealerts/2009/02/carbon-capture-and-storage-dont-ignore-the-waste-connections?cc_lang=en.

¹⁰⁴ OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations (adopted 2007, Ostend); OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed (adopted 2007, Ostend); Amendment to Article 6 of the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 (adopted on 30 October 2009, not yet entered into force).



that the relation between CO₂ storage and waste regulations is clarified, to provide greater certainty to operators with regard to regulatory requirements and associated costs.

The law provides that public participation in environmental decision-making is primarily focused on engagement with local communities, which fails to incorporate communities which may be affected by the wide-ranging impacts of climate engineering.¹⁰⁵ Indeed, climate engineering within the meaning of the large-scale intervention with the Earth's climate system may potentially affect various communities worldwide. Furthermore, if the UK increases its import of biomass from abroad for the purposes of BECCS, it is unclear to what extent public participation is required in those countries from where biomass is imported. On the basis of existing public participation legislation, the Government would be expected to give public participation and access to justice due consideration in its approach to regulating climate engineering.

Environmental Damage Regulations establish a strict liability regime but may fall short of adequately protecting against a possible negative cumulative effect of climate engineering activities in the UK.¹⁰⁶ A climate engineering activity by itself might not constitute a significant risk of harm to the environment.¹⁰⁷ Yet the cumulative effect of all climate engineering activity in the UK combined might constitute such a risk, without triggering the liability regime. As such, an independent body might need to be established or appointed, to regulate and oversee all climate engineering activities in the UK and monitor the cumulative impact of the sector on the environment. This way, the actual combined risk of climate engineering can be monitored and controlled.

Implications for UK climate change law

The primary piece of UK climate change law is the Climate Change Act 2008, which commits the UK Government to achieving net-zero emissions by 2050.¹⁰⁸ The UK Government has committed to growing a GGR sector to help meet the net-zero target and interim targets, known as carbon budgets.¹⁰⁹ To clarify which climate engineering technologies are within the scope of the UK Government's commitment, it is recommended that the definition of GGR is clarified. Furthermore, the distinction may need to be made between nature-based technologies and 'engineered' technologies. As such, it is recommended that policy and legal developments are developed to appropriately reflect and govern these types of climate engineering techniques according to their distinct characteristics and associated risks.¹¹⁰

The definition and legal status of removals must also be clarified. The current proposed amendment to the Climate Change Act is a step towards clarifying legal status of removals achieved by climate engineering under the UK climate law regime.¹¹¹ This could serve as an example on the international climate law level and the remaining ambiguity under the Paris Agreement as to the inclusion of

¹⁰⁵ See, for instance, the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, the Planning Act 2008, and the Localism Act 2011.

¹⁰⁶ Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (SI 2015/810), Regulation 5 (1) and (2).

¹⁰⁷ Ibid, Regulation 4, Schedule 1 and 3.

¹⁰⁸ Climate Change Act 2008, s. 1 (1) as amended by the Climate Change Act 2008 (2050 Target Amendment) Order 2019 (S.I. 2019/1056), articles 1 and 2.

¹⁰⁹ Climate Change Act 2008; Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf, p. 21 and 126-128.

¹¹⁰ Climate Change Act, s. 29 (1) (b).

¹¹¹ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022), s. 111.



'engineered' removals within the meaning of article 4.¹¹² Furthermore, standardisation would open the door to the future inclusion of removals in emission trading schemes.¹¹³

The strategic framework provided by the Climate Change Act allows for the inclusion of long-term and interim climate targets, as well as a cycle of policy development.¹¹⁴ Furthermore, the independent role of the CCC has been instrumental to informing the Government's view on climate engineering.¹¹⁵ As such, the framework provided by the Climate Change Act may serve as an example to further inform the regulatory regime related to climate engineering in the UK and beyond.

Given the global impacts of climate engineering, international coordination is essential. There may be a need for an international agreement to standardise the governance of climate engineering and carbon removals, and strengthen international collaboration to monitor environmental impacts.¹¹⁶ The UK could play an instrumental role in such an initiative.

3.1.4 Noteworthy international developments

A 2021 study assessed the policy developments around CDR in 9 Organisation for Economic Cooperation and Development (OECD) countries.¹¹⁷ Climate policies to support CDR technologies (other than forestry) in countries like Germany, Ireland and the United States are limited. In Germany, the issue of technological CDR such as techniques involving CCS is heavily contested. It has been argued that policy developments at the EU level will substantially shape German climate policy, particularly considering the controversy which may best be addressed at the EU level.¹¹⁸ CDR in the United States is limited due to the political discussion typically focusing on the validity of climate science.¹¹⁹ CDR policy is primarily focused on removals by sinks, as part of the Land Use, Land Use Change and Forestry (LULUCF) sector.¹²⁰

Swedish climate law establishes an emissions reduction target of 100% by 2045, and states that no less than 85% of emissions reductions should be achieved through emissions abatement, with no more than 15% to be achieved through 'complementary measures', including CDR.¹²¹ The focus in Sweden has primarily been on BECCS and enhanced LULUCF sinks. The Government strongly supports the research,

¹¹² Paris Agreement (entered into force 4 November 2016) 3156 U.N.T.S., signed by the UK on 22 April 2016, ratified on 18 November 2016, article 4 (1).

¹¹³ Macinante J. and Ghaleigh N. S. (2022) 'Regulating Removals: Bundling to Achieve Fungibility in GGR 'Removal Units'', *University of Edinburgh School of Law Research Paper Series, No 2022/05*, [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4064970>, p. 28.

¹¹⁴ Climate Change Act, s. 36 and 37; Averchenkova A. Fankhauser S. and Finnegan J. J. (2021) 'The impact of strategic climate legislation: evidence from expert interviews on the UK Climate Change Act' *Climate Policy*, 21 (2), [Online]. Available at: <https://doi.org/10.1080/14693062.2020.1819190>.

¹¹⁵ Averchenkova A. Fankhauser S. and Finnegan J. J. (2021) 'The impact of strategic climate legislation: evidence from expert interviews on the UK Climate Change Act' *Climate Policy*, 21 (2), [Online]. Available at: <https://doi.org/10.1080/14693062.2020.1819190>.

¹¹⁶ House of Commons Science and Technology Committee (2010) *The Regulation of Geoengineering: Fifth Report of Session 1009-10*. House of Commons, London, [Online]. Available at: <https://publications.parliament.uk/pa/cm200910/cmselect/cmsctech/221/221.pdf>.

¹¹⁷ Schenuit F. et al (2021) 'Carbon Dioxide Removal Policy in the Making: Assessing Developments in 9 OECD Cases' *Frontiers in Climate*, 3:638805. DOI: <https://doi.org/10.3389/fclim.2021.638805>.

¹¹⁸ Ibid, p. 5-6.

¹¹⁹ Ibid, p. 12-13.

¹²⁰ Ibid, p. 12-13.

¹²¹ Ministry of the Environment (2021) *Sweden's climate policy framework / Government Offices of Sweden*, [Online]. Available at: <https://www.government.se/articles/2021/03/swedens-climate-policy-framework/>.



development and deployment of BECCS, although CDR-related policies are generally done separately from the Swedish climate law regime.¹²²

Whilst various CDR-related CCS projects are emerging in Norway, explicit policies to govern CDR are almost entirely absent from Norwegian climate regulation.¹²³

New Zealand's policy and ETS treat CO₂ removals as fully equivalent to CO₂ abatement, meaning that removals from forestry are an integrated component of the country's mitigation strategy.¹²⁴

China appears to be exploring both CDR and SRM technologies as part of the country's mitigation strategy.¹²⁵ As the world's biggest emitter of greenhouse gases, Chinese experts and policy makers consider CDR to be necessary to reach carbon neutrality by 2050.¹²⁶ One paper suggests, however, that China's CCUS policy is lagging behind, which has resulted in the limited uptake of private investment and public awareness of the technology.¹²⁷ Unlike the EU, China does not have a regulatory framework for the deployment of CCUS.¹²⁸ Nevertheless, China's contribution to global greenhouse gas emissions and emission reduction targets, make Chinese regulatory developments in this area worthwhile to follow.

Countries in the Middle East may be particularly well-suited for CCUS given the amount of potential CO₂ storage sites offered by the region's oil and gas reserves.¹²⁹ The region is one of the biggest exporters of oil and gas and many of the region's countries are among the world's highest emitters of greenhouse gas emissions per capita.¹³⁰ At the same time, the region is highly vulnerable to the effects of climate change,¹³¹ making climate engineering a possible solution to be explored further. Whilst some publicly funded CCUS demonstrator projects are underway, none of the countries in the Middle East have

¹²² Schenuit F. et al (2021) 'Carbon Dioxide Removal Policy in the Making: Assessing Developments in 9 OECD Cases' *Frontiers in Climate*, 3:638805. DOI: <https://doi.org/10.3389/fclim.2021.638805>, p. 7.

¹²³ Ibid, p. 8.

¹²⁴ Ibid, p. 11

¹²⁵ Marcotullio S. (2022) *Climate engineering in China: Technologies for achieving carbon neutrality / Nextrends Asia*, [Online]. Available at: <https://nexttrendsasia.org/climate-engineering-in-china-technologies-for-achieving-carbon-neutrality/>.

¹²⁶ Ibid.

¹²⁷ Jiang K. et al. (2019) 'China's carbon capture, utilization and storage (CCUS) policy: A critical review' *Renewable and Sustainable Energy Reviews*, [Online]. DOI: <https://doi.org/10.1016/j.rser.2019.109601>.

¹²⁸ Zhang H. (2021) 'Regulations for carbon capture, utilization and storage: Comparative analysis of development in Europe, China and the Middle East' *The Chinese University of Hong Kong Faculty of Law Research Paper No. 2021-38*, [Online]. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3871831&dgcid=ejournal_hhtmlmail_political:economy:development:environment:ejournal_abstractlink, p. 19.

¹²⁹ Ibid, p. 16; Liu H. et al. (2012) 'The role of CO₂ capture and storage in Saudi Arabia's energy future', *International Journal of Greenhouse Gas Control*, 11, 163-71. DOI: <https://doi.org/10.1016/j.ijggc.2012.08.008>

¹³⁰ United Nations Economic and Social Commission for Western Asia (2017), *Report on Carbon Capture Utilisation and Storage Challenges and Opportunities for the Arab Region*. UN ESCWA, Beirut, [Online]. Available at: https://www.unescwa.org/sites/www.unescwa.org/files/page_attachments/technical_paper-report_ccus-received_from_css.pdf; Zhang H. (2021) 'Regulations for carbon capture, utilization and storage: Comparative analysis of development in Europe, China and the Middle East' *The Chinese University of Hong Kong Faculty of Law Research Paper No. 2021-38*, [Online]. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3871831&dgcid=ejournal_hhtmlmail_political:economy:development:environment:ejournal_abstractlink, p. 15.

¹³¹ Ibid; Zhang H. (2021) 'Regulations for carbon capture, utilization and storage: Comparative analysis of development in Europe, China and the Middle East' *The Chinese University of Hong Kong Faculty of Law Research Paper No. 2021-38*, [Online]. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3871831&dgcid=ejournal_hhtmlmail_political:economy:development:environment:ejournal_abstractlink, p. 16-17.

adopted specific laws or regulation. Nevertheless, regulatory developments in this area are worthwhile to continue to monitor.

From this comparative analysis it appears that countries such as Sweden, the UK, and Australia, are currently the frontrunners in the development of laws and policies that actively encourage the uptake of CDR. In addition, China is heavily investing in climate engineering technologies, making it an interesting case study to continue to follow from a regulatory point of view.

Given the Convention on Biological Diversity's (CBD) de facto moratorium on SRM, many countries have followed suit and are not currently pursuing SRM activities.¹³² Nevertheless, some research into SRM is ongoing or closely monitored by various governments worldwide.¹³³

3.2 Climate engineering-specific regulatory challenges

Although the regulatory challenges of climate engineering are similar for each of the countries considered in this report, various synergistic and antagonistic approaches to law and policy can be identified between them. This section presents a commentary of the main gaps and challenges in existing regulation based on the analysis set out in the national legal case studies, starting from the most prominent regulatory hurdle – the question of whether to permit climate engineering at all – moving to more specific and detailed regulatory challenges, such as the legal status of removals from climate engineering technologies.

3.2.1 To allow climate engineering or not?

The primary regulatory consideration in relation to climate engineering, is the current legal status of such technologies under national and international laws, and the likely role climate engineering will play in national climate mitigation strategies. The above analysis presented an array of different approaches, from the explicit political commitment to GGR in the UK,¹³⁴ to Austria's moratorium on CCS.¹³⁵ To date, the focus of many national climate policies and mitigation strategies has traditionally been on enhancing natural sinks, such as through afforestation and reforestation. Only a limited number of

¹³² Decision adopted by the Conference of the Parties to the Convention on Biological Diversity at its Ninth Meeting: IX/16. Biodiversity and climate change, 9th mtg, Agenda Item 4.5, UNEP/CBD/COP/DEC/IX/16 (9 October 2008) Section C, paragraph 4.

¹³³ See, for instance, Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>; Goering, L. (2021) *Sweden rejects pioneering test of solar geoengineering tech* / Reuters [Online]. Available at: <https://www.reuters.com/article/us-climate-change-geoengineering-sweden-idUSKBN2BN35X>; Temple, J. (2022) *The US government is developing a solar geoengineering research plan* / MIT Technology Review [Online]. Available at: <https://www.technologyreview.com/2022/07/01/1055324/the-us-government-is-developing-a-solar-geoengineering-research-plan/>.

¹³⁴ Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf, p. 21 and 126-128.

¹³⁵ Federal Republic of Austria (2011b). 'On the ban of geological storage of carbon dioxide and amendment of the Environmental Impact Assessment Act 2000, the Federal Environmental Liability Act, the Industrial Code 1994 and the Mineral Resources Act (title translated with DeepL)' <http://extwprlegs1.fao.org/docs/pdf/aut147621.pdf>; Federal Ministry for Sustainability and Tourism (2019). 'Long-Term Strategy 2050 – Austria' *unfccc.int* https://unfccc.int/sites/default/files/resource/LTS1_Austria.pdf, p. 15, 17 and 37.

countries, such as the UK and China, explicitly recognise the need for technology-based climate engineering solutions in order to achieve climate targets.

There appears to be a trend, however, towards the increased recognition that climate engineering may be essential if global climate targets are to be achieved. After all, the Intergovernmental Panel on Climate Change (IPCC) climate mitigation pathways published in 2018 rely on the assumption that CDR technologies will be deployed to some extent in order to limit global warming in line with the objective of the Paris Agreement.¹³⁶ That being the case, there is a need to clarify the legality of various climate engineering techniques and their legal status at the international law level as well as the national level.

3.2.2 Defining climate engineering technologies

In order to clarify the legal status of climate engineering, the definition of various climate engineering techniques needs to be addressed. Importantly, the distinction between different types of climate engineering technologies should be clarified, including the CDR and SRM dimension. Furthermore, it should be considered whether CDR refers to the removal of CO₂ alone, or whether it should be expanded to include the potential for the removal of other greenhouse gases (GHGs). The UK Government, for instance, uses the term Greenhouse Gas Removal (GGR) as an umbrella term for technologies that remove greenhouse gases from the atmosphere.¹³⁷

Whilst there has generally been more acceptance of CDR technologies, and CCS in particular, SRM remains much more controversial. The IPCC no longer uses the term 'climate engineering' nor 'geoengineering' in its sixth Assessment Report (AR6), but instead focuses on CDR as a climate mitigation measure.¹³⁸ Furthermore, instead of SRM referring to Solar Radiation Management, the IPCC uses the term Solar Radiation *Modification* throughout the AR6.¹³⁹ At the same time, the IPCC no longer explicitly distinguishes between nature-based and other forms of CO₂ removal, but instead refers to CDR methods based on the removal processes, which can be land-based biological, ocean-based biological, geochemical, and chemical.¹⁴⁰

Furthermore, there is the issue of scale. In this report, climate engineering has been defined as 'the deliberate large-scale intervention in the Earth's climate system, in order to moderate global warming.'¹⁴¹ One type of SRM activity, such as the Australian RRAP, may not constitute climate engineering within the definition of affecting the Earth's climate system. However, the same technique used at a large scale is likely to fall within the definition of climate engineering. Regulation on climate engineering must therefore be able to govern large-scale activities which intervene with the global climate system, as well as those local and small-scale activities of which the cumulative effect is sufficiently significant to intervene with the global climate system. Whilst this legal analysis has primarily focused on technology-based climate engineering, even nature-based techniques and activities in the LULUCF sector arguably fall within the definition of climate engineering. The IPCC

¹³⁶ IPCC. (2018) *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Cambridge University Press, Cambridge, UK and New York, USA, [Online]. Available at: <https://doi.org/10.1017/9781009157940>, 4.1.

¹³⁷ Department for Business, Energy & Industrial Strategy. (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

¹³⁸ Skea J. et al (2021) *Climate Change 2022: Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel on Climate Change, [Online]. Available at: <https://www.ipcc.ch/report/ar6/wg3/>, Technical Summary, p. 94.

¹³⁹ Ibid.

¹⁴⁰ Ibid, Technical Summary, p. 94-95.

¹⁴¹ Shepherd, J., Caldeira, K., Cox, P., Haigh, J., Keith, D., Launder, B., & Mace, G. (2009) *Geoengineering the Climate: Science, Governance, and Uncertainty*. Available at: <http://royalsociety>.



recognised this in AR6 and has seemingly adjusted its approach, stepping away from the distinction between 'nature-based' and 'engineered' removals.¹⁴²

Divergent definitions and uncertainty around the legal status of climate engineering technologies deserve to be addressed. A comprehensive regulatory regime should be capable of adequately governing a variety of climate engineering techniques. Considering their distinct characteristics, it is recommended that a regulatory distinction is made between CDR (or potentially GGR to include the possibility of removing other greenhouse gases from the atmosphere as well), and SRM.

3.2.3 Legal status of GHG removals from climate engineering technologies

Those countries that see an essential role for climate engineering in their climate mitigation strategies need to clarify the legal status of the removals achieved through climate engineering activities. New legislation or legislative amendments may be required to clarify whether removals achieved through climate engineering technologies count towards a country's emission reduction targets. The UK seeks to do so with the proposed amendment to the definition of 'removals' in the Climate Change Act.¹⁴³ New CDR schemes coming onstream in Australia are also expected to be eligible for carbon credits under Australia's Emission Reduction Fund, including those involving innovative technologies.¹⁴⁴ Similarly, at the time of writing in Winter 2022, the European Commission introduced a new proposal for a certification framework of carbon removals in the EU.¹⁴⁵ The objective of this harmonisation measure is to 'ensure the high quality of carbon removals in the EU (...) [and] establish an EU governance certification system to avoid greenwashing by correctly applying and enforcing the EU quality framework criteria (...)'.¹⁴⁶ Indeed, such a framework for quantifying and certifying carbon removals may help generalise these activities and encourage greater uptake.¹⁴⁷ Furthermore, such a legislative initiative may serve as an international example approach to the regulation of carbon removals elsewhere.

Nevertheless, this does raise the issue of equivalence, and whether removals can and should indeed be treated as the negative equivalent of emissions. Explicitly recognising climate engineering as part of a country's climate mitigation strategy, may risk inducing a delayed reduction in emissions of greenhouse gases.¹⁴⁸ The continued emission of greenhouse gases for the next 10 years, and the subsequent offsetting of these by carbon removal technologies, may still impact the global climate in a way which would not have occurred had these emissions been avoided altogether. Whilst some governments recognise that the priority should be to 'tackle the root cause of climate change by reducing emissions

¹⁴² Skea J. et al (2021) *Climate Change 2022: Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel on Climate Change, [Online]. Available at: <https://www.ipcc.ch/report/ar6/wg3/>.

¹⁴³ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022), s. 111.

¹⁴⁴ *Emissions Reduction Fund - DCCEEW* (no date). Available at: <https://www.dcceew.gov.au/climate-change/emissions-reduction/emissions-reduction-fund> (Accessed: 3 October 2022).

¹⁴⁵ European Commission, Proposal for a Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals (30.11.2022, COM(2022) 672 final.

¹⁴⁶ European Commission, Proposal for a Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals (30.11.2022, COM(2022) 672 final, p. 1.

¹⁴⁷ Ibid.

¹⁴⁸ See the description of the moral hazard dilemma, Adomaitis, L. Grinbaum, A., and Lenzi, D. (2022) *TechEthos D2.2: Identification and Specification of Potential Ethical Issues and Impacts and Analysis of Ethical Issues of Digital Extended Reality, Neurotechnologies, and Climate Engineering*. Available at <https://www.techethos.eu/analysis-of-ethical-issues/>, p. 101.

from greenhouse gases,¹⁴⁹ the equivalent treatment of removals and emissions in law may unduly legitimise a delay in the efforts to reduce emissions.

Clarification at the international level could help provide greater legal certainty on the national level. In that regard, it is recommended that the definition of 'removals' within the meaning of article 4 of the 2015 Paris Agreement is clarified. Article 4 of the Paris Agreement refers to achieving 'a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases...'.¹⁵⁰ It is unclear whether 'removals by sinks' refers to nature-based sinks only or includes engineered sinks, such as BECCS or DACCS. Interestingly, the French version of the Paris Agreement refers to '*...un équilibre entre les émissions anthropiques par les sources et les absorptions anthropiques...*', which translates to a balance between emissions from anthropogenic emissions by sources and *anthropogenic* sinks or removals.¹⁵¹ Clarification of this legal ambiguity would be welcomed to provide greater certainty as to the legality of climate engineering technologies in the national and international context.

3.2.4 Counting removals: the need for strong international collaboration

Accounting carbon removals is likely to require strong international collaboration. To illustrate, biomass used for BECCS in country X may have been imported from country Y, where it was grown. In this instance, at least two countries are responsible for the removals during different stages of the BECCS process. To avoid double-counting and legal uncertainty, and to allow for international collaboration with respect to removals accounting and the possibility of international emissions trading, it is recommended that climate engineering is regulated at the international level.

It is furthermore recommended that national laws and regulation follow international trends and terminologies. Such standardisation is not a simple exercise, however, considering the fact that climate engineering as a technology family is evolving, with new scientific methods, techniques and ideas emerging and changing rapidly. Nonetheless, if CDR is to be recognised as a climate mitigation measure, and SRM to become more policy-relevant as a form of local adaptation, it is important that the definitions of these technology subfamilies are clarified and standardised, to allow for the development of regulatory frameworks at the national and international level capable of providing legal certainty to investors, project developers and operators, public authorities and civil society.

International efforts, such as the 2009 amendment to the London Protocol on the relation between the regulatory regime regarding ocean dumping and the geological storage of CO₂, are a step in the right direction.¹⁵² Nevertheless, this amendment is yet to enter into force, and much more work is required to achieve greater consistency across the international regulatory plane. Whilst the United Nations (UN) would most likely be the appropriate forum for this, countries currently at the forefront of climate engineering policy and regulation might be in a good position to lead the way and initiate such a collaborative effort.

¹⁴⁹ See, for instance, Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

¹⁵⁰ Paris Agreement (entered into force 4 November 2016) 3156 U.N.T.S., signed by the UK on 22 April 2016, ratified on 18 November 2016, article 4 (1).

¹⁵¹ Accord De Paris (French language version of the Paris Agreement) (entered into force 4 November 2016) 3156 U.N.T.S., signed by the UK on 22 April 2016, ratified on 18 November 2016, article 4 (1).

¹⁵² Amendment to Article 6 of the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 (adopted on 30 October 2009, not yet entered into force).

3.2.5 Developing regulatory frameworks for climate engineering

The large-scale uptake of CDR technologies is likely to require a comprehensive regulatory framework in order to normalise operations and provide legal certainty to investors and operators.¹⁵³ A lack of clarity over legal issues risks impeding market development, as was considered a concern in relation to the legal nature of emission allowances under EU Emission Trading Scheme (ETS) for instance.¹⁵⁴

Furthermore, a regulatory framework is required to govern the environmental risks associated with climate engineering. Such a regime would need to be able to account for different types of climate engineering technologies, with separate regimes required for the governance of CDR and SRM. The legal case studies of Australia and the UK in particular, have highlighted that, whilst existing environmental liability regimes may be in place, there is a risk that these fall short of adequately protecting against the cumulative negative effects of climate engineering activities.¹⁵⁵ The local SRM example in the Australian case study suggests that there is a need for the regulation of SRM to not only focus on activities with the *purpose* of moderating the global climate system, but also activities with that *effect*. Oversight at the national level, such as by an overseeing regulatory body, may need to be established to monitor SRM and CDR activities, including those deployed with a purpose other than the moderation of the global climate.¹⁵⁶ Such an overseeing body could also collaborate with similar bodies at the international level to oversee the global impact of climate engineering activities, encourage standardisation for possible inclusion of removal units in emission trading schemes, and assist in the avoidance of double-counting.

A further challenge in relation to liability for environmental harm and climate engineering, is establishing accountability for such harm given the potential difficulty in proving causation. Given the fact that climate engineering is intended to address to global issue of climate change, it is pertinent that such activities have a net positive environmental outcome and are aligned to wider sustainability objectives. Establishing a comprehensive liability regime for failing to prevent or remediate environmental harm helps to ensure that climate engineering techniques are deployed in a sustainable manner, provide an avenue for public participation and access to justice. Possible approaches may include a risk-based or strict liability-based regime. However, a balance must be struck between providing an adequate liability regime, and discouraging operators by overly stringent standards, such as ones resulting in open-ended liability in relation to CO₂ storage facilities.¹⁵⁷

¹⁵³ Zhang H. (2021) 'Regulations for carbon capture, utilization and storage: Comparative analysis of development in Europe, China and the Middle East' *The Chinese University of Hong Kong Faculty of Law Research Paper No. 2021-38*, [Online]. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3871831&dgcid=ejournal_htmlmail_political:economy:development:environment:ejournal_abstractlink, p. 18.

¹⁵⁴ Macinante J. and Ghaleigh N. S. (2022) 'Regulating Removals: Bundling to Achieve Fungibility in GGR 'Removal Units'', *University of Edinburgh School of Law Research Paper Series, No 2022/05*, [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4064970>, p. 10.

¹⁵⁵ See, for instance, (UK) Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (SI 2015/810), Regulation 5 (1) and (2); (Australia) *Environment Protection and Biodiversity Conservation Act* (1999) (Cth) (EPBCA); Brent, K. *et al.* (2018) 'Carbon dioxide removal geoengineering', *Australian Law Journal*, 92(10), p.835.

¹⁵⁶ See, for instance, the RRAP in Australia: The Program' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/the-program/>; Tollefson, J. (2010) 'Geoengineering faces ban', *Nature*, 468(7320), pp. 13–14. Available at: <https://doi.org/10.1038/468013a>; Walsh, B. (2010) 'Climate: Why It's a Mistake to Ban Research on Geoengineering', *Time*, 2 November. Available at: <https://science.time.com/2010/11/02/climate-why-its-a-mistake-to-ban-research-on-geoengineering/>.

¹⁵⁷ Zhang H. (2021) 'Regulations for carbon capture, utilization and storage: Comparative analysis of development in Europe, China and the Middle East' *The Chinese University of Hong Kong Faculty of Law Research Paper No. 2021-38*, [Online]. Available at: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3871831&dgcid=ejournal_htmlmail_political:economy:development:environment:ejournal_abstractlink, p. 18.

4. Comparative analysis – neurotechnologies

This section examines the legal issues and challenges identified in the three national legal case studies considered in relation to neurotechnologies. It firstly provides a comparative summary overview of the legal systems and relevant laws in Germany, Ireland, and the United States, before contextualising these findings by briefly outlining relevant legal and policy developments in other jurisdictions. In the final section, the key regulatory challenges specific to neurotechnologies are considered.

4.1 Summary comparative overview

Neurotechnologies represent a family of technologies the common purpose of which is directly monitoring, assessing, mediating, manipulating and/or emulating structure, functions, and capabilities of the human brain.¹⁵⁸ These technologies offer significant possibilities to improve health and well-being, and are expected to transform existing medical practice by redefining clinical and non-clinical brain monitoring, as well the scope for and effectiveness of neuro-interventions, such as neuromodulation and neurostimulation. For example, the use of neurotechnological devices enabling neuron regeneration by stimulating certain brain zones has been linked to improved patient outcomes for those suffering with degenerative motor conditions.¹⁵⁹ Such neuro-devices are the object of ongoing clinical research and development (R&D) efforts to investigate the possibilities for treating Parkinson's, patients who have suffered a stroke, Alzheimer's disease, severe trauma affecting the nervous system, and many other mental and neurological conditions.¹⁶⁰ Nevertheless, neurotechnologies also raise significant ethical, legal and societal concerns relating to, inter alia, personal data privacy management, integrity and responsibility, accessibility, and potential off-label and misuse of such technology.¹⁶¹

For the purposes of this report, which complements the analysis of international and EU law in relation to neurotechnologies contained in TechEthos Deliverable 4.1,¹⁶² national legal case studies on Germany, Ireland, and the United States of America (USA) were conducted to assess the regulatory implications of and the regulation applicable to neurotechnologies in each of these national legal jurisdictions. In particular, these national legal case studies focused on the current state of the art of neurotechnologies, ongoing legal and policy developments, human rights law, privacy and data protection law, use in legal systems, and liability for harms, including contract law, tort law and the criminal law. The complete national legal case study reports can be found in annexes 9.4, 9.5 and 9.6. This section provides a comparative summary overview of each national legal case study, drawing out the most prominent legal issues from the identified legal frameworks, and highlighting the key regulatory gaps and challenge.

¹⁵⁸ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

¹⁵⁹ See, e.g., Micera, S. 'Advanced Neurotechnologies for the Restoration of Motor Function', *Neuron*, Vol.105:4, pp.604-620. DOI: <https://doi.org/10.1016/j.neuron.2020.01.039>

¹⁶⁰ See, e.g., Cometa, A. et al. (2022) 'Neuroscience and neurotechnology: An Amazing symbiosis', *iScience*, Vol.25:10. DOI: <https://doi.org/10.1016%2Fj.isci.2022.105124>

¹⁶¹ Buchinger, E., et al. (2022). *TechEthos technology portfolio: Assessment and final selection of economically and ethically high impact technologies. Deliverable 1.2 to the European Commission*. TechEthos Project Deliverable. Available at: www.techethos.eu, p. 37.

¹⁶² Santiago, N., et al. (2022). *TechEthos D4.1: Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.

4.1.1 Germany

Table 16: Overview of the German legal system

Characteristics	Details
Legislative arm	Federal legislative power is divided between the main legislative body, the German Parliament (<i>Bundestag</i>), which is directly elected by German citizens, and the German federal council (<i>Bundesrat</i>), which represents the sixteen regional states (<i>Länder</i>) in the federal legislative process.
Constitutional governance	The Basic Law (<i>Grundgesetz</i>) is the constitution for the Federal Republic of Germany that establishes the system of parliamentary democracy and institutes the horizontal separation of powers between the executive, legislative and judicial branches at the federal level, as well as the vertical power-sharing arrangement between the Federation and the sixteen federated states (<i>Länder</i>).
Sources of law	<ul style="list-style-type: none"> ○ EU Regulations ○ German Basic Law ○ German Civil Code ○ Statutory law passed by the <i>Bundestag</i> ○ International law (enacted via statutory law)

Current state of neurotechnologies in Germany

Neurotechnology is an internationally dynamic field of research with intensive research activities also existing in Germany. Research institutions like Fraunhofer and Max-Planck play an important role in this area, although no research results could be found in the context of this study on keywords such as “neuroright”, and the like.¹⁶³ The same applies to funding programmes like the National Bernstein Network Computational Neuroscience (BNCN) already launched in 2004 by the Federal Ministry of Education and Research (*Bundesministerium für Bildung und Forschung*, BMBF), which establishes the basic structural framework in the field of computational neuroscience in Germany.¹⁶⁴ It can be assumed that legal issues related to neurotechnologies will play an important part in projects like the BNCN or, for example, in those of the German Research Foundation (*Deutsche Forschungsgemeinschaft*, DFG), the body responsible for the promotion of science and research in the Federal Republic of Germany, which deals with the topic as well, for example by means of publications, but also by initiating conferences or by funding initiatives.¹⁶⁵

¹⁶³ Eckhardt, A., Abegg, A., Seferovic, G., Ibrić, S., Wolf, J. (2022): ‘Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik’. Bern, Switzerland: TA-SWISS 78. p. 187. Available at: <https://doi.org/10.3218/4138-5> (Accessed: 24 October 2022).

¹⁶⁴ With the funding programme “National Bernstein Network Computational Neuroscience” (NNCN), the BMBF aims at supporting structures that bundle, strengthen and network the outstanding expertise available in Germany in the experimental and theoretical neurosciences. Available at: <https://www.bmbf.de/bmbf/de/forschung/gesundheitswissenschaften/grundlagenforschung/nationales-bernstein-netzwerk-computational-neuroscience.html> (Accessed 04. November 2022).

¹⁶⁵ Deutsche Forschungsgemeinschaft (DFG) (German Research Foundation). Available at: https://www.dfg.de/en/dfg_profile/what_is_the_dfg/index.html (Accessed: 04 November 2022).

More generally, terms such as “neuroethics”, “neuroright”, “neurocrime”, and “neurosecurity” (*Neuroethik*, *Neurorecht*, *Neurokriminallität* and *Neurosicherheit*) are part of the academic discourse, yet they are not widely recognised or used in public discourse. The sub-discipline of “neuro-criminology” (*Neurokriminologie*), which deals with the neuroscientific, biological and criminological origins of criminal offences and, with increasing urgency, also addresses the question of effective measures of rehabilitation and prevention, is just emerging.¹⁶⁶ Hence, overall, there are only limited neurotechnology-specific policy and legal developments in Germany. National debates that engage with neurotechnology either directly, for example, in the academic discourse, or indirectly, for example, in the political debate on the reform of the legal system, tend to be oriented towards the international, especially Anglo-American, discourse. In this respect, however, there are considerations as to whether and to what extent neurotechnologies might influence relevant German laws, such as the criminal law.

German policy on neurotechnologies

It is only in recent years that practical and normative questions of neurotechnology and neuroscience more generally have come into focus of the law, for which there is now a multifaceted discussion - not only about the possible impact of neuroscience on criminal law, but also with regard to the level of civil law.¹⁶⁷ In particular, it is worth mentioning that the scientific discourse that relates to the German criminal law (StGB) and the neurosciences is oriented toward the international, especially the Anglo-American discussion. These discussions illustrate that neuroethics, neurolaw, neurorights and neurosecurity are interdisciplinary fields, which may influence criminal law.¹⁶⁸ This aspect is also recognised by the *Deutsche Forschungsgemeinschaft* (DFG), the central self-governing research funding organisation in Germany. A key consideration, based on the suggestion that neurotechnological devices can influence sensory perception and cognitive as well as emotional states, relates to the connection between freedom of the will and culpability,¹⁶⁹ specifically the possibility that neuroscientific insights may lead to altered understandings of such concepts, and thereby necessitate corresponding modifications of legal standards to improve current practices.¹⁷⁰

Laws explicitly covering neurotechnologies

There are no known active proposals for dedicated legislation, nor any existing laws that explicitly refer to neurotechnologies in Germany. However, the laws which are affected by or referred to in connection with the development of neurotechnologies, or at least could be in the future, include: the German Basic

¹⁶⁶ Duttge, G. (2015) ‘Einsatz von Neurotechnologie: Zukunftsperspektiven eines modernen Sanktionensystems?’, in Kathrin Höffler (ed.). *Brauchen wir eine Reform der freiheitsentziehenden Sanktionen?* Göttinger Studien zu den Kriminalwissenschaften. Universitätsverlag Göttingen. 27th edn. p. 116.

¹⁶⁷ Spranger, T. M. (2015) ‘Prolegomena zu den praktischen Herausforderungen der Neurowissenschaften (Prolegomena to the practical challenges of neuroscience)’, *Jahrbuch für Wissenschaft und Ethik*, 19th edn.(1), pp. 61-64.

¹⁶⁸ Schleim, S. (2021) ‘Neurorights in History: A Contemporary Review of José M. R. Delgado’s “Physical Control of the Mind” (1969) and Elliot S. Valenstein’s “Brain Control” (1973)’, *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022).

¹⁶⁹ Duttge, G. (2015) ‘Einsatz von Neurotechnologie: Zukunftsperspektiven eines modernen Sanktionensystems?’, in Kathrin Höffler (ed.). *Brauchen wir eine Reform der freiheitsentziehenden Sanktionen?* Göttinger Studien zu den Kriminalwissenschaften. Universitätsverlag Göttingen. 27th edn. p. 111.

¹⁷⁰ Schleim, S. (2012) ‘Brains in context in the neurolaw debate: The examples of free will and “dangerous” brains’, *International Journal of Law and Psychiatry*, 35(2), p. 104-111. Available at: <https://doi.org/10.1016/j.ijlp.2012.01.001> (Accessed: 24 October 2022).

Law,¹⁷¹ the German Criminal Code (StGB),¹⁷² medical product law such as the Medical Products Act,¹⁷³ the Federal Data Protection Act (*Bundesdatenschutzgesetz*, BDSG),¹⁷⁴ the European Union Charter of Fundamental Rights (CFREU),¹⁷⁵ and the majority of the major international human rights treaties which have been signed and ratified by Germany.¹⁷⁶

Implications for human rights law

The various sources of human rights law in Germany include the Basic Rights contained in Articles 1-19 of the Basic Law, international human rights law treaties to which Germany is a state party, including the European Convention on Human Rights (ECHR),¹⁷⁷ and European Union law, such as the Charter of Fundamental Rights of the European Union (CFREU).¹⁷⁸ The primary use case of neurotechnological devices in Germany is in a clinical context. Here, the use of such technology may have the effect of fostering equal treatment or preventing discrimination for certain categories of patient pursuant to the general equal treatment law (*Allgemeines Gleichbehandlungsgesetz*) and Article 3 of the German Basic Law. Advances in neurotechnologies as communication tools are already being considered as potential decision-making devices that could help in ensuring patient's participation in medical choices, thus ensuring their interests, needs and wishes are considered. Brain machine or computer interfacing (BMI/BCI) neurotechnologies, for example, may open up new ways of communicating for those with neurological conditions causing verbal communication impairments.¹⁷⁹ In the academic discourse, BCI-based informed consent procedures are viewed critically, since, for example, discussing and varying treatments as well as withdrawing consent may not be readily realised at any time, given that the application of the technology is complex.¹⁸⁰ However, the opportunity created by BCI, namely, to give patients a voice and thus to allow them to exercise their right to information and consent to medical interventions according to the Convention on Human Rights and Biomedicine (CHRB), is highly valued.¹⁸¹

Expanding on the use of neurotechnologies as a communication tool for patients with verbal communication impairments, it is relevant to consider the recent Federal Constitutional Court (FCC)

¹⁷¹ Bundesamt für Justiz (Federal Office of Justice) (n.d.) *Grundgesetz für die Bundesrepublik Deutschland* (German basic law). Available at: <https://www.gesetze-im-internet.de/gg/>

¹⁷² Bundesamt für Justiz (Federal Office of Justice) (2021) *Strafgesetzbuch* (German Criminal Code). Available at: http://www.gesetze-im-internet.de/englisch_stgb/index.html

¹⁷³ Justiz (Federal Office of Justice) (2021) *Gesetz über Medizinprodukte* (Medical Products Act). Available at: <https://www.gesetze-im-internet.de/mpg/>

¹⁷⁴ Bundesamt für Justiz (Federal Office of Justice) (n.d.) *Federal Data Protection Act* (BDSG). Available at: https://www.gesetze-im-internet.de/englisch_bdsq/index.html

¹⁷⁵ Charter of Fundamental Rights of the European Union (CFREU) (entry into force 18 December 2009) 2000/C 364/01.

¹⁷⁶ E.g., International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res. 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res. 2200A (XXI), 993 U.N.T.S. 3; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

¹⁷⁷ European Convention on Human Rights (as amended by Protocols 11, 14 and 15) (entered into force 3 September 1953), E.T.S. 5, 4. XI. 1950.

¹⁷⁸ Charter of Fundamental Rights of the European Union (CFREU) (entry into force 18 December 2009) 2000/C 364/01.

¹⁷⁹ Spranger, T., M. (2014) 'Prolegomena zu den praktischen Herausforderungen der Neurowissenschaften', in: Sturma, D., Honnefelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, p. 62.

¹⁸⁰ Further elaboration on the difficulties of application can be found in Rödinger C. (2014) 'Obtaining informed consent through use of brain-computer interfaces? Future perspectives in medical health care', in: Sturma, D., Honnefelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, 107ff.

¹⁸¹ Rödinger C. (2014) 'Obtaining informed consent through use of brain-computer interfaces? Future perspectives in medical health care', in: Sturma, D., Honnefelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, p. 107ff.

judicial review decision in which a law prohibiting ‘business-like’ assisted suicide as unconstitutional was overturned, with the FCC instead holding that the prohibition on access to assisted suicide services was irreconcilable with the constitutional protections for the right to human dignity under Article 1 and, in particular, the right to human autonomy as protected by the personal freedoms found in Article 2.¹⁸² Whilst the scope of this ruling is not restricted in its application, and applies to all phases and situations of life provided the individual concerned is of age and is capable of giving consent,¹⁸³ this may, as indicated above, be particularly relevant for individuals who wish to complete assisted suicide but are unable to communicate their intentions, such as those with brain injuries causing a permanent vegetative state.¹⁸⁴ In order to uphold individuals’ constitutional rights to dignity and autonomy, as well as ensuring medical decisions are made in the patient’s best interests, it may be necessary for medical professionals involved in assisted suicide to more routinely use neurotechnologies, particularly those that are considered to have important potential use in communicating end-of-life decision-making.¹⁸⁵

Implications for privacy and data protection law

As brain and other neural data carries private and sensitive biological information, the access or manipulation of which by malicious actors could cause significant physical (including life-threatening), psychological or social harm, the interconnected issues of privacy and data protection are of particular significance to in relation to neurotechnologies. The constitutional right to privacy is explicitly guaranteed by Article 10 of the German Basic Law, which provides that “[t]he privacy of correspondence, posts and telecommunications shall be inviolable.” Supplementing this, the German Federal Constitutional Court (*Bundesverfassungsgericht*, BVerfGE) has held that the constitutional protections for human dignity (Article 1) and personality rights (Article 2) encompass and give effect to a “right to informational self-determination”, the purpose of which is to protect the individual “against the unlimited collection, storage, use and sharing of their personal data.”¹⁸⁶ The BVerfGE has further held that these rights also give effect to “the fundamental right to protection of the confidentiality and integrity of informational technology systems.”¹⁸⁷ Whilst, unlike the right to privacy, these unenumerated rights are not inviolable, they may offer more directly applicable protection to – and a mechanism of legal recourse for – individuals who experience privacy and data protection interferences.

The primary statutory source of data protection law in Germany is the Federal Data Protection Act (*Bundesdatenschutzgesetz*, BDSG),¹⁸⁸ most recent amendments to which replicate and implement specific aspects of the EU General Data Protection Regulation (GDPR) (*Datenschutz-Grundverordnung*,

¹⁸²Wiesing, U. (2022) ‘The Judgement of the Federal Constitutional Court regarding assisted suicide: a template for pluralistic states?’, *Journal of Medical Ethics*, Vol.48, pp.542-546. DOI: <http://dx.doi.org/10.1136/medethics-2021-107233>, discussing Bundesverfassungsgericht (BVerfG) (The Federal Constitutional Court) *Urteil des Zweiten Senats vom 26. Februar 2020 (Judgment of the Second Senate on 26 February 2020)- 2 BvR 2347/15 -, Rn. 1-343*, Available at: https://www.bundesverfassungsgericht.de/SharedDocs/Entscheidungen/DE/2020/02/rs20200226_2bvr234715.html

¹⁸³ Ibid.

¹⁸⁴ See, e.g., Chandler, J.A., Sun, J.A., and Racine, E. (2016) ‘Online public reactions to fMRI communication with patients with disorders of consciousness: Quality of life, end-of-life decision making, and concerns with misdiagnosis’, *AJOB Empirical Bioethics*, Vol.8:1, pp.40-51. DOI: <https://doi.org/10.1080/23294515.2016.1226199>

¹⁸⁵ See generally, Catley, P. Pywell, S. (2014) ‘The ethical imperative of ascertaining and respecting the wishes of the minimally conscious patient facing a life-or-death decisions’, in Sturma, D. Honnefelder, L. Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, p. 77.

¹⁸⁶ Order of 15 December 1983, 1 B v. R 209, 269, 362, 420, 440, 484/83.

¹⁸⁷ Order of 27 February 2008, 1 B v R 370/07, 1 B v R 595/07.

¹⁸⁸ Federal Office of Justice *Federal Data Protection Act (BDSG)*. Available at: https://www.gesetze-im-internet.de/englisch_bdsq/index.html (Accessed: 04. November 2022).

DS-GVO).¹⁸⁹ The BDSG applies to the processing of personal data by public bodies of the Federation, as well as public bodies of the Länder in certain specified circumstances, with private bodies that process personal data “wholly or partly by automated means” also within the purview of the statute.¹⁹⁰ The BDSG establishes a number of derogations from the prohibition on the processing of special categories of personal data in Article 9(1) of the GDPR, including, most applicably to the clinical use of neurotechnologies, where “processing is necessary for the purpose of preventive medicine”, “medical diagnosis, the provision of health or social care or treatment”, or “for reasons of public interest in the area of public health”, such as “ensuring high standards of quality and safety of health care and of medicinal products or devices”.¹⁹¹

Implications for use in legal proceedings

Although the Code of Criminal Procedure, dating from 1877, does not explicitly guarantee the right to a fair trial, the statutory implementation of the European Convention on Human Rights (ECHR) renders the right to a fair hearing under Article 6(1) applicable in Germany, while also requiring German courts to consider relevant jurisprudence of the European Court of Human Rights (ECtHR) in the application of domestic law.¹⁹² The Federal Constitutional Court has also held the right to a fair trial to be located in the constitutional concept of *Rechtsstaat*, and therefore protected by Articles 20(1) and 28(1) of the Constitution.¹⁹³ However, it is considered that the use of neurotechnologies in the legal system, particularly neuroimaging techniques, could lead to interferences with this protected right. Addressing some of the questions around the issue of applying neuroimaging (*Hirnbildgebung*) techniques in the courtroom, a non-binding recommendation issued by the German Ethics Council to inform possible political and legislative action¹⁹⁴ has emphasised that the multitude of data obtained through neuroimaging must first be contextualised.¹⁹⁵ One member, Reinhard Merkel, for instance, stated that neuroimaging could not fully replace the psychiatric reports most commonly used in the criminal justice system, but for the time being could “cautiously” supplement them.¹⁹⁶

Implications for liability for harms

In neurotechnology, deep brain stimulation (DBS) (*Tiefe Hirnstimulation*) refers to a neuromodulation treatment involving implantation of a pulse generator that sends signals to specific parts of the brain via implanted electrodes. DBS falls under the regime of medical product law in Germany, specifically the Medical Products Act (MPG), which provides that a clinical trial of a medical device may not be started

¹⁸⁹ Bundesministerium der Justiz (Federal Ministry of Justice) *Datenschutz-Grundverordnung (DS-GVO) (General Data Protection Regulation) (GDPR)* Available at: https://www.bmj.de/DE/Themen/FokusThemen/DSGVO/DSVGO_node.html (Accessed: 04. November 2022).

¹⁹⁰ Federal Data Protection Act of 30 June 2017 (Federal Law Gazette I p. 2097), as last amended by Article 10 of the Act of 23 June 2021 (Federal Law Gazette I, p. 1858; 2022 I p. 1045), s.1(1).

¹⁹¹ Ibid s.22.

¹⁹² Weigend, T. (2019) ‘The Potential to Secure a Fair Trial Through Evidence Exclusion: A German Perspective’ in Gless, S., and Richter, T (eds). *Do Exclusionary Rules Ensure a Fair Trial? A Comparative Perspective on Evidentiary Rules* (Springer, Switzerland) p.64.

¹⁹³ Ibid. See, e.g., BVerfG, Decision of 3 June 1969, 1 B v. L 7/68 (=BVerfGE 26, 66, 71).

¹⁹⁴ Act on the Establishment of the German Ethics Council (*Gesetz zur Einrichtung des Deutschen Ethikrats*), s.2(1).

¹⁹⁵ The German Ethics Council deals with the great questions of life and provides opinions and recommendations for orientation for society and politics. It was constituted on April 11, 2008, on the basis of the Ethics Council Act and succeeded the National Ethics Council established by the Federal Government in 2001. The members are appointed by the President of the German Bundestag. More information can be found here: <https://www.ethikrat.org/en/?cookieLevel=not-set&cHash=4cedc8fcdda0b368d4409bb0febbe036> (Accessed: 26. September 2022).

¹⁹⁶ Medical community (2013) ‘Neurobildgebung: Wie beeinflussen Bilder vom Gehirn unser Menschenbild?’, *Deutsches Ärzteblatt*, 29 November [online]. Available at: <https://www.aerzteblatt.de/nachrichten/56759/Neurobildgebung-Wie-beeinflussen-Bilder-vom-Gehirn-unser-Menschenbild> (Accessed: 26 September 2022).



An additional concern is that both current medical and future commercialised BCIs could be hacked, as can happen with other medical devices.¹⁹⁹ Halperin et al. (2008), for example, experimentally demonstrated that hackers could wirelessly interfere with the security and privacy of, for example, an already commercialised implanted cardiac defibrillator.²⁰⁰ In their experiment, hackers were able to use homemade and low-cost devices to modify a patient's therapies, switch off therapies altogether and trigger potentially deadly processes such as ventricular fibrillation.²⁰¹ In the context of neurotechnologies, one suggested response is to regulate instances of malicious so-called "brain hacking" as a specific "neurocrime", in relation to which the criminal law is applicable,²⁰² although there exists no such active legislative proposal in Germany.

The National Regulatory Control Council (*Nationaler Normenkontrollrat*, NKR) recently called for reform of the legislative process in Germany. The Chairman of the NKR, Lutz Göbel, stated that laws are often passed overly quickly and under significant time pressure, leading to errors and undesirable consequences, as well as a lot of bureaucracy.²⁰³ He suggested involving more experts, prospectively including neuroscientists, within the process in advance.²⁰⁴ This demand may also allow conclusions to be drawn about the development of neurotechnologies and their legal implications, since an improved understanding of the brain could lead to better-designed laws and fairer legal procedures. Aside from the greater integration of expertise into the legislative process, researchers including Eckhardt et al. are calling for legislators to keep a close eye on technological development to ensure the safety and efficacy of neurotechnological products.²⁰⁵ They describe the current relatively widespread assignment

²⁰⁵ Eckhardt, A., Abegg, A., Seferovic, G., Ibric, S., Wolf, J. (2022) *Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik (When people network their bodies with technology. Fundamentals and perspectives of non-medical bioelectronics)*. Bern: ETH Zürich, p. 22. Available at: <https://www.research-collection.ethz.ch/bitstream/handle/20.500.11850/565525/1/9783728141385.pdf> (Accessed: 04 November 2022).

of nonmedical bioelectronic products to medical products, with their more burdensome testing procedures, as effectively hindering technological progress and increasing the cost of these products.²⁰⁶

4.1.2 Ireland

Table 17: Overview of the Irish legal system

Characteristics	Details
Legislative arm	The bicameral Irish legislature, known as the <i>Oireachtas</i> , is comprised of the lower house and main chamber <i>Dáil Éireann</i> , as well as the upper house, <i>Seanad Éireann</i> .
Constitutional governance	The Irish constitutional republic is a multi-party parliamentary democracy, in which the presidential head of state (<i>Uachtarán</i>) is elected to serve a maximum of two seven-year terms and executive power is vested in the prime minister as the elected head of government (<i>Taoiseach</i>).
Sources of law	<ul style="list-style-type: none"> ○ The Constitution (<i>Bunreacht na hÉireann</i>) ○ Statutory law ○ Common law ○ International law ○ European Union (EU) law

Current state of neurotechnologies in Ireland

There are limited neurotechnology-specific legal and policy developments in Ireland. Neuroscience is still a relatively young field.²⁰⁷ Some neurotechnologies, such as deep brain stimulation (DBS), are recognised procedures for treating neurological disorders, such as dystonia.²⁰⁸ However, due to cost and the absence of economies of scale, patients in Ireland are typically referred to hospitals elsewhere in the EU under the Treatment Abroad Scheme, or to hospitals the UK, for treatment.²⁰⁹

²⁰⁶ Ibid.

²⁰⁷ *Irish Brain Council* / Neuroscience Ireland, [Online]. Available at: <https://neuroscienceireland.com/neuroscience-advocacy/>.

²⁰⁸ *Deep Brain Stimulation* / Dystonia Ireland, [Online]. Available at: <https://www.dystonia.ie/forms-of-dystonia/treatment-options/deep-brain-stimulation/>.

²⁰⁹ *Deep Brain Stimulation* / Dystonia Ireland, [Online]. Available at: <https://www.dystonia.ie/forms-of-dystonia/treatment-options/deep-brain-stimulation/>; Regulation (EEC) No 1408/71 of the Council of 14 June 1971 on the application of social security schemes to employed persons and their families moving within the Community (OJ L 149, 5.7.1971, p. 2); Regulation (EEC) No 574/72 of the Council of 21 March 1972 fixing the procedure for implementing Regulation (EEC) No 1408/71 on the application of social security schemes to employed persons and their families moving within the Community, (OJ L 74, 27.2.1972, p. 1); Health Information and Quality Authority. (2012) *Health technology assessment of a national deep brain stimulation service in Ireland*. Available at: https://www.nai.ie/assets/45/114E52E4-0202-6A35-112B70131738C8D7_document/HTA-Deep-Brain-Stimulation-Service.pdf.

Irish policy on neurotechnologies

The Irish Department of Health is the governmental institution which seeks to improve the health and wellbeing of all people in Ireland.²¹⁰ Headed by the Minister of Health, the Department of Health is responsible for setting the government's strategic health objectives. The Statement of Strategy 2021-2023 is the department's corporate strategy over a three-year period.²¹¹ Whilst technological innovation and digitisation is seen as a key enabler, the policy document makes no reference to neurotechnologies. The Irish Health Services Executive is the publicly funded body responsible for the provision of health services. The National Strategy & Policy for the Provision of Neuro-Rehabilitation Services in Ireland does not explicitly refer to neurotechnological developments, such as advances in neuroimaging, as part of its overall vision.²¹²

Since 2013, the Irish Brain Council has provided a platform for policy development and advocacy in relation to brain research.²¹³ It is an umbrella organisation of groups and professional societies with an interest in brain research. The Irish Brain Council is committed to 'promoting neuroscience advocacy in Ireland through public outreach, legislative engagement, strategic partnership and individual member engagement.'²¹⁴ In its inaugural position paper of March 2017, the Irish Brain Council recognises the need for developing networks in order to create economies of scale in accessing emerging technologies, and envisions access to emerging technologies as a means to becoming a leader in brain health and research.²¹⁵ In this position paper, the Irish Brain Council also calls for legislative change and policy development to support brain health and research in Ireland.²¹⁶ Paralleling this, the Health Information and Quality Authority has called for reforms to Ireland's national health information system.²¹⁷ The basis for this view is the suggestion that the absence of dedicated legislation hinders the coordination of information sharing between the various health institutions.²¹⁸ Further, because Ireland's health information landscape is fragmented, strong health information policies and legislation are required to support the introduction of new systems or technologies, such as electronic health records.²¹⁹

²¹⁰ *About the Department of Health* / gov.ie, [Online]. Available at: <https://www.gov.ie/en/organisation-information/7d70f7-about-the-department-of-health/>.

²¹¹ Department of Health (2021) *Department of Health: Statement of Strategy 2021-2023*. [Online]. Available at: <https://www.gov.ie/en/organisation-information/0fd9c-department-of-health-statement-of-strategy-2021-2023/#:~:text=supporting%20people%20to%20lead%20healthy,health%20and%20social%20care%20service,p.6>

²¹² Health Services Executive. (2019) *National Strategy & Policy for the Provision of Neuro-Rehabilitation Services in Ireland: from Theory to Action*. Available at: <https://www.hse.ie/eng/services/list/4/disability/neurorehabilitation/national-strategy-policy-for-the-provision-of-neuro-rehabilitation-services-in-ireland.pdf>.

²¹³ NAI, Irish Brain Council and Novartis (2015) *Meeting Report: Brain Research in Ireland – Delivering on the Potential*. Nai, Irish Brain Council and Novartis, [Online]. Available at: https://irishbraincouncil.files.wordpress.com/2015/05/brain_research_in_ireland_report.pdf.

²¹⁴ *Advocacy* / The Irish Brain Council, [Online]. Available at: <https://irishbraincouncil.com/advocacy/>.

²¹⁵ Clarke, S., et al. (2017) *Building a Supportive Framework for Brain Research in Ireland: Inaugural Position Paper – The Irish Brain Council*. Irish Brain Council, [Online]. Available at: <https://neuroscienceireland.com/wp-content/uploads/2017/03/ibc-position-paper-march-2017.pdf>, p. 12-13.

²¹⁶ *Ibid*, p. 15.

²¹⁷ Health Information and Quality Authority. (2019) *The Need to Reform Ireland's National Health Information System: to support the delivery of health and social care services*. Available at: <https://www.hiqa.ie/sites/default/files/2021-10/The-need-for-reform-of-the-health-information-system.pdf>.

²¹⁸ *Ibid*, p. 6.

²¹⁹ Rogers, M. et al. (2019) 'Building a supportive framework for brain research in Ireland: Inaugural position paper of the Irish Brain Council' *European Journal of Neuroscience*, Vol.49, pp.1362-1370, pp.1367-1368. Available at: <https://doi.org/10.1111/ejn.14351>,

In addition to the Irish Brain Council, there are several not-for-profit organisations that seek to advance neuroscience and brain research in Ireland. Neuroscience Ireland, for instance, is Ireland's National Neuroscience Society. Established in 2005, this charitable organisation advocates for greater public and political awareness to advance neuroscience in Ireland.²²⁰ The Neurological Alliance of Ireland (NAI) represents over thirty organisations advocating for the rights of people with a neurological condition in Ireland.²²¹

Laws explicitly covering neurotechnologies

There are no known active proposals for dedicated legislation, nor any existing laws that explicitly refer to neurotechnologies in Ireland. Medical devices in general are regulated by the Health Products Regulatory Authority (HPRA) as the Competent Authority (CA) in Ireland.²²² Medical devices legislation, which in Ireland is predominantly derived from EU law, distinguishes between three types of devices: general medical devices, active implantable medical devices, and *in-vitro* medical devices. Regulation 2017/45 on Medical Devices (MDR) and Regulation 2017/746 on *In-Vitro* Diagnostic Devices (IVDR) were adopted to replace earlier Directives and significantly strengthen the regulation of medical devices across the EU.²²³ As an EU regulation, the MDR is directly applicable in all EU Member States without need for transposition into national law.²²⁴ It is also the main piece of EU legislation applicable to the use of neurotechnologies and the introduction of such technologies both in the single and Irish markets.

Implications for human rights law

The human rights law framework in Ireland is composed of a multitude of sources, including the various personal and familial rights contained in Articles 40-44 of the Irish Constitution, statutory law such as the European Convention on Human Rights Act (2003), implementing the eponymous Council of Europe human rights treaty,²²⁵ alongside the Irish Human Rights and Equality Commission Act (2014), as well as EU law, such as the Charter of Fundamental Rights of the European Union (CFREU).²²⁶ There are also various international human rights law treaties that Ireland has signed and ratified, including the International Covenant on Civil and Political Rights (ICCPR), the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD), the International Covenant on Economic, Social and Cultural

²²⁰ *About us* / Neuroscience Ireland, [Online]. Available at: <https://neuroscienceireland.com/about/>.

²²¹ Ibid.

²²² *Regulatory Information* / HPRA [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>.

²²³ Regulation (EU) 2017/45 of the European Parliament and of the Council of 5 April 2017 on Medical Devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directive 90/385/EEC and 93/42/EEC, (OJ L 117, p. 1); Regulation (EU) 2017/746 of the European Parliament and of the Council of 5 April 2017 on in vitro diagnostic medical devices and repealing Directive 98/79/EC and Commission Decision 2010/227/EU, (OJ L 117, p. 176); *Regulatory Information* / HPRA [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>.

²²⁴ *Regulatory Information* / HPRA [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>; Consolidated version of the Treaty on the Functioning of the European Union (2012) OJ C326/47, article 288.

²²⁵ European Convention on Human Rights (as amended by Protocols 11, 14 and 15) (entered into force 3 September 1953), E.T.S. 5, 4. XI. 1950.

²²⁶ Charter of Fundamental Rights of the European Union (CFREU) (entry into force 18 December 2009) 2000/C 364/01.

Rights (ICESCR), the Convention on the Rights of the Child (CRC), and the Convention on the Rights of Persons with Disabilities (CRPD).²²⁷

A key conceptual component of putative “neurorights” (see Section 4.2.4 below) is the right to mental integrity, the progenitor for which is rooted in the more widely recognised and protected right to bodily integrity.²²⁸ Indeed, although not explicitly provided for in the Irish Constitution, the unenumerated constitutional right to bodily integrity has been recognised by the Irish courts as derived from “the personal rights of the citizen.”²²⁹ Framed as a negative right guaranteeing protection against the physical intrusion on a person’s body and freedom from torture and inhumane treatment,²³⁰ further case law has additionally recognised that “[b]odily integrity includes psychological integrity.”²³¹ As indicated, protection for the latter right may be seen as closely connected to or a direct analogue for the so-called “neuroright” to mental integrity, which is conceptualised in ethical-legal analyses as protecting against harms arising from neurotechnology-related forced intrusion into and/or alteration of an individual’s neural processes.²³² In addition to constitutional protections, Ireland is a Member State of the EU, whose CFREU guarantees that “everyone has the right to respect for his or her physical and mental integrity”,²³³ and has also ratified the CRPD, Article 17 of which protects the right of persons with disabilities “to respect for his or her physical and mental integrity on an equal basis with others.”²³⁴ Although case law has not addressed any specific instances related to neurotechnology, these rights may offer protection and an established mechanism of legal recourse for individuals who suffer harms arising from neurotechnology-based interventions, including in clinical and rehabilitative contexts.

Implications for privacy and data protection law

The right to privacy is not expressly provided for nor guaranteed by the Constitution of Ireland, but is considered to be an unenumerated right implicitly embedded within it.²³⁵ Through case law it has been recognised that although not “an unqualified right”, nor “specifically guaranteed by the Constitution, the right to privacy is one of the fundamental personal rights of the citizen which flow from the Christian and democratic nature of the state.”²³⁶ Aspects of the right to privacy are also protected by statutes and statutory instruments,²³⁷ such as the European Convention on Human Rights Act (2003). Additionally, through its accession to membership of the EU (formerly the European Economic Community) in January 1973, Ireland is bound by the CFREU when implementing EU law,²³⁸ Article 7 of

²²⁷ International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

²²⁸ Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

²²⁹ Bunreacht na hÉireann, Article 40.3.1.

²³⁰ Doyle, O. (2008) *Constitutional Law: Text, Cases and Materials*. Dublin: Clarus Press. p.124.

²³¹ *McDonnell v The Governor of Wheatfield Prison* [2015] IECA 216, [2015] 2 ILRM 361, [58].

²³² Ienca, M. and Andorno, R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>

²³³ Charter of Fundamental Rights of the European Union (CFREU) (entry into force 18 December 2009) 2000/C 364/01, Article 3.

²³⁴ UN Convention on the Rights of Persons with Disabilities 2006 (A/RES/61/106).

²³⁵ Kelleher, D. (2015) *Privacy and Data Protection Law in Ireland* (2nd Edition. Bloomsbury) p.7.

²³⁶ *Kennedy v Ireland* [1987] I.R. 587 at 591.

²³⁷ Kelleher, D. (2015) *Privacy and Data Protection Law in Ireland* (2nd Edition. Bloomsbury) p.27.

²³⁸ Charter of Fundamental Rights of the European Union 2012/C 326/02, Article 51(1).

which provides that “[e]veryone has the right to respect for his or her private and family life, home and communications.”²³⁹

In comparison to the unenumerated constitutional protections for the right to privacy, the ECHR right to privacy may be more directly applicable to the privacy concerns related to neurotechnologies. In this context, brain and other neural data might be considered analogous to genetic and biometric data, including cellular samples, DNA profiles and dactyloscopic data, the collection and/or retention of which has been determined by the European Court of Human Rights (ECtHR) in various cases before it to constitute a *prima facie* interference with the right to respect for private life.²⁴⁰ Also relevant here is the interpretation of the right to privacy under Article 8 to protect information relating to an individual’s health, including mental health.²⁴¹ Should the ECtHR recognise through a declaration, decision, advisory opinion or judgement that these or another basis for privacy protection are applicable to or include brain and other neural data, such protections may also be made available as a matter of domestic law, with Irish courts bound by the European Convention on Human Rights Act to “take due account of the principles laid down by those declarations, decisions, advisory opinions, opinions and judgements.”²⁴²

Complementing the various sources of legal protection for the right to privacy, the primary statutory sources of data protection law in Ireland are the Data Protection Acts 1988 to 2018, implementing the Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data,²⁴³ the European Union (EU) Data Protection Directive 95/46/EC,²⁴⁴ and Regulation 2016/679,²⁴⁵ respectively. The latter establishes a comprehensive data governance framework for the furtherance of rights to privacy and data protection that is directly applicable in all EU Member States.²⁴⁶ Ireland has given “further effect”²⁴⁷ to this provision through its enactment of the Data Protection Act (2018) and, moreover, assumed an active role in shaping how this regulation applies in practice. The hosting of the European headquarters of multiple Big Tech multinational corporations (MNCs), including Google, Facebook and LinkedIn, has enabled the Irish Data Protection Commission (DPC), the domestic “supervisory authority” constituted in accordance with the GDPR,²⁴⁸ to monitor the data processing activities of these companies for compliance with the GDPR, both in Europe and beyond.²⁴⁹

Alongside the requirements relating to the processing of personal data, both Regulation 2016/679 (GDPR) and the Data Protection Act 2018 regulate the processing of special categories of personal data, the definition for and types of data included within which are substantially similar.²⁵⁰ Since the primary

²³⁹ Ibid, Article 7.

²⁴⁰ See, e.g., *Case of S. and Marper v. The United Kingdom* (Application nos.30562/04 and 30566/04) (4 December 2008); *Case of Gaughran v. The United Kingdom* (Application no.45245/15) (13 February 2020).

²⁴¹ See, e.g., *Case of Surikov v. Ukraine* (Application no.42788/06) (26 January 2017); *Case of Mockutė v. Lithuania* (Application no.66490/09) (27 February 2018).

²⁴² European Convention on Human Rights Act 2003, s.4

²⁴³ CETS 108.

²⁴⁴ Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data OJ L 281.

²⁴⁵ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119.

²⁴⁶ Consolidated version of the Treaty on the Functioning of the European Union C-326/47, Article 288.

²⁴⁷ Data Protection Act 2018, preamble.

²⁴⁸ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Article 51.

²⁴⁹ McLaughlin, S. (2018) ‘Ireland: A Brief Overview of the Implementation of the GDPR’, *European Data Protection Law Review*, vol.4:2, pp.227-234, pp.234. DOI: 10.21552/edpl/2018/212.

²⁵⁰ Data Protection Act 2018, s.2(1); Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.9(1).

use case of neurotechnologies in Ireland is in a clinical context for a broad range of diagnosis, treatment,²⁵¹ and research purposes,²⁵² the most directly applicable basis for the processing of special category personal data is s.53 of the Data Protection Act 2018. This provision permits as lawful the processing of special categories of personal data “where it is necessary for public interest reasons in the area of public health”, such as “protecting against serious cross-border threats to health and ensuring high standards of quality and safety of health care and of medicinal products and medical devices.”²⁵³ There are a range of medical neurotechnology applications that may currently or in the future be used for the provision of healthcare services in Ireland, including invasive neurosurgical procedures such as deep brain stimulation (DBS) (see above on Irish policy), as well as neuroimaging techniques such as functional magnetic resonance imaging (fMRI), electroencephalography (EEG) and the more invasive electrocorticography (ECoG). For such applications, the processing of special category personal data in the form of data concerning health may accordingly be treated as prima facie lawful, subject to the implementation of “suitable and specific measures to safeguard the fundamental rights and freedoms of data subjects”.²⁵⁴

The Health Research Regulations outlines the various procedural requirements with which healthcare researchers are required to comply in order to safeguard the rights of data subjects to privacy and data protection, including a conditional obligation to obtain the “explicit consent” of the data subject prior to commencing any research.²⁵⁵ Whilst this requirement can be disapplied by attaining a consent declaration from the Health Research Consent Declaration Committee (HRCDC), it has been suggested that the threshold and requirements for this may impose a significant and potentially insurmountable procedural burden on researchers,²⁵⁶ with resultant implications for the viability of conducting healthcare research in Ireland, prospectively including clinical and biomedical neuroscientific research involving the use of neurotechnologies.

Implications for use in legal proceedings

In the criminal justice system, neurotechnologies may currently or in the future be used to assess the appropriate age of criminal responsibility, and potential (implicit) jury or judicial bias, as well as to determine guilt by detecting dishonesty and the applicability of criminal law defences including insanity and diminished responsibility. The most established and accepted use of neurotechnologies in Irish criminal law proceedings is for the purposes of assessing defendants’ “fitness”²⁵⁷ or competency to stand trial.²⁵⁸ In general, however, Irish courts have been reluctant to admit neuroscientific evidence, particularly expert testimony, in the context of alleged insanity or cognitive impairment. In *DPP v. Ramzan*, for instance, the Supreme Court upheld the decision of the trial judge and the Court of Appeal to exclude the expert testimony of a consultant clinical neuropsychologist.²⁵⁹ However, as observed by the Court of Appeal, this was not a restriction on the admissibility of such evidence per se, but rather

²⁵¹ See generally, Ning, S. et al. (2022) ‘Neurotechnological Approaches to the Diagnosis and Treatment of Alzheimer’s Disease’, *Frontiers in Neuroscience*, 16 (854992). DOI:10.3389/fnins.2022.854992.

²⁵² See generally, Vázquez-Guardado, A., Yang, Y., Bandodkar, A.J., et al. (2020) ‘Recent advances in neurotechnologies with broad potential for neuroscience research’, *Nature Neuroscience*, vol.23, pp.1522-1536. DOI: <https://doi.org/10.1038/s41593-020-00739-8>

²⁵³ Data Protection Act 2018, s.53(a)-(b).

²⁵⁴ Ibid, s.53.

²⁵⁵ Ibid (Section 36(2)) (Health Research) Regulations 2018, Reg.3(1)(e).

²⁵⁶ Donnelly M and McDonagh M. (2019) ‘Health Research, Consent and the GDPR Exemption’, *European Journal of Health Law*, vol.26, pp.97-119, pp.118. DOI: <https://doi.org/10.1163/15718093-12262427>; Kirwan, M. et al. (2021) ‘What GDPR and the Health Research Regulations (HRRs) mean for Ireland: “explicit consent” – a legal analysis’, *Irish Journal of Medical Science*, vol.190, pp.515-521, pp.516. DOI: <https://doi.org/10.1007/s11845-020-02331-2>

²⁵⁷ Criminal Law (Insanity) Act 2006, s 4.

²⁵⁸ See, e.g., *O’C (J) v DPP* [2002] IEHC 151, [2002] 10 JIC 0804; *Geraldine Nolan v Joseph Carrick and Others* [2013] IEHC 523, [2013] 10 JIC 2505.

²⁵⁹ *DPP v Ramzan* [2018] IESCDT 34, [2018] 2JIC 0512.

borne of the requirement within s.5 of the Criminal Law (Insanity) Act 2006 that “at least one of the witnesses called in support of a defence of insanity must be a consultant psychiatrist.”²⁶⁰

Further case law indicates that the application of novel neuroscientific elicitation techniques may be restricted unless high proof of reliability is provided.²⁶¹ In *C (N) v DPP*, for example, the court found the “expertise” under which the memory was recovered had no effective test or control, the effect of which rendered the admission of such evidence “fraught with the risk of unfairness”.²⁶²

Within the scope of civil law personal injury cases where brain injuries are sustained, neurotechnological brain scanning techniques may be used to determine and quantify the extent of injury for the purposes of assessing and awarding damages. In *Oliver Bennett v John Codd and Wallace Taverns Ltd*, for instance, the court considered in evidence a report prepared by a consultant neurosurgeon, including CAT CT scans, on the basis of which it determined the appropriate damages to be awarded to the plaintiff.²⁶³

Implications for liability for harms

Irish law on liability for harms is informed by European legislation, as well as the common law tradition. The primary piece of legislation for products liability in Ireland is the Liability for Defective Products Act (1991), which implements the European Products Liability Directive.²⁶⁴ The Act provides that a producer is liable for damage caused by a defective product.²⁶⁵ In the context of neurotechnologies, this means that the developer of a defective neurotechnological product may be held liable in tort law for any damages caused wholly or partially due to a defect in their product.

In addition to general products liability law, neurotechnologies are likely to fall within the remit of the European Medical Devices Regulation (MDR),²⁶⁶ which is directly applicable in Ireland and all other EU Member States. According to the MDR, a medical device is used for a medical purpose and used in a physical manner, as supposed to a pharmacological, immunological or metabolic manner.²⁶⁷ The MDR seeks to regulate devices intended for medical purposes, while also applying to certain explicitly identified groups of products without an intended medical purpose,²⁶⁸ such as “[e]quipment intended for brain stimulation”.²⁶⁹ The emergence of consumer-grade neurotechnological devices not used for neuromodulation or neurostimulation may challenge the extent to which the MDR is applicable.²⁷⁰ Nonetheless, if neurotechnologies are developed for both medical and non-medical purposes, such

²⁶⁰ *DPP v Ramzan* [2016] CCA 42/12, [31] (emphasis added).

²⁶¹ See, e.g., *C (N) v DPP* [2001] IESC 54, [2001] 7 JIC 0502.

²⁶² *C (N) v DPP* [2001] IESC 54, [2001] 7 JIC 0502.

²⁶³ *Oliver Bennett v John Codd and Wallace Taverns Ltd* [2020] IEHC 554, [2020] 11 JIC 0301.

²⁶⁴ Liability for Defective Products Act 1991, no. 28; Council Directive of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (85/374/EEC) (07.08.1985, OJ L210/29); *Product Liability and Safety in Ireland: Overview*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

²⁶⁵ Liability for Defective Products Act 1991, no. 28, schedule 1, article 1; *Product Liability and Safety in Ireland: Overview* / Thomson Reuters [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

²⁶⁶ Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (5.5.2017, OJ L117/1).

²⁶⁷ *Regulatory information / Health Products Regulatory Authority*, [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>.

²⁶⁸ Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (5.5.2017, OJ L117/1), Article 1(2).

²⁶⁹ *Ibid*, Annex XVI.

²⁷⁰ Ienca, M. et al. (2022) ‘Towards a Governance Framework for Brain Data’, *Neuroethics*, Vol.15:20. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

Gaps and challenges

The majority of the most widely used neurotechnologies, such as brain implants or EEG, are likely to fall within the purview of the European Medical Devices Regulation (MDR).²⁷³ This notwithstanding, consumer-grade neurotechnologies may create a need to update Annex XVI of the MDR, which lists the groups of devices without an intended medical purpose that still fall within the scope of the regulation.

4.1.3 The United States of America (USA)

Table 18: Overview of the US legal system

Characteristics	Details
Legislative arm	The United States Congress is the bicameral federal legislative body of the US government, consisting of an upper body, the Senate, and a lower body, the House of Representatives.
Constitutional governance	The U.S. Constitution establishes a federal republic consisting of the district of Columbia and fifty states, each of which has its own codified Constitution.
Sources of law	<ul style="list-style-type: none"> ○ The U.S. Constitution ○ Common law (case law) ○ Statute law, including: <ul style="list-style-type: none"> ○ Federal statutory law ○ State statutory law ○ International treaties (non-self-executing treaties require express incorporation through implementing legislation in order to be judicially enforceable).

²⁷³ Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (5.5.2017, OJ L117/1).

Current state of neurotechnologies in the US

Through the various programs carried out as part of the Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) initiative (elaborated further in *US policy on neurotechnologies* below), which involves partners such as the National Institute of Health (NIH), the U.S. Food and Drug Administration (FDA) and the U.S Department of Defense Advanced Research Projects Agency (DARPA), neurotechnologies are widely used for a variety of research and development (R&D) purposes. At the time of writing, the most significant advancements in neurotechnology relate to brain computer or brain-machine interfaces (BCI/BMI), a type of neurotechnological device enabling direct and occasionally bidirectional communication between the brain and an external computer-based system.²⁷⁴

Although most commercially available BCIs are non-invasive, most recent R&D efforts have increasingly focused on more invasive implanted BCIs, with Synchron recently announcing it had received FDA approval to conduct the first human clinical trial of such technology following the granting of \$10 million from the NIH Neural Interfaces Program,²⁷⁵ and Neuralink also seeking regulatory clearance from the FDA to begin human trials for its own brain chip implant.²⁷⁶ Whilst both are primarily intended to be used as medical devices to restore motor and other functions, as well as to treat neurological disorders, Neuralink has indicated its long-term strategy is to eventually make its BCIs more widely available to the general population.²⁷⁷ Paralleling this is the general and significantly increasing trend towards the use of and reliance upon neuroscientific evidence, both in the form of brain scans and expert testimony, for civil and, in particular, criminal legal proceedings.²⁷⁸

US policy on neurotechnologies

The centrepiece of U.S. policy in relation to neurotechnologies is the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative. Launched in 2013, it involves a collaborative partnership between public and private sector bodies, with funding for R&D activities provided by various federal governmental agencies. DARPA, for example, funds R&D programs into medical and military applications of neurotechnologies,²⁷⁹ thereby highlighting the emergence of so-called “dual-use” neurotechnology, while the FDA works with the developers of medical devices to ensure the transparency of the applicable regulatory framework and assist in the bringing of safe and effective products to market.²⁸⁰

Furthermore, as part of its role in overseeing the initiative, the NIH established a BRAIN Working Group of the Advisory Committee to the Director, NIH, whose report entitled “BRAIN 2025: A Scientific Vision” sets out a 10-year plan to achieve the seven main goals of the BRAIN initiative.²⁸¹ A follow-up report by the Working Group 2.0 at the midway point of the initiative in 2019 reviewed the progress made in relation to the strategic priorities laid down in the 2025 Report and identified opportunities for the

²⁷⁴ Saha, S. et al. (2021) ‘Progress in Brain Computer Interface: Challenges and Opportunities’, *Frontiers in Systems Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnsys.2021.578875>

²⁷⁵ Park, A. (2022) *Sci-fi no more: Synchron implants mind-reading device in first US patient in paralysis trial* / Fierce Biotech [Online]. Available at: <https://www.fiercebiotech.com/medtech/synchron-implants-brain-computer-interface-first-us-patient-paralysis-trial>

²⁷⁶ Levy, R. (2022) *Musk approaches brain chip start-up Synchron about deal amid Neuralink delays* / Reuters [Online]. Available at: <https://www.reuters.com/technology/musk-approaches-brain-chip-startup-synchron-about-deal-amid-neuralink-delays-2022-08-19/>

²⁷⁷ See, e.g., Neuralink (no date) *Applications* / [Online]. Available at: <https://neuralink.com/applications/>

²⁷⁸ Aono, D., Yaffe, G., and Kober, H. (2019) ‘Neuroscientific evidence in the courtroom: a review’, *Cognitive Research: Principles and Implications*, Vol.4:40. DOI: <https://doi.org/10.1186/s41235-019-0179-y>

²⁷⁹ See, e.g., *DARPA and the Brain Initiative* [Online]. Available at: <https://www.darpa.mil/program/our-research/darpa-and-the-brain-initiative>

²⁸⁰ *Food and Drug Administration & The BRAIN Initiative* / Food and Drug Administration [Online]. Available at: <https://www.braininitiative.org/alliance/food-and-drug-administration/>

²⁸¹ Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Working Group Report to the Advisory Committee to the Director, NIH. (2014) *Brain 2025 – A Scientific Vision*, p.5. Available at: https://braininitiative.nih.gov/sites/default/files/pdfs/brain2025_508c.pdf

second phase of the initiative.²⁸² One of the key overall aims of the BRAIN initiative is the closer integration between neuroscience and neuroethics, in accordance with which the BRAIN Neuroethics Subgroup has developed a Neuroethics Roadmap focusing on the “potential neuroethics implications of new tools and neurotechnologies and their use.”²⁸³

Paralleling this, at the level of civil society there exists the Neurorights Foundation, the primary aim of which is to advocate for the incorporation of five specific so-called “neurorights” into both binding international and national human rights law and other regulatory frameworks, as well as soft law mechanisms including ethical guidelines.²⁸⁴ Its work with national governments, as well as other civil society stakeholders in both the public and private sector, has been particularly influential in legislative reforms in the Republic of Chile (see Section 4.1.4 below).

Laws explicitly covering neurotechnologies

There are currently no known dedicated U.S. laws regulating neurotechnologies at the federal or state level. However, federal medical device legislation, such as the Federal Food, Drug, and Cosmetic Act (1938) (FD&C Act), the Medical Device Amendments to the FD&C Act (1976), and the 21st Century Cures Act (2016), is applicable to neurotechnologies classified as such. The FD&C Act (1938) is the primary statutory authority for the FDA’s regulatory oversight of medical devices,²⁸⁵ while the Medical Device Amendments to the FD&C Act (1976) creates a three-tiered risk-based classification system designed to ensure the safety and effectiveness of all medical devices intended for human use.²⁸⁶

For devices classified as Class III, there exists “insufficient information” that neither the general controls applicable to Class I devices, nor the performance standards applicable to Class II devices, “are sufficient to provide reasonable assurance of the safety and effectiveness of the device”, with the effect that such devices are subject to premarket approval requirements.²⁸⁷ A potential challenge here relates to direct-to-consumer neurotechnologies that purport to serve health-related purposes, such as improving cognition, but which do not claim to serve a clear therapeutic benefit, for which classification as low-risk devices that do not require FDA regulatory approval may represent a regulatory oversight.²⁸⁸ More recently, the 21st Century Cures Act has clarified the types of digital health technologies regulated as medical devices within the meaning of the legislation, specifically by excluding those with a software function intended, inter alia, for administrative support of a healthcare facility, the maintenance of a healthy lifestyle, or to serve as electronic patient records.²⁸⁹

Implications for human rights law

In accordance with the Supremacy Clause,²⁹⁰ one of the primary sources of human rights law is the U.S. Constitution. While the original text contains certain inalienable human rights protections, for instance the right to trial by jury,²⁹¹ the most significant have been enumerated in subsequent constitutional

²⁸² Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Working Group 2.0 Report to the Advisory Committee to the Director, NIH. (2019) *The Brain Initiative 2.0: From Cells to Circuits, Towards Cures*. Available at: https://braininitiative.nih.gov/sites/default/files/images/brain_2.0_6-6-19-final_revised10302019_508c.pdf

²⁸³ Advisory Committee to the Director Working Group on BRAIN 2.0 Neuroethics Subgroup. (2019) *The BRAIN Initiative and Neuroethics: Enabling and Enhancing Neuroscience Advances for Society*. Available at: https://braininitiative.nih.gov/sites/default/files/images/bns_roadmap_11_october_2019_sent_to_acd_for_oct_2019_revised_10282019_508c.pdf

²⁸⁴ *Mission* / The Neurorights Foundation [Online]. Available at: <https://neurorightsfoundation.org/mission>

²⁸⁵ 21 U.S.C §372.

²⁸⁶ *Ibid*, §360c.

²⁸⁷ *Ibid*, §360c(a)(1)(c).

²⁸⁸ Altimus, C., Helmers-Wegman, E. and Raver, S. (2021) Neurotechnology – A Giving Smarter Guide. *Milken Institute Center for Strategic Philanthropy*. Available at: <https://milkeninstitute.org/report/neurotechnology-giving-smarter-guide>

²⁸⁹ 21 U.S.C §360j(o)(1)(A)-(E).

²⁹⁰ U.S. Const. Art. VI.

²⁹¹ *Ibid*, Art.III§2.



amendments. The Bill of Rights (1791), for instance, comprises the first ten amendments to the U.S. Constitution and protects rights including the right to freedom of speech, press and peaceful assembly,²⁹² the right to be free from cruel and unusual punishment,²⁹³ and the extension of the right of trial by jury to civil law cases.²⁹⁴ Included within the Bill of Rights is the Ninth Amendment, which expresses the general principle that further human rights may emerge through judicial interpretation of the U.S. Constitution, with the U.S. Supreme Court variously relying upon this provision as well as the Due Process Clauses of the Fifth and Fourteenth Amendments,²⁹⁵ together with the Equal Protection Clause of the Fourteenth Amendment,²⁹⁶ as the basis for giving effect to certain unenumerated rights.²⁹⁷

Human rights protections are also located in federal legislation enacted by Congress, including the Civil Rights Act (1964),²⁹⁸ the Americans with Disabilities Act (1990),²⁹⁹ and the Genetic Information Non-discrimination Act (2008),³⁰⁰ as well as in international human rights law treaties that have been signed and ratified. This includes the International Covenant on Civil and Political Rights,³⁰¹ the International Convention on the Elimination of All Forms of Racial Discrimination,³⁰² the Convention against Torture and Other Cruel, Inhuman and Degrading Treatment or Punishment,³⁰³ and the Optional protocols to the Convention on the Rights of the Child.³⁰⁴ The U.S. has modified its obligations in relation to some of the international human rights treaties to which it is a State Party, however, by treating them as non-self-executing and exercising the reservation, understanding and declaration mechanism (RUDs), which informs the content, effect, interpretation and implementation of treaties so as not to interfere with comparable provisions of the U.S. Constitution.³⁰⁵

Key human rights challenges in relation to neurotechnologies in the US include the blurring of the real/testimonial evidence distinction pursuant to the Fifth Amendment privilege against self-incrimination, the adequate protection of individuals against discriminatory treatment based on their brain and other neural data, and the lack of clarity around the independence or interdependence of expression in the application of First Amendment protection to the right to freedom of thought.

Implications for privacy and data protection law

There is no explicit guarantee of the rights to privacy or data protection under the U.S. Constitution. In its case law, however, the U.S. Supreme Court has identified a number of unenumerated constitutional

²⁹² Ibid, Amend. I.

²⁹³ Ibid, Amend. VIII.

²⁹⁴ Ibid, Amend. VII.

²⁹⁵ Ibid, Amend. V, XIV.

²⁹⁶ Ibid, Amend. XIV.

²⁹⁷ Congressional Research Service. (2022) *Privacy Rights Under the Constitution: Procreation, Child Rearing, Contraception, Marriage, and Sexual Activity*. LSB10820. Available at:

<https://crsreports.congress.gov/product/pdf/LSB/LSB10820>

²⁹⁸ 42 U.S.C §2000d et seq.

²⁹⁹ Ibid, §12101-12213.

³⁰⁰ Ibid, §2000ff.

³⁰¹ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI).

³⁰² International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX).

³⁰³ Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (entry into force 26 June 1987) G.A. Res. A/RES/54/263.

³⁰⁴ Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution, and child pornography (entry into effect 18 January 2002) G.A. Res. A/RES/54/263; Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict (entry into effect 12 February 2002) G.A. Res. A/RES/54/263.

³⁰⁵ Congressional Research Service. (2022) *Reservations, Understandings, Declarations, and Other Conditions to Treaties*. IF12208. Available at: <https://crsreports.congress.gov/product/pdf/IF/IF12208>



protections for privacy interests rooted in, inter alia, the First Amendment,³⁰⁶ the Third Amendment protection of the privacy of the home against compulsory quartering of soldiers,³⁰⁷ and the Fourth Amendment “right of people to be secure in their persons, houses, papers, and effects, [and] against unreasonable searches and seizures”.³⁰⁸ The variety of constitutional safeguards for protecting against government interference with privacy interests,³⁰⁹ notwithstanding, the focus of these protections upon limiting governmental overreach highlights the lack of similar constitutional protections in relation to privacy violations caused by private parties.³¹⁰ Such rights are also unenumerated, meaning in exceptional circumstances the amendment of judicial precedent could lead to privacy protections being rolled back.³¹¹ The continuance of these constitutional safeguards, as well as their applicability to the various privacy risks associated with neurotechnologies, may therefore be subject to limitations.

Unlike the emerging trend of state legislatures enacting “omnibus” data privacy laws,³¹² there is no single, primary federal law which comprehensively regulates all aspects of the collection, storage and use of data in the public and private sector. Instead, there exists a patchwork of sector-specific federal data privacy laws, which may be interpreted to protect against interference with the brain and other neural data generated by neurotechnologies in certain specific contexts of use. Considering current and future neurotechnology use cases, federal data privacy laws with application to the healthcare,³¹³ education,³¹⁴ and entertainment³¹⁵ sectors are all likely to be applicable, with longstanding consumer protection laws offering extra protection against privacy intrusions perpetuated by unfair and deceptive commercial practices.³¹⁶

The primary federal consumer protection statute, the Federal Trade Commission Act (1914), for example, establishes the U.S. Federal Trade Commission (FTC),³¹⁷ which is authorised to initiate law enforcement action against individuals and/or organisations that breach the prohibition on unfair or deceptive acts or practices in or affecting commerce.³¹⁸ The broad remit of this statutory power extends to bringing legal proceedings against companies that violate consumer data privacy rights, or that fail to maintain adequate security procedures for sensitive consumer information.³¹⁹ In 2015, for example, the FTC brought enforcement action against and eventually settled with Carrot Neurotechnology, Inc.,

³⁰⁶ U.S. Const. Amend. I; See, e.g., *NAACP v. Alabama*, 357 U.S. 449 (1958).

³⁰⁷ U.S. Const. Amend. III; See, e.g., *Griswold v. Connecticut*, 381 U.S. 479 (1965).

³⁰⁸ U.S. Const. Amend. IV.

³⁰⁹ Swire, P. and Kennedy-Mayo, D. (2017) ‘How Both the EU and the U.S. are “Stricter” Than Each Other for the Privacy of Government Requests for Information’, *Emory Law Journal*, Vol.66:3, pp.617-667. Available at: <https://scholarlycommons.law.emory.edu/elj/vol66/iss3/5>

³¹⁰ Krishnamurthy, V. (2020) ‘A Tale of Two Privacy Laws: The GDPR and the International Right to Privacy’, *American Journal of International Law*, Vol.114, pp.26-30, p.29. DOI: <https://doi.org/10.1017/ajl.2019.79>

³¹¹ See, e.g., *Dobbs v. Jackson Women’s Health Organisation*, 597 U.S. (2022), in which the US Supreme Court overruled its jurisprudence on the right to obtain an abortion as protected by the right to privacy.

³¹² Schwartz, P.M. and Nikolaus-Peifer, K. (2017) ‘Transatlantic Data Privacy Law’, *The Georgetown Law Journal*, Vol.106:1, pp.115-179. Available at: <https://www.law.georgetown.edu/georgetown-law-journal/in-print/volume-106/volume-106-issue-1-november-2017/transatlantic-data-privacy-law/>

³¹³ Health Insurance Portability and Accountability Act of 1996, Pub. L. 104-19.

³¹⁴ Family Education Rights and Privacy Act of 1974, Pub. L. 90-247.

³¹⁵ Children’s Online Privacy Protection Act of 1998, Pub. L. 105-277.

³¹⁶ Krishnamurthy, V. (2020) ‘A Tale of Two Privacy Laws: The GDPR and the International Right to Privacy’, *American Journal of International Law*, Vol.114, pp.26-30, p.29. DOI: <https://doi.org/10.1017/ajl.2019.79>

³¹⁷ 15 U.S.C §41-58.

³¹⁸ *Ibid*, §45.

³¹⁹ Federal Trade Commission. (no date) *Privacy and Security Enforcement* / [Online]. Available at: <https://www.ftc.gov/news-events/topics/protecting-consumer-privacy-security/privacy-security-enforcement>

which it accused of making deceptive health-related claims relating to improvements in vision resulting from the use of a software application marketed by the accused.³²⁰

Implications for use in legal proceedings

Neuroscientific evidence in the form of brain scans or expert testimony could be introduced in court to prove or disprove a disputed fact. Neuroscientific evidence may be used for a variety of purposes and at various stages in both civil and criminal justice systems, including in the initial phase to assess competency to stand trial,³²¹ at the guilt phase to determine criminal culpability, including that of adolescents,³²² and at the sentencing phase in mitigation,³²³ particularly in death penalty trials.³²⁴ Other potential current and future applications of neurotechnologies in the courtroom include assessing jury (or judicial) bias,³²⁵ eliciting memories,³²⁶ and predicting recidivism.³²⁷

Rules of evidence determine how items and information can be admitted as evidence before a court. Evidential law at the federal level is heavily informed by the trilogy of landmark U.S. Supreme Court cases handed down in the 1990s,³²⁸ the particular relevance of which is in the establishment of a general framework by which courts may determine the admissibility of expert testimony, including that which relates to neuroscientific evidence.³²⁹ An early indication of how U.S. federal courts might treat neuroscientific evidence can be understood from *United States v. Semrau*, in which the court ruled that the exclusion by the District Court of functional magnetic resonance imaging (fMRI) lie detection results relied upon by the defendant as proof of his innocence was not an abuse of court discretion.³³⁰ Whilst indicative, the lie detection results were proffered at the liability/guilt stage, whereas in comparison the sentencing phase may be more conducive to the admissibility of neuroscientific evidence,³³¹ as indicated by *Florida v. Grady Nelson*, in which the admission of qEEG brain mapping evidence at this stage contributed to the defendant in a homicide case avoiding the death penalty.³³²

³²⁰ Federal Trade Commission. (2015) *FTC Charges Marketers of 'Vision Improvement' App With Deceptive Claims* / Press Release [Online]. Available at: <https://www.ftc.gov/news-events/news/press-releases/2015/09/ftc-charges-marketers-vision-improvement-app-deceptive-claims>

³²¹ See, e.g., Perlin, M.L. and Lynch, A.J. (2018) "'My Brain is So Wired': Neuroimaging's role in competency cases involving persons with mental disabilities', *Boston University Public Interest Law Journal*, Vol.27:1, pp.73-98. Available at: https://digitalcommons.nyls.edu/fac_articles_chapters/1093/

³²² See, e.g., Steinberg, L. (2013) 'The influence of neuroscience on US Supreme Court decisions about adolescents' criminal culpability', *Nature Review Neuroscience*, Vol.14, pp.513-518. DOI: <https://doi.org/10.1038/nrn3509>

³²³ See, e.g., Du, Y. (2020) 'The Application of Neuroscience Evidence on Court Sentencing Decisions: Suggesting a Guideline for Neuro-Evidence', *Seattle Journal for Social Justice*, Vol.18:2, pp.493-524. Available at: <https://digitalcommons.law.seattleu.edu/sjsj/vol18/iss2/19>

³²⁴ Denno, D.W. (2015) 'The Myth of the Double-Edged Sword: An Empirical Study of Neuroscience Evidence in Criminal Cases', *Boston College Law Review*, Vol.56:2, pp.493-551. Available at: https://ir.lawnet.fordham.edu/faculty_scholarship/548

³²⁵ See generally, Jolly, R.L. (2019) 'The New Impartial Jury Mandate', *Michigan Law Review*, Vol.117:4, pp.713-760. DOI: <https://doi.org/10.36644/mlr.117.4.new>

³²⁶ Roelfsema, P.R., Denys, D. and Klink, P.C. (2018) 'Mind Reading and Writing: The Future of Neurotechnology', *Trends in Cognitive Sciences*, Vol.22:7, pp.598-610. DOI: <https://doi.org/10.1016/j.tics.2018.04.001>

³²⁷ See, e.g., Lamparello, A. (2011) 'Using Cognitive Neuroscience to Predict Future Dangerousness', *Columbia Human Rights Law Review*, Vol.41:2, pp.481-539. Available at: <https://ssrn.com/abstract=1742940>

³²⁸ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993); *General Electric Co. v. Joiner*, 552 U.S. 136 (1997); *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

³²⁹ Kraft, C.J. and Giordano, J. (2017) 'Integrating Brain Science and Law: Neuroscientific Evidence and Legal Perspectives on Protecting Individual Liberties', *Frontiers in Neuroscience*, Vol.11. DOI: <https://doi.org/10.3389/fnins.2017.00621>

³³⁰ *United States v. Semrau*, 693 F.3d 510 (6th Cir.) (2012).

³³¹ *Ibid.*

³³² *Florida v. Grady Nelson*, No.FO5-00846 (11th Fla. Cir. Ct., 4 Dec 2010).

Jury trials are a constitutionally enshrined right in the United States for criminal and some civil defendants,³³³ a fundamental element of the right to due process underpinning which is that the jury must be impartial, meaning the “jurors must lack specific bias against the parties.”³³⁴ Neurotechnologies could be used to help courts assess juror bias, with some neuroscientists believing that brain imaging might better uncover “whether jurors are lying, even to themselves, about the influences that affect the way they think and the decisions they make,”³³⁵ an approach one legal scholar has termed “*neuro-voir dire*.”³³⁶ There are no known examples of this happening in courtrooms yet, but there are no rules explicitly prohibiting the use of neurotechnologies for this purpose. Critics of this proposal, however, point to concerns around accuracy, high costs and other logistical challenges at least in the short-term, as well as more fundamental considerations related to the right to privacy of jurors, specifically the risk that neurotechnology could bypass protections against enforced disclosure of personal information.³³⁷

An additional potential use of neurotechnologies is to help assess competency to stand for trial (CST or trial competency), which is the most frequent “disability law” issue in criminal law.³³⁸ While the Federal Rules on Criminal Procedure and Federal Rules on Evidence do not explicitly discuss neurotechnologies and competency assessments, judges have interpreted the rules to allow neuroscientific evidence in court for this purpose. In *United States v. Kasim* (2008),³³⁹ for instance, the admission of neuroimaging evidence contributed to a finding of incompetence. However, as above, there remains reservations related to the accuracy and reliability of neurotechnology used for this purpose, as well as the difficulties of bridging the gap between neuroscience and the law, and the more theoretical issue of whether this specific use of neuroscientific evidence is consistent with the fulfilment of human dignity.

Implications for liability for harms

At the federal level, there is no general statute on tort law. Instead, most tort law is state-based. Whilst this gives scope for variation between states, some basic uniformity is derived from one of the primary sources of U.S. tort law being the common law, with judges often having regard to relevant judgements handed down in other states and in federal courts, as well as consulting the non-binding but strongly persuasive uniform tort rules set out in the Restatement of Torts published by the American Law Institute (ALI).³⁴⁰ Amongst its treatises, perhaps most relevant to the liabilities arising in relation to neurotechnologies is the Restatement (Third) of Torts: Products Liability (1998), which outlines the general rules of tort liability applicable to commercial sellers or distributors for harm caused by defective products.³⁴¹ Also potentially relevant to neurotechnologies, particularly those devices used to enable XR applications that blur the public/private distinction, is the privacy tort of intrusion upon seclusion, for which the Restatement (Second) of Torts provides that “One who intentionally intrudes, physically or otherwise, upon the solitude or seclusion of another or his private affairs or concerns, is subject to liability to the other for invasion of his privacy, if the intrusion would be highly offensive to a reasonable person.”³⁴²

³³³ U.S. Const. Amend. VI, VII.

³³⁴ Jolly, R.L. (2019) ‘The New Impartial Jury Mandate’, *Michigan Law Review* 117(4), p714. DOI: <https://doi.org/10.36644/mlr.117.4.new>

³³⁵ Fox, D. (2014) ‘Neuro-Voir Dire and the Architecture of Bias’, *Hastings Law Journal*, Vol. 65:4, p1014. Available at: https://repository.uchastings.edu/hastings_law_journal/vol65/iss4/2

³³⁶ Greely, H.T. (2009) ‘Law and the Revolution in Neuroscience: An Early Look at the Field’, *Akron Law Review* 42(3), p697.

³³⁷ Fox, D. (2014) ‘Neuro-Voir Dire and the Architecture of Bias’, *Hastings Law Journal*, Vol. 65:4, p1014. Available at: https://repository.uchastings.edu/hastings_law_journal/vol65/iss4/2

³³⁸ Perlin, M.L. and Lynch, A.J. (2018) ‘“My Brain Is So Wired”: Neuroimaging’s Role in Competency Cases Involving Persons with Mental Disabilities’, *Public Interest Law Journal*, 27, p75.

³³⁹ *United States v. Kasim*, No. 2:07 CR 56 (N.D. Ind. Nov. 3, 2008).

³⁴⁰ Ibid, p.103-104; See, e.g., Restatement (Second) of Torts (1965); Restatement (Third) of Torts: Products Liability (1998); Restatement (Third) of Torts: Apportionment of Liability (2000); Restatement (Third) of Torts: Liability for Physical and Emotional Harm (2010).

³⁴¹ Restatement (Third) of Torts §1.

³⁴² Restatement (Second) of Torts §652B.

Like tort law, most contract law in the U.S. is located at the state level, with each state having its own rules regulating contracts involving the sale of goods. The fundamental aspects of contract law are outlined in the Restatement (Second) of the Law of Contracts published by the ALI, which defines a contract as “a promise or a set of promises for the breach of which the law gives a remedy, or the performance of which the law in some way recognises as a duty.”³⁴³ Furthermore, whilst not federal law, the Uniform Commercial Code (UCC) provides a comprehensive framework governing all commercial transactions in the U.S., including contractual arrangements relating to the sale of goods,³⁴⁴ which has been adopted uniformly across all states.³⁴⁵

At the federal level, Congress has codified federal criminal law in Title 18 of the U.S. Code.³⁴⁶ There is scope for variation between the federal and state level, however, since each state has a criminal code which determines the offences subject to criminalisation in that jurisdiction. The overall trend towards the increased integration of neurotechnologies into daily life, as indicated by the growing availability of consumer-grade devices and applications, gives rise to various considerations in relation to the application of criminal law doctrine, including whether and if so how neurotechnological interventions may affect existing understanding of essential ethical-legal concepts, such as criminal responsibility.³⁴⁷

Gaps and challenges

Firstly, the U.S. Congress has addressed some of the risks posed by genomic technologies to the adequate protection of genetic data through the enactment of the Genetic Information Non-discrimination Act (GINA) (2008).³⁴⁸ Within the legal scholarly discourse two possible regulatory solutions to better protect individuals’ rights to privacy and non-discrimination in the context of neurotechnologies have been proposed, namely: the extension of the remit of GINA to include brain and other neural data, or the enactment by Congress of an equivalent federal regulatory framework addressing the various harmful risks associated with the misuse and unintended use of such data.³⁴⁹

Secondly, and following the nascent trend towards state legislatures enacting omnibus data privacy laws, the enactment of comprehensive federal data privacy legislation may serve the dual purpose of offering more direct, robust and comprehensive protection of individuals’ data privacy, while also reducing the burden of regulatory compliance for the private sector by pre-empting relevant state law and establishing uniformity in the application of federal standards across all states.

Finally, factors that may affect more widespread use and acceptance of neuroscientific evidence in legal proceedings include the rules on admissibility of evidence, costs and other practical constraints, the legal system (i.e., whether civil or criminal), the stage at which the evidence is proffered (e.g., guilt/liability stage and/or sentencing), and the purpose behind its admission (e.g., in plea/mitigation).

4.1.4 Noteworthy international approaches

Internationally, various nation states and supranational organisations provide funding to neuroscientific and neurotechnological research and development (R&D) initiatives. Launched in 2013, the Human Brain

³⁴³ Restatement (Second) of Contracts §1.

³⁴⁴ U.C.C. §2.

³⁴⁵ National Conference of Commissioners on United State Laws. (no date) *Uniform Commercial Code / Uniform Law Commission* [Online]. Available at: <https://www.uniformlaws.org/acts/ucc>

³⁴⁶ 18 U.S.C.

³⁴⁷ See generally, Thompson, K. (2019) ‘Committing Crimes with BCIs: How Brain-Computer Interface Users can Satisfy Actus Reus and be Criminally Responsible’, *Neuroethics*, Vol.14, pp.311-322. DOI: <https://doi.org/10.1007/s12152-019-09416-5>; Müller, O. and Rotter, S. (2017) ‘Neurotechnology: Current Developments and Ethical Issues’, *Frontiers in Systems Neuroscience*, Vol.11. DOI: <https://doi.org/10.3389%2Ffnsys.2017.00093>

³⁴⁸ 42 U.S.C §1320d-9.

³⁴⁹ Jwa, A.S. and Poldrack, R.A. (2022) ‘Addressing privacy risk in neuroscience data: from data protection to harm prevention’, *Journal of Law and the Biosciences*, Vol.9:2, pp.1-25. DOI: <https://doi.org/10.1093/jlb/lisac025>



Project (HBP), for instance, is one of the EU's flagship research programs, the aim of which is to create a fully computerised simulation of the human brain.³⁵⁰ In conjunction with the U.S. BRAIN initiative, which was launched around the same time (see Section 3.2.3 above), the HBP has stimulated similar initiatives in various other nation states, including China,³⁵¹ Canada,³⁵² Japan,³⁵³ South Korea,³⁵⁴ and Australia.³⁵⁵ Each of these states is also a member nation of the International Brain Initiative (IBI), the broad aims of which include for representatives to combine research efforts, establish data sharing mechanisms, and "to collaborate in the fields of neuro-ethics, agency, responsible data stewardship and cerebral privacy protection."³⁵⁶

The Republic of Chile became the first state to directly address through legal regulation some of the harmful risks posed to human rights by emerging neurotechnologies. In October 2021, the president signed into law a constitutional amendment to "[t]he right to life and to the physical and mental integrity of the person" under Article 19,³⁵⁷ which now affirms that "[s]cientific and technological development will be at the service of people and will be carried out with respect for life and physical and psychological integrity."³⁵⁸ It further provides that "[t]he law will regulate the requirements, conditions and restrictions for their use in people, and must especially protect brain activity, as well as the information from it."³⁵⁹ To implement Article 19 and other related "neurorights", including personal integrity, mental privacy and equal access to enhancing neurotechnologies, the Chilean legislature is in the process of considering a further proposed bill for the protection of neurorights.³⁶⁰

This legal development can be situated within the context of the scholarly and increasingly mainstream debate surrounding proposed "neurorights",³⁶¹ the term attributed to the cluster of putative neuro-specific human rights protections advocated by a number of leading scholars, whose central contention is that the existing human rights law framework is insufficiently equipped to respond to the emerging challenges posed by neurotechnologies.³⁶² Ienca and Andorno, for instance, have contended that "the possibilities opened up by neurotechnological developments and their application to various aspects of human life will force a reconceptualization of certain human rights, or even the creation of new rights

³⁵⁰ Banks, M. (2013) *The one billion euro brain* / Horizon, the EU Research and Innovation magazine [Online]. Available at: <https://ec.europa.eu/research-and-innovation/en/horizon-magazine/one-billion-euro-brain>

³⁵¹ Cyranoski, R. (2018) 'Beijing launches pioneering brain-science centre', *Nature*, Vol.556, pp.157-58. DOI: <https://doi.org/10.1038/d41586-018-04122-3>

³⁵² The Canadian Brain Research Strategy. Available at: <https://canadianbrain.ca/mission-vision/>

³⁵³ The Brain Mapping by Integrated Neurotechnologies for Disease Studies (Brain/MINDS) project. Available at: <https://brainminds.jp/en/overview/objectives>

³⁵⁴ The Korea Brain Initiative. (no date) Available at: http://kbri.re.kr/new/pages_eng/sub/page.html?mc=3186

³⁵⁵ Australian Brain Alliance. (no date) *An Australian Brain Initiative: Our Vision*. Available at: <https://www.brainalliance.org.au/wp-content/uploads/2017/11/ABI-Vision-1.pdf>

³⁵⁶ International Brain Initiative (2017). *Declaration of Intent to Create an International Brain Initiative*. Available at: <https://www.internationalbraininitiative.org/sites/default/files/files/IBI%20Declaration%20of%20Intent%202017.pdf>

³⁵⁷ Constitution of the Republic of Chile, 1925 (as Amended), Article 19.

³⁵⁸ Law 21.383, "Modifies the Fundamental Charter to Establish Scientific and Technological Development at the Service of People". Available at: <https://www.bcn.cl/leychile/navegar?idNorma=1166983&idParte=10278855&idVersion=2021-10-25>

³⁵⁹ Ibid.

³⁶⁰ Rommelfanger, K.S., Pustilnik, A. and Salles, A. (2022) 'Mind the Gap: Lessons Learned from Neurorights', *Science and Diplomacy*. DOI: <https://doi.org/10.1126/scidip.ade6797>

³⁶¹ McCay, A. (2022) 'Neurorights: the Chilean constitutional change', *AI & Society*. DOI: <https://doi.org/10.1007/s00146-022-01396-0>

³⁶² See, e.g., Yuste, R. et al. (2017) 'Four ethical principles for neurotechnologies and AI', *Nature*, Vol.55, pp.159-163. DOI: <https://doi.org/10.1038/551159a>

to protect people from potential harm.”³⁶³ Both they and Yuste et al have been vocal proponents of the right to mental integrity and psychological continuity amongst the range of proposed neurorights (see Section 4.2.4 below),³⁶⁴ with the latter’s advocacy to and close collaboration with the Senate of the Republic of Chile, as well as the Minister of Science and Catholic University,³⁶⁵ greatly influencing the identified actual and proposed legislative reforms.³⁶⁶

Preceding the Chilean example, in July 2021 Spain introduced the *Carta de Derechos Digitales* (Charter of Digital Rights), in which it is affirmed that the various “fundamental rights and freedoms recognised in the Spanish Constitution, in the Universal Declaration of Human Rights, in the Charter of Fundamental Rights of the European Union and in the international treaties and covenants on the same matters ratified by Spain are guaranteed in the digital environment or space.”³⁶⁷ Digital rights in the use of neurotechnologies are addressed in Article XXIV, which states that neurotechnologies shall be regulated by law, for the purpose of:

- (a) Preserving individual identity as a person’s sense of self.
- (b) Guaranteeing individual self-determination, sovereignty, and freedom in decision-making.
- (c) Safeguarding the confidentiality and security of data obtained or regarding their brain processes, and full control over them.
- (d) Regulating the use of human-machine interfaces which could affect physical or psychological integrity; and
- (e) Ensuring that decisions and processes based on neurotechnologies are not conditioned by the provision of data, programs, or information that are incomplete, undesired, unknown, or biased, or by interference with neuronal connections.³⁶⁸

Additionally, in accordance with the protection of dignity, equality, and non-discrimination, it is provided that the law is to regulate “the use of neurotechnologies, which beyond their therapeutic application, are aimed at mental augmentation or the stimulation or enhancement of human capabilities.”³⁶⁹ Whilst not legally binding, this soft law model is intended to be used as a frame of reference for future legislative proposals.³⁷⁰

From this brief overview of some of the noteworthy international approaches to neurotechnology, it appears that a separation can be made between the adoption of neuro-related initiatives, on the one hand, and active efforts to establish specific legal regulation directly addressing the harms and challenges associated with neurotechnologies on the other hand. At the state level, the member nations of the IBI, for instance, are the clear frontrunners in neurotechnological and neuroscientific R&D efforts.³⁷¹ Yet, it is notable that the policy initiatives adopted by these nation states have not been

³⁶³ Ienca, M. and Andorno, R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>

³⁶⁴ See, e.g., Yuste, R., Genser, J. and Herrman, S. (2021) ‘It’s Time for Neuro-Rights’, *Horizons*, 18, pp.154-164. Available at: <https://www.cirsd.org/en/horizons/horizons-winter-2021-issue-no-18/its-time-for-neuro-rights>

³⁶⁵ *NeuroRights in Chile* / The Neurorights Foundation [Online]. Available at: <https://neurorightsfoundation.org/chile>

³⁶⁶ Ienca, M. (2021) ‘On Neurorights’, *Frontiers in Human Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnhum.2021.701258>

³⁶⁷ Charter of Digital Rights, Article I (1).

³⁶⁸ Ibid Article XXIV.

³⁶⁹ Ibid.

³⁷⁰ Carbonell, E.M. ‘The Regulation of Neuro-Rights’, *European Review of Digital Administration & Law*, Vol.2:2, pp.149-162. DOI: 10.53136/979125994752914.

³⁷¹ See generally, Abbott, A. (2021) ‘How the world’s biggest brain maps could transform neuroscience’, *Nature*, Vol.598, pp.22-25. DOI: <https://doi.org/10.1038/d41586-021-02661-w>



paralleled by proposed or actual legal reforms, whether through binding law or soft law, as has been the case in the Federal Republic of Chile and Spain. Based on the Chilean example, it has been suggested that if such substantive legal reforms are to serve as a blueprint or framework for the governance of harms relating to neurotechnologies in other national and international legal systems, it will be necessary to achieve greater clarity around the ongoing conceptual, philosophical and stakeholder engagement issues associated with the “neurorights” phenomenon.³⁷²

4.2 Neurotechnology-specific regulatory challenges

The national legal case studies on Germany, Ireland and the USA, in conjunction with the noteworthy international approaches outlined in Section 4.1 (above), have highlighted the various synergistic and antagonistic approaches to regulation of neurotechnologies in different jurisdictions. This section presents a commentary of the main gaps and challenges in existing regulation based on the analysis set out in the national legal case studies.

4.2.1 Regulating consumer and other emerging neurotechnology applications

Unlike the focus of climate engineering debates on *whether* the use of such technologies (in particular SRM) should be permitted or restricted (see Section 3.2.1), the foregoing analysis of neurotechnologies, indicates that the primary issue in legal and policy debates on neurotechnologies instead relates to the question of *how* best to regulate and govern the use, misuse and unintended of such technologies. In this context, the main challenge is the anticipated inflection point induced by the proliferation of research and development initiatives (R&D) focusing on novel applications of neurotechnologies, including consumer-facing and “dual-use” neurotechnologies, which for present purposes can be defined as devices used for both civilian and military applications,³⁷³ for which existing legal regulation may not or only in a limited way be applicable.

On this, both historically and currently, the primary use case of neurotechnologies is in biomedical and clinical contexts for treatment and research purposes, in relation to which medical device regulations are generally applicable. In the EU Member States of Germany and Ireland, for instance, both Regulation 2017/45 on Medical Devices (MDR) and Regulation 2017/746 on *In-Vitro* Diagnostic Devices (IVDR) regulate devices intended for medical purposes,³⁷⁴ while in the US there are various pieces of federal medical device legislation applicable to neurotechnologies classified as such, including the Federal Food, Drug, and Cosmetic Act (1938) (FD&C Act),³⁷⁵ the Medical Device Amendments to the FD&C Act (1976),³⁷⁶ and the 21st Century Cures Act (2016).³⁷⁷

Yet, whilst this is likely to remain the primary area for R&D, at least in the short-term, the U.S. national legal case study in particular highlights the emergence of military uses of neurotechnologies (e.g.,

³⁷² Rommelfanger, K.S., Pustilnik, A. and Salles, A. (2022) ‘Mind the Gap: Lessons Learned from Neurorights’, *Science and Diplomacy*. DOI: <https://doi.org/10.1126/scidip.ade6797>

³⁷³ European Commission. (2020) *Guidance note – Research with an exclusive focus on civil applications*. Available at: https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/guide_research-civil-apps_en.pdf

³⁷⁴ Regulation (EU) 2017/45 of the European Parliament and of the Council of 5 April 2017 on Medical Devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directive 90/385/EEC and 93/42/EEC, (OJ L 117, p. 1); Regulation (EU) 2017/746 of the European Parliament and of the Council of 5 April 2017 on in vitro diagnostic medical devices and repealing Directive 98/79/EC and Commission Decision 2010/227/EU, (OJ L 117, p. 176); *Regulatory Information* / HPRA [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>.

³⁷⁵ 21 U.S.C §372.

³⁷⁶ Ibid, §360c.

³⁷⁷ Ibid, §360c(a)(1)(c).

DARPA N³ program),³⁷⁸ as well as the efforts by information technology companies in the private sector to gain regulatory approval for invasive neurotechnological devices ultimately intended for consumer-related use (e.g., Neuralink's integrated BCI).³⁷⁹ Without express inclusion, however, such applications may fall outside the purview of existing medical device regulation, thereby risking the creation of a regulatory loophole. The EU Medical Devices Regulation, for instance, identifies a range of products without an intended medical purpose that are still subject to the regulation, including most applicably "[e]quipment intended for brain stimulation",³⁸⁰ but effectively excludes from its purview neurotechnological devices not used for the purposes of neurostimulation and neuromodulation, prospectively including those marketed for wellness, relaxation or other health-related but non-medical purposes.³⁸¹ As such, there may be a need for regulators to consider implementing neuro-specific updates to existing medical device regulation,³⁸² as well as international weapons conventions,³⁸³ in order to ensure more effective regulation of ever-increasing consumer and dual use neurotechnology.

4.2.2 Privacy and protection of brain and other neural data

In addition to regulating consumer and dual use neurotechnologies, an additional area of focus for potential regulatory reforms should be upon clarifying the status and ensuring the sufficient privacy and adequate protection of brain and other neural data generated through the use of neurotechnologies. The U.S. approach to data privacy at the federal level outlined in Section 4.1.3 is characterised by narrow, consumer-focused, sector-specific data privacy laws and the absence of an equivalent right to data protection.³⁸⁴ This diverges substantively from the comprehensive, fundamental rights-focused data protection regime followed by the EU and its Member States, including Germany and Ireland. Indeed, in comparison, the patchwork of U.S. data privacy laws covers only limited context-specific uses of brain and other neural data, such as healthcare,³⁸⁵ thereby rendering individuals vulnerable to and without protection against the misuse and unintended use of such data in other unregulated areas. Reflecting upon the specific legal challenges posed by neurotechnologies and neuroscience for the right to privacy and the protection of brain and other neural data in the Americas, the Inter-American Juridical Committee, for instance, has observed that

it is of concern that adequate guarantees have not been developed to ensure that the neural information obtained for medical and scientific research purposes is used only for that purpose, limiting the application of decoding techniques that would allow a person to be identified or to become identifiable and, as a consequence of transgressing those boundaries, violate the deepest sanctuary of his/her mental privacy.³⁸⁶

³⁷⁸ See, e.g., Sarma, G. (no date) *Next-Generational Nonsurgical Neurotechnology* / DARPA [Online]. Available at: <https://www.darpa.mil/program/next-generation-nonsurgical-neurotechnology>

³⁷⁹ See, e.g., Musk, E. and Neuralink. (2019) 'An Integrated Brain-Machine Interface Platform With Thousands of Channels', *Journal of Medical Internet Research*, 21(10). DOI: <https://doi.org/10.2196/16194>

³⁸⁰ Regulation (EU) 2017/45 of the European Parliament and of the Council of 5 April 2017 on Medical Devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directive 90/385/EEC and 93/42/EEC, (OJ L 117), Annex XVI.

³⁸¹ Ienca, M. and Malgieri, G. (2022) 'Mental data protection and the GDPR', *Journal of Law and the Biosciences*, Vol.9:1, pp.1-19. DOI: <https://doi.org/10.1093/jlb/lisac006>

³⁸² Ienca, M. et al. (2022) 'Towards a Governance Framework for Brain Data', *Neuroethics*, Vol.15:20. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

³⁸³ Ienca, M., Jotterand, F. and Elger, B.S. (2018) 'From Healthcare to Warfare and Reverse: How Should We Regulate Dual-Use Neurotechnology?', *Neuron: NeuroView*, Vol.97:2, pp.269-274. DOI: <https://doi.org/10.1016/j.neuron.2017.12.017>

³⁸⁴ See generally, Chander, A. Kaminski, M.E. and McGeeveran, W. (2021) 'Catalysing Privacy Law', *Minnesota Law Review*, Vol.15, pp.1733-1802, pp.1747-56. Available at: <https://scholar.law.colorado.edu/faculty-articles/1336>

³⁸⁵ Health Insurance Portability and Accountability Act of 1996, Pub. L. 104-19.

³⁸⁶ Declaration of the Inter-American Juridical Committee on Neuroscience, Neurotechnologies and Human Rights: New Legal Challenges for the Americas CJI/DEC.01(XCIX-0/21), p.3. Available at: http://www.oas.org/en/sla/iajc/docs/CJI-DEC_01_XCIX-O-21_ENG.pdf

Comparatively, as indicated above, the privacy and protection of brain and other neural data in the EU Member States of Germany and Ireland is more robust. Within the comprehensive regulatory framework of the GDPR, as applicable in all EU Member States, brain and other neural data generated in neurotechnologies should be *prima facie* classified as personal data.³⁸⁷ Furthermore, in relation to specific use cases, the brain and other neural data collected and processed in the majority of medical neurotechnologies is likely to constitute “data concerning health” because it can be used to infer “the physical or mental health in a natural person”,³⁸⁸ while recordings of brain and other neural data in emerging consumer neurotechnologies may also in certain circumstances qualify as health data, or instead, if sufficient, as “biometric data for the purpose of uniquely identifying a natural person”.³⁸⁹

Nonetheless, it is notable that brain and other neural data (or any other terminological variation thereof) are not listed as a specific type of data within the special categories of personal data safeguarded by the conditional prohibition on processing under Article 9,³⁹⁰ with such data only protected as sensitive data to the extent that there is an overlap with one of the other types of data listed in the provision. In practice, this may lead to various potentially significant gaps in protection. By way of example, brain and other neural data may be treated as biometric data if sufficient to identify an individual, but this protection may not extend to the inferences that can be drawn in relation an individual’s interests or preferences, which data controllers or processors may seek to use and commodify in order to exert influence over an individual’s commercial (e.g., neuromarketing),³⁹¹ social or any other marketable behaviour.³⁹² Similarly, as outlined in Section 4.2.1, there is the risk that emerging consumer neurotechnologies fall outside the scope of medical device regulation regimes, with the effect that in relation to the GDPR the brain and other neural data processed and generated in such devices may not be recorded for health-related purposes, and as such may not be protected as special category personal data in the form of “data concerning health”.³⁹³ For these reasons, there may be a need to recognise and protect brain data as a special category of personal data within the GDPR.³⁹⁴

4.2.3 Neurodiscrimination and neuroenhancement

Whilst neurotechnologies pose a number of challenges to human rights protections, the majority of international and national human rights law, including in each of the three national legal case studies outlined above, does not contain specific reference to either neurotechnologies or neuroscience more generally. One particular challenge, likely exacerbated by the growth in the availability of consumer neurotechnologies, relates to the right to non-discrimination, with neurotechnologies creating a risk of “neurodiscrimination”, whereby brain and other neural data provides insights into mental health status, or cognitive performance, which may lead to differential treatment in various socio-economic contexts, including employment and insurance.³⁹⁵ In considering possible regulatory reforms, the US Genetic

³⁸⁷ Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

³⁸⁸ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Article 4(15).

³⁸⁹ Ibid, Article 9(1).

³⁹⁰ Ibid Article 9(1)-(2).

³⁹¹ See, e.g., Vences, N.A., Diaz-Campo, J., and Garcia Rosales, D.F. (2020) ‘Neuromarketing as an Emotional Connection Tool Between Organisations and Audiences in Social Networks. A Theoretical Review’, *Frontiers in Psychology*, Vol.11. DOI: <https://doi.org/10.3389/fpsyg.2020.01787>

³⁹² Rommelfanger, K.S., Pustilnik, A. and Salles, A. (2022) ‘Mind the Gap: Lessons Learned from Neurorights’, *Science and Diplomacy*. DOI: <https://doi.org/10.1126/scidip.ade6797>

³⁹³ Rainey, S. et al. (2020) ‘Is the European Data Protection Regulation sufficient to deal with emerging data concerns relating to neurotechnology?’, *Journal of Law and the Biosciences*, Vol.7:1, pp1-19. DOI: <https://doi.org/10.1093/jlb/lcaa051>

³⁹⁴ Ienca, M. et al. (2022) ‘Towards a Governance Framework for Brain Data’, *Neuroethics*, Vol.15:20. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

³⁹⁵ Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe. Available at: <https://rm.coe.int/report-final-en/1680a429f3>



Information Non-discrimination Act (2008),³⁹⁶ as well as the Council of Europe Oviedo Convention,³⁹⁷ both of which prohibit discrimination on the basis of genetic information, could be expanded to include a specific provision to safeguard against the risk of neurodiscrimination, or otherwise be used as a framework on which to model comparable restrictions on the misuse of brain and other neural data.³⁹⁸

A related consideration is the risk to protections against discrimination posed by neurotechnologies for which marketing claims extend beyond therapeutic benefit and into neurotechnology-based human neuro-cognitive and behavioural enhancement.³⁹⁹ Whilst there may be premature and exaggerated claims about the actual capabilities of current and newly emerging neurotechnologies, it is increasingly apparent that ongoing innovations relating to bidirectional neural interfaces are likely to lead to future applications enabling so-called neuroenhancement.⁴⁰⁰ In the US, DARPA's Targeted Neuroplasticity Training (TNT) program, for instance, aims to facilitate long-term retention of defense-relevant cognitive skills through the combination of non-invasive peripheral neurostimulation and conventional training practices.⁴⁰¹ Such as yet unproven applications for neuroenhancement pose a number of ethical and legal considerations, including (in)equitable access and the associated danger of creating new forms of discrimination,⁴⁰² as well as the risk of prioritising individual benefit at the cost of wider societal needs.⁴⁰³ The latter is a particular concern in relation to the proposed so-called neuroright (see below) of "equal access to mental augmentation", for which it has been suggested that the State should not have to assume the burden of guaranteeing enhancement with public resources, nor is such a right likely to be universalizable, both because of gaps and power asymmetries between developed and developing countries, as well as the variance in cultural and social contexts globally.⁴⁰⁴ The various challenges for this particular proposed right, notwithstanding, the recognition of certain so-called "neurorights" are widely seen as an increasingly necessary response to the gaps in and challenges to existing human rights frameworks created by the increasing use of neurotechnologies, as will be explored further below.⁴⁰⁵

4.2.4 Neurorights

In considering the issue of how best to address the various challenges posed by neurotechnologies to human rights, there is a growing consensus amongst various stakeholders that putative "neurorights" may offer the most appropriate conceptual and regulatory framework against which to consider the

³⁹⁶ 42 U.S.C. §2000ff(4)(A)(i)-(iii).

³⁹⁷ Convention for the Protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine (entry into force 1 December 1999), E.T.S 164 4.IV.1997, Article 11.

³⁹⁸ See, e.g., Jwa, A.S. and Poldrack, R.A. (2022) 'Addressing privacy risk in neuroscience data: from data protection to harm prevention', *Journal of Law and the Biosciences*, Vol.9:2, pp.1-25. DOI: <https://doi.org/10.1093/jlb/lsac025>; Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

³⁹⁹ Garden, H., and Winickoff, D. (2018) 'Issues in neurotechnology governance', *OECD Science, Technology and Industry Working Papers*, OECD Publishing, Paris. DOI: <http://dx.doi.org/10.1787/c3256cc6-en>

⁴⁰⁰ Ibid.

⁴⁰¹ Arthur, J. (no date) *Targeted Neuroplasticity Training* / DARPA [Online]. Available at: <https://www.darpa.mil/program/targeted-neuroplasticity-training>

⁴⁰² Yuste, R. et al. (2017) 'Four ethical principles for neurotechnologies and AI', *Nature*, Vol.55, pp.159-163. DOI: <https://doi.org/10.1038/551159a>

⁴⁰³ Adomaitis, L., Grinbaum, A., and Lenzi, D. (2022) *TechEthos D2.2: Identification and Specification of Potential Ethical Issues and Impacts and Analysis of Ethical Issues of Digital Extended Reality, Neurotechnologies, and Climate Engineering*. Available at <https://www.techethos.eu/analysis-of-ethical-issues/>, pp.77-78.

⁴⁰⁴ Borbón, D. and Borbón, L. (2021) 'A Critical Perspective on Neurorights: Comments Regarding Ethics and Law', *Frontiers in Human Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnhum.2021.703121>

⁴⁰⁵ See generally, Ienca, M. and Andorno, R. (2017) 'Towards new human rights in the age of neuroscience and neurotechnology', *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>



- Anticipate special issues related to capacity, autonomy, and agency.
- Protect the privacy and confidentiality of neural data; and
- Attend to possible malign uses of neuroscience tools and neurotechnologies.⁴¹⁰

In assessing the mechanisms by which such neurorights could be legally effected, two possibilities emerge, principally either through explicit recognition as a new set of human rights protections, or

⁴¹⁵ *McDonnell v The Governor of Wheatfield Prison* [2015] IECA 216, [2015] 2 ILRM 361, [58].

instead through the evolutive (re)interpretation of existing rights.⁴¹⁶ While certain existing rights, such as the right to mental integrity,⁴¹⁷ could conceivably be reconceptualised to protect against the risks posed by neurotechnologies in the form of unauthorised intrusions into an individual's mental wellbeing, in other cases there may be a need to create neuro-specific rights.⁴¹⁸ For instance, it has been suggested that mental privacy can be differentiated from other forms of privacy, with the former necessitating more stringent protection in the form of a particularised right due to its ontological connection to personal identity.⁴¹⁹ In any case, in addition to consideration of the means by which such legal rights could be effected, it is necessary to also consider the question of the most suitable forum(s) (e.g., national and/or international) and framework(s) (e.g., binding hard law or non-binding soft law).

4.2.5 The appropriate forum(s) and framework(s)

Should policymakers, legislators and other relevant stakeholders converge on the need for additional regulatory measures to address the challenges associated with neurotechnologies, prospectively including the regulation of consumer and dual use neurotechnology (see Section 4.2.1), specific protection for brain and other neural data (see Section 4.2.2 and Section 4.2.3), and either especially created or adaptively interpreted neurorights (see Section 4.2.4), there are a number of practical and normative factors to be considered. A primary consideration is the appropriate forum for proposed regulatory changes, specifically whether at national, international and/or supranational level (e.g., EU or Council of Europe), which may vary depending on the specific regulatory reform under consideration.

In relation to proposed neurorights, for instance, both the United Nations (UN) Human Rights Council and the NeuroRights Foundation in the US have indicated that such changes should be addressed at the international level,⁴²⁰ with the latter contending that "[t]he UN is best positioned of any international organization to generate momentum for protecting human rights in the age of neurotechnology."⁴²¹ A follow-up consideration is the question of the most appropriate instrument through which to give effect to such rights protections, for instance whether through clarifications of or additions to existing human rights conventions, or instead through non-binding soft law mechanisms, such as human rights declarations.⁴²² Within the scholarly debate, it has been suggested that the various relevant stakeholders should consider neurorights as part of a combination of governance approaches, prospectively including binding legal regulation, ethical guidelines and other soft law mechanisms.⁴²³

Existing governance of neurotechnologies, both internationally, regionally and the level of nation states, is mostly through such ethical guidelines and equivalent soft law mechanisms, including the

⁴¹⁶ Ienca, M. and Andorno, R. (2017) 'Towards new human rights in the age of neuroscience and neurotechnology', *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>

⁴¹⁷ See, e.g., Charter of Fundamental Rights of the European Union (CFREU) (entry into force 18 December 2009) 2000/C 364/01, Article 3; See also the unenumerated constitutional right to bodily integrity in Ireland, which has been interpreted to include 'psychological integrity.' *McDonnell v The Governor of Wheatfield Prison* [2015] IECA 216, [2015] 2 ILRM 361, [58].

⁴¹⁸ Ienca, M. and Andorno, R. (2017) 'Towards new human rights in the age of neuroscience and neurotechnology', *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>

⁴¹⁹ Paz, A.W. (2021) 'Is Mental Privacy a Component of Personal Identity', *Frontiers in Human Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnhum.2021.773441>

⁴²⁰ See, e.g., Human Rights Council. (2022) *Report of the Advisory Committee on its twenty-eights session*. A/HRC/AC/28/2.

⁴²¹ Genser, J., Herrmann, S., and Yuste, R. (2022) *International Human Rights Protection Gaps in the Age of Neurotechnology*. NeuroRights Foundation, pp.29. Available at: <https://static1.squarespace.com/static/60e5c0c4c4f37276f4d458cf/t/6275130256dd5e2e11d4bd1b/1651839747023/Neurorights+Foundation+PUBLIC+Analysis+5.6.22.pdf>

⁴²² Ienca, M. et al. (2022) 'Towards a Governance Framework for Brain Data', *Neuroethics*, Vol.15:20. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

⁴²³ Ibid.



Recommendation of the Council on Responsible Innovation in Neurotechnology,⁴²⁴ the National Institutes of Health (NIH) BRAIN initiative Neuroethics Guiding Principles,⁴²⁵ and the Declaration of the Inter-American Juridical Committee on Neuroscience, Neurotechnologies and Human Rights.⁴²⁶ Other proposed or actual governance measures in the form of binding law include consumer protection regulation,⁴²⁷ international human rights law,⁴²⁸ and data protection law.⁴²⁹ It has been suggested therefore that any further governance reforms should build upon this layered approach, whilst also ensuring that active steps are taken where possible to harmonise and standardise governance efforts in relation to other linked new and emerging technologies,⁴³⁰ such as Artificial Intelligence (AI) (see Section 5.5 below).⁴³¹

Normatively, it is essential for the various stakeholders in the wider debate around neurotechnologies to critically consider the scope, limits and specific content of each of the proposed neurorights protections, as well as to account for and seek to harmonise divergent understandings, before incorporating them into these various different governance mechanisms.⁴³² There is also a need for terminological standardisation, semantic-normative disambiguation, and conceptual clarification in relation to both neurorights specifically and the articulation of the challenges associated with neurotechnologies more generally.⁴³³ By way of example, this report has used the broad term “brain and other neural data” in referring to the information gained through the use of neurotechnologies, yet such data is variously referred to as “neurodata”,⁴³⁴ and increasingly within the category of “mental data”, which broadly refers to “any data that can be organised and processed to make inferences about the mental states of a person, including their cognitive, affective and conative states.”⁴³⁵ The adoption of a clear definition for the type(s) of brain data being referred to in the context of neurotechnologies, one suggestion for which is “quantitative data about human brain structure, activity and function”, is necessary in the interests of promoting clarity for conceptual, regulatory and governance purposes.⁴³⁶

⁴²⁴ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

⁴²⁵ Greely, H.T. et al. (2018) ‘Neuroethics Guiding Principles for the NIH BRAIN Initiative’, *Journal of Neuroscience*, Vol.38:50, pp.10586-10588, Table 1. DOI: <https://doi.org/10.1523/JNEUROSCI.2077-18.2018>

⁴²⁶ Declaration of the Inter-American Juridical Committee on Neuroscience, Neurotechnologies and Human Rights: New Legal Challenges for the Americas CJI/DEC.01(XCIX-0/21). Available at: http://www.oas.org/en/sla/iajc/docs/CJI-DEC_01_XCIX-O-21_ENG.pdf

⁴²⁷ See, e.g., Wexler, A. and Reiner, P.B. (2019) ‘Oversight of direct-to-consumer neurotechnologies’, *Science*, Vol.363, pp.234-235. DOI: <https://doi.org/10.1126/science.aav0223>

⁴²⁸ See, e.g., Ienca, M. and Andorno, R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>; Yuste, R., Genser, J. and Herrman, S. (2021) ‘It’s Time for Neuro-Rights’, *Horizons*, 18, pp.154-164. Available at: <https://www.cirsd.org/en/horizons/horizons-winter-2021-issue-no-18/its-time-for-neuro-rights>

⁴²⁹ Ienca, M. and Malgieri, G. (2022) ‘Mental data protection and the GDPR’, *Journal of Law and the Biosciences*, Vol.9:1, pp.1-19. DOI: <https://doi.org/10.1093/jlb/lzac006>

⁴³⁰ Ienca, M. et al. (2022) ‘Towards a Governance Framework for Brain Data’, *Neuroethics*, Vol.15:20. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

⁴³¹ See, e.g., Proposal for a Regulation of the European Parliament and of the Council Laying Down Harmonised Rules on Artificial Intelligence (Artificial Intelligence Act) And Amending Certain Union Legislative Acts COM/2021/206 final.

⁴³² Borbón, D. and Borbón, L. (2021) ‘A Critical Perspective on Neurorights: Comments Regarding Ethics and Law’, *Frontiers in Human Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnhum.2021.703121>

⁴³³ Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe, p.68. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

⁴³⁴ See, e.g., Rommelfanger, K.S., Pustilnik, A. and Salles, A. (2022) ‘Mind the Gap: Lessons Learned from Neurorights’, *Science and Diplomacy*. DOI: <https://doi.org/10.1126/scidip.ade6797>

⁴³⁵ Ienca, M. and Malgieri, G. (2022) ‘Mental data protection and the GDPR’, *Journal of Law and the Biosciences*, Vol.9:1, pp.1-19. DOI: <https://doi.org/10.1093/jlb/lzac006>

⁴³⁶ Ienca, M. et al. (2022) ‘Towards a Governance Framework for Brain Data’, *Neuroethics*, Vol.15:20. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

5. Comparative analysis – Digital extended reality

This section examines the legal issues and challenges identified in the three national legal case studies considered in relation to XR. First, it provides a comparative summary overview of France, Italy, and the United Kingdom, before highlighting some noteworthy international approaches. It then sets out the key challenges specific to the regulation of XR.

5.1 Comparative summary overview

Digital Extended Reality technologies combine advanced computing systems (hardware and software) that can change how people connect with each other and their surroundings and influence or manipulate human actions through interactions with virtual environments. Digital Extended Reality includes Artificial Intelligence (AI)-based technologies emulating or connecting with human cognitive functions (e.g., voice, gesture, movement, choices, feelings), as well as human-digital machine interaction and data processing technologies to reproduce, replace, adapt, and influence human actions. A potential field of application includes people's remote assistance for educational, medical, and training purposes through virtual and digital devices (e.g., mobile phones, computers, autonomous systems). This technology family also include computing systems used for Natural Language Processing (NLP) applications, intended to process, and analyse a vast quantity of human natural language information (e.g., voice, text, images) in advanced extended reality situations, extracting the most relevant data to profile and influence behaviours. A typical example is observed in online platforms and social media, influencing consumer opinions and people's behaviour. This might lead to unexpected concerns, such as the "chilling" effect, where people avoid speak or act freely to not be influenced or controlled by digital technologies and online platforms.⁴³⁷

The legal issues pertaining to XR technologies are primarily focused on privacy and data protection, the regulation of artificial intelligence and harmful online content, freedom of expression, non-discrimination, and the protection of special categories of persons, including children.

This section on digital extended reality (XR) summarises the comparative approaches towards regulating XR technologies in France, Italy, and the United Kingdom respectively. The complete legal case studies can be found in annexes 9.7, 9.8 and 9.9. Whilst laws explicitly governing the use of XR is limited, France, and Italy are particularly influenced by European Union (EU) law in relation to XR and ongoing legal developments including the proposed Artificial Intelligence (AI) Act, Digital Services Act (DSA), Digital Markets Act (DMA). Despite leaving the EU, the UK has retained various EU laws. In the long-term, however, it is likely that UK law relevant for XR technologies will diverge from or at least no longer closely follow EU law.

⁴³⁷ Buchinger, E., et al. (2022). *TechEthos technology portfolio: Assessment and final selection of economically and ethically high impact technologies. Deliverable 1.2 to the European Commission*. TechEthos Project Deliverable. Available at: www.techethos.eu, p. 37.

5.1.1 France

Table 19: Overview of the French legal system

Characteristics	Details
Legislative arm	Two-chamber parliamentary system comprising the National Assembly and the Senate
Constitutional governance	Unitary state with executive, legislative and judicial branches established by the French Constitution of 1958
Sources of law	<ul style="list-style-type: none"> ○ Constitution of 4 October 1958 ○ National law adopted by the French Parliament ○ EU law ○ International law

Current state of XR in France

At the time of writing, “The Sandbox” is the dominating metaverse space in France with several well-known companies and brands owning land on the metaverse and operating there, including Groupe Carrefour, Groupe Casino, AXA Assurances, Ubisoft, and Groupe Havas.⁴³⁸ In 2022, Meta and Simplon launched a coding academy dedicated to Meta’s metaverse in France.⁴³⁹

French policy on XR

The study did not identify policies explicitly addressed to XR technologies. Nevertheless, France supports the European Commission’s broader initiatives to increase protection for journalists and freedom of expression online (the European Democracy Action Plan) and to require greater accountability from digital service providers (the Digital Services Act).⁴⁴⁰

Laws explicitly covering XR

France’s Digital Republic Act was adopted on 7 October 2016 and mentions the creation of a Commission for Digital Sovereignty.⁴⁴¹ It aims at investigating how national sovereignty can be understood in the globalised digital arena, such as the metaverse or other applications of XR technologies. It also seeks to create tools that enhance France’s digital sovereignty, such as by developing an independent operating system.

⁴³⁸ Simon, C. (2022) *Metaverse français : les principaux metaverses en France* / BeinCrypto France [Online]. Available at <https://fr.beincrypto.com/apprendre/metaverse-francais-les-principaux-metaverses-en-france/> (last visited 24 October 2022).

⁴³⁹ Simon, C. (2022) *Meta lance une ‘académie du métavers’ en France à la rentrée 2022* / L’Express.fr [Online]. Available at https://www.lexpress.fr/actualites/1/societe/meta-lance-une-academie-du-metavers-en-france-a-la-rentree-2022_2175065.html (last visited 24 October 2022).

⁴⁴⁰ European Commission, Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on a Single Market For Digital Services (Digital Services Act) and Amending Directive 2000/31/EC, 2020.

⁴⁴¹ LOI N° 2016-1321 Du 7 Octobre 2016 Pour Une République Numérique (1), 2016-1321, 7 October 2016.



Ongoing legal and policy developments

Ethical and legal research efforts have been dedicated to exploring the idea of digital sovereignty. *Commission de réflexion sur l'Éthique de la Recherche en sciences et technologies du Numérique d'Allistene* (CERNA) – an ethics and policy research consortium - has published a report addressing how sovereignty, as a pivotal and defining notion of the relationship of legitimate authority between human beings under the rule of law, is affected by rapid and global technological change.

To enhance the digital sovereignty of France, the CERNA report recommends enhancing access to data for scientific purposes, providing ethical and privacy-oriented training, and strongly supporting open access research.⁴⁴²

Furthermore, the Minister of Economy, the Minister of Culture and the Secretary of State for Digital Transition and Electronic Communications requested the establishment of an exploratory mission on the development of a metaverse in February 2022, and a report published in October 2022 explores the issue of identity in the metaverse, among others.⁴⁴³ Currently, the users of the metaverse can use a pseudonym and an avatar, which raises questions of identity verification and traceability of actions. Thus, in addition to human anonymity, there is a question of avatar humanity in the first place – is there anyone behind an avatar? There are proposals to solve this issue by introducing watermarking or other techniques to enforce the human-machine distinction.⁴⁴⁴

Some suggested solutions with regard to identifying techniques to identify avatars and ensure the link between digital and material identity include a European Digital Identity Wallet and expand on the EU Regulation on electronic identification and trust services for electronic transactions in the internal market (eIDAS regulation).⁴⁴⁵

Implications for French human rights law

French human rights law comprises the French Constitution from 1958, the 1789 Declaration of the Rights of Man and of the Citizen.⁴⁴⁶ Furthermore, as a monist State, international and EU human rights laws are an integral part of the French legal system, without the need for such laws to be transposed into French domestic law.⁴⁴⁷

XR technologies may have implications for the protection of users' fundamental rights. For example, the imitation of a single individual to create a digital avatar may have implications for the protection of the right to dignity, if used improperly. XR may also have implications for bias and fairness, which would have consequences in relation to the human right to non-discrimination. In 2020, the Council of Europe recommended that developers, manufacturers, and service providers should avoid any potential bias,

⁴⁴² 'Cerna (Commission de réflexion sur l'Éthique de la Recherche en sciences et technologies du Numérique d'Allistene', in 2018. *Research Ethics in Machine Learning*. Available at: <https://www.allistene.fr/publications-cerna-sur-lethique-de-la-recherche-en-apprentissage-machine/>

⁴⁴³ Basdevant, A., François, C., and Ronfard, R. (2022) *Mission Exploratoire Sur Les Métavers*. Ministère de la Culture – Ministère de l'Économie, des Finances et de la Souveraineté et numérique. Available at: <https://www.vie-publique.fr/rapport/286878-mission-exploratoire-sur-les-metavers>

⁴⁴⁴ Grinbaum, A., and Adomaitis, L. (2022) 'The Ethical Need for Watermarks in Machine-Generated Language', arXiv:2209.03118, [Online]. Available at: <https://doi.org/10.48550/arXiv.2209.03118>.

⁴⁴⁵ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market and Repealing Directive 1999/93/EC, OJ L, vol. 257, 23 July 2014.

⁴⁴⁶ Constitution Du 4 Octobre 1958; Déclaration des droits de l'homme et du citoyen de 1789.

⁴⁴⁷ Universal Declaration of Human Rights (8 December 1948), G.A. Res. 217(A) III; European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950; Charter of Fundamental Rights of the European Union (entry into force 18 December 2009), 2000/C 364/01 (CFREU).

including unintentional or hidden bias, as well as the risks of discrimination.⁴⁴⁸ Also, the EU's proposed AI Act outlines measures to limit discriminatory biases and employs the notion of human oversight as the key to fighting them.⁴⁴⁹

The proposed AI Act considers AI-based chatbots in recruitment systems to be high-risk,⁴⁵⁰ meaning that legal compliance assessment is mandatory ex ante to market launch, including risk management processes, monitoring, bias detection and correction, technical documentation, event logs, user consent, human oversight, robustness, security, accuracy, and proportionality.

The protection of vulnerable persons, including minors online is another legal issue posed by XR technologies. The proposed AI Act prohibits the use of any AI system that exploits the vulnerability of a group of individuals to influence the behaviour of any of these individuals and cause harm to them.⁴⁵¹ Furthermore, France's data protection authority CNIL published a set of recommendations for the protection of minors online.⁴⁵² French civil law limits the legal capacity of minors and precludes them from buying or owning digital assets.⁴⁵³

The proposed AI Act also seeks to protect individuals' autonomy. Manipulative technologies capable of causing physical or psychological harm will be prohibited, as well as the exploitation of vulnerabilities of specific groups.⁴⁵⁴

Implications for French privacy and data protection law

The protection of personal data in France was considered part of privacy law as early as 1978, known as the Data Protection Act in France.⁴⁵⁵ Data protection is now governed by the EU's General Data Protection Regulation (GDPR).⁴⁵⁶ The control of personal data protection falls under a national regulator, the CNIL in France, which monitors compliance with the GDPR and the French Data Protection Act, mostly by issuing opinions and formal notices and by applying sanctions under the oversight of the Council of State.⁴⁵⁷

One major challenge in relation to the regulation of XR is related to consent. Although the national courts and the Court of Justice of the European Union are progressively developing jurisprudence on

⁴⁴⁸ Council of Europe, Convention 108 + Convention for the Protection of Individuals with Regard to the Processing of Personal Data.

⁴⁴⁹ European Commission, Proposal for a Regulation Of The European Parliament And Of The Council Laying Down Harmonised Rules On Artificial Intelligence (Artificial Intelligence Act) And Amending Certain Union Legislative Acts, 2021.

⁴⁵⁰ European Commission, Proposal for a Regulation Of The European Parliament And Of The Council Laying Down Harmonised Rules On Artificial Intelligence (Artificial Intelligence Act) And Amending Certain Union Legislative Acts, 2021, Article 6 in conjunction with Annex III.

⁴⁵¹ Ibid, Article 5.

⁴⁵² CNIL (2021) *La CNIL publie 8 recommandations pour renforcer la protection des mineurs en ligne* / CNIL, [Online]. Available at: <https://www.cnil.fr/fr/la-cnil-publie-8-recommandations-pour-renforcer-la-protection-des-mineurs-en-ligne>.

⁴⁵³ N° 2019-486 Du 22 Mai 2019 Relative à La Croissance et La Transformation Des Entreprises (1), 2019-486, mai 2019.

⁴⁵⁴ European Commission, Proposal for a Regulation Of The European Parliament And Of The Council Laying Down Harmonised Rules On Artificial Intelligence (Artificial Intelligence Act) And Amending Certain Union Legislative Acts, 2021, Article 5.

⁴⁵⁵ Loi N° 78-17 Du 6 Janvier 1978 Relative à l'informatique, Aux Fichiers et Aux Libertés, 6 January 1978.

⁴⁵⁶ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA Relevance), OJ L, vol. 119, 27 April 2016.

⁴⁵⁷ Ibid.

data protection, such as the case of *Google v. CNIL*,⁴⁵⁸ there are questions on the quality of consent, its meaning, and the conditions under which it is collected (legibility, clarity, and precision of clauses).⁴⁵⁹ These tensions between the law and the actual collection of data stimulate the current reflections in this area.

Implications for French consumer rights law

Much of the economic trade in metaverse is facilitated by Non-Fungible Tokens (NFTs), a digital token giving access to the file saved in the blockchain. It has been suggested that the regulation of virtual markets should focus on the question of taxation – how digital assets on a blockchain can be taxed and enforced.⁴⁶⁰ Currently, the Article 150 VH bis of the French General Tax Code provides that the transfer exchange of digital assets for other digital assets by individuals is not taxable.⁴⁶¹

Whether or not NFTs will be included in the definition of digital assets will have major consequences for the economy of a metaverse. Developments at the European level, such as the proposed Markets in Crypto-Assets (MiCA) Regulation, will directly influence the regulation of digital assets in France.⁴⁶²

Implications for French law on liability for harms

The legal problem of mis- and disinformation spread through XR technologies concerns the responsibility of the manufacturer and provider of such technologies. The legal texts on this subject are limited because they essentially relate to the formation of the contract. The French Civil Code imposes the requirement of good faith in contractual relations,⁴⁶³ and an obligation to disclose information to obtain consent.⁴⁶⁴ Moreover, unfair commercial practices aiming at deceiving the consumer are prohibited by the Consumer Code.⁴⁶⁵ The exploitation of vulnerable persons is sanctioned by the criminal code.⁴⁶⁶

Some illicit acts, such as prostitution, incest, torture, paedophilia or murder are sensitive themes in virtual worlds. Some researchers in France suggest that the National Agency for Information Systems Security (ANSSI) could be the first point of contact in ensuring safety in a metaverse.⁴⁶⁷ On top of that,

⁴⁵⁸ Bougiakiotis, E. (2021) 'One Law to Rule Them All? The Reach of EU Data Protection Law after the Google v CNIL Case', *Computer Law & Security Review*, Vol.42. DOI: <https://doi.org/10.1016/j.clsr.2021.105580>; Zalnieriute, M. (2020) 'Goole LLC v. Commission Nationale de l'informatique et Des Libertés (CNIL)', *American Journal of International Law*, 114:2, pp.161-167. DOI: <https://dx.doi.org/10.2139/ssrn.3516337>; ECJ, *Google LLC, Successor in Law to Google Inc v Commission Nationale de l'informatique et Des Libertés (CNIL)*, Case C-507/17, 24 September 2019, available at <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:62017CJ0507> (last visited 25 October 2022).

⁴⁵⁹ Gray, C.M., et al. (2021) 'Dark Patterns and the Legal Requirements of Consent Banners: An Interaction Criticism Perspective', *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems*, 172, pp.1-18. DOI: <https://doi.org/10.1145/3411764.3445779>; Papadogiannakis, E., et al. (2021) 'User Tracking in the Post-Cookie Era: How Websites Bypass GDPR Consent to Track Users', *Proceedings of the Web Conference 2021*, pp.21-30. DOI: <https://doi.org/10.1145/3442381.3450056>.

⁴⁶⁰ Basdevant, A., François, C., and Ronfard, R. (2022) *Mission Exploratoire Sur Les Métavers*. Ministère de la Culture – Ministère de l'Économie, des Finances et de la Souveraineté et numérique. Available at: <https://www.vie-publique.fr/rapport/286878-mission-exploratoire-sur-les-metavers>

⁴⁶¹ Article 150 VH Bis - Code Général Des Impôts, 24 May 2019.

⁴⁶² Proposal for a Regulation of the European Parliament and of the Council on Markets in Crypto-Assets, and amending Directive (EU) 2019/1937, COM/2020/593 final.

⁴⁶³ Article 1104 - Code Civil, 1 October 2016.

⁴⁶⁴ Article 1112-1 - Code Civil, 1 October 2016.

⁴⁶⁵ Article L120-1 - Code de La Consommation, L120-1, 2008.

⁴⁶⁶ Article 223-15-2 - Code Pénal, 14 May 2009.

⁴⁶⁷ Basdevant, A., François, C., and Ronfard, R. (2022) *Mission Exploratoire Sur Les Métavers*. Ministère de la Culture – Ministère de l'Économie, des Finances et de la Souveraineté et numérique. Available at: <https://www.vie-publique.fr/rapport/286878-mission-exploratoire-sur-les-metavers>

Meta created its own entity to act as an online quasi-judicial online entity.⁴⁶⁸ As these platforms operate in France, French users will be subjected to decisions by such entities. Whether platforms themselves are the appropriate forum for such adjudication is open to debate.

Gaps and challenges

Digital sovereignty debates might have to extend to more general themes of how territorial land relates to digital law. For example, if fraud or other crimes are committed in the metaverse, which law enforcement agency should investigate it? Does it depend on where the cloud information is kept, which IP address was used, what citizenship the subject holds, or does a metaverse merit its own law enforcement agency?

Proposed regulation in the AI Act stresses that training, validation, and test datasets must be subject to appropriate data governance and management practices to mitigate possible biases.⁴⁶⁹ These biases will be important in understanding how biometric data and mental data collected in a metaverse can be used fairly and unfairly.

Whilst virtual actions do not directly translate into physical damage,⁴⁷⁰ harmful online experiences in the metaverse can have lasting psychological effects. The model of responsibility and legal liability is still to be clearly conceptualised.

Ongoing specific debates single out the question of identity as the main one for a legal framework. Should we identify avatars and how? Other specific concerns also stand out regarding posthumous data, impersonation, unfair biases, the privacy of biometric and mental data, consent practices and law enforcement in a metaverse. The ongoing discussions in France will likely carry over to the European level and vice versa, anything that is decided on the European level will be implemented in France.

5.1.2 Italy

Table 20: Overview of the Italian legal system

Characteristics	Details
Legislative arm	Two-chamber parliamentary system comprising the Chamber of Deputies (<i>Camera dei Deputati</i>) and the Senate of the Republic (<i>Senato della Repubblica</i>)
Constitutional governance	Italy is a representative democracy in the form of a parliamentary republic headed by the President of the Republic, governed by the Constitution of the Italian Republic ⁴⁷¹

⁴⁶⁸ Klonick, K. (2021) *Inside the Making of Facebook's Supreme Court* /The New Yorker [Online]. Available at <https://www.newyorker.com/tech/annals-of-technology/inside-the-making-of-facebooks-supreme-court> (last visited 25 October 2022).

⁴⁶⁹ European Commission, Proposal for a Regulation Of The European Parliament And Of The Council Laying Down Harmonised Rules On Artificial Intelligence (Artificial Intelligence Act) And Amending Certain Union Legislative Acts, 2021.

⁴⁷⁰ Adomaitis, L., Grinbaum, A., and Lenzi, D. (2022) *TechEthos D2.2: Identification and Specification of Potential Ethical Issues and Impacts and Analysis of Ethical Issues of Digital Extended Reality, Neurotechnologies, and Climate Engineering*. Available at <https://hal-cea.archives-ouvertes.fr/cea-03710862> (last visited 25 October 2022).

⁴⁷¹ Costituzione della Repubblica Italiana 1947. Available at: governo.it/it/costituzione-italiana/parte-seconda-ordinamento-della-repubblica/

Sources of law	<ul style="list-style-type: none"> ○ Constitution of the Italian Republic 1947 ○ Constitutional law ○ EU law ○ International law ○ National law (Acts of the Italian Parliament) ○ Regional and local laws
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Current state of XR in Italy

There are no known laws or current proposals for dedicated legislation on XR in Italy. Nevertheless, in most relevant legal domains it has been possible to identify specific legal cases that, although not directly related to XR, might be applied to XR technologies (or XR technologies might be used to improve and extent the service, such as in the case of SPID, and App IO).

Italian legal and policy developments in relation to XR

There are several regulatory bodies in Italy dealing with legal domains in human rights, privacy and data protection, digital services and data governance, artificial intelligence, and consumer protection. As such, these bodies are concerned with the application of XR technologies. With regard to Privacy and Data Protection, the Regulatory body is the Data Protection Authority. Regarding products safety, the Regulatory bodies are represented by several Ministries such as Ministry for the Economic Development, Ministry of Health, Ministry of Labour, Ministry of Social Policies, Ministry of Internal Affairs, Ministry of Economy and Finance and Ministry of Transport.

Implications for Italian human rights law

The Italian Constitution provides several fundamental human rights, including the right to life, human dignity, freedom of expression, justice, etc.⁴⁷² Furthermore, the Italian Constitution recognises the principles of international law, and is signatory to various international and EU human rights laws.⁴⁷³

The ongoing discussion on the Metaverse concept highlights several issues related to protection of human rights. For example, online anonymity might lead to issues affecting online safety and the protection of special category groups, due to inappropriate behaviour such as verbal and physical (sexual) harassment and violence. However, in regulating harmful online content a balance must be struck between protecting individuals from associated harms and ensuring protection for the right to freedom of expression. Potential freedom of expression challenges in relation to XR include the adoption – made by platforms implementing XR - of any kind of policy which might prevent users'

⁴⁷² See, for example, Costituzione della Repubblica Italiana 1947, articles 2-4, 9, 13-15, 17-19, 21, 24, 29-30, 32-38, 48 and 49.

⁴⁷³ Costituzione della Repubblica Italiana 1947, article 10; Universal Declaration of Human Rights (UDHR) (8 December 1948), G.A. Res. 217(A) III; International Covenant on Civil and Political Rights (ICCPR) (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (ICERD) (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (ICESCR) (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; Convention on the Rights of the Child (CRC) (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (CRPD) (entered into force 3 May 2008), GA Res. A/61/106; European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entered into force 3 September 1953), E.T.S. 5, 4. XI. 1950; Charter of Fundamental Rights of the European Union (CFREU) (entry into force 18 December 2009) 2000/C 364/01.



exercise of freedom of expression (related to lawful content) or provides the non-intervention or adoption of measures to contrast unlawful acts which do limit the freedom of expression.⁴⁷⁴

Rights related to equality and protection against discrimination shall need to be respected by digital platforms to safeguard women's rights to equality.⁴⁷⁵ As such, digital platforms shall adopt policies according to which no kind of gender - discriminatory related act will be tolerated, nor any act involving discrimination against other persons with protected characteristics, and on the other, sanctions shall be issued to users.

In relation to accessibility, the CRPD provides that persons with disabilities shall be guaranteed the right to live independently and participate fully in all aspects of life.⁴⁷⁶ This means that no one shall be discriminated against by not being able to access the physical environment, transportation, information, and communications (such as information and communications technologies and systems).⁴⁷⁷ Therefore, barriers representing obstacles to accessibility, in particular to the Internet and other means of communication (e.g. internet platforms) will need to be removed.

Implications for privacy and data protection law

The EU GDPR is the primary piece of privacy and data protection legislation in Italy.⁴⁷⁸ Due to the importance of the personal data collected and stored by Digital Extended Reality devices (such as genetic and biometric data related to the user), the GDPR, and associated Italian legislation,⁴⁷⁹ represent the "gatekeeper" to the use of those data. Specifically, the use of XR technology, implies several activities during the immersive experience, which all rely on the body and behavioural reactions of users. These activities regard the analyses of user's heart rate, eye movements, body

⁴⁷⁴ ICCPR, articles 19 and 20 in conjunction with LEGGE 25 ottobre 1977, n. 881 "Ratifica ed esecuzione del patto internazionale relativo ai diritti economici, sociali e culturali, nonché' del patto internazionale relativo ai diritti civili e politici, con protocollo facoltativo, adottati e aperti alla firma a New York rispettivamente il 16 e il 19 dicembre 1966" (GU n.333 del 07-12-1977 - Suppl. Ordinario).

⁴⁷⁵ CEDAW, article 3 in conjunction with LEGGE 14 marzo 1985, n. 132 "Ratifica ed esecuzione della convenzione sull'eliminazione di ogni forma di discriminazione nei confronti della donna, adottata a New York il 18 dicembre 1979" (GU n.89 del 15-04-1985 - Suppl. Ordinario). Available at: normattiva.it/urires/N2Ls?urn:nir:stato:legge:1985-03-14;132!vig=2022-10-13.

⁴⁷⁶ CRPD, article 9 in conjunction with LEGGE 3 marzo 2009, n. 18 "Ratifica ed esecuzione della Convenzione delle Nazioni Unite sui diritti delle persone con disabilità, con Protocollo opzionale, fatta a New York il 13 dicembre 2006 e istituzione dell'Osservatorio nazionale sulla condizione delle persone con disabilità" (GU n.61 del 14-03-2009). Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2009-03-03;18

⁴⁷⁷ CRPD, article 9(1)(a)-(b) in conjunction with LEGGE 3 marzo 2009, n. 18 "Ratifica ed esecuzione della Convenzione delle Nazioni Unite sui diritti delle persone con disabilità, con Protocollo opzionale, fatta a New York il 13 dicembre 2006 e istituzione dell'Osservatorio nazionale sulla condizione delle persone con disabilità" (GU n.61 del 14-03-2009). Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2009-03-03;18.

⁴⁷⁸ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) (4.5.2016, OJ L119/1).

⁴⁷⁹ Delega al Governo per il recepimento delle direttive europee e l'attuazione di altri atti dell'Unione europea - Legge di delegazione europea 2016-2017 (17G00177) normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2017-10-25;163; Privacy Control. GDPR 679/16 and Legislative Decree of adaptation n. 101/2018 (Online). Available at: privacycontrol.it/en/gdpr-679-16-and-legislative-decree-of-adaptation-n-101-2018/; PERSONAL DATA PROTECTION CODE Containing provisions to adapt the national legislation to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC. Available at: gdpd.it/documents/10160/0/PERSONAL+DATA+PROTECTION+CODE.pdf.

gestures, etc. Therefore, the collected data is likely to be classified as special “data”, such as biometric and health related.⁴⁸⁰

Accessibility and privacy concerns are key regulatory challenges in relation to digital platforms and apps for public services in Italy.⁴⁸¹ Approaches to addressing these challenges can help inform the future deployment of XR technologies in Italy.

Implications for consumer rights law

The Italian Consumer Code implements EU consumer protection law into Italian domestic law.⁴⁸² Recent legislative developments at the European level have aimed at stricter consumer protection particularly with regard to the supply of digital content,⁴⁸³ and have subsequently been transposed into Italian law.⁴⁸⁴ Furthermore, the proposed Digital Services Act (DSA) and Digital Markets Act (DMA) will significantly influence Italian law. In particular, legal issues such as the right to information and the protection of minors will influence the manner in which XR technologies can be deployed in Italy.

In the consumer protection domain, human rights are at the core of the discussion on the new Digital Market Act and Digital Service Act. Issues of the right to information and transparency and protection of minors are being considered in particular. XR technologies enable new approaches that seek to change consumer behaviour, such as nudging, sludge, and dark patterns. This allows for sophisticated methods of advertising on online platforms that challenge consumer rights, and will therefore require further discussions at the policy and regulatory level. Moreover, health issues have arisen regarding the use of XR devices which might affect minors, such as impaired visual development, as well as psychological issues concerning the ability to switch between virtual and physical reality.

Implications for liability for harms

The Italian Civil Code articles 1218⁴⁸⁵ and 2043⁴⁸⁶ govern contract and tort liability respectively. Contract liability concerns the violation of a legal constraint, while tort liability concerns harms to others. Criminal liability is mentioned at the art. 27 of the Italian Constitution⁴⁸⁷, stating that criminal

⁴⁸⁰ Paule, L. (2021) *Data in the XR industry: why do we need it?* / [Online]. Available at: blog.laval-virtual.com/en/data-in-the-xr-industry-why-do-we-need-it/.

⁴⁸¹ See, for instance, Spid – Public Digital Identity System FAQ – *Frequently Asked Questions?* (Online). Available at: spid.gov.it/en/frequently-asked-questions/ (Accessed: 25 August 2022); App IO – FAQ *Accessibilità* (Online). Available at: io.italia.it/faq/#n5_1 (Accessed: 25 August 2022); App IO – FAQ *Sicurezza e Privacy* (Online). Available at: io.italia.it/faq/#n7_2 (Accessed: 25 August 2022).

⁴⁸² D.lgs 206/2005 - Codice del Consumo, [Online]. Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2005-09-06;206; Unione Nazionale dei Consumatori. *Codice del Consumo – Conosci i tuoi diritti* [Online]. Available at: codicedelconsumo.it/english-version/ (Accessed: 27 October 2022).

⁴⁸³ Directive (EU) 2019/770 of the European Parliament and of the Council of 20 May 2019 on certain aspects concerning contracts for the supply of digital content and digital services (22.5.2019, OJ L 136/1); Directive (EU) 2019/771 of the European Parliament and of the Council of 20 May 2019 on certain aspects concerning contracts of the sale of goods, amending Regulation (EU) 2017/2394 and Directive 2009/22/EC, and repealing Directive 1999/44/EC (22.5.2019, OJ L136/28).

⁴⁸⁴ Decreto Legislativo n. 173/2021 - Attuazione della direttiva (UE) 2019/770 del Parlamento europeo e del Consiglio, del 20 maggio 2019, relativa a determinati aspetti dei contratti di fornitura di contenuto digitale e di servizi digitali.

⁴⁸⁵ Italian Civil Code, Artiche 1218 “Responsabilità del debitore”. Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1942-03-16;262

⁴⁸⁶ Ibid, Article 2043 “Risarcimento per fatto illecito”. Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1942-03-16;262

⁴⁸⁷ Constitution of the Italian Republic, Article 27. Available at: senato.it/documenti/repository/istituzione/costituzione_inglese.pdf



liability is personal. Article 42⁴⁸⁸ of the criminal code describes the subjective elements of the crime, to assess the guilt of a person.

A case of sexual assault can be useful to understand how to deal with criminal liability in the digital XR context. It has been suggested that the lack of physical contact means that sexual violence within XR would not constitute a crime within the meaning of article 609-bis of the Italian criminal code.⁴⁸⁹ Furthermore, the Italian legal system does not provide a separate crime of sexual harassment. Nevertheless, the criminal code punishes the crime of harassment of the person, understood as the behaviour with which, in a place open to the public, harassment or disturbance is caused to others for reasons worthy of reproach.⁴⁹⁰ Thus, this indicates the possibility for sexual harassment within XR to constitute the crime of harassment, even in the absence of the material act of physical contact typical of sexual violence.

Gaps and challenges

The Italian case study highlights the importance of defining the data originating from XR technologies relating to special categories of personal data, which shall be safeguarded due to their particular nature. Whilst there is no proposal for dedicated regulation of XR at the Italian national level, initial discussions are in progress as framed in relation to the opportunities and challenges of XR-specific concepts, such as the Metaverse. At this stage, it is likely that case law more than legislation will inform the regulation of unanticipated and unforeseen incidents involving XR technologies, such as ‘crimes’ in the virtual world. Stronger cooperation between the European Commission and the Member States, and national authorities, such as the Italian Data Protection Authority, is encouraged.

5.1.3 United Kingdom

Table 21: Overview of the UK legal system

Characteristics	Details
Legislative arm	Two-chamber parliamentary system comprising the House of Commons and House of Lords
Constitutional governance	Unitary State with devolved administrations in Scotland, Northern Ireland and Wales, resting on the principle of Parliamentary Sovereignty.
Sources of law	<ul style="list-style-type: none"> ○ Common law ○ UK legislation (Acts of Parliament or the Parliaments of devolved administrations) ○ Retained EU law ○ International law

⁴⁸⁸ Italian Criminal Code, Article 42 “Responsabilita' per dolo o per colpa o per delitto preterintenzionale. Responsabilit  obbiettiva”. Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1930-10-19;1398

⁴⁸⁹ Ibid, Article 609 (2) “Violenza sessuale”. Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1930-10-19;1398; Sicolo, M. (2022) *Molestie sessuali nel Metaverso: sono reato?* (Online). Available at: studiocataldi.it/articoli/44610-molestie-sessuali-nel-metaverso-sono-reato.asp (Accessed: 30 September 2022).

⁴⁹⁰ Italian Criminal Code, Article 660 “Molestia o disturbo alle persone”. Available at: normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1930-10-19;1398



Current state of XR in the UK

There are no UK laws specifically developed or being developed to deal with XR. However, the UK government is in the process of debating the Online Safety Bill, which has been hailed as a 'world-first online safety law'.⁴⁹¹ Whilst the EU's proposed AI Act will not apply to the UK following its departure from the EU, the UK Government is developing a Data Protection and Digital Information Bill that covers some of the concerns embedded in the AI Act, and is likely to apply to the development and use of XR technologies.⁴⁹²

UK policy and legal developments in relation to XR

Whilst there are no current laws or policies explicitly concerned with the regulation of XR in the UK, various legal developments, such as the Online Safety Bill, will impact the way XR technologies are governed. The Bill, if adopted, will introduce a 'duty of care' for tech companies providing safe online environments for users. Terms and Conditions will need to be amended to align with the new directives, and harmful content must be removed on their platforms. Furthermore, it will give government the right to fine (up to ten per cent of revenues) for illegal material, material relating to terrorism, and child sexual exploitation and abuse.⁴⁹³ The scope of the Bill is comparable to the EU's proposed Digital Services Act (DSA).⁴⁹⁴

The other significant legislation under discussion is the Data Protection and Digital Information Bill,⁴⁹⁵ which proposes to reform various pieces of data protection legislation, including the UK's incorporation of the GDPR (UK GDPR) and the Data Protection Act 2018. The Office of Communications (Ofcom) is the regulatory authority for communications services in the UK and is responsible for the enforcement of the law. Fines of up to ten percent of income for companies will be made payable if the law is broken.⁴⁹⁶

Implications for UK human rights law

The Human Rights Act 1998 is the primary piece of human rights legislation in the UK.⁴⁹⁷ The Act transposes the provisions of the European Convention on Human Rights (ECHR) into domestic UK law.⁴⁹⁸ Furthermore, the Equality Act 2010 brings together several distinct forms of anti-discrimination

⁴⁹¹ Online Safety Bill (HC), HC Bill 121 (as introduced on 28 June 2022); House of Commons, *Online Safety Bill / UK Parliament*, [Online]. Available at: <https://bills.parliament.uk/bills/3137>; Department for Digital, Culture, Media & Sport and the Rt Hon Nadine Dorries MP (2022) *World-first online safety laws introduced in Parliament / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/news/world-first-online-safety-laws-introduced-in-parliament#:~:text=The%20Online%20Safety%20Bill%20marks,while%20protecting%20freedom%20of%20speech.>

⁴⁹² Data Protection and Digital Information Bill (HC), HC Bill 143 (as introduced on 18 July 2022); House of Commons, *Data Protection and Digital Information Bill / UK Parliament*, [Online]. Available at: <https://bills.parliament.uk/bills/3322>.

⁴⁹³ Online Safety Bill (HC), HC Bill 121 (as introduced on 28 June 2022); House of Commons, *Online Safety Bill / UK Parliament*, [Online]. Available at: <https://bills.parliament.uk/bills/3137>.

⁴⁹⁴ Directive (EU) 2019/770 of the European Parliament and of the Council of 20 May 2019 on certain aspects concerning contracts for the supply of digital content and digital services (22.5.2019, OJ L 136/1).

⁴⁹⁵ Data Protection and Information Bill. Retrieved 28.10.2022. Available at: <https://bills.parliament.uk/bills/3322>

⁴⁹⁶ Ofcom, [Online]. Available at: <https://www.ofcom.org.uk/home>; Communications Act 2003, c. 21.

⁴⁹⁷ Human Rights Act 1998, c. 42.

⁴⁹⁸ Ibid, article 1 in conjunction with schedule 1; European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950.



legislation including of sex, disability and race.⁴⁹⁹ The UK is also a signatory to various international human rights treaties.⁵⁰⁰

XR may impact human rights in a variety of ways, both positively and negatively. In relation to some rights in particular contexts, XR has the potential to enhance the enjoyment of privileges and responsibilities, such as when XR technologies provide innovative methods of communication options, that positively enrich the user's right to freedom of expression. In other situations, the human rights issues that need to be addressed are child safeguarding and protection (e.g., sexual abuse, grooming), free speech (legitimate public discussion on complex ethical issues), online abuse (e.g., self-harm and eating disorders), online deception (e.g., filters that alter appearances or encourage harmful behaviours), trolling (e.g., deliberate threats of harm, cyberbullying), sexual harassment (of women and girls), women's rights and children's rights.

As XR enables speech, language and communication mediated in technological platforms, laws of free speech and free expression are likely to be significantly important in XR. Exercising the right to freedom of expression "carries with it duties and responsibilities" and may as such be 'subject to such formalities, conditions, restrictions or penalties as are prescribed by law and are necessary in a democratic society'.⁵⁰¹

The UK has several laws against hate speech built into various other laws (rather than a standalone law). For example, section 4 of the Public Order Act 1986 makes it offence to use 'threatening, abusive or insulting words or behaviours that causes, or is likely to cause, another person harassment, alarm or distress'.⁵⁰² There is currently a discussion underway to develop a Bill of Rights to strengthen free speech. This bill was introduced into parliament on Wednesday 22nd June 2022. The Bill of Rights is intended to repeal and replace the Human Rights Act 1998, although appears to have been paused at the time of writing.⁵⁰³

More generally, the development of the right to freedom of speech will impact the way in which XR technologies can be used. There is an ongoing debate involving 'legal but harmful speech' and legal debates must consider the balance between regulating freedom of speech on the one hand, and hate crime on the other.

Furthermore, protection against online harmful content in relation to XR, particularly in the case of children, poses new challenges in terms of regulation and monitoring. Whilst the Online Safety Bill aims to protect children from harmful imagery/speech/incitements,⁵⁰⁴ it may be challenging to monitor who the end-user is behind the XR technology and to adequately protect them from harmful online content.

⁴⁹⁹ Equality Act 2010, c. 15.

⁵⁰⁰ International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; International Convention on the Protection of All Migrant Workers and Members of Their Families (entered into force 18 December 1990), G.A. Res 45/158; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

⁵⁰¹ Human Rights Act 1998, schedule 1, article 10 (2).

⁵⁰² Public Order Act 1986, c.64, s. 4; CARE. (n.d.) Free Speech in the UK: what does the law actually say? Retrieved 28.10.22. Available at/ <https://care.org.uk/cause/religious-liberty/free-speech-law>

⁵⁰³ Elgot, J. (2022). *Liz Truss halts Dominic Raab's bill of rights plan* / The Guardian [Online]. 7 September 2022. Retrieved 28.10.22. Available at/ <https://www.theguardian.com/law/2022/sep/07/liz-truss-halts-dominic-raab-bill-of-rights-plan>.

⁵⁰⁴ Online Safety Bill. Retrieved 28.10.22. Available at/<https://bills.parliament.uk/bills/3137>.

Implications for UK privacy and data protection law

Following Brexit, the UK Government has indicated its intention to update and reform the UK's data protection laws, specifically the Data Protection Act (2018) and the UK General Data Protection Regulation (UK GDPR).⁵⁰⁵ This led to the introduction of the Data Protection and Digital Information Bill to the House of Commons in July 2022.⁵⁰⁶ Substantively, the various provisions contained in the Bill remain broadly in keeping with the fundamental aspects of, and only introduce minor modifications to, the EU GDPR. At the time of writing, the Bill had entered its second reading stage in Parliament, although it appears to be facing some delays.⁵⁰⁷

Implications for UK consumer rights law

The Consumer Rights Act 2015 is the UK's primary piece of legislation in relation to consumer protection.⁵⁰⁸ The Act offers consumer protection in relation to goods as well as digital content.⁵⁰⁹ The Act provides that consumers have a right to remedies, such as repair, replacement, a price reduction or a refund, if their consumer rights under a goods or digital content contract are not met.⁵¹⁰

Following Brexit, UK consumer protection law remained largely unchanged due to the retained EU law. However, ongoing legal developments at the EU level, such as the Digital Services Act and the Digital Markets Act, will not apply in the UK.⁵¹¹ In the long run, it is thought that UK and EU consumer rights law will diverge further, which will likely have various implications on producers and sellers of XR technologies in the UK and EU.⁵¹²

Implications for UK liability for harms

The Consumer Protection Act 1987 is the primary piece of legislation relating to product liability in England and Wales, and implements the EU Directive on liability for defective products.⁵¹³ Furthermore, as a common law jurisdiction, the tort of negligence is a recognised doctrine in the UK. A breach of

⁵⁰⁵ See, *Consultation outcome: Data: A new direction – government response to consultation* / Gov.uk Department for Digital, Culture, Media & Sport, [Online]. Available at: <https://www.gov.uk/government/consultations/data-a-new-direction-government-response-to-consultation#:~:text=response%2Dto%2Dconsultation-Introduction,the%20UK's%20National%20Data%20Strategy>.

⁵⁰⁶ Data Protection and Digital Information Bill 143 2022-23. Available at: <https://publications.parliament.uk/pa/bills/cbill/58-03/0143/220143.pdf>

⁵⁰⁷ See, for example, Kirsop, J. (2022) *UK Data Protection and Digital Information Bill faces delay* / Pinsent Masons [Online]. Available at: <https://www.pinsentmasons.com/out-law/news/data-protection-digital-information-bill-delay>; Woollacott, E. (2022) *UK Reconsiders Data Protection Rules (Again)* / Forbes [Online]. Available at: <https://www.forbes.com/sites/emmawoollacott/2022/10/04/uk-reconsiders-data-protection-rules-again/?sh=27767b87207f>.

⁵⁰⁸ Consumer Rights Act 2015, c. 15.

⁵⁰⁹ Ibid, chapter 2 and 3.

⁵¹⁰ Ibid, Chapter 3, s. 42-45.

⁵¹¹ Proposal for a Regulation of the European Parliament and of the Council on a Single Market For Digital Services (Digital Services Act) and amending Directive 2000/31/EC (15.12.2020, COM(2020) 825 final), [Online]. Available at: <https://eur-lex.europa.eu/legal-content/en/ALL/?uri=COM:2020:825:FIN>; Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act).

⁵¹² Conway, L. (2021) *Brexit: UK consumer protection law* / UK Parliament: House of Commons Library [Online]. Available at: <https://commonslibrary.parliament.uk/research-briefings/cbp-91126/#:~:text=In%20effect%2C%20consumer%20protection%20law,as%20they%20did%20before%20Brexit>.

⁵¹³ Council Directive of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (7.8.1985, OJ L210/29).

contract may also give rise to liability.⁵¹⁴ Finally, alleged product safety issues may also result in criminal investigation and prosecution.⁵¹⁵ UK law provides for the offence of corporate manslaughter in the case of a gross breach of duty of care for which an organisation can be held responsible.⁵¹⁶

Two recent UK incidents illustrate the impact of online platforms on vulnerable groups of people, such as children.⁵¹⁷ Whilst these incidents did not concern liability for harm caused by the online platforms, they will likely be informative for the ongoing debate of regulating harmful online content and responsibilities of operators and providers.

Gaps and challenges

Regulating XR technologies in the context of harmful online content appears to be an important regulatory challenge in the UK. A balance must be struck between protecting the right to freedom of expression on the one hand, and protecting against harmful online content and hate speech on the other, particularly in the context of groups with protected characteristics. XR technologies pose a unique challenge in this regard, given their immersive nature which may exacerbate possible negative impacts.

Brexit is a further area which may pose future challenges with regard to the regulation of XR technologies in the UK, versus the EU. Whilst many laws that originated in the EU are currently retained in UK domestic law, it is likely that these will diverge in the long-term. This may have wide-ranging implications on developers and providers, as well as end-users, although the exact implications remain to be seen.

5.1.4 Noteworthy international approaches

Countries such as Brazil and India have both considered much stricter regulation of content monitoring online, than the UK or the EU, for example. The Brazilian executive issued a Provisional Measure 1068 to restrict content removal by social media platforms, limiting removal only to cases of nudity, violence, narcotics, and incitement to crime, thereby preventing social media platforms from removing disinformation, such as President Jair Bolsonaro's COVID-19 disinformation removed by Facebook, Twitter, and YouTube.⁵¹⁸ The Indian government has similarly issued several regulations, including the Information Technology Act and Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules of 2021⁵¹⁹, which direct user-to-user services to remove a wide range of content,

⁵¹⁴ Sale of Goods Act 1979, c. 54; Supply of Goods and Services Act 1982, c. 29; Directive 1999/44/EC of the European Parliament and of the Council of 25 May 1999 on certain aspects of the sale of consumer goods and associated guarantees (7.7.1999 OJ L171/12); *Product liability and safety in the UK (England and Wales): overview* / Thomson Reuters Practical Law [Online]. Available at:

[https://uk.practicallaw.thomsonreuters.com/w-013-0564?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-013-0564?transitionType=Default&contextData=(sc.Default)&firstPage=true).

⁵¹⁵ *Product liability and safety in the UK (England and Wales): overview* / Thomson Reuters Practical Law [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-013-0564?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-013-0564?transitionType=Default&contextData=(sc.Default)&firstPage=true).

⁵¹⁶ Corporate Manslaughter and Corporate Homicide Act 2007, c. 19.

⁵¹⁷ BBC (2022). Archie Battersbee: How did life support battle end up in court? 6th August 2022. [Online] Retrieved 28.10.22 Available at/ <https://www.bbc.co.uk/news/uk-england-esssex-61829522>; BBC (2022). Molly Russell inquest: Father makes social media plea. 30th September 2022. [Online] Retrieved 28.10.22. Available at/ <https://www.bbc.co.uk/news/uk-england-london-63073489>.

⁵¹⁸ Satariano, A. (2021). *Youtube Pulls Videos by Bolsonaro for Spreading Misinformation on the virus* / The New York Times [Online]. Available at: <https://www.nytimes.com/2021/07/22/world/youtube-bolsonaro-covid.html>.

⁵¹⁹ Ministry Electronics and Information Technology. (2021). The Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021. Feb 25. 2021. Retrieved 28.10.22. Available at/ <https://prsindia.org/billtrack/the-information-technology-intermediary-guidelines-and-digital-media-ethics-code-rules-2021>

including material that threatens the sovereignty of the Indian state. This uses algorithmic systems to monitor and remove harmful content, and to trace encrypted messages to limit online anonymity. Activist groups have claimed that these measures are aimed at curbing dissent against the government, resulting in what they call “digital authoritarianism.”⁵²⁰

To the contrary, it has been argued that U.S. privacy and data protection laws fall short of adequately protecting the privacy risks associated with XR technologies, considering the amount and depth of information XR technologies can reveal about a person.⁵²¹ Whilst there are some State level and sector-specific federal data privacy laws,⁵²² these laws may not be sufficiently adequate to capture the risks of XR technologies.⁵²³ The US legal system also often relies on litigation to develop and interpret the boundaries of laws.⁵²⁴ As a result, enforceable legal standards take time to develop, and do not develop further until a dispute arises.⁵²⁵ US law is generally considered to be cautious when it comes to regulating offensive conduct, in large part because of First Amendment protection of the right to freedom of expression,⁵²⁶ meaning that the legal protections offered in the U.S. against offensive conduct in the virtual world are likely to be limited as well.⁵²⁷

5.2 XR-specific regulatory challenges

Although the regulatory challenges of XR technologies are common across each of the identified countries, various synergistic and antagonistic approaches to regulation can be identified between them. This section presents a commentary of the main gaps and challenges in existing regulation based on the analysis set out in the three national legal case studies and the noteworthy examples from other jurisdictions.

5.2.1 Protecting privacy and ensuring adequate data protection

A key regulatory challenge is to ensure the privacy and adequate protection of the significant volume and various types of data collected and processed in XR technologies.⁵²⁸ The particular privacy risks for virtual reality (VR) users in the Metaverse have been highlighted in a recent study conducted by Nair et al, in which they identified how a malicious actor, such as a hardware manufacturer, software developer, server administrator, or even another end-user, could obtain more than 25 unique data points in relation to individual users of commercially-available VR devices in the course of 10-20 minutes of use, with the

⁵²⁰ Shahbaz, A. (n.d). “The Rise of Digital Authoritarianism” Freedom on the net 2018. Retrieved 28.10.22. Available at: <https://freedomhouse.org/report/freedom-net/2018/rise-digital-authoritarianism>

⁵²¹ Pahi S. and Schroeder C. (2022) ‘Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them’, *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>.

⁵²² See, for instance, California Consumer Privacy Act (CCPA) and the California Privacy Rights Act (CPRA); Electronic Communications Privacy Act of 1986 (ECPA); Children’s Online Privacy Protection Act (COPPA); Health Insurance Portability and Accountability Act of 1996 (HIPAA).

⁵²³ Pahi S. and Schroeder C. (2022) ‘Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them’, *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>.

⁵²⁴ Silverman K. and Campbell T.A. (2021) *The knotty problem of applying real-world laws to VR and AR* / *World Economic Forum*, [Online]. Available at: <https://www.weforum.org/agenda/2021/08/real-world-laws-ar-and-vr/>.

⁵²⁵ Ibid.

⁵²⁶ U.S. Const. Amend I.

⁵²⁷ Silverman K. and Campbell T.A. (2021) *The knotty problem of applying real-world laws to VR and AR* / *World Economic Forum*, [Online]. Available at: <https://www.weforum.org/agenda/2021/08/real-world-laws-ar-and-vr/>.

⁵²⁸ Pahi S. and Schroeder C. (2022) ‘Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them’, *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>.

possibility for other more sensitive data such as sexual or political orientation to be tracked and inferred.⁵²⁹

Broadening this to XR technologies collectively, the ability for such technologies to either partially or fully immerse the end user in the virtual world, combined with the potential to simulate different experiences and sensations, such as the feeling of touch through haptic sensors, means that there is a wealth of beneficial opportunities in terms of user experience. This is particularly the case for traditionally marginalised communities, such as persons with disabilities. In addition, however, there are significant risks to the human rights to privacy and data protection through the breadth and depth of data collection associated with XR technologies.⁵³⁰

Of the significant volume and variety of data collected in XR technologies, a certain amount may be provided involuntarily or unconsciously, for example through eye or other forms of physiological or psychological tracking, and may also be combined with other data points to enable further inferences to be drawn.⁵³¹ The risks associated with this may affect both end users and non-users, i.e., bystanders, whose personal data may be captured and processed in an XR user's device (e.g., AR used in public spaces) either directly or indirectly, and with or without knowledge and consent,⁵³² with resultant implications for the ability of such individuals to exert control over the use of, and their rights in relation to, their data.⁵³³ Such risks may, moreover, be exacerbated if the data pertains to special categories of person, such as children.⁵³⁴ Yet, most challenging for regulatory purposes, this pervasive collection and processing of various types of personal and/or sensitive data, ranging from potentially identifying input data such as a username and IP address, to more sensitive output data including biometric and neural data, is viewed as "fundamentally necessary" to enable the "core functionality" of XR technologies.⁵³⁵ This highlights the need to strike a balance between enabling positive user experiences, for which data collection and processing is essential, and protecting users and bystanders against the associated risks.

In assessing the effectiveness of existing regulatory frameworks to protect both end-users and bystanders against these risks, it appears that the data protection regimes in the three national legal case studies outlined above are better equipped to respond to these challenges in comparison to the patchwork of information privacy laws in the US (see Section 4.1.3 above). On this, whilst not explicitly preventing or specifically addressing such risks of privacy and data protection interference in the context of XR, the GDPR, to which France and Italy are subject as EU Member States, and on which the UK Data Protection Act 2018 is based,⁵³⁶ establishes various principles relating to, and a requirement

⁵²⁹ Nair, V., Munilla Garrido, G., and Song, D. (2022) 'Exploring the Unprecedented Privacy Risks of the Metaverse', *arXiv:2207.13176*. DOI: <https://doi.org/10.48550/arXiv.2207.13176>

⁵³⁰ Heller, B. (2021) 'Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law', *Vanderbilt Journal of Entertainment & Technology Law*, Vol.23:1, pp.1-51. Available at: <https://scholarship.law.vanderbilt.edu/jetlaw/vol23/iss1/1>

⁵³¹ Pahi S. and Schroeder C. (2022) 'Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them', *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>

⁵³² Ibid.

⁵³³ Roesner, F. et al (2014) 'Augmented Reality: Hard Problems of Law and Policy', *2014 ACM International Joint Conference on Pervasive and Ubiquitous Computing: Adjunct Publication*, pp.1283-1288. Available at: <https://ssrn.com/abstract=2482198>

⁵³⁴ Pahi S. and Schroeder C. (2022) 'Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them', *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>

⁵³⁵ McGill, M. (2021) 'Extended Reality (XR) and the Erosion of Anonymity and Privacy', *The IEEE Global Initiative on Ethics of Extended Reality (XR) Report*, pp.1-24. Available at: <https://ieeexplore.ieee.org/document/9619999>

⁵³⁶ NB: Although in the post-Brexit landscape the UK government has tabled a new Data Protection and Digital Information Bill to amend and update the UK's current Data Protection Act (2018) and General Data

for the lawfulness of, the processing of “personal data”,⁵³⁷ broadly defined as “any information relating to an identified or identifiable natural person”.⁵³⁸ As well as the requirements relating to the processing of personal data, the GDPR also establishes a conditional prohibition on special categories of personal data, which includes XR-relevant data points such as “biometric data for the purpose of uniquely identifying a natural person”.⁵³⁹

More generally, the GDPR emphasises fundamental principles such as data protection by design and default, in accordance with which it imposes a requirement on data controllers to limit the collection and processing of personal data by “implement[ing] appropriate technical and organisational measures for ensuring that, by default, only personal data which are necessary for each specific purpose of the processing are processed.”⁵⁴⁰ Comparatively, the US information privacy regulatory landscape is more limited, both in terms of scope and the practicality of enforcement, with potentially constraining factors including the narrowness of sector-specific protection at the federal level, coupled with the territorial and jurisdictional restrictions on the applicability of more comprehensive data privacy laws at the state level (e.g., California Consumer Privacy Act and California Privacy Rights Act), as well as the overall lack of resource for enforcement of such laws at both the federal and state level.⁵⁴¹

5.2.2 Regulating harmful online content

One of the major regulatory challenges posed by XR technologies is the regulation of harmful online content in the context of the right to freedom of expression. The immersive and increasingly realistic nature of VR, specifically, may render the psychological and emotional harm suffered by victims of “virtual assault”, for instance, comparable to that which occurs in the physical world.⁵⁴² Yet, incidences of this nature may not be treated equivalently for the purposes of the law. As such, a careful balance must be struck between protecting the right to freedom of expression and regulating potentially harmful online content, including hate crime and online (sexual) harassment, particularly in relation to special category groups. In this regard, it appears that each country takes a tailored approach that is seemingly heavily culture-dependant, as evidenced in the divergences noted in section 5.1 between the studied European countries, Brazil, India and the United States.

5.2.3 Identity and legal status of online avatars

The regulation of harmful online content relates to a further regulatory challenge associated with XR, namely of online identity and the legal status of online avatars, or digital twins. Currently, users of extant metaverse environments can use a pseudonym and online avatar, which helps create human anonymity. Whilst online privacy may be protected that way, it raises challenges when it comes to

Protection Regulation (UK GDPR), which together implement the EU GDPR, the various provisions contained therein remain broadly in keeping with the fundamental aspects of and only introduce minor modifications to the EU GDPR. See further: Data Protection and Digital Information Bill 143 2022-23.

Available at: <https://publications.parliament.uk/pa/bills/cbill/58-03/0143/220143.pdf>

⁵³⁷ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Article 5-6.

⁵³⁸ Ibid, Article 4(14).

⁵³⁹ Ibid, Article 9(1).

⁵⁴⁰ Ibid, Article 25.

⁵⁴¹ See, e.g., Pahi S. and Schroeder C. (2022) ‘Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them’, *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>; Heller, B. (2021) ‘Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law’, *Vanderbilt Journal of Entertainment & Technology Law*, Vol.23:1, pp.1-51. Available at: <https://scholarship.law.vanderbilt.edu/jetlaw/vol23/iss1/1>

⁵⁴² Petter O. (2022) *Why Is No One Taking Sexual Assault In the Metaverse Seriously?* / *Vogue* [Online]. Available at: <https://www.vogue.co.uk/arts-and-lifestyle/article/sexual-assault-in-the-metaverse>.



identity verification and tracing illegal online activity, such as fraud, defamation, and identity theft.⁵⁴³ To further enhance online safety and combat cybercrime, additional regulation may be required to introduce identifiers, such as watermarks,⁵⁴⁴ or unique online identifiers like the European Digital Identity Wallet.⁵⁴⁵ In addition, the legal status awarded to online avatars may affect the protection of creative works through intellectual property rights, although the full implications of this require further consideration and research.

5.2.4 Roles and responsibilities of XR providers

The national legal case studies and comparative analysis also highlighted a legal issue regarding the role of online platform providers in monitoring and controlling harmful content on their platforms. In light of the spread of mis/disinformation, hate speech and conspiracy theories on online platforms such as Facebook, an Oversight Board was established by Meta in 2018 to act as judge of the kind of speech that would be allowed on the platform.⁵⁴⁶ This raises the question as to what role online platform providers should play in monitoring and controlling online content. The Board's decisions will impact Facebook users worldwide, but may not necessarily align to national or regional regulation of harmful online content and the protection of the right to freedom of speech, which is often country and culture specific. Furthermore, if it is accepted that providers do have a responsibility in monitoring and removing harmful online content, the scope of this responsibility must be clarified. For instance, the UK case study highlighted two incidences in which teenagers died at the influence of online media platforms. Incidents like these are likely to inform the ongoing debate regarding the responsibilities of online platform providers, and the possibility of liability for failure to identify or remove harmful online content.

Developments at the EU level, such as the proposed Digital Services Act, seek to enhance consumer protection and online safety, by calling 'for more fairness, transparency and accountability for digital services' content moderation processes,'⁵⁴⁷ The Act calls for harmonised rules on illegal online content and content moderation. XR technologies, and VR, AR and metaverse technologies in particular, are likely to be covered by the proposed DSA. Content moderation is defined as 'activities undertaken by providers of intermediary services aimed at detecting, identifying and addressing illegal content or information incompatible with their terms and conditions, ...'.⁵⁴⁸ Illegal content, in this regard, refers to information which does not comply with either EU law or law of a Member State.⁵⁴⁹ As such, platform providers will be responsible for identifying and addressing illegal content, and will require responsible and diligent behaviour in order to respect fundamental rights, such as the right to freedom of expression and non-discrimination.⁵⁵⁰ Whilst the UK will not be covered by the proposed DSA like France and Italy, current legal developments in the UK are comparable to the proposed DSA.⁵⁵¹

⁵⁴³ Cheong B. C. (2022) 'Avatars in the metaverse: potential legal issues and remedies', *International Cybersecurity Law Review*, 3 (467), [Online]. Available at: <https://doi.org/10.1365/s43439-022-00056-9>.

⁵⁴⁴ Grinbaum A. and Adomaitis L. (2022) 'The Ethical Need for Watermarks in Machine-Generated Language' [arXiv:2209.03118](https://arxiv.org/abs/2209.03118), [Online]. Available at: <https://doi.org/10.48550/arXiv.2209.03118>.

⁵⁴⁵ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market and Repealing Directive 1999/93/EC, OJ L, vol. 257, 23 July 2014.

⁵⁴⁶ Klonick K. (2021) *Inside the making of Facebook's Supreme Court* / *The New Yorker*, [Online]. Available at: <https://www.newyorker.com/tech/annals-of-technology/inside-the-making-of-facebooks-supreme-court>.

⁵⁴⁷ Proposal for a Regulation of the European Parliament and of the Council on a Single Market for Digital Services (Digital Services Act) and amending Directive 2000/31/EC COM/2020/825 final. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020PC0825&from=EN>.

⁵⁴⁸ Ibid, article 2 (p).

⁵⁴⁹ Ibid, article 2 (g).

⁵⁵⁰ Ibid, preamble, para. 3.

⁵⁵¹ See, the Online Safety Bill (HC), HC Bill 121 (as introduced on 28 June 2022); House of Commons, *Online Safety Bill* / *UK Parliament*, [Online]. Available at: <https://bills.parliament.uk/bills/3137>.



5.2.5 AI governance and implications for XR technologies

Legal developments regarding AI, such as the EU's proposed AI Act, will have implications for AI-based XR technologies in the European Union.⁵⁵² Depending on the type of AI systems involved in XR technologies, they may be considered to pose an unacceptable risk, and therefore prohibited, or otherwise treated as high-risk, limited risk or minimal risk.⁵⁵³ It is expected that various XR technologies, including natural language processing (NLP) systems, such as the use of chatbots in recruitment processes, will fall within the high-risk category of the proposed AI Act.⁵⁵⁴ High-risk AI systems will be subject to stricter obligations, including risk assessments and mitigation systems, before such systems can be put on the European market.⁵⁵⁵

Furthermore, the proposed AI Act also imposes a general requirement on users of emotion recognition and biometric categorisation systems to inform exposed natural persons of the operation of such systems.⁵⁵⁶ As such, users of XR wearables enabled with facial recognition technology,⁵⁵⁷ for instance, may be required to inform affected persons (bystanders) that they have been the subject of biometric categorisation. Although the UK's departure from the EU means that the proposed AI Act will not apply, UK-based manufacturers of XR technologies would still be bound by the provisions of the Act if they want to introduce their products to the EU market.

5.2.6 Divergent approaches to regulation and implications for XR

Finally, divergent approaches to regulation may have various implications for XR technologies. Particularly, the creation of a metaverse as an integrated, immersive and borderless virtual world, of which users may be located in different jurisdictions in the physical world, raises challenges as to the applicable regulation. In general, any provider operating in the EU would be subject to EU regulation. In addition, providers are subject to the national legislation of EU Member States, as well as being required to comply with national laws of non-EU Member States, such as the UK, US and in other parts of the world. As such, it appears that compliance with legislation would be cumulative for metaverse providers, potentially creating a significant regulatory burden. Furthermore, overlapping regulation creates a risk of failure to comply due to potentially inherently conflicting laws and regulations, or for a metaverse provider to potentially operate entirely outside the reach of a regulatory framework.⁵⁵⁸ To encourage more widespread consistency, regulation may therefore best be placed at an international level, or at least the regional level, such as through the auspices of the EU.

⁵⁵² Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain union legislation acts (21.4.2021, COM(2021) 206 final).

⁵⁵³ Ibid.

⁵⁵⁴ Ibid, preamble, para. 36.

⁵⁵⁵ *Regulatory framework proposal on artificial intelligence / European Commission*, [Online]. Available at: <https://digital-strategy.ec.europa.eu/en/policies/regulatory-framework-ai>.

⁵⁵⁶ Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain union legislation acts (21.4.2021, COM(2021) 206 final), Article 52 (2).

⁵⁵⁷ See, for instance, the Vuzix M400 smart glasses enable the mobile deployment of the NeoFace Kaoato facial recognition system offered by NEC Solution Innovators. Available at: <https://www.biometricupdate.com/202201/new-worldwide-deals-facial-recognition-integration-for-vuzix-smart-glasses>.

⁵⁵⁸ Boyd M. (2022) *Regulating The Metaverse: Can We Govern The Ungovernable?* / Forbes [Online]. Available at: <https://www.forbes.com/sites/martinboyd/2022/05/16/regulating-the-metaverse-can-we-govern-the-ungovernable/?sh=19f0941c1961>.

6. Cross-cutting regulatory challenges

Climate engineering, neurotechnologies and digital extended reality are technology families with distinct and unique characteristics. The analysis of the national legal case studies has highlighted the regulatory challenges specific to these technology families. Importantly, however, as emerging technology families, they also present some cross-cutting regulatory challenges. The section below sets out the major regulatory challenges applicable to two or more of the technology families.

6.1 Defining emerging technologies

A regulatory challenge which is relevant for all three technology families, is the issue of legal definitions. Defining what an emerging technology entails, and drawing the line between what does and does not fall within that definition, poses challenges for both policymaking and the development of effective regulatory regimes. Furthermore, the emerging and rapidly evolving nature of these technologies means that there is a risk that regulation may become outdated, if it is not sufficiently comprehensive or unable to keep up with and adapt to technological developments.

Climate engineering

A variety of terms is used across the legal, policy and academic discourse to describe the family of technologies this report has referred to as climate engineering. Other terms include geoengineering and negative emission technologies (NETs). Within the climate engineering technology family, a distinction is often made between Carbon Dioxide Removal (CDR) or Greenhouse Gas Removal (GGR), and Solar Radiation Management or Modification (SRM). The use of these terms appears to have evolved over time; where geoengineering and climate engineering were generally used as overarching terms to describe both CDR and SRM, the IPCC no longer uses these terms, but instead refers to CDR in the context of 'climate mitigation' and to SRM separately.⁵⁵⁹

Furthermore, within the CDR category a distinction is sometimes made between nature-based solutions and non-nature-based or 'engineered' technologies. Nature-based solutions generally involve methods and/or techniques aimed at enhancing natural sinks, i.e., the natural process in which CO₂ is absorbed, such as by forests, soil, and oceans. 'Engineered' technologies, generally involve a more technological and anthropogenic intervention to absorb CO₂ from the atmosphere, such as BECCS and DACCS. The Paris Agreement does not expressly address climate engineering, and is silent on the issue of whether 'removals by sinks' refers to all forms of removals, including 'engineered' removals, or is restricted to removals from nature-based sinks alone.⁵⁶⁰ Clarifying the meaning of removals under the international and national climate law regime would help provide greater certainty regarding the legal status and legality of climate engineering, and CDR in particular. Whether there is a regulatory need to explicitly distinguish between 'engineered' and nature-based removals may depend on the risks of environmental harm and possible negative consequences. It may be, that legal and policy developments follow the trend of the IPCC, which adopted a strict distinction between CDR and SRM, but no longer distinguishes between 'engineered' and nature-based removals. It is worth noting that some climate engineering techniques indeed involve both nature-based and engineered processes, such as BECCS.

Whilst seemingly more environmentally-friendly at face value, nature-based solutions may have negative environmental or societal implications, which, depending on the specific circumstances, might

⁵⁵⁹ Skea J. et al (2021) *Climate Change 2022: Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel on Climate Change, [Online]. Available at: <https://www.ipcc.ch/report/ar6/wg3/>, Technical Summary, p. 94.

⁵⁶⁰ Paris Agreement (entered into force 4 November 2016) 3156 U.N.T.S., article 4 (1).

outweigh those of 'engineered' solutions. For example, the land requirements of afforestation to offset a country's emissions may put significant pressure on biodiversity conservation and competing land-uses such as food production.⁵⁶¹ As such, a solution such as DACCS may offer a better outcome, although this is likely to be country- and context-specific. Therefore, any regulation specifically addressing climate engineering, must be sufficiently capable of incorporating context-specific characteristics, to avoid or mitigate negative externalities as much as possible.

Carbon Capture and Storage (CCS) and Carbon Capture and Utilisation (CCU) arguably do not constitute CDR by themselves, for the fact that they do not remove carbon dioxide from the atmosphere by themselves. They would, however, constitute CDR if combined with bioenergy production (BECCS) or direct air capture (DACCS).⁵⁶² Furthermore, there is a temporal component to what constitutes a removal, meaning that CCU arguably does not constitute climate engineering. Regulation is likely required to define what constitutes a removal, taking into account the period for which CO₂ and other GHGs may be removed from the atmosphere.

Regulation likely needs to distinguish between different types of climate engineering technologies, considering their wide-ranging and divergent impacts and implications. Currently, there still appears to be ambiguity between various types of climate engineering and clarification of such definitions at the international level can help provide greater clarity, such as in the case of IPCC emission pathways and the reliance on different types of climate engineering techniques in achieving climate targets.⁵⁶³

Neurotechnologies

For the purposes of this report, the following definition of neurotechnologies has been used, namely: "devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons."⁵⁶⁴ Unpacking this broad definition, a number of distinctions can be made. The first relates to whether neurotechnologies are used to "read" information outputted by the brain and/or "write" information into the brain in order to modulate function.⁵⁶⁵ Neurotechnologies and neuroscientific techniques that monitor and assess the neural activity in the brain include electroencephalography (EEG) and functional magnetic resonance imaging (fMRI), while those that modulate or stimulate the brain and neural system include deep brain stimulation (DBS) and variations thereof, such as transcranial direct current stimulation (tDCS). As indicated, neuroimaging technologies and neurostimulation or neuromodulation technologies are not mutually exclusive, however, and there is a growing subset of bidirectional neural interfaces that combine both recording and stimulation by transferring information into *and* out of the nervous system, the primary clinical uses for which include for neuroprosthetic, neurorepair and neurotherapeutic purposes.⁵⁶⁶

⁵⁶¹ See, Dooley K. et al (2022) *The Land Gap Report 2022*. The Land Gap Report, [Online]. Available at: https://www.landgap.org/storage/2022/11/Land-Gap-Report_FINAL.pdf; Fujimori S. et al (2022) 'Land-based climate mitigation measures can affect agricultural markets and food security' *Nature Food*, 3 (110), [Online]. Available at: <https://doi.org/10.1038/s43016-022-00464-4>.

⁵⁶² Skea J. et al (2021) *Climate Change 2022: Mitigation of Climate Change: Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Intergovernmental Panel on Climate Change, [Online]. Available at: <https://www.ipcc.ch/report/ar6/wg3/>, Technical Summary, p. 95.

⁵⁶³ IPCC (2018) *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Cambridge University Press, Cambridge, UK and New York, USA, [Online]. Available at: <https://doi.org/10.1017/9781009157940>, 4.1.

⁵⁶⁴ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457, p.6.

⁵⁶⁵ Rommelfanger, K.S., Pustilnik, A. and Salles, A. (2022) 'Mind the Gap: Lessons Learned from Neurorights', *Science and Diplomacy*. DOI: <https://doi.org/10.1126/scidip.ade6797>

⁵⁶⁶ Greenwald, E. Masters, M.R. and Thakor, N.V. (2017) 'Bidirectional Neural Interfaces', *Medical & Biological Engineering & Computing*, Vol.54, pp.1-17. DOI: <https://doi.org/10.1007%2Fs11517-015-1429-x>



A further distinction between different neurotechnologies relates to the degree of invasiveness, with the use of some neurotechnologies requiring invasive surgical procedures, while others require less or entirely non-invasive methods of use.⁵⁶⁷ Modern brain computer or brain machine interfaces (BCIs/BMIs), for instance, aim to create a direct channel of communication to transform the recording of brain activity into outputs of actions performed by digital computers, for which they rely upon either internally surgically implanted electrodes or other direct connection to the central nervous system, or instead the recording of neural activity through non-invasive, externally placed electrodes used for neuroimaging techniques such as EEG.⁵⁶⁸ The degree of invasiveness informs both the capabilities of neurotechnologies to “read” information from and “write” information to the brain, with more invasive neurotechnologies typically more enhanced and therefore capable of such bidirectionality,⁵⁶⁹ as well as determining the applicable basis for regulation. The EU Medical Device Regulation, for instance, classifies all non-invasive devices as class I,⁵⁷⁰ while all surgically invasive devices are classified as class IIa.⁵⁷¹

Beyond the specific technical components of neurotechnologies, an additional definitional consideration is associated neuro-specific concepts. For instance, whilst this report has used the term ‘brain and other neural data’ to refer to the primary type(s) of data collected and processed in neurotechnologies, there exists in the academic discourse a range of variations thereof, including “neurodata”,⁵⁷² and the broader category of “mental data”.⁵⁷³ Further, in its Recommendation on Responsible Innovation in Neurotechnology, the OECD refers to “personal brain data”, defined as “data relating to the functioning or structure of the human brain of an identified or an identifiable individual that includes unique information about their physiology, health, or mental states.”⁵⁷⁴ The various stakeholders in the neurotechnology debate may need to consider the standardisation of neuro-specific terminology and associated concepts, such as neurorights, to promote conceptual clarity and regulatory certainty.

Digital extended reality

For the purpose of this report, XR has been defined as: AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs (e.g., voice, gestures, language, movement, emotions, and other elements of human communication), allowing extended or mixed virtual scenarios (e.g., visual, audio, linguistic or haptic) to be tailor-made or “customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices).⁵⁷⁵ XR can include a range of technologies, from software-based

⁵⁶⁷ McCay, A. (2022) Neurotechnology, law and the legal profession. *Horizon Report for the Law Society*. Available at: <https://www.lawsociety.org.uk/topics/research/how-will-brain-monitoring-technology-influence-the-practice-of-law>

⁵⁶⁸ Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe, pp.15-16. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

⁵⁶⁹ Rommelfanger, K.S., Pustilnik, A. and Salles, A. (2022) ‘Mind the Gap: Lessons Learned from Neurorights’, *Science and Diplomacy*. DOI: <https://doi.org/10.1126/scidip.ade6797>

⁵⁷⁰ Regulation (EU) 2017/45 of the European Parliament and of the Council of 5 April 2017 on Medical Devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directive 90/385/EEC and 93/42/EEC, (OJ L 117), Annex VIII, Chapter III §4.

⁵⁷¹ Ibid, Annex VIII, Chapter III §5.

⁵⁷² See, e.g., Rommelfanger, K.S., Pustilnik, A. and Salles, A. (2022) ‘Mind the Gap: Lessons Learned from Neurorights’, *Science and Diplomacy*. DOI: <https://doi.org/10.1126/scidip.ade6797>.

⁵⁷³ Ienca, M. and Malgieri, G. (2022) ‘Mental data protection and the GDPR’, *Journal of Law and the Biosciences*, Vol.9:1, pp.1-19. DOI: <https://doi.org/10.1093/jlb/lbac006>.

⁵⁷⁴ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457, p.6.

⁵⁷⁵ TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.



VR, AR and XR systems, digital twins, nudge and affective computing, and NLP, to hardware including headsets, contact lenses, and motion sensors.⁵⁷⁶

Whilst there is no national legislation specifically dedicated to the regulation of XR, existing and proposed laws at the national and international level will affect the ways in which XR technologies may be developed and used. The EU's proposed AI Act, for instance, regulates AI-based systems, and will likely apply to XR technologies using AI. As introduced by the Commission in 2021, the definition of an AI system is contained in Annex I of the proposed AI Act.⁵⁷⁷ Depending on the application area of the AI system, it may be classified as unacceptable risk and would therefore be prohibited,⁵⁷⁸ high-risk and therefore subject to certain conditions,⁵⁷⁹ or low or minimal risk.⁵⁸⁰ The use of AI systems in education, or in employment, law enforcement, migration, asylum and border control management, and the administration of justice and democratic processes is considered high risk.⁵⁸¹

Whilst XR technologies are increasingly AI-based, any XR technology using a system not listed in Annex I according to the European Commission's initial proposal, would fall outside the scope of the regulation. However, the final version of the compromise text of the proposed EU AI Act drafted by the sitting Czech Presidency of the Council of the European Union, as published at the time of writing in the winter of 2022, proposes a much narrower definition of an AI system, removing Annex I from the proposed AI Act altogether.⁵⁸² The new definition of AI is limited to systems 'designed to operate with elements of autonomy and that, based on machine and/or human-provided data inputs, infers how to achieve a given set of objectives using machine learning and/or logic- and knowledge based approaches, and produces system-generated outputs ...'⁵⁸³ The definition of AI, as an emerging technology in itself, will significantly impact the extent to which AI regulation will apply to XR technologies. It is likely that 'elements of autonomy' will require clarification to determine which XR technologies fall within the scope of the AI Act.

6.2 Striking a balance between mitigating risk and stifling innovation

In contemplating possible regulatory reforms at the national and/or international level in relation to each of the identified technology families, there is a need to consider and strike a balance between the protection of individuals and society against associated risks, on the one hand, and avoiding stifling innovation, on the other.

With regard to climate engineering, policy makers must strike a balance between deploying climate engineering for the purpose of meeting climate targets, and regulating climate engineering for the purpose of respecting environmental law principles and objectives, such as the precautionary principle. Furthermore, public participation requirements involves striking a balance between giving local communities a voice and acting in the interest of the world population as a whole, as well as future generations. Too stringent regulation might impede the development of safe and sustainable climate engineering solutions which may prevent countries from meeting their climate targets. The legal status that is awarded to climate engineering and carbon removals may have varied and unintended

⁵⁷⁶ TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.

⁵⁷⁷ Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain union legislation acts (21.4.2021, COM(2021) 206 final), Annex I.

⁵⁷⁸ Ibid, article 5.

⁵⁷⁹ Ibid, article 6 and Chapter 2 and 3, in conjunction with Annex III.

⁵⁸⁰ Ibid.

⁵⁸¹ Ibid.

⁵⁸² Ibid, article 3 (1).

⁵⁸³ Ibid.



consequences. For instance, there is a risk that treating removals as the negative equivalent of emissions may result in the materialisation of the ‘moral hazard’ dilemma, meaning that such treatment might reduce the perceived importance of reducing greenhouse gas emissions as a priority over removing emissions at a later stage.⁵⁸⁴ As such, the possible side effects of regulation and the legal status awarded to elements of climate engineering must be given due consideration during legislative and policy developments.

In relation to neurotechnologies and XR, the EU’s risk-based approach to the regulation of AI, is likely to impact the way in which such technologies are regulated in the EU Member States of Germany, Ireland, France and Italy. The classification of these technologies as unacceptable risk, high risk or low/minimal risk will impact the manner in which these technologies may be developed and used. To illustrate, the Council of the EU’s position on the AI Act, as drafted by the sitting Czech’s presidency at the time of writing in December 2022, states that AI systems enabling manipulation and material distortion of human behaviour, from which physical or psychological harms are likely to occur, present a significant danger “and should therefore be forbidden.”⁵⁸⁵ Both “machine-brain interfaces” and “virtual reality” are currently explicitly listed as examples of “subliminal techniques that subvert or impair person’s autonomy, decision-making or free choices in ways that people are not consciously aware of, or even if aware not able to control or resist”.⁵⁸⁶ If the Act, as it is currently drafted, gets adopted, it would result in a blanket ban on the further marketing, putting into service and use of such AI-based technologies.⁵⁸⁷ Whether the wording of the Act will be further nuanced remains to be seen.

Furthermore, the EU’s proposed Digital Services Act ‘calls for harmonised rules for addressing illegal content online and for liability exemptions and content moderation.’⁵⁸⁸ As such, the proposed Act places the responsibility of moderating harmful online content on providers of intermediary services by imposing an obligation to remove illegal content if ordered to do so by the relevant national judicial or administrative authority of a Member State.⁵⁸⁹ However, the removal of harmful online content, which is considered illegal in one Member State, may be considered to interfere with the right to freedom of expression in another EU or non-EU state. The appropriate role for providers of intermediary services remains highly topical, in the EU, but also in the UK, such as with the development of the Online Safety Bill, and recent changes to remove the responsibility of providers to remove legal but harmful content from the Bill.⁵⁹⁰

6.3 Protecting human rights from the risks posed by emerging tech

The analysis of the three technology families has raised the question of how human rights might best be protected from the risks posed by emerging technologies. Indeed, all three technology families may both positively and negatively affect human rights. Also, all three technology families have given rise to

⁵⁸⁴ See, Adomaitis, L., Grinbaum, A., and Lenzi, D. (2022) *TechEthos D2.2: Identification and Specification of Potential Ethical Issues and Impacts and Analysis of Ethical Issues of Digital Extended Reality, Neurotechnologies, and Climate Engineering*. Available at <https://www.techethos.eu/analysis-of-ethical-issues/>, p. 101.

⁵⁸⁵ Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative Acts – General approach (6 December 2022) 2021/0106(COD), Recital 16.

⁵⁸⁶ Ibid.

⁵⁸⁷ Ibid.

⁵⁸⁸ European Commission, Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on a Single Market For Digital Services (Digital Services Act) and Amending Directive 2000/31/EC, 2020, explanatory memorandum, p. 2.

⁵⁸⁹ Ibid, article 8 (1).

⁵⁹⁰ Vallance C. and McCallum S. (2022) ‘Online Safety Bill: Plan to make big tech remove harmful content axed’ *BBC News*, Tuesday 29th November 2022, [Online]. Available at: <https://www.bbc.com/news/technology-63782082>.



the debate around the adequacy of the existing human rights framework, and the emergence of novel rights. Whilst there have been calls for the adoption of additional rights, a key advantage of rights-based legal frameworks, such as the ones discussed in this report, is the *built-in flexibility* to adapt to the challenges posed by new and emerging technologies, such as through a more expansive interpretation of existing provisions.

The analysis of climate engineering and human rights, for instance, highlighted that climate engineering would serve to protect human rights by seeking to prevent dangerous climate change. Indeed, human rights have previously been invoked in climate change related legal cases to demand climate action.⁵⁹¹ Whilst such climate litigation has been successful in some instances,⁵⁹² it has not resulted in the recognition of an explicit link between climate change and human rights, such as a ‘right to be protected from climate change’. Nevertheless, there appears to be a growing trend towards the recognition of the need for climate action for the purpose of the protection of human rights.⁵⁹³ The explicit recognition of the link between climate action and human rights protection may serve as a mandate for the use of climate engineering in the future. Such a ‘right to be protected from climate change’ would be closely related to the right to life, the right to private life, and a healthy environment, but intrinsically incorporates the protection of the future environment and the interests of future generations. As such, broadening the interpretation of the existing human rights framework would be a way to incorporate the interests of future generations, which is an established legal principle and was identified as a key ethical dilemma.⁵⁹⁴

The analysis of neurotechnologies highlighted how various human rights, such as the right to autonomy, dignity, and freedom of expression, may be enhanced. Simultaneously, the analysis highlighted possible risks of human rights infringements, such as with the right to privacy and integrity. It is considered a risk that existing human rights law frameworks may be inadequate to ensure sufficient privacy and protection of brain and other neural data generated through the use of neurotechnologies.⁵⁹⁵ This risk has given rise to a scholarly debate around the possible need to recognise a series of neurorights. Such rights could be adopted as a new set of human rights, or be incorporated into the interpretation of existing rights, such as the right to privacy, human dignity and the right to autonomy.

Finally, the analysis of digital extended reality has highlighted various human rights implications, such as the protection of right to freedom of expression in the context of online safety, the protection of special category groups, and the regulation of harmful online content. Competing interests requires

⁵⁹¹ See for example, the case of *Mex M v Austria*, Krömer, P. (2021). ‘New application: <blank> v Austria and request for expedite proceedings under Rule 41 (expedite proceedings)’

http://climatecasechart.com/climate-change-litigation/wp-content/uploads/sites/16/non-us-case-documents/2021/20210325_13412_complaint.pdf; and *R (on the application of Friends of the Earth, ClientEarth, Good Law Project and Joana Wheatley) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (18 July 2022), para. 265.

⁵⁹² Most prominently, see, *In de zaak van De Staat der Nederlanden tegen Stichting Urgenda*, arrest, Hoge Raad, 20 december 2019, ECLI:NL:HR:2019:2006; for unofficial English translation see *The State of the Netherlands v Stichting Urgenda*, judgement, Supreme Court of the Netherlands, 20 December 2019, ECLI:NL:HR:2019:2007.

⁵⁹³ See, for instance, Paris Agreement (entry into force 4 November 2016) 3156 UNTS (Paris Agreement), preamble; *The impacts of climate change on the effective enjoyment of human rights / United Nations Human Rights Office of the High Commissioner*, [Online]. Available at: <https://www.ohchr.org/en/climate-change/impacts-climate-change-effective-enjoyment-human-rights>.

⁵⁹⁴ See, United Nations Framework Convention on Climate Change (entry into force 21 March 1994) 1771 UNTS 107 (UNFCCC), article 3 (1); Adomaitis, L., Grinbaum, A., and Lenzi, D. (2022) *TechEthos D2.2: Identification and Specification of Potential Ethical Issues and Impacts and Analysis of Ethical Issues of Digital Extended Reality, Neurotechnologies, and Climate Engineering*. Available at <https://www.techethos.eu/analysis-of-ethical-issues/>, p. 106.

⁵⁹⁵ See, for example, Ienca, M. and Andorno, R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>; Yuste, R. et al. (2017) ‘Four ethical principles for neurotechnologies and AI’, *Nature*, Vol.55, pp.159-163. DOI: <https://doi.org/10.1038/551159a>.

governments to strike a careful balance between restricting the right to freedom of expression, and avoiding harm from online content which may be exacerbated due to the immersive and increasingly realistic nature of XR technologies. Furthermore, this balance is likely to be culture and context specific, whilst the end-user may access this type of content which exists in a single, virtual metaverse from any part of the world, making the regulation of such content particularly challenging.

A key consideration in this legal analysis has been how human rights may be protected from the risks posed by emerging technologies, such as climate engineering, neurotechnologies and digital extended reality. A human rights assessment of possible implications and enhancements can help inform the development of laws and policies to govern emerging technologies.⁵⁹⁶ Such an exercise is helpful with a view to respect human rights and avoid human rights violation, but also to promote technological development in a manner which can enhance human rights.

The adequacy of the existing human rights law framework must be given due consideration in the context of legal and policy developments aimed at the regulation of the three technology families. On the one hand, existing human rights frameworks may be inadequate or insufficient to protect individuals against the risks posed by new and emerging technologies, calling for an expansion or reinterpretation of such human rights protections. On the other hand, there is a danger of rights proliferation, which risks diluting existing protections and creating the potential for uncertainty around the scope and meaning of rights, thus rendering novel rights practically unworkable and unenforceable.

6.4 The limits of existing privacy and data protection frameworks

The foregoing analysis has highlighted the particular risks to privacy and data protection presented by both neurotechnologies and digital extended reality (XR) technologies, which overlap with but are also distinct from those relating to other often interconnected new and emerging technologies, such as Artificial Intelligence (AI). In relation to neurotechnologies, a key consideration, as made more urgent by the extension to use beyond the clinical setting and increasingly into consumer and military contexts, is the status of the significant amount of brain and other neural data collected therein, in relation to which there may exist heightened expectation of (mental) privacy due to its suggested ontological connection with the very essence of personhood and personal identity.⁵⁹⁷ For XR technologies, it is the combination of both great volume and vast range in type of data collected and processed to enable and enhance user experiences through such features as partial or complete visual immersiveness, with the potential for at least some of such data to be collected involuntarily and/or unconsciously (e.g., micromovements), which may relate to both end users and/or bystanders.⁵⁹⁸ These various privacy and data protection risks are, moreover, exacerbated by the increased incorporation into both technologies of AI approaches, such as advanced machine learning, deep learning and big data analytics (see Section 6.5 below).⁵⁹⁹

Of the privacy and data protection frameworks in the national legal case studies on neurotechnologies and XR outlined above, a distinction can be drawn between the current and former Member States of

⁵⁹⁶ See, for example, Mantelero A. (2022) *Beyond Data: Human Rights, Ethical and Societal Impact Assessment in AI*. Information Technology and Law Series, 1st edn, T.M.C. Asser Press The Hague.

⁵⁹⁷ See, e.g., Ienca, M. and Andorno, R. (2017) 'Towards new human rights in the age of neuroscience and neurotechnology', *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>; Paz, A.W. (2021) 'Is Mental Privacy a Component of Personal Identity', *Frontiers in Human Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnhum.2021.773441>

⁵⁹⁸ Pahi S. and Schroeder C. (2022) 'Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them', *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>.

⁵⁹⁹ Ibid; Kellmeyer, P. (2018) 'Big Brain Data: On the Responsible Use of Brain Data from Clinical and Consumer-Directed Neurotechnological Devices', *Neuroethics*, Vol.14, pp.83-98. DOI: <https://doi.org/10.1007/s12152-018-9371-x>.



the European Union, on the one hand, and the US, on the other hand. In relation to the former, the safeguarding of fundamental rights to privacy and data protection is a key cornerstone of the GDPR,⁶⁰⁰ to which each of Germany, Ireland, France, Italy and the UK are subject to and/or have enacted domestic statutory law based on its provisions. There is, however, terminological as well as more substantive differences with US data privacy law. Indeed, in comparison to the European Union (EU) data protection regime, which for the purposes of this analysis also includes the UK, as a former Member State whose statutory data protection law at the time of writing in December 2022 is based upon EU law,⁶⁰¹ particular features of U.S. federal data privacy law include the protection of consumers, rather than fundamental rights-holders, a segmented, sector-specific approach instead of so-called “omnibus” data privacy regulation, and the comparatively inverted base presumption “that personal data may be collected, used or disclosed unless a specific legal rule forbids these activities.”⁶⁰² Whilst these features are also present in existing data privacy laws at the state level as well, recent proposed and actual legislative reforms are increasingly based on more comprehensive data privacy protections akin to the EU GDPR.⁶⁰³

In combination with the particular risks posed by neurotechnologies and XR, these substantive differences inform the specific character of the gaps and challenges in existing privacy and data protection regulation. In the US, for instance, the limitations of existing data privacy laws include territorial restrictions and/or limitations on the types of data protected.⁶⁰⁴ By way of example, the California Consumer Privacy Act and the forthcoming California Privacy Rights Act, which together establish similar rights for individuals in relation to their “personal information”⁶⁰⁵ to those contained in the GDPR, including the right to delete personal information,⁶⁰⁶ the right to correct inaccurate information,⁶⁰⁷ and the right to limit the use and disclosure of sensitive information,⁶⁰⁸ is limited in application to Californian residents.⁶⁰⁹ Thus, whilst the broad definition of “personal information”, expressly including “biometric information”,⁶¹⁰ may apply to the types of data collected in both neurotechnologies and XR, these protections are not available to individuals in other states or under federal law.

As regards specific types of data, the Illinois Biometric Information Privacy Act (BIPA) (2008), for instance, establishes requirements relating to the retention, collection, disclosure and destruction of “biometric identifiers or biometric information”,⁶¹¹ with the latter defined as “any information...based

⁶⁰⁰ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Article 1(1).

⁶⁰¹ N.B.: In the post-Brexit landscape the UK government has tabled a new Data Protection and Digital Information Bill to amend and update the UK’s current Data Protection Act (2018) and General Data Protection Regulation (UK GDPR), which together implement the EU GDPR, although the various provisions contained therein remain broadly in keeping with the fundamental aspects of and only introduce minor modifications to the EU GDPR. See further: Data Protection and Digital Information Bill 143 2022-23. Available at: <https://publications.parliament.uk/pa/bills/cbill/58-03/0143/220143.pdf>

⁶⁰² Chander, A. Kaminski, M.E. and McGeeveran, W. (2021) ‘Catalysing Privacy Law’, *Minnesota Law Review*, Vol.15, pp.1733-1802, pp.1747-56. Available at: <https://scholar.law.colorado.edu/faculty-articles/1336>

⁶⁰³ At the time of writing, at least five states have enacted so-called omnibus data privacy laws, including California, Colorado, Connecticut, Virginia, and Utah. See further National Conference of State Legislatures (2022). *2022 Consumer Privacy Legislation* / [Online]. Available at: <https://www.ncsl.org/research/telecommunications-and-information-technology/2022-consumer-privacy-legislation.aspx>.

⁶⁰⁴ Pahi S. and Schroeder C. (2022) ‘Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them’, *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>.

⁶⁰⁵ Cal. Civ. Code §1798.140.

⁶⁰⁶ Ibid, §1798.105.

⁶⁰⁷ Ibid, §1798.106.

⁶⁰⁸ Ibid, §1798.121.

⁶⁰⁹ Ibid, §1798.140.

⁶¹⁰ Ibid, §1798.140.

⁶¹¹ Illinois Biometric Information Privacy Act (BIPA) of 2008, 740 ILCS 14/15.



on an individual's biometric identifier used to identify an individual"⁶¹² and the list of "biometric identifiers" defined exhaustively as "a retina or iris scan, fingerprint, voiceprint, or scan of hand or face geometry."⁶¹³ Whilst therefore encompassing types of data collected and processed in certain XR technologies, in particular retina and iris scans that are key to enabling functioning in VR, the focus upon the use of such data for identification purposes may effectively exclude other uses of such data, such as to infer the individual preferences of users.⁶¹⁴ Further, the absence of an explicit inclusion of brain and other neural data, coupled with the express exclusion from this definition of the brain scans created by neuroimaging technologies such as magnetic resonance imaging (MRI) and positron emission tomography (PET),⁶¹⁵ highlights potential gaps in relation to the protection of data generated in neurotechnologies. Beyond the state level, the patchwork of data privacy laws at the federal level are narrowly framed in relation to particular sectors (e.g., education),⁶¹⁶ persons (e.g., children),⁶¹⁷ and/or data type (e.g., health information),⁶¹⁸ with the effect of creating potentially significant gaps in coverage for the data collection and processing activities involved in both neurotechnologies and XR.

Comparatively, the limits of the GDPR relate primarily to the definitions for and level of protection afforded to the types of data collected and processed in neurotechnologies and XR. Indeed, whilst the expansive definition of personal data as "any information relating to an identified or identifiable natural person"⁶¹⁹ is likely to apply to much of the data generated in both technologies, there are circumstances in which the enhanced level of protection afforded to special categories of personal data may not apply, notwithstanding its possible sensitivity. For instance, whilst likely to be classified as data concerning health when collected and processed in the course of healthcare provision, the absence of explicit protection for brain and neural data as a special category of personal data means that such data may be lawfully processed for non-health-related purposes, such as predicting consumer behaviours.⁶²⁰ Similarly, the GDPR includes "biometric data for the purpose of uniquely identifying a natural person" as special category personal data, but the restriction to biometric data for identification purposes may exclude novel and invasive data collection and processing activities, such as so-called "biometric psychography", whereby the biometric data captured in immersive XR and neurotechnologies to enable core functionality is also used to identify and build digital profiles relating to users' likes and interests.⁶²¹

6.5 Interconnections between new and emerging technologies

As well as being used in combination to enhance user experiences, with brain-computer interfaces (BCIs) and electroencephalographic (EEG) biosensors enabling brain control in virtual reality (VR) gaming,⁶²² for instance, both neurotechnologies and digital extended reality (XR) technologies leverage machine learning and other Artificial Intelligence (AI) approaches to enable and enhance their operation. In the context of clinical neuroscience and translational neurotechnologies, for instance, advanced machine

⁶¹² Illinois Biometric Information Privacy Act (BIPA) of 2008, 740 ILCS 14/10.

⁶¹³ Ibid.

⁶¹⁴ Heller, B. (2021) 'Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law', *Vanderbilt Journal of Entertainment & Technology Law*, Vol.23:1, pp.1-51, p.4. Available at: <https://scholarship.law.vanderbilt.edu/jetlaw/vol23/iss1/1>

⁶¹⁵ Illinois Biometric Information Privacy Act (BIPA) of 2008, 740 ILCS 14/10.

⁶¹⁶ 20 U.S.C. §1232g.

⁶¹⁷ Children's Online Privacy Protection Act of 1998, Pub. L. 105-277.

⁶¹⁸ Health Insurance Portability and Accountability Act of 1996, Pub. L. 104-19.

⁶¹⁹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Article 4(1).

⁶²⁰ Ienca, M. et al. (2022) 'Towards a Governance Framework for Brain Data', *Neuroethics*, Vol.15:20. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

⁶²¹ Heller, B. (2021) 'Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law', *Vanderbilt Journal of Entertainment & Technology Law*, Vol.23:1, pp.1-51, p.4. Available at: <https://scholarship.law.vanderbilt.edu/jetlaw/vol23/iss1/1>

⁶²² (2018) *Enhancing AR/VR devices with EEG and ECG Biosensors* / Neurosky [Online]. Available at: <https://neurosky.com/2018/01/enhancing-arvr-devices-with-eeq-and-ecq-biosensors/>



learning enables diagnostic classification and prediction of disease outcomes,⁶²³ whilst the combination of AI and XR enables applications including affective computing, medical training, and driver education.⁶²⁴ Here, the main function of advanced machine learning and other AI methods is to analyse, interpret, and identify patterns in the brain, biometric and other complex datasets generated therein.⁶²⁵ Yet, whilst bringing undoubted benefits, as highlighted above, this leveraging of AI approaches also exacerbates existing regulatory gaps and challenges, particularly in relation to privacy (see Sections 5.2.1 and 5.2.5).

From a governance perspective, therefore, the use of both neurotechnologies and XR devices that rely upon AI systems is likely to be informed by relevant guidance frameworks, such as the US Blueprint for an AI Bill of Rights.⁶²⁶ Furthermore, these technologies are likely to become subject to AI-specific forthcoming regulation, such as the proposed AI Liability Directive.⁶²⁷ The combination of these guidance and regulatory frameworks may have implications for future research and development (R&D) efforts. By way of example, in the general approach establishing in the form of a political agreement the Council of the EU's provisional position on the proposed EU AI Act, as drafted by the sitting Czech Presidency and published at the time of writing in December 2022, it is stated in Recital 16 that AI systems enabling manipulation and material distortion of human behaviour, from which physical or psychological harms are likely to occur, present a significant danger "and should therefore be forbidden."⁶²⁸ Both "machine-brain interfaces" and "virtual reality" are explicitly listed as examples of "subliminal techniques that subvert or impair person's autonomy, decision-making or free choices in ways that people are not consciously aware of, or even if aware not able to control or resist", meaning that if in negotiations the European Parliament agrees to this drafting of the text, the further marketing, putting into service and use of such AI-enabled technologies may ultimately be restricted.⁶²⁹

⁶²³ Kellmeyer, P. (2018) 'Big Brain Data: On the Responsible Use of Brain Data from Clinical and Consumer-Directed Neurotechnological Devices', *Neuroethics*, Vol.14, pp.83-98. DOI: <https://doi.org/10.1007/s12152-018-9371-x>

⁶²⁴ Reiners, D. et al. (2021) 'The Combination of Artificial Intelligence and Extended Reality: A Systematic Review', *Frontiers in Virtual Reality*, Vol.2. DOI: <https://doi.org/10.3389/frvir.2021.721933>

⁶²⁵ Ibid; Kellmeyer, P. (2018) 'Big Brain Data: On the Responsible Use of Brain Data from Clinical and Consumer-Directed Neurotechnological Devices', *Neuroethics*, Vol.14, pp.83-98. DOI: <https://doi.org/10.1007/s12152-018-9371-x>

⁶²⁶ The White House Office of Science and Technology Policy. (2022) *Blueprint for an AI Bill of Rights: Making Automated Systems Work for the American People* / The White House [Online]. Available at: <https://www.whitehouse.gov/ostp/ai-bill-of-rights/>

⁶²⁷ Proposal for a Directive of the European Parliament and of the Council on adapting non-contractual civil liability rules to artificial intelligence (AI Liability Directive) COM(2022)496 final.

⁶²⁸ Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence (Artificial Intelligence Act) and amending certain Union legislative Acts – General approach (6 December 2022) 2021/0106(COD), Recital 16.

⁶²⁹ Ibid.

7. Conclusion and outlook

The nine national legal case studies and comparative analysis have provided various insights into the technology-specific and cross-cutting regulatory challenges associated with the governance of climate engineering, neurotechnologies and digital extended reality. Whilst there are no or limited comprehensive legal frameworks dedicated to the regulation of the three technology families, many existing legal frameworks are nonetheless directly applicable.

This report has analysed the various legal issues and challenges associated with the regulation of climate engineering, neurotechnologies and digital extended reality (XR), focusing in particular on those issues with high socio-economic and human rights implications. The analysis of nine national legal case studies has focused in particular on gaps in existing frameworks and other regulatory challenges. Together with TechEthos Deliverable 4.1,⁶³⁰ this analysis will serve as the basis for future work in the TechEthos project involving the development of recommendations for the adjustment or enhancement of legal frameworks at the national and/or international level, as well as policy briefs on the possible need for dedicated legislation at the EU level. This section recaps the key insights from the legal analysis for each technology family separately, before presenting some concluding remarks and providing an outlook for ongoing and future legal and policy developments with application to each of the technology families.

Climate engineering

The primary regulatory consideration in relation to climate engineering, is the current legal status of such technologies under national and international laws, and the likely role climate engineering will play in national climate mitigation strategies. Australia and the UK have both set out to become net-zero by 2050,⁶³¹ whilst Austria wants to become net-zero as early as 2040.⁶³² Whilst all three countries have a net-zero target, the approach and route to implementation varies. The UK's Climate Change Act introduced a legal commitment to setting out an emission reduction pathways through the implementation of carbon budgets.⁶³³ Australia's newly enacted climate law introduced an interim

⁶³⁰ Santiago, N., et al (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.

⁶³¹ For Australia, see: *A Bill for an Act to set out Australia's greenhouse gas emissions reductions targets, to provide for annual climate change statements, to confer advisory functions on the Climate Change Authority, and for related purposes 2022 (Cth) (Climate Change Bill)*. Available at: <http://www.legislation.gov.au/Details/C2022B00055> (Accessed: 3 October 2022), s. 10; for the UK, see: Climate Change Act 2008, s. 1 (1) as amended by the Climate Change Act 2008 (2050 Target Amendment) Order 2019 (S.I. 2019/1056), articles 1 and 2.

⁶³² Federal Republic of Austria (2020a). 'Aus Verantwortung für Österreich. Regierungsprogramm 2020 – 2024' [bundeskanzleramt.gv.at https://www.bundeskanzleramt.gv.at/dam/jcr:7b9e6755-2115-440c-b2ec-cbf64a931aa8/RegProgramm-lang.pdf](https://www.bundeskanzleramt.gv.at/dam/jcr:7b9e6755-2115-440c-b2ec-cbf64a931aa8/RegProgramm-lang.pdf).

⁶³³ Climate Change Act, s. 29 (1) (b).

commitment of cutting emissions by 43% by 2030,⁶³⁴ whilst Austria's pathway to achieving net-zero appears to be primarily policy-based.⁶³⁵

The analysis of Austria, Australia and the United Kingdom has presented an array of different approaches to climate engineering, from explicit political commitment to grow a 'greenhouse gas removal (GGR)' sector in the UK by 2030,⁶³⁶ to Austria viewing climate engineering as a last-resort option, only to be considered if all other climate mitigation options fail.⁶³⁷ The Australian legal case study brought various legal insights into the possible implications of SRM. For instance, defining engineering as activities for the purpose of 'moderating the Earth's climate system' means that small scale local SRM initiatives, such as the RRAP programme,⁶³⁸ would fall outside that definition, even though their cumulative impact may have similar global environmental and climate implications. As such, a key regulatory challenge concerns the definition and legal status of various climate engineering technologies depending on their purpose and effect on the Earth's climate system. Generally speaking, such technologies would either fall within the CDR or SRM categories, and regulation might need to evolve around the same broad distinction, due to their distinct characteristics and associated risks.

Furthermore, policy and legal developments will need to address the legal status carbon removals, particularly in relation to emissions. A current proposal in the UK seeks to clarify the legal status of 'removals' to include removals from climate engineering technologies.⁶³⁹ Similarly, the newly proposed EU certification scheme seeks to introduce a framework for the certification of high-quality carbon removals.⁶⁴⁰ Ambiguity around the status of removals achieved through climate engineering remains, as it can be disputed whether the Paris Agreement explicitly mandates the use of climate engineering to achieve a balance between emissions and removals.⁶⁴¹ Clarification of the meaning of 'removals' could provide greater certainty around the legality of climate engineering and the status of removals achieved as a result. Nevertheless, due consideration must be given to the effect of classifying 'removals' as the negative equivalent of 'emissions', to avoid unduly legitimising the delayed reduction of greenhouse gas emissions.

The issue above illustrates the challenge of carbon accounting, and the inclusion of removals is likely to require additional international collaboration. Considering the often international context of climate

⁶³⁴ *A Bill for an Act to set out Australia's greenhouse gas emissions reductions targets, to provide for annual climate change statements, to confer advisory functions on the Climate Change Authority, and for related purposes 2022 (Cth) (Climate Change Bill)*. Available at: <http://www.legislation.gov.au/Details/C2022B00055> (Accessed: 3 October 2022), s 10.

⁶³⁵ Federal Ministry for Sustainability and Tourism (2019). 'Long-Term Strategy 2050 – Austria' *unfccc.int* https://unfccc.int/sites/default/files/resource/LTS1_Austria.pdf; Federal Republic of Austria (2020a). 'Aus Verantwortung für Österreich. Regierungsprogramm 2020 – 2024' *bundestkanzleramt.gv.at* <https://www.bundestkanzleramt.gv.at/dam/jcr:7b9e6755-2115-440c-b2ec-cbf64a931aa8/RegProgrammlang.pdf>.

⁶³⁶ Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf, p. 21 and 126-128.

⁶³⁷ Federal Republic of Austria (2011b). 'On the ban of geological storage of carbon dioxide and amendment of the Environmental Impact Assessment Act 2000, the Federal Environmental Liability Act, the Industrial Code 1994 and the Mineral Resources Act (title translated with DeepL)' <http://extwprlegs1.fao.org/docs/pdf/aut147621.pdf>; Federal Ministry for Sustainability and Tourism (2019). 'Long-Term Strategy 2050 – Austria' *unfccc.int* https://unfccc.int/sites/default/files/resource/LTS1_Austria.pdf, p. 15, 17 and 37.

⁶³⁸ the RRAP in Australia: The Program' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/the-program/>.

⁶³⁹ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022), s. 111.

⁶⁴⁰ European Commission, Proposal for a Regulation of the European Parliament and of the Council establishing a Union certification framework for carbon removals (30.11.2022, COM(2022) 672 final, p. 1.

⁶⁴¹ Paris Agreement (entered into force 4 November 2016) 3156 U.N.T.S., signed by the UK on 22 April 2016, ratified on 18 November 2016, article 4 (1).



engineering activities, international collaboration could help monitor activities and facilitate standardisation of removals accounting to avoid double-counting and open the door to future trading schemes. Furthermore, a comprehensive regulatory framework can help normalise climate engineering operations, establish an adequate liability regime, and provide an avenue for public participation and access to justice.

Neurotechnologies

The foregoing analysis of relevant laws and policies in Germany, Ireland, and the US has highlighted a number of regulatory challenges in relation to neurotechnologies. Firstly, the clinical and biomedical use cases for neurotechnologies are featured in each of the identified national legal jurisdictions, with scope for use of brain computer interfaces (BCIs) as communication tools in Germany, Irish citizens being covered under the Treatment Abroad Scheme to undergo deep brain stimulation (DBS) surgery in the UK or elsewhere,⁶⁴² and the first human clinical trial in the US of a brain implant intended for clinical use recently taking place.⁶⁴³ Yet, whilst the latter example of a permanently implanted endovascular BCI is focused on use for three health-related services, namely neuroprosthetics, neuromodulation, and neurodiagnostics,⁶⁴⁴ other examples of private sector-led innovations in the US indicate an intention to broaden the availability of neurotechnologies on the mass consumer market to include both non-invasive and invasive applications, as well as to eventually make as yet unproven applications for neurocognitive enhancement commercially available (e.g., Neuralink's integrated BCI).⁶⁴⁵ Paralleling this, in the public sector, additional ongoing research and development (R&D) efforts in the US relate to dual use neurotechnologies intended for use in military domains (e.g., DARPA N³ program).⁶⁴⁶ Such emerging applications and use cases present a key regulatory challenge, since existing medical device regulation and international weapons conventions may not or only in a limited way be applicable.

Secondly, the diversification of applications and use cases for neurotechnologies reinforces the need to ensure human rights frameworks are adequately equipped to simultaneously guide R&D, as well as to protect individuals and groups from the various associated risks, which include neurodiscrimination, interferences with (mental) privacy and inadequate protection of brain and other neural data, as well as violations of the principle against self-incrimination.⁶⁴⁷ The term "neurorights" describes the range of novel human rights protections proposed within ethical and legal analyses, as well increasingly within policymaking initiatives and legislative proposals, as a possible response to the shortcomings in existing human rights frameworks.⁶⁴⁸ As yet, however, such rights are mostly absent from both international and national human rights frameworks, including in the considered countries of Germany and the US, with the partial exception of Ireland, in which there exists a recognised unenumerated right to bodily integrity inclusive of "psychological integrity."⁶⁴⁹ In addition to limited legal enactment of such rights protections, there also exists a lack of consensus around various key issues, including which particular rights should be protected, whether such rights should be recognised autonomously or instead through evolutive (re)interpretation of existing rights, and the appropriate forum(s) and framework(s) for

⁶⁴² *Deep Brain Stimulation* / Dystonia Ireland, [Online]. Available at: <https://www.dystonia.ie/forms-of-dystonia/treatment-options/deep-brain-stimulation/>.

⁶⁴³ Park, A. (2022) *Sci-fi no more: Synchron implants mind-reading device in first US patient in paralysis trial* / Fierce Biotech [Online]. Available at: <https://www.fiercebiotech.com/medtech/synchron-implants-brain-computer-interface-first-us-patient-paralysis-trial>

⁶⁴⁴ *Synchron* [Online]. Available at: <https://synchron.com/>

⁶⁴⁵ See, e.g., Musk, E. and Neuralink. (2019) 'An Integrated Brain-Machine Interface Platform With Thousands of Channels', *Journal of Medical Internet Research*, 21(10). DOI: <https://doi.org/10.2196/16194>

⁶⁴⁶ See, e.g., Sarma, G. (no date) *Next-Generational Nonsurgical Neurotechnology* / DARPA [Online]. Available at: <https://www.darpa.mil/program/next-generation-nonsurgical-neurotechnology>

⁶⁴⁷ Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

⁶⁴⁸ Ienca, M. and Andorno, R. (2017) 'Towards new human rights in the age of neuroscience and neurotechnology', *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1> ; Yuste, R. et al. (2017) 'Four ethical principles for neurotechnologies and AI', *Nature*, Vol.55, pp.159-163. DOI: <https://doi.org/10.1038/551159a>

⁶⁴⁹ *McDonnell v The Governor of Wheatfield Prison* [2015] IECA 216 , [2015] 2 ILRM 361, [58].

implementation and enforcement.⁶⁵⁰ Clarification of the various practical, conceptual and normative aspects of proposed “neurorights” therefore represent a key area of focus for future interdisciplinary ethical-legal research.

Digital extended reality

The analysis of the relevant laws and policies in France, Italy and the United Kingdom in respect of digital extended reality (XR) has provided some key insights. The regulatory challenges related to XR are centred around the right to freedom of expression in the context of the regulation of harmful online content, the fundamental rights to privacy and data protection, and the regulation of specific technological domains or elements, such as the regulation of AI or the provision of digital services. Indeed, the proposed AI Act and Digital Services Act are likely to have a significant impact on the ways in which digital extended reality technologies may be developed, marketed and used in France and Italy. In particular, the classification of XR technologies under the AI Act will impact the ways in which such technologies may be developed and marketed in the EU. Comparable legislative developments are underway in the UK, referring to the Online Safety Bill and Data Protection and Digital Information Bill in particular.⁶⁵¹

The regulation of harmful online content and the protection of the right to privacy and personal data is context and culture specific. Indeed, countries like Brazil and India exercise more stringent controls on online content,⁶⁵² whereas the privacy and data protection laws of the U.S. arguably fall short of adequately protecting the privacy risks associated with XR technologies.⁶⁵³ Considering the fact that most XR technologies not only offer virtual immersion, but also often contain haptic sensors providing the feeling of touch, the amount of personal data that may be collected is vast. Particularly if combined with AI and/or neurotechnologies, due consideration must be given to the adequacy of current privacy and data protection frameworks, such as the GDPR, to protect fundamental human rights.

Furthermore, harmful online content, which may be consumed from anywhere in the world through the use of XR technologies, and the metaverse in particular, raises a variety of regulatory challenges. For example, it raises the question around the responsibility of providers of digital services to monitor and moderate harmful online content. Arguably, the immersive and increasingly realistic nature of XR technologies means that this technology family uniquely increases the risks posed by harmful online content. It may also be extremely difficult to determine who the end-user is of such content, making the protection of special category groups, such as children, particularly challenging for governments.

Possible interventions to improve the protection of fundamental rights whilst developing and using XR technologies may involve measures to verify user identity and/or machines,⁶⁵⁴ and placing a responsibility on providers to monitor and moderate online content, such as is suggested by the EU’s

⁶⁵⁰ Ienca, M. (2021) *Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields*. Council of Europe. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

⁶⁵¹ Online Safety Bill (HC), HC Bill 121 (as introduced on 28 June 2022); Data Protection and Digital Information Bill (HC), HC Bill 143 (as introduced on 18 July 2022).

⁶⁵² See, for instance, Satariano, A. (2021). Youtube Pulls Videos by Bolsonaro for Spreading Misinformation on the virus. New York Times; Ministry Electronics and Information Technology. (2021). The Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021. Feb 25. 2021. Retrieved 28.10.22. Available at/ <https://prsindia.org/billtrack/the-information-technology-intermediary-guidelines-and-digital-media-ethics-code-rules-2021>; Shahbaz, A. (n.d). *The Rise of Digital Authoritarianism / Freedom on the net 2018* [Online]. Retrieved 28.10.22. Available at/ <https://freedomhouse.org/report/freedom-net/2018/rise-digital-authoritarianism>.

⁶⁵³ Pahi S. and Schroeder C. (2022) ‘Extended Privacy for Extended Reality: XR Technology Has 99 Problems and Privacy is Several of Them’, *Notre Dame Journal of Emerging Tech*, 4 (forthcoming 2023), [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4202913>.

⁶⁵⁴ See, for instance, Cheong B. C. (2022) ‘Avatars in the metaverse: potential legal issues and remedies’, *International Cybersecurity Law Review*, 3 (467), [Online]. Available at: <https://doi.org/10.1365/s43439-022-00056-9>; Grinbaum A. and Adomaitis L. (2022) ‘The Ethical Need for Watermarks in Machine-Generated Language’ [arXiv:2209.03118](https://arxiv.org/abs/2209.03118), [Online]. Available at: <https://doi.org/10.48550/arXiv.2209.03118>.

Digital Services Act.⁶⁵⁵ Nevertheless, the question of the most suitable entity to whom responsibility should be allocated for the balancing of content moderation against the right to freedom of speech, remains a topic of debate.⁶⁵⁶

Outlook

In addition to the technology-specific regulatory challenges, the three technology families present some cross-cutting challenges which put existing legal frameworks and principles to the test. Human rights, for instance, may both be enhanced and interfered with, depending on the manner in and purposes for which these emerging technology families are deployed. As such, it is pertinent that human rights are protected, and ideally enhanced, through the process of further technological development.

As evidenced through the national legal case studies of EU Member States (Austria, Germany, Ireland, France and Italy), developments at the EU level are likely to have a significant impact on the regulatory frameworks that will govern climate engineering, neurotechnologies and digital extended reality in these countries. Furthermore, other countries may be influenced by developments at the EU level, most noticeably the United Kingdom at the moment, as reflected in the substantive similarities between the various provisions in both the EU's Digital Services Act and the UK's Online Safety Bill, as well as the EU's GDPR and the UK's Data Protection and Information Bill. The so-called "Brussels Effect", conceptualising the process by which regulatory developments in the EU are externalised and exported through market mechanisms to create a "unilateral regulation globalisation",⁶⁵⁷ may also be exerting de facto and de jure influence on data privacy in the US, with many multinational companies (MNCs) headquartered there adopting company-wide privacy policies in line with the GDPR,⁶⁵⁸ and various state legislatures, including perhaps most notably in California, shifting towards the enactment of GDPR-style comprehensive data privacy laws.⁶⁵⁹ Nevertheless, time will tell how these legal systems continue to evolve and to what extent each of these jurisdictions remain influenced by ongoing regulatory developments in the EU, or if instead internal forces and domestic factors exert stronger influence.⁶⁶⁰

Simultaneously, legislative and policy developments outside the EU may significantly influence and inform future developments within the EU. For example, Chile's consideration of 'neurorights' in its Constitution may serve as an example for the expansion of existing human rights law frameworks in other jurisdictions. Also, China's plans to explore both CDR and SRM as part of its climate mitigation

⁶⁵⁵ Proposal for a Regulation of the European Parliament and of the Council on a Single Market for Digital Services (Digital Services Act) and amending Directive 2000/31/EC COM/2020/825 final. Available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52020PC0825&from=EN>.

⁶⁵⁶ Klonick K. (2021) *Inside the making of Facebook's Supreme Court* / *The New Yorker*, [Online]. Available at: <https://www.newyorker.com/tech/annals-of-technology/inside-the-making-of-facebooks-supreme-court>.

⁶⁵⁷ Bradford, A. (2012) 'The Brussels Effect', *Northwestern University Law Review*, Vol.107, pp.1-68. Available at: https://scholarship.law.columbia.edu/faculty_scholarship/1966.

⁶⁵⁸ See, e.g., Brill, J. (2018) *Microsoft's commitment to GDPR, privacy and putting customers in control of their own data* / *Microsoft On the Issues* [Online]. Available at: <https://blogs.microsoft.com/on-the-issues/2018/05/21/microsofts-commitment-to-gdpr-privacy-and-putting-customers-in-control-of-their-own-data/>.

⁶⁵⁹ At the time of writing, at least five states have enacted so-called omnibus data privacy laws, including California, Colorado, Connecticut, Virginia, and Utah. See further, National Conference of State Legislatures (2022). *2022 Consumer Privacy Legislation* / [Online]. Available at: <https://www.ncsl.org/research/telecommunications-and-information-technology/2022-consumer-privacy-legislation.aspx>.

⁶⁶⁰ In the US, for instance, the so-called "California Effect" may exert significant influence over the direction of data privacy laws. See, e.g., Chander, A. Kaminski, M.E. and McGeeveran, W. (2021) 'Catalysing Privacy Law', *Minnesota Law Review*, Vol.15, pp.1733-1802, pp.1747-56. Available at: <https://scholar.law.colorado.edu/faculty-articles/1336>; Schwartz, P.M. (2019) 'Global Data Privacy: The EU Way', *New York University Law Review*, Vol.94, pp.771-818. Available at: <https://www.nyulawreview.org/issues/volume-94-number-4/global-data-privacy-the-eu-way/>; Hartzog, W., and Richards, N. (2020) 'Privacy's Constitutional Moment and the Limits of Data Protection', *Boston College Law Review*, Vol.61:5, pp.1687-1761. Available at: <https://lawdigitalcommons.bc.edu/bclr/vol61/iss5/3>

strategy, makes any associated legislative and policy developments worth monitoring.⁶⁶¹ As such, the comparative analysis of international legal and policy developments is a worthwhile exercise to continue, particularly in the EU's priority areas, such as the green transition and digital transformation.

The national legal case studies and comparative analysis presented in this report highlight how the three technology families present their own unique regulatory challenges, in relation to which various synergistic and antagonistic approaches to regulation can be identified between countries. However, in addition, various cross-cutting challenges were also identified in respect of all three technology families, such as the protection of human rights. Together with TechEthos Deliverable 4.1,⁶⁶² this analysis will serve as the basis for future work in the TechEthos project involving the development of recommendations for the adjustment or enhancement of legal frameworks at the national and/or international level, as well as policy briefs on the possible need for dedicated legislation at the EU level.

⁶⁶¹ Marcotullio S. (2022) *Climate engineering in China: Technologies for achieving carbon neutrality / Nextrends Asia*, [Online]. Available at: <https://nexttrendsasia.org/climate-engineering-in-china-technologies-for-achieving-carbon-neutrality/>.

⁶⁶² Santiago, N., et al. (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.



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9. Annexes – National legal case studies

1. Climate engineering in Australia
2. Climate engineering in Austria
3. Climate engineering in the United Kingdom
4. Neurotechnologies in Germany
5. Neurotechnologies in Ireland
6. Neurotechnologies in the United States
7. Digital extended reality in France
8. Digital extended reality in Italy
9. Digital extended reality in the United Kingdom

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Annex 9.1 National legal case study of Climate Engineering in Australia



D4.2 Comparative analysis of national legal case studies

December 2022



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D4.2 National legal case studies: Annex 9.1 Climate Engineering in Australia

Work Package	WP4 Policy, legal and regulatory analysis		
Lead Partner	Trilateral Research (TRI)		
Lead Author(s)	Bennet Francis (UT)		
Other contributors	Dominic Lenzi (UT), Julie Vinders (TRI), Ben Howkins (TRI)		
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The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three to four technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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List of abbreviations

Table 1: List of Abbreviations

Term	Explanation
AC	Companion of the Order of Australia
ACCU(s)	Australian Carbon Credit Unit(s)
ACT	Australian Capital Territory
ARC	Australian Research Council
BECCS	Bio-energy with carbon capture and storage
CAT	United Nations Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment
CBD	Convention on Biological Diversity
CCS	Carbon capture and storage
CCUS	Carbon capture, use and storage
CDR	Carbon-dioxide removal
CE	Climate engineering
CEDAW	United Nations Convention on the Elimination of All Forms of Discrimination against Women
CERD	International Convention on the Elimination of All Forms of Racial Discrimination
CRC	United Nations Convention on the Rights of the Child
CRPD	Convention on the Rights of People with Disabilities
Cth	Commonwealth (federal law)
DAC	Direct air-capture



DACCS	Direct air-capture with carbon capture and storage
DCCEEW	Department of Climate Change, Energy, the Environment and Water
EIA	Environmental Impact Assessment
ENMOD	Convention on the Prohibition of Military or Any Other Hostile Use of Environmental Modification Techniques
EPBCA	Environmental Protection and Biodiversity Conservation Act 1999 (Cth)
ERAC	Emissions Reduction Assurance Committee
ERF	Emissions Reduction Fund
GBR	Great Barrier Reef
GBRMPA	Great Barrier Reef Marine Park Authority
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
IPCC	Intergovernmental Panel on Climate Change
MCB	Marine Cloud Brightening
MCBP	Marine Cloud Brightening Protect (University of Washington)
NDC	Nationally Determined Contribution
NOPSEMA	National Offshore Petroleum Safety and Environmental Management Authority
NSW	New South Wales
NT	Northern Territory
OF	Ocean fertilisation
Qld	Queensland
R&D	Research and development
RRAP	Reef Restoration and Adaptation Program
SA	South Australia
SCoPEX	Stratospheric Controlled Perturbation Experiment (Harvard)
SDA	Environment Protection (Sea Dumping) Act 1981 (Cth)
SRM	Solar Radiation Management
Tas	Tasmania



UDHR	Universal Declaration of Human Rights
UNDRIP	United Nations Declaration on the Rights of Indigenous Peoples
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNFCCC	United Nations Framework Convention on Climate Change
UNTS	United Nations Treaty Series
Vic	Victoria
WA	Western Australia
WP	Work Package

Abstract

The objective of this report is to review the current state of the law and legal responses to solar radiation management and carbon dioxide removal technologies in Australia. It focuses on Australia's obligations under international law, as well as issues arising from domestic human rights law, environmental law and climate law. It sets out the extent to which these legal domains are capable of regulating climate engineering research and deployment as currently instantiated, before highlighting gaps and challenges facing the existing legal framework.

A summary overview of the main findings and legal issues surrounding climate engineering in Australia is provided in section 3.1.1 of the TechEthos D4.2 Comparative analysis of national legal case studies. This report is primarily aimed at informing the Australian government and Australian policymakers regarding the regulatory challenges of climate engineering in Australia. Furthermore, it provides further background to readers to the specific Australian context of the main points and key regulatory challenges identified in the comparative analysis to which this report is annexed.



1. Introduction

Climate engineering techniques have the potential to interact with extant law in Australia in important respects, while also presenting novel regulatory challenges to which Australian law will have to adapt. This study highlights areas in which existing Australian legal frameworks bear relevance to climate engineering – both research and deployment – either imminently or in the further future. It also identifies ongoing and potential legal developments.

This report is a case study of how climate engineering technologies are regulated in Australian law.

Climate Engineering is defined under this project as ‘the deliberate large-scale intervention in the Earth’s climate system, in order to moderate global warming’.¹

Climate Engineering techniques² can be divided into Solar Radiation Management (SRM), and Carbon Dioxide Removal (CDR). SRM techniques reduce the heating effect of the Sun on the Earth’s atmosphere by reflecting solar radiation before it can be absorbed by the Earth’s surface and re-emitted as heat. Carbon Dioxide Removal techniques reduce the heating effect of the Sun on the Earth’s atmosphere by reducing the abundance of molecules that absorb heat energy.

CDR techniques are included in most models surveyed by the Intergovernmental Panel on Climate Change (IPCC) that imply a possibility of keeping global average temperature rise below 1.5C or 2C above the pre-industrial baseline.³ No such techniques are sufficiently developed for any deployment capable of producing the scale of negative emissions represented in these models. It is therefore a mainstream view that swift progress in the development and large-scale deployment of CDR techniques is necessary to avoid seriously dangerous warming. Thus, CDR is considered a near-term, and indeed an ongoing form of intervention.

Carbon removed from the atmosphere must be permanently stored for such techniques to be effective. Storage is perhaps the major source of regulatory challenges with respect to CDR (e.g. forestry

¹ Shepherd, J., Caldeira, K., Cox, P., Haigh, J., Keith, D., Launder, B., & Mace, G. (2009). *Geoengineering the Climate: Science, Governance, and Uncertainty*. Available at: https://royalsociety.org/~media/royal_society_content/policy/publications/2009/8693.pdf (Accessed 25 October 22); see also Adomaitis, L., Grinbaum, A., Lenzi, D. (2022). TechEthos D2.2: Identification and specification of potential ethical issues and impacts and analysis of ethical issues of digital extended reality, neurotechnologies, and climate engineering. TechEthos Project Deliverable. Available at: www.techethos.eu.

² Following the convention established by TechEthos Deliverable 2.2, this report refers to climate engineering “techniques” rather than “technologies”, as some SRM techniques are speculative proposals for physical intervention in the earth’s atmosphere rather than concrete socio-technical systems, and some CDR techniques have been practiced for millennia.

³ P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, and M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley (eds) (2022) ‘IPCC, 2022: Summary for Policymakers’, in *Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*. Cambridge, UK and New York, NY USA: Cambridge University Press., §B.6.4

regulation, safety regulations for geological storage, and rules on land use), although certain proposed interventions themselves present regulatory challenges (for instance in relation to the prevention of harmful impacts on terrestrial and marine ecosystems). A survey of the CDR techniques judged most significant by the IPCC is offered in **TechEthos Deliverable 2.2.**⁴

SRM techniques, meanwhile, are in many cases speculative proposals for experimentation, and the prospects for their eventual deployment are uncertain, due to technical considerations, but also due to ethical, political and regulatory considerations. The most pressing regulatory challenges concern the governance of research into such techniques, the establishment of systems of governance for any future deployment with global scope, and the regulation of proposals for geographically localised shielding from solar radiation. A survey of the most significant proposals for SRM is offered in **TechEthos Deliverable 2.2.**⁵

1.1 Purpose of the Australian legal case study

The subject of this case study was selected to complement the other case studies being conducted under this Task. At least one common law jurisdiction and at least one civil law jurisdiction was selected for each of the three technology families, to ensure a full range of legal frameworks would inform the comparative legal analysis. As an extensive study of EU law (and international law) in relation to the technology families is conducted under task 4.3, it was also judged advantageous to represent both EU and non-EU jurisdictions in the national case studies, in order to explore both how EU law is operationalised at a national level, and how non-EU frameworks differ from EU approaches.

Australia, as a non-EU common law jurisdiction, was selected in particular because of its unique policy outlook in relation to climate engineering. Australia has one of the most advanced policies on CCS investment, research and development of any country in the world. It is host to the world's largest dedicated geological storage operation, and it developed one the world's first examples of CCS-specific legislation.⁶ This means it is uniquely positioned to illustrate prospects and challenges in relation to the regulation of CE methods that involve CCS: BECCS and DACCS. In addition, Australia is at time of writing the only jurisdiction in which Marine Cloud Brightening technology is being actively deployed.⁷

The following table provides an overview of the nine national legal case studies conducted as part of part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

Table 2: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

⁴ Adomaitis, L., Grinbaum, A., Lenzi, D. (2022). TechEthos D2.2: Identification and specification of potential ethical issues and impacts and analysis of ethical issues of digital extended reality, neurotechnologies, and climate engineering. TechEthos Project Deliverable. Available at: www.techethos.eu, §4.1.1-8

⁵ Ibid., §4.2.1-3

⁶ Global CCS Institute (no date) *The Global Status of CCS: 2021*. Australia, p.27. Available at: <https://www.globalccsinstitute.com/wp-content/uploads/2021/10/2021-Global-Status-of-CCS-Global-CCS-Institute-Oct-21.pdf>

⁷ Tollefson, J. (2021) 'Can artificially altered clouds save the Great Barrier Reef?', *Nature*, 596(7873), pp. 476–478. Available at: <https://doi.org/10.1038/d41586-021-02290-3>.

1.2 Structure of the study

Section 2 begins by giving an overview of the policy outlook on Climate Engineering in Australia, noting significant existing projects and government-funded programmes. It sets out which are the most relevant regulatory institutions with responsibility for enforcement and notes potential future directions for policy development.

Section 3 then sets out the most salient legal issues with respect to climate engineering in Australia across 3 domains of law: human rights law (Section 3.1), environmental law (Section 3.2), and climate law (Section 3.3). Section 4 develops an analysis of potential gaps and challenges facing Australian legal frameworks with respect to climate engineering, on the basis of the foregoing discussion of the three domains. Finally, Section 5 offers an overall conclusion to the study by noting lessons that can be drawn internationally from the Australian case.

1.3 Scope and limitations

This national legal case study on Australia was prepared as part of TechEthos Work Package 4, on policy, legal and regulatory analysis. Its scope is defined by the task's workplan. It is beyond the scope defined by this workplan to conduct a comprehensive survey of all relevant Australian statutes, regulations and cases. Instead, the aim of the study is to provide a high-level overview of the regulatory landscape for climate engineering in Australia, on the basis of the prior identification of three salient legal domains: human rights law, environmental law and climate law. This structure is intended to facilitate a comparative analysis with the other national case studies being conducted on climate engineering in Austrian law and in UK law. The study also highlights potential legal challenges which have arisen as especially salient in recent academic literature on this subject.

1.4 Introduction to the Australian legal system

The Australian legislative system is based broadly on the Westminster model (the Parliament of the United Kingdom) but is also heavily influenced by the Washington system (the United States of America's Congress). The functioning of the Australian legislative system is defined by the Australian Constitution (1900), an Act of Parliament of the United Kingdom.⁸ It establishes a bicameral parliament consisting of a lower house, the House of Representatives, and an upper house, the Senate. Unlike the Westminster model, in which the House of Lords does not have power to prevent key bills becoming law, the two chambers of Australia's Parliament have equal power and all bills must pass in both chambers to become law.⁹

The Australian constitution establishes Australia as a federal system of government. As such, it consists of three levels of government: federal Parliament, which makes laws for all of Australia, the parliaments of the six states (New South Wales (NSW), Victoria (Vic), Queensland (Qld), Western Australia (WA), South Australia (SA), Tasmania (Tas)) and two territories (Australian Capital Territory (ACT), Northern Territory (NT)), which each make laws for their state or territory, and local councils, which make by-laws

⁸ *Commonwealth of Australia Constitution Act 1900: an act to constitute the Commonwealth of Australia South Australia Parliament* (1900). Available at: <https://www.aph.gov.au/constitution>.

⁹ *Infosheet 20 - The Australian System of Government* (no date). Available at: https://www.aph.gov.au/About/Parliament/House_of_Representatives/Powers_practice_and_procedure/00 - Infosheets/Infosheet 20 - The Australian system of government (Accessed: 3 October 2022).



for their region or district.¹⁰ The official name of the Australian state is the Commonwealth of Australia. Law which applies to the whole of Australia (federal law) is referred to as Commonwealth law (Cth), as distinct from state or territory law.

Australia is a common law jurisdiction, meaning precedents established by earlier judgements, especially by superior courts, have legal force in Australian courts. These precedents can be traced back to the decisions of English courts beginning after the Norman conquest of Britain, and originally reflected judges' assessment of local customs. Common law jurisdictions are contrasted against civil law jurisdictions, where judges have less power to create law via the interpretation of earlier decisions and must instead rely upon codified principles.

Unlike other jurisdictions, for example the United States of America, the Constitution of Australia does not contain a Bill of Rights. Its principal role is to determine the form and function of Australia's legislative institutions. However, it does contain explicit protections for five civil and political rights: the right to vote,¹¹ the right against acquisition of property on unjust terms,¹² the right to trial by jury,¹³ freedom of religion,¹⁴ and the prohibition of discrimination on the basis of State of residency.¹⁵ The High Court of Australia has also found that implicit rights protections can be derived from the structure of the Constitution. For example, the court has ruled that the form of government defined by the constitution implies the right to debate political issues.¹⁶

Australia follows the convention of legal dualism. As such, international treaties must be codified or otherwise reflected in domestic law to be applied by Australian courts. The exception to this principle is that Australian courts have found international law to be an important influence on the common law; judges have in some cases found international law to have direct force in Australian courts by this mechanism.¹⁷ Australia is a party to several international treaties which are relevant to the research and deployment of climate engineering techniques. These include the United Nations human rights covenants: the International Covenant on Civil and Political Rights (ICCPR)¹⁸ and the International Covenant on Economic, Social and Cultural Rights (ICESCR).¹⁹ They also include the United Nations

¹⁰ *Three levels of government: governing Australia - Parliamentary Education Office* (no date). Available at: <https://peo.gov.au/understand-our-parliament/how-parliament-works/three-levels-of-government/three-levels-of-government-governing-australia/> (Accessed: 3 October 2022).

¹¹ *Commonwealth of Australia Constitution Act 1900 : an act to constitute the Commonwealth of Australia* South Australia Parliament (1900). Available at: <https://www.aph.gov.au/constitution>, Section 41

¹² Ibid., Section 51 (xxxi)

¹³ Ibid., Section 80

¹⁴ Ibid., Section 116

¹⁵ Ibid., Section 117

¹⁶ *How are human rights protected in Australian law? / Australian Human Rights Commission* (no date). Available at: <https://humanrights.gov.au/our-work/rights-and-freedoms/how-are-human-rights-protected-australian-law> (Accessed: 3 October 2022).

¹⁷ Vines, P. (2013) *Law and Justice in Australia: Foundations of the Legal System*. Third Edition. Oxford, New York: Oxford University Press. p.27

¹⁸ UN General Assembly, *International Covenant on Civil and Political Rights*, 16 December 1966, United Nations, Treaty Series, vol. 999, p. 171, available at: <https://treaties.un.org/doc/Publication/UNTS/Volume%20999/v999.pdf> (accessed 24 October 2022)

¹⁹ UN General Assembly, *International Covenant on Economic, Social and Cultural Rights*, 16 December 1966, United Nations, Treaty Series, vol. 993, p. 3, available at: <https://treaties.un.org/doc/Publication/UNTS/Volume%20993/v993.pdf> (accessed 24 October 2022)



Framework Convention on Climate Change,²⁰ and the United Nations Framework Convention on Biological Diversity.^{21,22}

The Australian legal system also recognises Indigenous Customary Law as a source of law. Before 1992, Australian law operated under the legal fiction that the territory of Australia was *terra nullius* prior to settlement by Europeans, meaning land that was uninhabited and owned by no-one. This convention was superseded in the judgement *Mabo vs Queensland* (1992),²³ in which the High Court ruled that title to land could exist independently of the common law, on the basis of Indigenous customary law.²⁴ The status of indigenous customary law in Australia remains the subject of debate.

Table 3: Court Hierarchy in Australia


Court Hierarchy in Australia	
Higher  Lower	<ul style="list-style-type: none"> • High Court of Australia • Federal courts • State/Territory Supreme Courts • District Courts • Local Courts

Table 4: Sources of Law in Australia

Sources of Law in Australia
<ul style="list-style-type: none"> • The Australia Constitution (An Act of Parliament of the United Kingdom) • Common law (Case law) • Statute law, including: <ul style="list-style-type: none"> ◦ Commonwealth (Federal) Statute Law ◦ State Statute Law ◦ Local Government Law • Indigenous Customary Law • International Treaties (implemented through domestic statute law)

²⁰ UN General Assembly, *Framework Convention on Climate Change*, 9 May 1992, United Nations, Treaty Series, Vol.1771, p.107, available at: https://treaties.un.org/doc/Treaties/1994/03/19940321%2004-56%20AM/Ch_XXVII_07p.pdf (accessed 24 October 2022)

²¹ UN General Assembly, *Convention on Biological Diversity*, 5 June 1992, United Nations, Treaty Series, Vol.1760, p.79, available at: https://treaties.un.org/doc/Treaties/1992/06/19920605%2008-44%20PM/Ch_XXVII_08p.pdf (accessed 24 October 2022)

²² *International human rights system* (no date) *Attorney-General's Department*. Available at: <https://www.ag.gov.au/rights-and-protections/human-rights-and-anti-discrimination/international-human-rights-system> (Accessed: 3 October 2022).

²³ *Mabo v Queensland (No 2)* ("Mabo case") [1992] HCA 23; (1992) 175 CLR 1 (3 June 1992)

²⁴ Vines P. (2013), *supra* note 6, p.8

1.5 Current state of Climate Engineering in Australia

There is at least one ongoing project in Australia which involves SRM research, the Reef Restoration and Adaption Project, which received initial funding in 2018, and began its 'R&D phase' in 2020.²⁵ This project involves field testing of Marine Cloud Brightening and Ground-Based Albedo Modification technologies.²⁶ It is funded by the Commonwealth Government via the Reef Trust Partnership.

There is also at least one CDR scheme using novel technology at an advanced stage of planning: *AspiraDAC*. This is a Direct Air Capture with Carbon Capture and Storage (DACCS) project that has secured funding via the Commonwealth Government and an advanced purchase from the Frontier Fund, an organization backed by major corporations including Meta and Alphabet.²⁷ The project will use solar energy to power the facility, and will use geological storage in partnership with ongoing Carbon Capture and Storage (CCS) schemes.²⁸

These projects will be discussed in more detail in subsequent sections.

²⁵ 'The Program' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/the-program/> (Accessed: 3 October 2022).

²⁶ 'Interventions' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/interventions/> (Accessed: 30 July 2022).

²⁷ Readfearn, G. (2022) 'Australian company secures \$700,000 deal for carbon capture and storage machine', *The Guardian*, 1 July. Available at: <https://www.theguardian.com/environment/2022/jul/02/australian-company-secures-700000-deal-for-carbon-capture-and-storage-machine> (Accessed: 3 October 2022).

²⁸ *DAC company launches with first purchases from Frontier* (June 2022) *AspiraDAC*. Available at: <https://www.aspiradac.com/dac-company-launches-with-first-purchases-from-frontier> (Accessed: 3 October 2022).



2. Climate Engineering-specific legal developments

This section provides an overview of the legal and policy developments pertaining to climate engineering in Australia. It examines relevant policies and laws in relation to climate engineering and identifies the national authorities involved in the implementation and enforcement of such laws and policies.

Australian policy on Climate Engineering

SRM

The Australian government has no active policy on SRM for the purpose of climate engineering,²⁹ which according to the above definition, is a large-scale intervention, aimed at moderating global warming. SRM can however also be deployed at a small scale, with aims other than moderating global warming. For instance, the relevant actors might aim simply to protect local ecology from extreme conditions when the need arises, rather than aiming to moderate warming generally and continuously, or until sufficient mitigation of greenhouse gas emissions has been achieved.

It is ambiguous whether such interventions are correctly described as climate engineering, rather than, for instance, adaptation. However, they use the same technology and engender similar ethical and regulatory concerns as SRM for the purpose of climate engineering. Australia is unique in that active field and testing for such a small-scale SRM is ongoing, as part of the Reef Restoration and Adaptation Program (RRAP). The RRAP aims to use SRM techniques (among other interventions) to protect the Great Barrier Reef (GBR) from heat-induced degradation, including bleaching. Reef protection is a priority for the Australian Government, as the GBR is one of the most significant sites for biodiversity worldwide, and an important source of revenue from tourism.

The RRAP is funded by the Commonwealth Government and the State of Queensland. An initial concept feasibility phase with funding of AU\$6mil began in 2019. A further AU\$100mil of funding was awarded by the Commonwealth Government covering the first 5 years of a planned 10 year R&D phase, beginning in 2020. This is supplemented by further funding from charitable organisations and research organisations, bringing total funding to AU\$300mil for the first 5 years.³⁰

The interventions under investigation by the RRAP include cooling by cloud brightening, shading by fogging, shading by misting, shading by surface films, shading by microbubbles and shading by algae (among others).³¹ All of these are forms of albedo modification and as such are forms of SRM, with the exception of shading by algae. The promotion of ocean algae growth is however considered to be a candidate form of CDR.³² Of these, Marine Cloud Brightening (MCB) is the most significant from a governance standpoint, because of its potential to be adapted for large-scale deployment. The RRAP

²⁹ Talberg, A., Thomas, S. and Wiseman, J. (2018) 'A scenario process to inform Australian geoengineering policy', *Futures*, 101, pp. 67–79. Available at: <https://doi.org/10.1016/j.futures.2018.06.003>.

³⁰ 'The Program' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/the-program/> (Accessed: 3 October 2022).

³¹ 'Interventions' (no date) *Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/interventions/> (Accessed: 30 July 2022).

³² TechEthos D2.2, *supra* note 4



has released a report on modelling of large-scale deployment (over the entire GBR),³³ which, as McDonald et al. (legal scholars not connected to RRAP) write, ‘in the long term could result in large-scale manipulation of the planetary environment’.³⁴ The RRAP describes MCB as ‘one of the most innovative and promising large-scale interventions being investigated by the R&D program’.³⁵

Beginning in March 2020, a team led by Dr Daniel Harrison at Southern Cross University, Coffs Harbour, New South Wales, began field-testing of MCB technology. This was ‘the world’s first field trial of marine cloud brightening’,³⁶ although the RRAP argues that similar technology is already used to increase precipitation for the purposes of hydroelectric power generation in New South Wales and Tasmania.³⁷ No peer-reviewed publications from the MCB study are available at time of writing, thus it is difficult to assess how far the project has progressed.

The test involves pumping seawater through a mist machine mounted to the stern of a ship, spraying salt microparticles into the air. These merge with low-lying clouds, acting as nuclei for vapour condensation, raising clouds’ albedo. The RRAP uses spray nozzles developed for the Marine Cloud Brightening Project (MCBP), based at the University of Washington, Seattle.³⁸ This latter group, led by Professor Robert Wood, is researching MCB for the purposes of climate engineering.³⁹

The RRAP is internationally significant from a regulatory perspective, given that the level of ethics approval to which SRM projects have been obliged to submit themselves elsewhere in the world has thus far acted as a barrier to analogous projects being initiated. For comparison, Harvard University’s SCoPEX project, which planned to release no more than 2kg of calcium carbonate into the stratosphere above Sweden in 2021, in order to ‘improve knowledge of some aspects of stratospheric aerosol physics and chemistry relevant to solar geoengineering’ was instructed by its independent Advisory Committee to suspend planned flights until the committee can make a final recommendation on the basis of ‘robust public engagement in Sweden that is broadly inclusive of indigenous populations’.⁴⁰ This suspension included planned equipment test flights that would not release any aerosols.

To secure funding for the full-scale project, the RRAP was obliged to submit a Regulatory Assessment.⁴¹ The findings of the regulatory assessment will be discussed below, under **Proposals for Dedicated Law; Environmental Law**.

³³ Harrison, D et al. (2019) *Reef Restoration and Adaptation Program: Environmental Modelling of Large Scale Solar Radiation Management. A report provided to the Australian Government by the Reef Restoration and Adaptation Program*. Available at: https://gbrrestoration.org/wp-content/uploads/2020/09/T14-Environmental-Modelling-of-Large-Scale-SRM_v3.03-3.pdf.

³⁴ McDonald, J. et al. (2019) ‘Governing geoengineering research for the Great Barrier Reef’, *Climate Policy*, 19(7), p. 804.

³⁵ ‘Cooling by cloud brightening’ (2020) *Reef Restoration and Adaptation Program*, 30 September. Available at: <https://gbrrestoration.org/program/cooling-by-cloud-brightening/> (Accessed: 3 October 2022).

³⁶ Tollefson, J. (2021) ‘Can artificially altered clouds save the Great Barrier Reef?’, *Nature*, 596(7873), pp. 476–478. Available at: <https://doi.org/10.1038/d41586-021-02290-3>.

³⁷ ‘Cooling by cloud brightening’ (2020) *Reef Restoration and Adaptation Program*, 30 September. Available at: <https://gbrrestoration.org/program/cooling-by-cloud-brightening/> (Accessed: 3 October 2022).

³⁸ O’Neill, S. (2022) ‘Solar Geoengineering to Reduce Global Warming—The Outlook Remains Cloudy’, *Engineering*, 9, pp. 6–9. Available at: <https://doi.org/10.1016/j.eng.2021.12.005>.

³⁹ ‘Marine Cloud Brightening Project | Robert Wood’ (no date). Available at: https://faculty.washington.edu/robwood2/wordpress/?page_id=954 (Accessed: 3 October 2022).

⁴⁰ Keutsch Group at Harvard - Statements (no date). Available at: <https://www.keutschgroup.com/scopex/statements> (Accessed: 3 October 2022).

⁴¹ Fidelman, P et al. (2019) ‘Reef Restoration and Adaptation Program: Regulatory Assessment Findings. A report provided to the Australian Government by the Reef Restoration and Adaptation Program’. Available at: <https://gbrrestoration.org/wp-content/uploads/2020/09/T2-Regulatory-Assessment-Findings3.pdf>

CDR

Australia has active policy on CDR through the Emissions Reduction Fund (ERF). This scheme allows individuals and firms to earn Australian Carbon Credit Units (ACCUs) for every tonne of CO₂ equivalent (tCO₂e) 'avoided' or 'stored'.⁴² The scheme thus actively promotes both abatement and CDR.

As noted by the Department for Climate Change, Energy, the Environment and Water,⁴³ ACCUs can be granted for projects involving:

- new technology
- upgrading equipment
- changing land or business practices to improve productivity or energy use
- changing the way vegetation is managed to store more carbon

Eligible projects include those associated with:

- vegetation management
- agriculture
- energy consumption
- waste
- transport
- coal and gas production
- industrial processes

The ERF thus envisages that new CDR schemes coming onstream will be eligible for carbon credits, including those involving innovative technologies.

In addition to compensating net-negative emissions per unit, via the ERF, Australia has also awarded advanced R&D funding for CDR. From 1st March to 29th March 2021, the Australian government opened the *Carbon Capture, Use and Storage Development Fund*. This funding round offered grants of up to AU\$25 million for CCS projects.⁴⁴ One of the successful projects was a CDR by Direct Air Capture project: *AspiraDAC*, which was awarded AU\$4 million.⁴⁵

AspiraDAC, which describes itself as the 'world's first solar powered Direct Air Capture facility', announced its launch in a release dated June 2022.⁴⁶ *AspiraDAC* is a wholly owned subsidiary of *Corporate Carbon*, a company which manages net-negative emissions development to generate income via the ERF.⁴⁷ It plans to capture and sequester 1 tonne of carbon per day, using 'modular and scalable solar powered units', in partnership with Southern Green Gas, which developed and licensed the technology. It expects 'production and deployment' of the modules by 'the end of 2022'.⁴⁸

⁴² *Emissions Reduction Fund - DCCEEW* (no date). Available at: <https://www.dcceew.gov.au/climate-change/emissions-reduction/emissions-reduction-fund> (Accessed: 3 October 2022).

⁴³ Ibid.

⁴⁴ *Carbon Capture Use and Storage Development Fund* / *business.gov.au* (2022). Available at: <https://business.gov.au/grants-and-programs/carbon-capture-use-and-storage-development-fund> (Accessed: 3 October 2022).

⁴⁵ Ibid.

⁴⁶ *DAC company launches with first purchases from Frontier* (2022) *AspiraDAC*. Available at: <https://www.aspiradac.com/dac-company-launches-with-first-purchases-from-frontier> (Accessed: 3 October 2022).

⁴⁷ *What we do* (no date) *Corporate Carbon*. Available at: <https://www.corporatecarbon.com.au/what-we-do> (Accessed: 3 October 2022).

⁴⁸ 'Solar-powered carbon capture technology leading the way – Southern Green Gas' (no date). Available at: <https://www.southerngreengas.com.au/solar-powered-carbon-capture-technology-leading-the-way/> (Accessed: 3 October 2022).



Australian law on Climate Engineering

Australia does not have domestic laws that explicitly govern CE research, field-testing or deployment.⁴⁹

The ERF, which actively promotes CDR, was established by the *Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth)*,⁵⁰ and the *Carbon Credits (Carbon Farming Initiative) Rule 2015 (Cth)*.⁵¹

The *Offshore Petroleum and Greenhouse Gas Storage Act 2006 (Cth)* regulates offshore CCS at a national level (which has implications for DACCS and BECCS).⁵² There are state-level statutes for onshore CCS, for example the *Greenhouse Gas Storage Act 2009 (Qld)*.⁵³

Proposals for dedicated law

SRM

The RRAP conducted a Regulatory Assessment, which was published in September 2019.⁵⁴ The report focused mainly on the regulatory system surrounding protection of the Great Barrier Reef, which is governed by the *Great Barrier Reef Marine Park Act 1975 (Cth)* in Commonwealth law,⁵⁵ and by the *Marine Parks Act 2004 (Qld)* in state law.⁵⁶

The report authors write, '[T]he Great Barrier Reef regulatory system is robust, but it may not be entirely fit for purpose for some of the interventions proposed by RRAP'.⁵⁷ It makes several proposals for changes to the regulatory system. Most of these are interventions at the level of policy, for instance, increasing funding for the Great Barrier Reef Marine Park Authority (the Commonwealth agency responsible for administering the marine protected area).

The report does make 9 proposals for reform in the regulatory sphere. These proposals are mainly focused on transparency, most importantly, 'establish[ing] a public register with all application and reporting documents related to funded projects' and 'requir[ing] annual (or biennial) performance audits'.⁵⁸ It is not stated whether the authors take these recommendations to require legal reforms, or whether they can simply, for instance, be included in the funding agreements between projects and the relevant agencies. The report authors also call for a streamlining of existing regulations, for instance, to avoid a situation in which the same application for a permission under existing environmental

⁴⁹ McDonald, J. et al. (2019) 'Governing geoengineering research for the Great Barrier Reef', *Climate Policy*, 19(7), p. 805. Available at: <https://doi.org/10.1080/14693062.2019.1592742>.

⁵⁰ *Carbon Credits (Carbon Farming Initiative) Act 2011 (Cth)*. Available at: <https://www.legislation.gov.au/Details/C2022C00257> (Accessed: 3 October 2022).

⁵¹ *Carbon Credits (Carbon Farming Initiative) Rule 2015* (no date). Attorney-General's Department. Available at: <https://www.legislation.gov.au/Details/F2022C00403/Html/Text>, <http://www.legislation.gov.au/Details/F2022C00403> (Accessed: 3 October 2022).

⁵² *Offshore Petroleum and Greenhouse Gas Storage Act 2006* (no date). Attorney-General's Department. Available at: https://www.legislation.gov.au/Details/C2022C00175/Html/Volume_1, <http://www.legislation.gov.au/Details/C2022C00175> (Accessed: 3 October 2022).

⁵³ *Greenhouse Gas Storage Act 2009 - Queensland Legislation - Queensland Government* (no date). Available at: <https://www.legislation.qld.gov.au/view/html/inforce/current/act-2009-003> (Accessed: 3 October 2022).

⁵⁴ Fidelman, P et al. (2019) *Reef Restoration and Adaptation Program: Regulatory Assessment Findings. A report provided to the Australian Government by the Reef Restoration and Adaptation Program*. Available at: <https://gbrrestoration.org/wp-content/uploads/2020/09/T2-Regulatory-Assessment-Findings3.pdf> (Accessed: 30 July 2022).

⁵⁵ *Great Barrier Reef Marine Park Act 1975 (Cth)*. Available at: <https://www.legislation.gov.au/Series/C2004A01395> (Accessed: 3 October 2022).

⁵⁶ *Marine Parks Act 2004 (Qld)*. Available at: <https://www.legislation.qld.gov.au/view/html/inforce/current/act-2004-031> (Accessed: 3 October 2022).

⁵⁷ Fidelman, P et al. (2019), supra note 40, p.2

⁵⁸ Ibid., p.25



regulation must be approved by multiple agencies.⁵⁹ Apparently, then, the report does not explicitly call for new legislation.

McDonald, McGee, Brent and Burns (2019) argue that a national governance framework for SRM is necessary.⁶⁰ This framework, they argue, should build on the Oxford Principles,⁶¹ the Asilomar Principles,⁶² and Hubert's Code of Conduct for Geoengineering Research.⁶³ For instance, in order to operationalise the stipulation of the Oxford Principles that CE should be regulated as a public good, funding agreements should require intellectual property related to CE research to be made public, or at least 'be allocated so as to safeguard access to the benefits of the research'.⁶⁴ They also recommend systems of public oversight to ensure public support for outdoor testing.⁶⁵ The authors stress that their main intention is not to make specific governance recommendations, but simply to highlight the importance of having a governance framework of some kind.⁶⁶

CDR

McCormack, McDonald and Brent (2020) offer three governance priorities for legal reform, 'to minimize trade-offs and maximise co-benefits for NETs [negative emission technologies] and conservation'.⁶⁷ These are:

3. 'Prioritize nature-based solutions that align with climate-adaptive conservation goals and could be implemented immediately under existing Australian legal frameworks'
4. 'Laws for assessing net proposals should operate within a framework of landscape-scale and cross-sectoral land-use planning, to facilitate an appropriate balance between competing climate-governance goals.'
5. 'Legal instruments should provide clear guidance, for example in the form of statutory decision-making principles, on trade-offs between nets and conservation goals'⁶⁸

The authors' focus in this national legal case study is land-based CDR rather than, for example, DACCS.

Responsibility for enforcement

Responsibility for the enforcement of regulation relevant to CE research and deployment would fall to a wide range of agencies depending on the nature of the intervention under consideration.

The agencies with most relevant competence are:

⁵⁹ Ibid.

⁶⁰ McDonald, J. *et al.* (2019) 'Governing geoengineering research for the Great Barrier Reef', *Climate Policy*, 19(7), p. 808. Available at: <https://doi.org/10.1080/14693062.2019.1592742>.

⁶¹ Rayner, S. *et al.* (2013) 'The Oxford Principles', *Climatic Change*, 121(3), pp. 499–512. Available at: <https://doi.org/10.1007/s10584-012-0675-2>.

⁶² Asilomar Scientific Organizing Committee (2010) *The Asilomar Conference Recommendations on Principles for Research into Climate Engineering Techniques*. Climate Institute Washington DC. Available at: <http://www.climateactionfund.org/images/Conference/finalfinalreport.pdf>.

⁶³ Hubert, A.-M. (2021) 'A Code of Conduct for Responsible Geoengineering Research', *Global Policy*, 12(S1), pp. 82–96. Available at: <https://doi.org/10.1111/1758-5899.12845>.

⁶⁴ McDonald, J. *et al.* *supra* note 60'. p.808

⁶⁵ Ibid.

⁶⁶ Ibid.

⁶⁷ McCormack, P.C., McDonald, J. and Brent, K.A. (2020) , *Climate Law*, 10(2), pp. 123–150. Available at: <https://doi.org/10.1163/18786561-01002001>.

⁶⁸ Ibid. p.126



- The Department for Climate Change, Energy, the Environment and Water⁶⁹

This Commonwealth Government department was established by the incoming Albanese administration on 1 July 2022, integrating functions previously held by the Department of Agriculture, Water and the Environment, and the Department of Industry, Science, Energy and Resources. It took on the portfolio of the Federal Environment Minister, who bears statutory responsibility for granting permissions under the Environment Protection and Biodiversity Act (1999) (See **3.1 Environmental law**, below).

- The Clean Energy Regulator⁷⁰

An independent statutory authority,⁷¹ formally a sub-department of the Department for Climate Change, Energy and Water. Among other duties, it is responsible for administering the Emissions Reduction Fund, including issuing ACCUs for accredited carbon abatement and removal schemes, and the purchase of ACCUs through the auction system.

- National Petroleum Safety and Environmental Management Authority⁷²

Although primarily responsible for regulating offshore oil drilling, this statutory agency⁷³ is also responsible for approving and enforcing the environment plans that every CCS project must submit. It has powers to issue remedial directions to CCS titleholders and operators.⁷⁴

- The Great Barrier Reef Marine Park Authority⁷⁵

A Commonwealth agency established by the *Great Barrier Reef Marine Park Act 1975 (Cth)*, responsible for (among other things), granting permissions for activities in the vicinity of the GBR, including the airspace 915m above the marine park. CE activities, including MCB, Ground-based Albedo Modification (GBAM), Ocean Fertilization (OF) and most other CE interventions would require permits if carried out in the protected area.

- Local government

Responsible for planning approvals.

Significant legal cases

This study did not identify significant legal cases involving climate engineering in Australia.

⁶⁹ EPBC Act - Frequently asked questions - DCCEEW (no date). Available at: <https://www.dcceew.gov.au/environment/epbc/publications/factsheet-epbc-act-frequently-asked-questions> (Accessed: 3 October 2022).

⁷⁰ Clean Energy Regulator Clean Energy Regulator - Home (no date). Available at: <https://www.cleanenergyregulator.gov.au/> (Accessed: 3 October 2022).

⁷¹ Established under *Clean Energy Regulator Act 2011 (Cth)*. Available at: <https://www.legislation.gov.au/Series/C2011A00163>. (Accessed 25 October 2022)

⁷² Home / NOPSEMA (no date). Available at: <https://www.nopsema.gov.au/> (Accessed: 3 October 2022).

⁷³ Established under *Offshore Petroleum and Greenhouse Gas Storage Act 2006*. Available at: <http://www.legislation.gov.au/Details/C2022C00175> (Accessed: 3 October 2022).

⁷⁴ *How Australian laws and regulations affect carbon capture and storage* / White & Case LLP (no date). Available at: <https://www.whitecase.com/insight-our-thinking/how-australian-laws-and-regulations-affect-carbon-capture-and-storage> (Accessed: 3 October 2022).

⁷⁵ *Homepage* / gbrmpa (no date). Available at: <https://www2.gbrmpa.gov.au/> (Accessed: 3 October 2022).



Current debates and future policy and/or legal developments

The Albanese government, which assumed office 23rd May 2022, has signalled a higher level of attention to climate policy than previous administrations, for example by quickly moving to update Australia's Nationally Determined Contribution under the Paris Agreement - committing to emissions reductions of 43% of 2005 levels by 2030, compared to a previous target of 26-28%.⁷⁶ This may point to a greater willingness to engage with the issue of CE regulation, although it is still early in the government's tenure.

On 1 July 2022, the Albanese government announced it was launching a review of the ACCU scheme, which has been severely criticised by experts (see **4.3 Analysis of Gaps, Challenges and Future Trends – Climate Law**, below). This review, to be conducted by a panel lead by former Chief Scientist Professor Ian Chubb, is expected to present its report to the government by 31 December 2022.⁷⁷

The terms of reference for the review state that it will 'advise on the integrity of ACCUs issued under the Carbon Credits (Carbon Farming Initiative) Act 2011, with specific reference to whether the scheme's governance structure is fit for purpose[...], whether the scheme's settings and legislative requirements are appropriate to ensure good governance and confidence in scheme integrity[...]; whether the scheme has appropriate transparency including whether and how reporting and publication of data could be improved[...]'.⁷⁸ The terms state that the review will give consideration to recent claims raised about the Human Induced Regeneration, Carbon Capture and Storage, Avoided Deforestation, and Landfill Waste Gas methods – in other words, it will respond directly to the strong criticism the scheme has received.

The second part of the review's remit is to assess 'the broader impacts of activities incentivised under Australia's carbon crediting framework'.⁷⁹ The concerns under this heading include assessing whether the scheme incentivises behaviour which negatively impacts regional communities, the local environment, or agricultural productivity, assessing the extent to which ACCU schemes support positive outcomes for biodiversity and the participation of first nation people, wider non-carbon benefits more broadly, and whether ACCUs are suitable for use in the Climate Active scheme. This latter scheme allows traders to certify products as carbon neutral, in part by purchasing accredited carbon offsets.⁸⁰

⁷⁶ Australian Government Department of Industry, Science, Energy and Resources. (2022) *Australia's Nationally Determined Contribution Communication 2022*. Available at:

<https://unfccc.int/sites/default/files/NDC/2022-06/Australias%20NDC%20June%202022%20Update%20%283%29.pdf>

⁷⁷ *Independent Review of ACCUs / Ministers* (2022). Available at:

<https://minister.dcceew.gov.au/bowen/media-releases/independent-review-accus> (Accessed: 3 October 2022).

⁷⁸ Ibid.

⁷⁹ Ibid.

⁸⁰ *How it works / Climate Active* (no date). Available at: <https://www.climateactive.org.au/what-climate-active/how-it-works> (Accessed: 3 October 2022).



3. Domain-specific legal issues

This section examines the legal implications of climate engineering in an Australian context with respect to specific legal domains with a high socio-economic impact. The legal domains covered include human rights law, environmental law, and climate change law.

The three domains of law identified are demarcated to a large extent by Australia's obligations under international treaties. However, those treaty obligations figure into domestic law in ways that may have specific implications for the regulation of CE in Australia, which may not apply in other jurisdictions. This section will thus begin by setting out Australia's relevant obligations under international law with respect to each of the three legal domains, before clarifying how they are operationalised in the Australian context. It will then go on to highlight any gaps, challenges and future trends that are specific to each of the three domains.

A comprehensive analysis of the implications of international and EU human rights law, environmental law and climate change law for CE research and deployment is conducted under **TechEthos D4.1**. Therefore, this section will focus on how the relevant standards in international law are expressed in the domestic context. It will go on to highlight which of these standards, as expressed in domestic law, interact with the domestic policy sphere in the most relevant ways, and finally, set out some areas in which the law may not embody potential best practice.

3.1 Human rights law

Australia is a signatory to the 7 core human rights treaties that comprise the international human rights system:

- International Covenant on Civil and Political Rights (ICCPR)⁸¹
- International Covenant on Economic, Social and Cultural Rights (ICESCR)⁸²
- Convention on the Rights of the Child (CRC)⁸³
- Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)⁸⁴
- Convention on the Rights of Persons with Disabilities (CRPD)⁸⁵

⁸¹ UN General Assembly, *International Covenant on Civil and Political Rights*, 16 December 1966, United Nations, Treaty Series, vol. 999, p. 171, available at:

<https://treaties.un.org/doc/Publication/UNTS/Volume%20999/v999.pdf> (accessed 24 October 2022)

⁸² UN General Assembly, *International Covenant on Economic, Social and Cultural Rights*, 16 December 1966, United Nations, Treaty Series, vol. 993, p. 3, available at:

<https://treaties.un.org/doc/Publication/UNTS/Volume%20993/v993.pdf> (accessed 24 October 2022)

⁸³ UN General Assembly, *Convention on the Rights of the Child*, 20 November 1989, United Nations, Treaty Series, vol. 1577, p. 3, available at:

<https://treaties.un.org/doc/Publication/UNTS/Volume%201577/v1577.pdf> (accessed 24 October 2022)

⁸⁴ UN General Assembly, *Convention on the Elimination of All Forms of Discrimination Against Women*, 18 December 1979, United Nations, Treaty Series, vol. 1249, p.1, available at:

<https://treaties.un.org/doc/Publication/UNTS/Volume%201249/v1249.pdf> (accessed 24 October 2022)

⁸⁵ UN General Assembly, *Convention on the Rights of Persons with Disabilities*, 13 December 2006, United Nations, Treaty Series, vol. 2515, p.3, available at:

<https://treaties.un.org/doc/Publication/UNTS/Volume%202515/v2515.pdf> (accessed 24 October 2022)



- Convention on the Elimination of All Forms of Racial Discrimination (CERD)⁸⁶
- Convention against Torture (CAT)⁸⁷

It has also endorsed the non-binding Universal Declaration of Human Rights (UDHR),⁸⁸ and the Declaration on the Rights of Indigenous Peoples (UNDRIP).^{89,90}

As already noted, because Australia follows legal dualism, international treaties must be ratified in domestic law to have force in Australian courts. Thus, rights are instantiated through a diverse range of legislative instruments.

Of the protections enshrined in the international human rights system, the ones arguably of most relevance for the regulation of CE are the following (see **TechEthos D4.1: International and EU Legal Analysis**):

- The right to enjoy the benefits of scientific progress, as enshrined in ICESCR Article 15
- The right to information, as enshrined in ICCPR Article 19
- The right to participate in public affairs, ICCPR Article 26
- Indigenous Rights, as enshrined in UNDRIP

As noted, Australia is a jurisdiction with no explicit constitutional Bill of Rights. Unlike the UK, which similarly lacks a codified constitution which serves as the main repository of rights, Australia also lacks a Human Rights Act, a single statute that gives effect to its obligations under international treaties (primarily, in the UK case, the European Convention of Human Rights). Many human rights in Australian law are implicit, created by the fact that there exist no statutory prohibitions that would curtail the relevant freedoms. As such, these international treaties are not always explicitly transposed into Australian law via specific instruments. However, some of the above rights are created and enforced by domestic legislation. For instance, the *Human Rights (Parliamentary Scrutiny) Act 2011 (Cth)* provides that all new legislation must be assessed for compliance with obligations under the international human rights treaties.⁹¹

The Australian Capital Territory and the State of Queensland do have Human Rights Acts which have force in the courts of that territory and that state. *Human Rights Act 2004 (ACT)* follows the ICCPR and the ICESCR, translating the rights contained within those treaties into territory law. The *Human Rights Act 2019 (Queensland)* protects a list of 23 fundamental rights. *The Charter of Human Rights and Responsibilities Act 2006 (Victoria)* protects 20 fundamental rights, loosely based on the ICCPR.

The Australian Human Rights Commission is the statutory body responsible for overseeing and reporting on the protection of human rights in Australia. It was established by the *Australian Human Rights Commission Act 1986 (Cth)*.⁹² Although it has no legal power to enforce human rights by sanctioning human rights violations, it monitors Australian policy and the judgements of Australian

⁸⁶ UN General Assembly, Convention on the Elimination of All Forms of Racial Discrimination, 13 December 2006, United Nations, Treaty Series, vol. 2515, p.3, available at:

<https://treaties.un.org/doc/Publication/UNTS/Volume%202515/v2515.pdf> (accessed 24 October 2022)

⁸⁷ UN General Assembly, *Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment*, 10 December 1984, United Nations, Treaty Series, vol. 1465, p.85, available at:

<https://treaties.un.org/doc/Publication/UNTS/Volume%201465/v1465.pdf> (accessed 24 October 2022)

⁸⁸ UN General Assembly, *Universal Declaration of Human Rights*, 10 December 1948, 217 A (III)

⁸⁹ UN General Assembly, *United Nations Declaration on the Rights of Indigenous Peoples : resolution / adopted by the General Assembly*, 2 October 2007, A/RES/61/295

⁹⁰ *Human Rights in Australia | Australian Human Rights Commission* (no date). Available at:

<https://humanrights.gov.au/our-work/education/human-rights-australia> (Accessed: 3 October 2022).

⁹¹ *Human Rights (Parliamentary Scrutiny) Act 2011*, s. 8 (3). Attorney-General's Department. Available at: <https://www.legislation.gov.au/Details/C2016C00195> (Accessed: 3 October 2022).

⁹² *Australian Human Rights Commission Act 1986 (Cth)*. Attorney-General's Department. Available at: <https://www.legislation.gov.au/Details/C2017C00143> (Accessed: 3 October 2022).



courts, presenting recommendations for new legislation if the current legislative landscape has proven inadequate in upholding Australia's international obligations under human rights treaties.⁹³ It is responsible for preparing Australia's submissions to Australia's UPR Working Group, which prepares Australia's report as part of the Universal Period Review process under the UN Human Rights Council.⁹⁴

It also provides a conciliation service for people who have suffered alleged human rights abuse, for example, discrimination by employers, landlords, merchants, etc., on the grounds of protected characteristics including race, sex (including sexual orientation and gender identity), disability, age and political opinions.⁹⁵ Conciliation is voluntary on the part of the complainant and the respondent, and disputes are settled by mutual agreement. Disputes can be referred to court if conciliation is unsuccessful.⁹⁶

Victoria, Queensland and the Australian Capital Territory each have Human Rights Commissions which monitor adherence to their human rights acts. Other states typically have a Discrimination Commission which fulfills a similar role.⁹⁷

3.1.1 Current Human Rights framework and its implications for CE

The current human rights framework has some ability to regulate CE research and deployment. Arguably, of most significance in the Australian context is the domain of indigenous rights, and relatedly, the right to participate in public affairs (ICCPR Art.25). Although the UNDRIP is non-binding, in Australia indigenous rights are considered to be an integral part of the human rights system, for instance, the *Human Rights Commission Act 1986* (Cth) establishes a dedicated Aboriginal and Torres Strait Islander Social Justice Commissioner, who is responsible for the promotion of human rights in relation to these groups.⁹⁸ With respect to indigenous rights, the right of indigenous peoples to 'participate in decision-making in matters which would affect their rights'⁹⁹ is especially salient of CE regulation in Australia, given Australia's acknowledgement of native title claims (see below).

While the right to participate public affairs principally protects the right to participate in elections,¹⁰⁰ it also 'covers all aspects of public administration, and the formulation and implementation of policy at international, national, regional and local levels'.¹⁰¹

Also significant is the right to enjoy the benefits of scientific progress (ICESCR Art.15), which includes the protection of scientific freedom.¹⁰² The 2009 *Venice Statement on the Right to Enjoy the benefits of Scientific Progress and its Applications*, which was developed by in order to 'clarify the normative content of the right to enjoy the benefits of scientific progress'¹⁰³ under the auspices of UNESCO, interprets the

⁹³ Ibid., Section 11(j-p)

⁹⁴ *Australia's Second Universal Periodic Review on human rights | Australian Human Rights Commission* (no date). Available at: <https://humanrights.gov.au/our-work/rights-and-freedoms/australias-second-universal-periodic-review-human-rights> (Accessed: 26 October 2022).

⁹⁵ *Australian Human Rights Commission Act 1986* (Cth) *supra* note 92, Part IIB Division 1

⁹⁶ Ibid. Section 46PO(1)

⁹⁷ Oding, J. (no date) *Library Guides: Human Rights Law: Australia*. Available at: https://unimelb.libguides.com/human_rights_law/national/australia (Accessed: 3 October 2022).

⁹⁸ *Australian Human Rights Commission Act 1986* (Cth) *supra* note 93, Part IIA

⁹⁹ UNDRIP *supra* note 89, Art.18

¹⁰⁰ ICCPR, *supra* note 81, Article 25(b)

¹⁰¹ Committee on Civil and Political Rights. (1996) *General Comment No. 25: The right to participate in public affairs, voting rights and the right of equal access to public service*, CCPR/C/21/Rev.1/Add.7.

¹⁰² ICESCR, *supra* note 82, Article 15(3)

¹⁰³ Venice Statement on the Right to Enjoy the Benefits of Scientific Progress and its Applications (Venice Statement), July 2009. Available at: https://www.aas.org/sites/default/files/VeniceStatement_July2009.pdf (Accessed 25 October 22)



right as itself implying a public participation requirement, with ‘equal access and participation of all public and private actors’.¹⁰⁴

Thus indigenous rights, the right to participate in public affairs, and the right to enjoy the benefits of scientific progress can be viewed as mutually supportive, and implying requirements for public participation in, and democratic oversight of, scientific projects with the potential to affect the interests of many parties (see **TechEthos Deliverable 4.1 §4.3.7, §4.3.4**).¹⁰⁵

Because of the RRAP, the Great Barrier Reef has become an important site for current and potential future CE research and activity. The Great Barrier Reef is an extremely important site from an indigenous rights perspective, meaning CE activity is likely to interact with, and indeed is already interacting with the body of human rights law that relates to indigenous peoples in this area, and in significant ways.

The Australian Government recognises Aboriginal Australians and Torres Strait Islanders as traditional owners of the Great Barrier Reef, with different indigenous peoples claiming title to regions of ocean around the reef.¹⁰⁶ To define its approach to the recognition of these claims, following a public consultation exercise involving traditional reef owner groups, in 2019 the GBRMPA published the report *Aboriginal and Torres Strait Islander Heritage Strategy for the Great Barrier Reef Marine Park*.¹⁰⁷ The strategy document identified 3 major outcomes: keep heritage strong, keep heritage safe, and keep heritage healthy. The first of these entails empowering traditional owners, respecting them in all GBRMPA business, and promoting understanding of indigenous values. The second involves incorporating heritage values into the GBRMPA’s policy, planning, permitting and compliance processes. Finally, the third outcome involves cooperative management of marine resources through Traditional Use of Marine Resource Agreements.

This means, in principle, that the Australian state regards adequate recognition of indigenous rights to require representation of indigenous communities in the processes of issuing permissions for activities of all kinds on the GBR, which would include CE field testing such as the tests being conducted under the RRAP. Similar constraints would apply to any other CE activities conducted on lands of which indigenous people had traditional title claims. 40% of Australia’s land mass has some indigenous land rights over it.¹⁰⁸ This has implications, for instance, for CCS, as geological storage sites may fall within these lands. It may also have implications for land-based CDR such as BECCS.

The Native Title Act (1993) (Cth) recognises the preexisting rights over land of the indigenous peoples of Australia. It states that the content of these rights is to be determined by the traditional laws and customs of the relevant indigenous group.¹⁰⁹ This means it is impossible to determine the content of indigenous claims over lands and coastal waters without careful consultation with the groups in question. The Act implies that native title only includes surface rights of access, use and utilisation rather than rights over the subsurface geological pore space that would be used for geological

¹⁰⁴Ibid., Art.13(a)

¹⁰⁵Santiago, Nicole *et al.* (2022) *D4.1 Analysis of international and EU law and policy for the governance of climate engineering, neurotechnologies, and digital extended reality*. Available at: www.techethos.eu.

¹⁰⁶ Reef Traditional Owners / gbrmpa (no date). Available at: <https://www2.gbrmpa.gov.au/learn/traditional-owners/reef-traditional-owners> (Accessed: 3 October 2022).

¹⁰⁷ Authority, G.B.R.M.P. (2019) *Aboriginal and Torres Strait Islander Heritage Strategy for the Great Barrier Reef Marine Park*. Great Barrier Reef Marine Park Authority. Available at: <https://elibrary.gbrmpa.gov.au/jspui/handle/11017/3425> (Accessed: 3 October 2022).

¹⁰⁸ National Indigenous Australians Agency. *Land and Housing*. Available at: <https://www.niaa.gov.au/indigenous-affairs/land-and-housing> (Accessed: 3 October 2022).

¹⁰⁹ Crommelin, M. (2018) ‘Tenure, Title and Property in Geological Storage of Greenhouse Gas in Australia’, in *Carbon Capture and Storage: Emerging Legal and Regulatory Issues*. Ian Havercroft, Richard Macrory and Richard Stewart (eds.). Rochester, NY: Hart Publishing. Available at: <https://papers.ssrn.com/abstract=3495334> (Accessed: 3 October 2022).

storage.¹¹⁰ Rights over subsurface features, including geological storage, are held in reserve by the States and Territories.¹¹¹ Nevertheless, it is possible that surface activity related to geological storage may interfere with traditional access and use.

3.1.2 Human Rights: Gaps, challenges and future trends for CE

Overall Framework

The Australian human rights framework itself has been subject to important challenges, calling into question its fitness for responding to emerging fields of law like CE regulation. The Australian Human Rights Commission notes, 'Australia does not have a national Human Rights Act. This means that many core human rights and freedoms may not be adequately protected and promoted at a federal level and there is an inconsistent level of protection across Australian states and territories.'¹¹² An example of an area of human rights law where inconsistencies in the application of human rights across the Commonwealth could present challenges is in determining the scope of indigenous customary rights over land, watercourses, and marine areas. This could present ambiguities with respect to the validity of permissions for CE activities in these areas.

Australian Human Rights Commission carried out a "National Conversation" (a public inquiry with a public deliberation component) into what new legislation is needed on matters pertaining to human rights, and to comply with international agreements.¹¹³ It has published one issues paper¹¹⁴ and three discussion papers,^{115 116 117} as well as a periodic report to the UN Human Rights Council,¹¹⁸ and a position paper¹¹⁹ which contain recommendations for human rights reforms in Australia.

Among the various recommendations contained in the discussion papers, most relevant for CE is the recommendation that 'an agreement or framework for negotiations with Indigenous Australians should be developed, to recognise and address the structural inequalities brought about by colonisation and

¹¹⁰ *Native Title Act 1993* (Cth), Section 223. Available at: <https://www.legislation.gov.au/Details/C2017C00178> (Accessed: 3 October 2022); see also Crommelin, M. (2018), *supra* note 70.

¹¹¹ Crommelin, M. (2018), *supra* note 70, p.4

¹¹² *Australia's human rights framework* (no date) Victorian Equal Opportunity and Human Rights Commission. Available at: <https://www.humanrights.vic.gov.au/legal-and-policy/australias-human-rights-framework/> (Accessed: 3 October 2022).

¹¹³ *Free and Equal: An Australian conversation on human rights* / Australian Human Rights Commission (no date). Available at: <https://humanrights.gov.au/free-and-equal> (Accessed: 3 October 2022).

¹¹⁴ Australian Human Rights and Commission (2019) *Free and equal: An Australian conversation on human rights Issues Paper 2019*. Available at: https://humanrights.gov.au/sites/default/files/document/publication/ahrc_free_equal_issues_paper_2019_final.pdf.

¹¹⁵ Australian Human Rights and Commission (2019) *FREE AND EQUAL An Australian conversation on human rights 2019. Discussion Paper: Priorities for federal discrimination law reform*. Available at: <https://humanrights.gov.au/our-work/rights-and-freedoms/publications/discussion-paper-priorities-federal-discrimination-law>.

¹¹⁶ Australian Human Rights Commission (2019) *Discussion Paper: A model for Positive Human Rights Reform*. Available at: <https://humanrights.gov.au/our-work/rights-and-freedoms/publications/discussion-paper-model-positive-human-rights-reform-2019>.

¹¹⁷ Australian Human Rights Commission (2019) *Discussion Paper: Ensuring effective national accountability for human rights*. Available at: https://humanrights.gov.au/sites/default/files/19.10.14_discussion_paper-ensuring_effective_national_accountability_final.pdf.

¹¹⁸ *National report submitted in accordance with paragraph 5 of the annex to Human Rights Council resolution 16/21, A/HRC/WG.6/37/AUS/1* (2020). Available at: <https://documents-dds-ny.un.org/doc/UNDOC/GEN/G20/356/20/PDF/G2035620.pdf?OpenElement>.

¹¹⁹ Australian Human Rights Commission (2021) *Free and Equal: A reform agenda for federal discrimination laws (2021)*. Available at: <https://humanrights.gov.au/our-work/rights-and-freedoms/publications/free-and-equal-reform-agenda-federal-discrimination-laws> (Accessed: 30 July 2022).



the consequences of past and ongoing injustices'.¹²⁰ This recommendation, if enacted, would importantly constrain future CE research. The RRAP, for instance, has included indigenous groups in its research to some extent: Usop Drahm, a traditional owner of the Mandubarra Aboriginal Land and Sea Country, was invited to take part in the MCB project's expeditions.¹²¹ This was presumably pursuant to the GBRMPA's strategy document, which requires indigenous values to be incorporated into GBRMPA policy. The recommended changes to human rights law would give a more definite structure to this kind of involvement, potentially allowing for a range of indigenous voices to influence policy in a more substantive way.

Political Participation, Indigenous Rights and CCS

Legal scholar Michael Crommelin argues, 'the [legal] provisions for underground disposal of carbon dioxide are meagre indeed' and therefore that CCS regulation in Australia 'rests precariously on the uncharted divide between public and private law'.¹²² The fact that geological resources are owned by the state but exploited for private gain under a licence 'gives reign to the ingenuity' of the officials drafting these licences.¹²³ There is therefore arguably a need for new legislation to more carefully circumscribe the relationship between publicly held land rights and private enterprise.

It is here proposed that such legislation would be an appropriate site to strengthen the participatory rights of indigenous groups in determining whether proposed geological storage projects interfere with native title claims. It may also arguably be an important opportunity to strengthen rights to public participation more broadly, as CCS with geological storage raises wider questions of national interest concerning the use of Australia's shared public heritage, and how benefits from it are to be distributed.

Strengthening Scientific Freedom

There are also ongoing challenges in Australia with respect to scientific freedom and the human right to benefit from scientific research.¹²⁴ A May 2022 editorial in the leading scientific journal *Nature* strongly criticised the Australian state for failing to live up to the standard embodied by the Haldane principle.¹²⁵ This principle was introduced into British policymaking by the Haldane report in 1918, and has legal influence on the Commonwealth countries that still bear ties to the British legal system. The principle states that decisions regarding the award of research grants should not be taken by ministers or central government, but should instead as far as possible be determined by researchers themselves, through peer review. As *Nature* reports, on at least 4 occasions since 2001, Ministers have directly intervened to block the award of grants to research projects by the Australian Research Council (ARC). In the most recent instance, the government issued a statement explaining the decision of the Minister in question, Stuart Robert, to intervene, stating the Minister 'believes those rejected do not demonstrate value for taxpayers' money nor contribute to the national interest'.¹²⁶

¹²⁰ Australian Human Rights Commission (2019) *Discussion Paper: A model for Positive Human Rights Reform*, p. 19. Available at: <https://humanrights.gov.au/our-work/rights-and-freedoms/publications/discussion-paper-model-positive-human-rights-reform-2019>.

¹²¹ Mandubarra Aboriginal Land and Sea Inc., Regional Advisory and Innovation Network (RAIN) Pty Ltd (2020). *Mandubarra Sea Country Cultural Values: 2019-2020 mapping project*. Report. Mandubarra Aboriginal Land and Sea Inc. Available at: <https://elibrary.gbrmpa.gov.au/jspui/handle/11017/3815> (Accessed: 3 October 2022).

¹²² Crommelin *supra* note 109. p.14

¹²³ Ibid.

¹²⁴ ICESCR, *supra* note 82, Article 15(b)

¹²⁵ 'Australia must abolish law that allows politicians to veto research grants' (2022) *Nature*, 605(7908), pp. 7–7. Available at: <https://doi.org/10.1038/d41586-022-01200-5>.

¹²⁶ Nogrady, B. (2022) 'Australian researchers push to end politicians' power to veto grants', *Nature* [Preprint]. Available at: <https://doi.org/10.1038/d41586-022-00682-7>.



These incidents led to concerns in the research community, and in 2018 a legislative bill was tabled in parliament to amend the law to prevent ministerial interference.¹²⁷ On 9 February 2022, the Senate referred the amendment to the Senate Education and Employment Legislation Committee for inquiry. The inquiry opened for submissions in February 2022 and presented its report in March 2022.¹²⁸ Although there was widespread agreement in the submissions that a change to the law to place limits on ministerial interference was warranted, the committee noted a difference of opinion as to whether the role of ministers should be limited to setting an overall strategy for research funding, or whether ministerial discretion should serve as a 'necessary accountability mechanism'.¹²⁹ The committee recommended the bill to limit ministerial interference in research funding not be passed.¹³⁰ This of course means that the concerns of members of the research community who called for legal changes have not been addressed.

There is no indication that any of the documented cases of interference relate to CE funding. Indeed, the committee's report notes that interference seems mainly to relate to the blocking of funds for the arts, humanities and social sciences, rather than STEM.¹³¹ However, given interference concerns have not been addressed, research funding in Australia remains open to direct ministerial intervention. There is a case to be made that this may undermine the integrity of the approval process for CE research projects moving forward. The election of the Albanese government presents an opportunity for Australia's Parliament to return to the question of the integrity of academic research in the face of political interference.

3.2 Environmental law

Environmental law in Australia is split between major pieces of Commonwealth law, and a wide range of piecemeal regulations at a state/territory and local level. The central piece of Commonwealth-level environmental legislation in Australia is the *Environment Protection and Biodiversity Conservation Act* (1999) (Cth) (EPBCA). This statute regulates 9 matters of national environmental significance:¹³²

- World heritage
- National heritage
- Wetlands of international importance
- Migratory species protected under international agreements
- Listed threatened species and ecological communities
- Commonwealth marine areas
- The Great Barrier Reef Marine Park
- Nuclear actions (including uranium mines)
- Water resources, in relation to coal seam gas development and large coal mining development

Any group or individual proposing a project which may affect any of these matters of national environmental significance is required by the EPBCA to submit a proposal to the regulator.¹³³ The

¹²⁷ Australian Research Council (Ensuring Research Independence) Bill 2018 (Cth)

¹²⁸ Senate Education and Employment Legislation Committee (2022) *Australian Research Council Amendment (Ensuring Research Independence) Bill 2018*. p.23, Available at: [https://parlinfo.aph.gov.au/parlInfo/download/committees/reportsen/024901/toc_pdf/AustralianResearchCouncilAmendment\(EnsuringResearchIndependence\)Bill2018.pdf](https://parlinfo.aph.gov.au/parlInfo/download/committees/reportsen/024901/toc_pdf/AustralianResearchCouncilAmendment(EnsuringResearchIndependence)Bill2018.pdf)

¹²⁹ Ibid. p.28

¹³⁰ Ibid. p.28

¹³¹ Ibid. p.10

¹³² *Environment Protection and Biodiversity Conservation Act 1999* (Cth), ss 12-24E. Available at: <https://www.legislation.gov.au/Details/C2016C00777> (Accessed: 3 October 2022).

¹³³ Ibid. s. 68.



proposal is then published for public comment.¹³⁴ The Minister then decides whether a further Environmental Impact Assessment (EIA) is required, taking the public comments into account.¹³⁵

At a Commonwealth level, the relevant department - now the Department of Climate Change, Energy, the Environment and Water - can enforce the provisions of the EPBCA through a range of powers, including demanding mandatory environmental audits, issuing infringement notices, civil and criminal prosecution, and remediation orders to redress damage.¹³⁶ Primary responsibility for enforcement of environmental standards, however, lies with the states and territories, which each have their own environmental regulatory authority.¹³⁷ The states/territories each define environmental impact according to their own standards, whereas the Commonwealth Government only has authority to conduct assessments in relation to the 9 matters of national environmental significance.¹³⁸

With respect to international environmental law, Australia is a party to the *UN Convention on Biological Diversity (CBD)*.¹³⁹ It is also a signatory to the *London Protocol on Ocean Dumping*.¹⁴⁰ It is also a party to the *UNESCO World Heritage Convention*¹⁴¹ - this treaty is of particular significance for Australian environmental law, as the Great Barrier Reef is listed as a UNESCO World Heritage Site.¹⁴² Unlike the EU, Australia is not a signatory to the *Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)*.¹⁴³

3.2.1 Current environmental law framework and its implications for CE

The EPBCA would likely be triggered for a wide range of potential CE interventions. Marine CE that affected marine protected areas would be subject to EIA approval. Land-based CDR like BECCS has the potential to damage biodiversity,¹⁴⁴ and thus risks impacting threatened species and ecological communities in a way that may be restricted by the EPBCA. Any resulting prohibitions or demands for changes to project plans would however have to be imposed on a case-by-case basis, and would have no blanket effect on CE in general or any particular CE intervention as such. 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Protocol) (entry into force 24 March 2006) ATS 11 With respect to international law, Australia is a state party to the CBD, which has addressed the issue of CE through two non-binding decisions. The first, in

¹³⁴ Ibid. s.74 (3)

¹³⁵ Ibid. s.101

¹³⁶ Ibid., s 458; s 464; s 475, s 480A, s 481

¹³⁷ Thomson Reuters Practical Law (no date) *Environmental law and practice in Australia: overview, Practical Law*. Available at: [http://uk.practicallaw.thomsonreuters.com/1-502-8908?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](http://uk.practicallaw.thomsonreuters.com/1-502-8908?transitionType=Default&contextData=(sc.Default)&firstPage=true) (Accessed: 3 October 2022).

¹³⁸ *EPBC Act - Frequently asked questions - DCCEEW* (no date). Available at: <https://www.dcceew.gov.au/environment/epbc/publications/factsheet-epbc-act-frequently-asked-questions> (Accessed: 3 October 2022).

¹³⁹ Convention on Biological Diversity (CBD) (entered into force 29 December 1993) 1750 UNTS 79, 31 ILM 818. Available at: <https://treaties.un.org/doc/Publication/UNTS/Volume%201760/v1760.pdf> (Accessed 25 October 2022)

¹⁴⁰ 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Protocol) (entry into force 24 March 2006) ATS 11. Available at: <https://wwwcdn.imo.org/localresources/en/OurWork/Environment/Documents/PROTOCOLAmended2006.pdf> (Accessed 25 October 2022)

¹⁴¹ UN Educational, Scientific and Cultural Organisation (UNESCO), *Convention Concerning the Protection of the World Cultural and Natural Heritage*, 16 November 1972. Available at: <https://whc.unesco.org/document/191197> (Accessed 25 October 2022).

¹⁴² UNESCO World Heritage Centre (no date) *Great Barrier Reef, UNESCO World Heritage Centre*. Available at: <https://whc.unesco.org/en/list/154/> (Accessed: 3 October 2022).

¹⁴³ *Convention on Environmental Impact Assessment in a Transboundary Context, Espoo, Finland, 25 February 1991*. Available at: https://treaties.un.org/Pages/ViewDetails.aspx?src=TREATY&mtdsg_no=XXVII-4&chapter=27&clang=en (Accessed: 3 October 2022).

¹⁴⁴ Tech Ethos D2.2



2010, commits state parties to ensure that: '[N]o climate-related geo-engineering activities that may affect biodiversity take place, until there is an adequate scientific basis on which to justify such activities and appropriate consideration of the associated risks for the environment and biodiversity and associated social, economic and cultural impacts, with the exception of small scale scientific research studies that would be conducted in a controlled setting'.¹⁴⁵ A 2016 amendment to the decision reaffirmed the commitments of the 2010 decision and called upon parties to provide more information regarding what concrete steps they had taken pursuant to that decision. It also noted that 'more transdisciplinary research and sharing of knowledge among appropriate institutions is needed', including regarding 'regulatory options'.¹⁴⁶

The London Protocol on Ocean Dumping (1996) bans all dumping of waste and other materials into the ocean, with the exception of a small number of materials listed in annex to the protocol, which may be granted permission to be dumped.¹⁴⁷ The Protocol entered into force in 2006. An amendment (2013) to the London Protocol contains a prohibition on Marine Geoengineering.¹⁴⁸ However, according to legal scholar Jesse Reynolds, the prohibition in this amendment only applies to ocean fertilization.¹⁴⁹ Moreover, it has not yet entered into force.¹⁵⁰

Australia is party to the 1976 Convention on the Prohibition of Military or any other Hostile use of Environmental Modification Techniques (ENMOD Convention). While this treaty does not prohibit environmental modification for non-hostile purposes, it does contain an obligation to 'facilitate... the fullest possible exchange of scientific and technological information on the use of environmental modification techniques for peaceful purposes'.¹⁵¹

3.2.2 Environmental Law: Gaps, challenges and future trends for CE

Ocean Dumping

According to Brent, McDonald, McGee and Gogarty, the legal status of forms of CE which involve placing matter into Australian waters is ambiguous, with the potential for them to be considered illegal.¹⁵² Such activities would include 'marine sunscreening' (placing a reflective polymer film on the ocean surface to reflect sunlight, a form of GBAM) and ocean fertilization – both of which are being carried out under RRAP – although it would not include MCB. The London Protocol is implemented into Australian domestic law via the *Environment Protection (Sea Dumping) Act 1981 (Cth)* (SDA).¹⁵³ This act creates a general prohibition on the dumping of wastes in Australian waters, or from Australian vessels, or from

¹⁴⁵ UNEP/CBD/COP/DEC/X/33, Available at: <https://www.cbd.int/decisions/cop/10/33/8> (Accessed: 3 October 2022)

¹⁴⁶ UNEP/CBD/COP/DEC/13/14, available at: <https://www.cbd.int/decisions/cop/13/14> (Accessed: 3 October 2022)

¹⁴⁷ 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Protocol) *supra* note 139, Art.4.

¹⁴⁸ 2013 Amendment to the London Protocol to Regulate the Placement of Matter for Ocean Fertilization and other Marine Geoengineering Activities (Not in Force)

¹⁴⁹ Reynolds, J. (2018). International Law. In M. B. Gerrard & T. Hester (Eds.), *Climate Engineering and the Law* (pp. 57–153). Cambridge & New York: Cambridge University Press.

¹⁵⁰ Article 21(3) of the Protocol provides that '[a]n amendment shall enter into force for the Contracting Parties which have accepted it on the sixtieth day after two-thirds of the Contracting Parties shall have deposited an instrument of acceptance of the amendment with the Organization. Thereafter the amendment shall enter into force for any other Contracting Party on the sixtieth day after the date on which that Contracting Party has deposited its instrument of acceptance of the amendment.'

¹⁵¹ Convention on the Prohibition of Military or any Other Hostile Use of Environmental Modification Techniques. 18 May 1977: 1108 U.N.T.S. 151, arts. HI(3), V(1).

¹⁵² Brent, K. et al. (2018) 'Carbon dioxide removal geoengineering', *Australian Law Journal*, 92(10), pp. 830–838.

¹⁵³ *Environment Protection (Sea Dumping) Act 1981 (Cth)*. Available at: <https://www.legislation.gov.au/Series/C2004A02478> (Accessed: 3 October 2022).



vessels loaded in Australia. The dumping of certain ‘controlled materials’ (listed in Annex 1 of the London Protocol) may be allowed if a permit is granted by the federal Environment Minister, in accordance with the procedure in Annex 2 of the London Protocol.¹⁵⁴

Given that neither the materials used for ocean fertilisation nor those used for marine sunshields are listed in Annex 1 as controlled materials, a general prohibition on the dumping into the sea of these materials applies. To allow these activities, the materials would need to be listed as ‘controlled materials’ under annex 1. Thus, if placing these materials in the ocean qualifies as ‘dumping’, then the act prohibits this activity and does not allow for the Minister to grant a permit. According to the authors, whether placing materials into the ocean qualifies as dumping under the Act is determined by whether it qualifies as dumping under the Protocol.¹⁵⁵ Thus, the authors note, ‘[w]hether ocean fertilisation field-testing or implementation can legally take place in Australia will therefore depend on how it is characterised under the London Protocol, although it is the Environment Minister who must make this determination.’¹⁵⁶

The authors further argue that because of the Protocol’s broad definition of ‘dumping’, the Minister would (or should) likely judge that the intentional placing of matter into the ocean that has a potential to harm the marine environment does qualify as dumping under the protocol, and thus the SDA.¹⁵⁷ As noted, the 2013 amendment to the protocol prohibits placing matter in the ocean for CE, but contains an exception for ‘legitimate scientific research’.¹⁵⁸ However, because the amendment is not legally in force, the authors argue that it has no effect on the SDA, therefore the Minister may not consider scientific research as an exception to the prohibition on ocean dumping in Australian law.

As noted, the 2013 Amendment to the London Protocol specifically prohibits marine CE, in particular, ocean fertilization, but the amendment has not yet come into force.¹⁵⁹ McDonald, McGee, Brent and Burns argue, ‘Australia was one of three countries to propose the 2013 amendment [to the London Protocol on Ocean Dumping] and should therefore be expected to act in accordance with its spirit, regardless of whether the amendment has become binding international law.’¹⁶⁰ They note that despite this, Australia has made no attempt to explicitly apply the amendment’s prohibition on Ocean Fertilization in state law (barring the ambiguity discussed in the previous paragraph).

As signing up to the amendment clearly represents a stated international commitment on the part of Australia (along with the other signatories to the amendment), introducing a prohibition on Ocean Iron fertilization into domestic law is arguably warranted as a direction for future legal intervention. Given the content of the amendment, this could be either an outright ban, or a condition that requires international agreement that Ocean Fertilization is scientifically justified before any proposal can proceed.

Fragmented regulations for BECCS and CCS

Brent, McDonald, McGee and Dogarty argue that the EPCBA has some capacity to place legal limits on the implementation of BECCS projects, for instance on the grounds that protected species may be present at the proposed sites.¹⁶¹ However, they point out that ‘if the impacts of individual BECCS initiatives were considered on a case-by-case basis, there is a real risk of serious impacts on listed

¹⁵⁴ Ibid., section 19

¹⁵⁵ Brent *et al.* (2018), *supra* note 97, p.836

¹⁵⁶ Ibid.

¹⁵⁷ Ibid. p.837

¹⁵⁸ 2013 Amendment to the London Protocol to Regulate the Placement of Matter for Ocean Fertilization and other Marine Geoengineering Activities (Not in Force), Annex 4, s1.3

¹⁵⁹ Ibid., Art. 6 Bis

¹⁶⁰ McDonald, J. *et al.* (2019) ‘Governing geoengineering research for the Great Barrier Reef’, *Climate Policy*, 19(7), pp. 801–811. Available at: <https://doi.org/10.1080/14693062.2019.1592742>.

¹⁶¹ Brent, K. *et al.* (2018) ‘Carbon dioxide removal geoengineering’, *Australian Law Journal*, 92(10), p.835.



biodiversity overall, since the EPBC Act does a poor job of accounting for cumulative impacts'.¹⁶² They suggest instead that moving forward a 'programmatic approach' to planning and approval is to be preferred.¹⁶³ For instance, the regulator should be able to make an assessment of the environmental impact of a national BECCS program rather than being limited to assessing project proposals on a case-by-case basis.

Interpretation of term 'geoengineering' for CBD compliance

The 2010 and 2016 CBD decisions are regarded by some commentators as establishing a moratorium on geoengineering deployment globally.¹⁶⁴¹⁶⁵ However, as "decisions" under the convention they are non-binding and the text itself does not define any legal obligation.¹⁶⁶ Whether or not the decision is binding, however, it is 'highly persuasive'¹⁶⁷ in establishing a norm that geoengineering is internationally controversial and that parties should not allow open-air testing without international agreement as to its scientific merits. The RRAP does not assess its own activities as being subject to the CBD decision, because their aim is not the reversal of global climate change, but only local shielding of the reef. Campaign groups opposed to CE regard this as 'rebranding'¹⁶⁸ and 'geoengineering in disguise'¹⁶⁹.

Future trends: Samuel Review

A statutory review of the EPBCA, led by Professor Graeme Samuel AC, commenced on 29 October 2019. The review closed for submissions in April 2020 and the review presented its final report in October 2020.¹⁷⁰ The review set out to analyse the operation of the act and determine whether its objects had been achieved. The final report made 38 recommendations for reform.¹⁷¹ The most important of these was a call to introduce a suite of legally enforceable National Environmental Standards, which prescribe that all activities contribute to national environmental outcomes. Among the standards recommended is a National Environmental Standard for indigenous engagement and participation in decision-making. It recommended state governments shift their focus from individual project approvals to a focus on clear outcomes, implementing national and regional environmental plans.

The then-Minister for Agriculture, Water and the Environment, Sussan Ley, issued the Government's Response, 'A Pathway for Reforming National Environmental Laws', in June 2021.¹⁷² The government

¹⁶² Ibid.

¹⁶³ Ibid.

¹⁶⁴ Tollefson, J. (2010) 'Geoengineering faces ban', *Nature*, 468(7320), pp. 13–14. Available at: <https://doi.org/10.1038/468013a>.

¹⁶⁵ Walsh, B. (2010) 'Climate: Why It's a Mistake to Ban Research on Geoengineering', *Time*, 2 November. Available at: <https://science.time.com/2010/11/02/climate-why-its-a-mistake-to-ban-research-on-geoengineering/>

¹⁶⁶ Scott, K.N. (2012) 'International Law in the Anthropocene: Responding to the Geoengineering Challenge', *Michigan Journal of International Law*, 34, p. 309.

¹⁶⁷ Ibid., p.333

¹⁶⁸ *Geoengineers test planetary engineering scheme in Australia* (no date) *Friends of the Earth Australia*. Available at: <https://www.foe.org.au/geoengineers-test-planetary-engineering-scheme-in-australia> (Accessed: 30 July 2022).

¹⁶⁹ *Geoengineers test risky planetary engineering scheme in Australia* / ETC Group (2020). Available at: <https://www.etcgroup.org/content/geoengineers-test-risky-planetary-engineering-scheme-australia> (Accessed: 30 July 2022).

¹⁷⁰ Samuel, G (2020) *Independent Review of the EPBC Act – Final Report*. Canberra: Department of Agriculture, Water and the Environment. Available at: <https://epbcactreview.environment.gov.au/resources/final-report>.

¹⁷¹ Ibid. p.26

¹⁷² *Commonwealth of Australia, A pathway for reforming national environmental law*. (2021). Canberra: Department of Agriculture, Water and the Environment,. Available at: <https://www.dcceew.gov.au/sites/default/files/documents/pathway-reforming-national-environmental-law.pdf>.



has committed to implementing many of the review's recommendations, however at time of writing no reforms have been passed. The *Environment Protection and Biodiversity Conservation Amendment (Standards and Assurance) Bill 2021* began passage through parliament but lapsed at dissolution in July 2022 and has not been reintroduced.¹⁷³

3.3 Climate change law

Australia is a state party to the United Nations Framework Convention on Climate Change (UNFCCC), and a signatory to the 2015 Paris Agreement, which commits parties to holding the increase in global average temperature 'well below' 2C, and to 'pursue efforts' to hold the temperature rise below 1.5C.¹⁷⁴ It also requires signatories to submit Nationally Determined Contributions, committing to national mitigation targets, and to submit reports detailing the actions taken in pursuit of those targets.¹⁷⁵

Until September 2022, Australia had no domestic legislation transposing Australia's commitment under the Paris Agreement into domestic law. That changed with the introduction of *the Climate Change Bill 2022 (Cth)*, which received Governor-General's assent 13 September 2022. In addition to codifying Australia's greenhouse gas emissions reduction targets of 43% reduction from 2005 levels by 2030 and net zero by 2050,¹⁷⁶ the act requires the minister to table an annual climate change statement to parliament, requires the Climate Change Authority (the statutory body responsible for monitoring Australia's contribution to greenhouse gas emissions and its progress towards mitigations targets) to advise the minister in relation to the annual statement and future targets, and provides for periodic reviews of the operation of the act.¹⁷⁷

According to the London School of Economics Grantham Institute, Australia has 12 Commonwealth laws on Climate Change. They are:¹⁷⁸

- *Climate Change Bill 2022*
See above
- *Climate Energy Finance Corporation Act 2012 (last amended 2020)*
Establishes the Clean Energy Finance Corporation.
- *Building Energy Efficiency Disclosure Act 2010 (last amended 2017)*
Establishes a national scheme to require the disclosure of information about the energy efficiency of large office buildings at point of sale/lease

¹⁷³ *Environment Protection and Biodiversity Conservation Amendment (Standards and Assurance) Bill 2021* Available at:

https://www.apb.gov.au/Parliamentary_Business/Bills_LEGislation/Bills_Search_Results/Result?bld=r6683 (Accessed: 3 October 2022).

¹⁷⁴ Conference of the Parties, Adoption of the Paris Agreement (Paris Agreement) (entry into force 4 November 2016) 3156 UNTS, Art.2(1)(a). Available at: https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf. (Accessed 25 October 2022)

¹⁷⁵ Conference of the Parties, Adoption of the Paris Agreement (Paris Agreement) (entry into force 4 November 2016) 3156 UNTS, Art.4(2)-(3). Available at: https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf. (Accessed 25 October 2022)

¹⁷⁶ *A Bill for an Act to set out Australia's greenhouse gas emissions reductions targets, to provide for annual climate change statements, to confer advisory functions on the Climate Change Authority, and for related purposes 2022 (Cth) (Climate Change Bill)*. Available at: <http://www.legislation.gov.au/Details/C2022B00055> (Accessed: 3 October 2022), s 10.

¹⁷⁷ Ibid.

¹⁷⁸ Grantham Institute on Climate Change and the Environment (no date). *Australia - Climate Change Laws of the World*. Available at: <https://www.climate-laws.org/geographies/australia> (Accessed: 30 July 2022).



- *National Greenhouse and Energy Reporting Act 2007 (last amended 2017)*
Establishes the legislative framework for the National Greenhouse and Energy Reporting scheme, a single national reporting framework for information about greenhouse gas emissions. It provides that corporations that pass an annual threshold must submit annual reports to the Clean Energy Regulator.
- *Australian Renewable Energy Agency Act 2011 (last amended 2017)*
Establishes the Australian Renewable Energy Agency, which provides funding for and promotes renewable energy projects.
- *Building Energy Efficiency Disclosure Act 2010 (Act No. 67 of 2010)(Last amended 2016)*
Requires energy efficiency information to be provided when a commercial building of a certain meterage is put up for sale or lease.
- *Renewable Energy (Electricity) Act 2000 (last amended 2016)*
Establishes a scheme to issue certificates for the generation of renewable electricity from accredited sources. Requires certain purchasers to surrender a specified number of certificates for electricity that they acquire during a year.
- *Carbon Farming Initiative Amendment Bill 2014*
Establishes the Emissions Reduction Fund. Amends the *Carbon Credits (Carbon Farming Initiative) Act 2011*, which established the ACCU scheme in relation to accredited offset projects.
- *Greenhouse and Energy Minimum Standards Act 2012*
Establishes minimum standards that apply to the supply and commercial use of products that either use energy or affect the energy used by another product.
- *Climate Change Authority Act 2011*
Establishes the Climate Change Authority, which is obliged to conduct reviews under other acts, and conduct research about matters relating to climate change.
- *Australian National Registry of Emissions Units Act 2011*
Establishes the National Registry of Emissions Units.
- *Offshore Petroleum and Greenhouse Gas Storage Act 2006*
Provides a regulatory framework for petroleum exploration and recovery. Designates a joint authority for each offshore area which is responsible for implementing the act.

3.3.1 Current climate law framework and its implications for CE

The Climate Bill 2022 does not mention CE, nor does it have any direct impact on policy or regulation in relation to CE. However, as the bill reflects Australia's commitments under the Paris Agreement, it is possible that the content of that agreement has implications for the interpretation of Australia's commitments to certain means of pursuing mitigation targets. The Paris Agreement commits parties to 'achiev[ing] a balance between anthropogenic emissions by sources *and removals by sinks* [emphasis added]'.¹⁷⁹ This can be interpreted as an implied commitment to pursuing negative emissions strategies. The UNFCCC framework may also have implications for SRM regulation. Kerry Brent argues that at-

¹⁷⁹ Conference of the Parties, Adoption of the Paris Agreement (Paris Agreement) (entry into force 4 November 2016) 3156 UNTS, Art.4(1) (emphasis added). Available at: https://unfccc.int/sites/default/files/resource/parisagreement_publication.pdf.

scale deployment of SRM for CE is incompatible with the UNFCCC.¹⁸⁰ Jesse Reynolds, however, takes the opposite view, arguing that SRM could be consistent with all relevant international treaties.¹⁸¹

As already suggested, the area of existing climate law of most significance for CE in Australia is the body of law governing the ERF, given this scheme directly promotes CDR. The most popular method for generating ACCUs under the ERF has been Human-Induced Regeneration (HIR). This method allows landowners to earn ACCUs for the regeneration of native forests.¹⁸² As McIntosh et al. note, '[a]s of November 2021, HIR projects accounted for 32% of all registered ERF projects, 27% of all issued Australian carbon credit units (ACCUs) and more than 50% of all ACCUs contracted through the ERF purchasing scheme, worth approximately \$1.5-1.6 billion'.¹⁸³ As a form of afforestation/reforestation, in principle (properly managed), HIR is a form of CDR.

3.3.2 Climate Law: Gaps, challenges and future trends for CE

ERF: Carbon Accounting Concerns

The ERF has been the object of damning criticism because of 'serious integrity issues',¹⁸⁴ with a high proportion of ACCUs being awarded for schemes that do not represent 'real' or 'additional' abatement – that is to say, the claim that the emissions have been reduced is either false, or abatement would have occurred anyway in the absence of the schemes in question. These carbon accounting concerns were serious enough that a team lead by Professor Andrew MacIntosh (ANU), formerly head of the government's Emissions Reductions Assurance Committee, called the ERF 'environmental and taxpayer fraud'.¹⁸⁵

In response to the concerns raised about additional abatement, the Emissions Reduction Assurance Committee (ERAC) commissioned a report from AnalytEcon Pty Ltd (the Beare and Chambers Report), published in late 2021. This report concluded that the ERF had indeed generated an increase in woody forest cover in the areas stated.¹⁸⁶ However, MacIntosh et al. argue that the Beare and Chambers report suffered from a flawed methodology which effectively allowed for the counting of areas as new forest cover which should not qualify under the terms of the ERF.¹⁸⁷

Rather than faulting individual participants in the ERF scheme, MacIntosh et al. argue that there are systemic faults with the operation of the ERF.¹⁸⁸ They claim that 'the issues have arisen because of a focus on delivering large volumes of credits at a low cost for polluters'.¹⁸⁹ They argue for reform of the system, to ensure that ACCUs are only awarded if (i) there is high confidence in the counterfactual, that

¹⁸⁰ Brent, K.A. (2021) 'Solar Geoengineering Is Prohibited under International Law', in A. Zahar and B. Mayer (eds) *Debating Climate Law*. Cambridge: Cambridge University Press, pp. 274–284. Available at: <https://doi.org/10.1017/9781108879064.021>.

¹⁸¹ Reynolds, J.L. (2021) 'Solar Geoengineering Could Be Consistent with International Law', in A. Zahar and B. Mayer (eds) *Debating Climate Law*. Cambridge: Cambridge University Press, pp. 257–273. Available at: <https://doi.org/10.1017/9781108879064.020>.

¹⁸² MacIntosh, A. et al. (2022) 'The ERF's Human-induced Regeneration (HIR): What the Beare and Chambers Report Really Found and a Critique of its Method'. The Australian National University Canberra.

¹⁸³ Ibid.

¹⁸⁴ Andrew MacIntosh et al. (2022) *Fixing the integrity problems with Australia's carbon market Fixing the Integrity Problems with Australia's Carbon Market*. Australian National University. Available at: https://law.anu.edu.au/sites/all/files/erf_-_problems_and_solutions_final_6_april_2022.pdf.

¹⁸⁵ Ibid.

¹⁸⁶ Beare, S., Chambers, R. (2021) *Human induced regeneration: A spatiotemporal study*. AnalytEcon Pty Ltd, Berry, NSW

¹⁸⁷ MacIntosh et al. (2022) supra note 181, p.16

¹⁸⁸ Andrew MacIntosh et al. (2022) *Fixing the integrity problems with Australia's carbon market Fixing the Integrity Problems with Australia's Carbon Market*. Australian National University. Available at: https://law.anu.edu.au/sites/all/files/erf_-_problems_and_solutions_final_6_april_2022.pdf.

¹⁸⁹ Ibid.



reductions would not have occurred anyway without the credited schemes, (ii) we are able to accurately measure the relevant emissions and removals, and (iii) it is easy to distinguish the effects of the abatement activity on emissions and removals from those associated with natural variability.¹⁹⁰

As already noted, a public inquiry (the Chubb review) has been launched into the ERF. The terms of reference for the inquiry are expansive, and appear to represent an openness to the criticisms adduced by McIntosh and his collaborators. There is reason to be hopeful that the inquiry will recommend significant reforms and that the government will be receptive to their implementation.

4. Overview of gaps and challenges

This section highlights the main gaps and challenges identified in the previous sections. Climate Engineering regulation is a complex field that cuts across many different legal domains; this section draws out considerations which have implications across more than one domain.

- As the discussion of the capacity of the EPCBA to regulate technologies like BECCS suggests, a Commonwealth-level governance framework for CE should be seriously considered. Such a framework would help to overcome ambiguities in the application of standards between states/territories, and the exploitation of a lack of clear definition of international norms in domestic law.
- A clear legal definition of CE techniques needs to be developed, which specifies specific practices and processes that fall under the regulatory framework, while also maintaining the flexibility to cover emerging, novel and unforeseen technologies. This would prevent future projects from eluding regulation by interpreting the definition of CE in such a way as to exclude themselves from consideration.
- Public consultation must be a key component of the regulatory approval process. In the Australian context, traditional owners of affected lands and sea-country regions must be afforded a substantive policy-directing role. The stipulation that policy should 'reflect the values' of traditional owners risks leaving space for interpretation of those values to be manipulated by actors other than the indigenous people themselves.
- The content of any national legal framework should itself be informed by public consultation, but consideration should be given to public access to information on geoengineering proposals, and public ownership of intellectual property developed.
- Consideration should be given to ensuring research funding application processes are shielded from ministerial interference, while at the same time ensuring they are subject to democratic oversight and responsive to the public interest.
- Current environmental regulations are not well-suited to evaluating the impact of large-scale interventions or national level policies. Consideration should be given to ensuring environmental impact assessments are able to assess entire policy programmes.
- Geological storage is a public resource which is being allocated with little democratic oversight. Even if the risks to the public - for example from seismic effects - are low, and even if the chances of emission leakage are similarly low, it would remain the case that the public should have the

¹⁹⁰ Ibid. p.2



opportunity to determine whether it is receiving fair compensation for the use of its common resources. Of course, this consideration must be balanced against the need to promote carbon neutral development, and permitting oil and gas firms to maintain legitimate commercial interests.

- RRAP has also highlighted the concern that, while there is clear provision in the 2013 amendment to the London Protocol to restrict Ocean Fertilisation, the extent to which the protocol constrains other CE techniques that involve placing matter in the ocean, for example potential forms of ground-level albedo modification, is less well understood. Opportunities should be sought to clarify this question, either via domestic law or international law.
- The ACCU scheme remains controversial and there are outstanding questions as to whether it is fit for purpose at all. Consideration should be given to whether new CDR schemes should be incorporated into this controversial scheme, or whether it would be preferable to establish an entirely new framework to ensure integrity and public trust.

5. Conclusion

Australia is an instructive case from an international perspective, given its very advanced position internationally in certain areas of CE policy. It has introduced some innovative regulation in tandem with this advanced development, although regulation has not necessarily kept pace with the fast-moving policy environment.

This study does not claim to be exhaustive. In particular, there is a diffuse body of material on the regulation of CCS, with legal frameworks operating differently across the states and territories, of which it has only been possible to give a very general assessment. Australia is something of a test case for CCS, with the feasibility and effectiveness of CCS across the world being a major factor determining the degree to which continued use of fossil fuels will be compatible with the obligation under international law to keep global average temperature rises below 2C. Thus, there are global lessons to be drawn from the Australian experiment in this sphere.

RRAP is another globally significant experiment which will be instructive to other countries. It provides strong evidence for the widely held view that it is important CE governance frameworks are put in place as soon as possible, either at a national level or internationally, so that governments and wider civil society do not find themselves running to catch up with actors in the research and development community. A clear definition of the kinds of technologies that should activate regulatory oversight needs to be in place as early as possible, to avoid ambiguities of interpretation leading to potential conflicts with civil society.

6. References

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Annex 9.2 National legal case study of Climate engineering in Austria



D4.2 Comparative analysis of national legal case studies

December 2022



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D4.2 National legal case studies: Annex 9.2 Climate engineering in Austria

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Work Package lead	Trilateral Research (TRI)		
Partner name	AIT		
Lead Author(s)	Wenzel Mehnert (AIT)		
Other contributors	Julie Vinders (TRI), Ben Howkins (TRI)		
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The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Abbreviations

Term	Explanation
CCS	Carbon capture and storage
CCU	Carbon capture and utilisation
CDR	Carbon dioxide removal
CE	Climate engineering
CO ₂	Carbon dioxide
CSU	Carbon sequestration and utilisation
CTCN	Climate Technology Center & Network
D4.2	TechEthos deliverable 4.2
DoA	Description of Action
EU	European Union
LTS	Long-Term Strategy 2050
MS	Multiple sclerosis
NGO	Non-governmental organisation
PC	Project Coordinator
R&D	Research and development
WP	Work Package

Abstract

The objective of this study is to review the current state of the law and legal responses on climate engineering in Austria, as evidenced in policy, legislation, case law and regulation. It focuses on those issues affecting and/or contributing fundamental human rights and freedoms, socio-economic inequalities, and stimulation of innovation. This study also looks at developments in climate engineering that may influence constitutional or human rights, and proposals to create or adapt existing law in response to those climate engineering developments.

A summary overview of the main findings and legal issues surrounding climate engineering in Austria is provided in section 3.1.2 of the TechEthos D4.2 Comparative analysis of national legal case studies. This report is primarily aimed at informing the Austrian government and Austrian policy makers regarding the regulatory challenges of climate engineering in the Austria. Furthermore, it provides further background to readers to the specific Austrian context of the main points and key regulatory challenges identified in the comparative analysis to which this report is annexed.



1. Introduction

Climate engineering presents many significant legal issues that impact socio-economic equality and fundamental rights in Austria. This study provides an overview of those legal issues and challenges.

This study analyses relevant laws and policies from the Austrian legal system in relation to climate engineering. It looks at policies, legislations and regulations surrounding the development of Climate Engineering technologies (CE) in Austria. It provides an insight into the Austrian legal system, its position within the European Union and references to corresponding international framework conditions. It examines current and planned laws and developments in relation to climate engineering and offers an outlook on the possible legal environment for this emerging field of technologies.

For the purpose of the TechEthos project and this national legal case study, we have used the following definition for climate engineering:

- **Climate engineering (CE)**, refers to "... the deliberate large-scale intervention in the Earth's climate system, in order to moderate global warming."¹

The report deliberately focusses on potential applications such as (and among others) Carbon Dioxide Removal (CDR) like Carbon dioxides capture and utilisation (CCU) or Carbon dioxides capture and storage (CCS). The current state of CE, which is still in development and not yet market-ready or deployable on a large scale, goes along with a lack of policy and regulation. Therefore, most of the policies and measures that help to steer the development of CE in the broadest sense are current climate and environmental protection policies and laws that aim to promote CO₂-offsetting or support decarbonisation through the use of alternative and environmentally friendly energy sources. While these technologies are not the focus of this report, they nevertheless provide a potential framework for the development of future CE applications in Austria.

For more information about the TechEthos technology families and their innovation ecosystems, visit: <https://www.techethos.eu/resources/>.

1.1 Purpose of the Austrian legal case study

The objective of this study is to review the current state of the law and legal responses on climate engineering in Austrian, as evidenced in policy, legislation, case law and regulation. We prepared this study through desk research, using legal research and academic databases (such as <https://www.ris.bka.gv.at/>) and consultation with legal experts.

There are several climate engineering-specific laws or policies in Austria as well as existing laws and regulations (e.g., environmental laws) which may and should cover these technologies, including any harms resulting from them.

This study is part of a series of national legal case studies prepared in the TechEthos project covering three technology families: climate engineering, neurotechnologies, and digital extended reality. A complementary report covers the international and European Union law dimensions of the three

¹ Shepherd, J., Caldeira, K., Cox, P., Haigh, J., Keith, D., Launder, B., & Mace, G. (2009)

technology families. The following table provides an overview of the nine country studies conducted as part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

Table 2: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Structure of the case study

Section II explores the existing and proposed laws and policies that specifically address climate engineering. **Section III** explores the legal implications of climate engineering in relation to specific legal domains, including human rights law, environmental law and climate change law. **Section IV** provides an overview of the gaps and challenges in relation to the regulation of climate engineering. **Section V** concludes the case study followed by a reference list at the end.

1.3 Scope and Limitations

This study was prepared as part of the TechEthos project's work package on policy, legal and regulatory analysis. Therefore, the scope is demarcated by that project task's workplan. The legal issues related to climate engineering are too vast to be covered comprehensively in a study of this size. Instead, this study focuses on a limited range of topics with significant human rights and socio-economic impacts that are of high policy relevance, particular in the European context.

1.4 Overview of the Austrian legal system²

Austria is constituted as a democratic, federal republic. It consists of nine provinces (Vienna, Upper Austria, Lower Austria, Styria, Carinthia, Salzburg, Tyrol, Vorarlberg, and Burgenland), each administered by its respective government, and a federal government (Der *Bund*), called Federation.

The current constitution³ was written in 1920, re-enacted after the Second World War and constantly revised up until now. It establishes Austria as a country governed through an indirect democracy with a two-chamber parliamentary system: The first chamber, the *Nationalrat* (National Council), holds most of the legislative power and is elected by a nationwide election every five years.⁴ The second chamber, the *Bundesrat* (Federal Council), is established through representatives of the nine provinces and represents their interests.⁵ For a bill to become a law, it has to be submitted to the National Council as motions by its members. The bill is then sent to the Federal Council. They can neglect or agree within

² Weichsel, H. (2021)

³ Federal Republic of Austria. (1995)

⁴ Ibid., Art. 24 and following

⁵ Ibid., Art. 34 and following

eight weeks.⁶ However, for certain bills concerning changes in the Federal Assembly, the federal states' sphere of action, the federal principal law or similar, the Federal Assembly's approval is mandatory.

Since 1995, Austria has been part of the European Union and is therefore subject to EU law, including its respective Regulations, Directives and Decisions.⁷ Within this context, the Austrian legal system can be separated into the following hierarchy:

The fundamental rights in Austria are outlined in the constitution. In contrast to some other states (e.g. the constitution of Germany), Austria's fundamental rights are not listed in one single law but are distributed among the articles of the constitution. Any fundamental changes to the constitution require a national referendum. Even though the constitution does not contain a catalogue of fundamental rights, some provisions have a fundamental rights-like character and follow principles that are typical for democratic and libertarian constitutions:

The democratic principle states that Austria is a democratic state and all power is legitimated by the public.⁸ This principle also covers, among others, the right for a referendum⁹ or the right to vote freely and in secret¹⁰.

The republican and the federal principle explain the form of the state.¹¹

The principle of separation of powers prevents a concentration of power and splits the state into a legislature, a judiciary and an executive.¹²

The principle of equality states that all nationals are equal before the law and that privileges based upon birth, sex, estate, class or religion are excluded.¹³

The Right-to-life principle abolishes the death penalty.¹⁴

EU law is interwoven with the Austrian constitution. An example for this is the Human-Rights Charta of the EU¹⁵, which become part of the Austrian constitution meaning that Austrian laws and administrative acts that contradict the Charter can now be repealed by the Constitutional Court as unconstitutional¹⁶. This also concerns environmental directives, regulations, and standards passed by the EU. Directives are legally addressed to member state governments.¹⁷ In turn, member states have legal obligations to take regulatory and further legislative and administrative measures to incorporate directives into national law. EU regulations are legally binding on member states as well as persons and private entities in the jurisdiction of member states (although member states may still pass complementary measures to ensure enforcement and application).¹⁸ EU standards on the other hand are non-binding

⁶ Ibid., Art. 42 (4)

⁷ Consolidated Version of the Treaty on the Functioning of the European Union (OJ C326/49, 26.10.2012), article 288.

⁸ Federal Republic of Austria. (1995)

⁹ Ibid., Art. 45

¹⁰ Ibid., Art. 26 (1)

¹¹ Ibid., Art. 2

¹² Ibid., Art. 18

¹³ Ibid., Art. 7(1)

¹⁴ Ibid., Art. 85

¹⁵ European Court of Human Rights (1950).

¹⁶ Verfassungsgerichtshof. (2012).

¹⁷ Consolidated Version of the Treaty on the Functioning of the European Union (OJ C326/49, 26.10.2012), Article 249.

¹⁸ Consolidated Version of the Treaty on the Functioning of the European Union (OJ C326/49, 26.10.2012), Article 288

recommendations, technical guidance, or reference, often issued in support of directives or regulations.¹⁹ With regards on how to implement EU laws, the Austrian constitution states²⁰ that the Federation must inform the provinces without delay regarding all projects within the framework of the European Union. The provinces, in return, have the opportunity to present their views within a reasonable interval to be fixed by the federation. If the provinces have given a uniform opinion on a project, the Federation may depart from this opinion only for compelling integration and foreign policy reasons.

On the third level comes domestic Austrian law, which is separated into the federal sphere, which consists of national constitutional law and national law, and the regional sphere, which consists of regional constitutional law and regional law, which differs between the nine individual states. In general, regional constitutional law is subordinated to national constitutional law. However, there are some exceptions. For example, national law that is not constitutional in nature does not usually take priority over regional law. This becomes important when looking at environmental issues, as the established laws are divided between the federal and the regional level. Depending on the topic, the governmental responsibilities lie at the national or the regional level. While the Federation is exclusively responsible for issues like forestry, conservation of waterways²¹ or disposal of dangerous refuse, other topics, like environmental impact assessment, rest with the provinces.²² In other topics, like waste management, the federation acts as legislator while the provinces are responsible for administering environmental law adopted on the national level. Since the EU has become a main influence for the impact and the designation of environmental law, EU regulations and directives relating to environmental issues must be considered on both levels, national and regional.²³

1.5 Current state of climate engineering activities in Austria

Currently, there are no direct activities concerning climate engineering technology in particular. There are, however, activities that foster climate friendly technologies in general. One of them is the **“Masterplan Umwelttechnologie”** (2019)²⁴ written and development by the *Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology*. The plan draws the vision of Austria taking a leading position in environmental technology and services within the European Union and becoming part of a world market innovation engine for modern environmental technology. Despite these efforts, most of the technologies referred to in the strategy paper are not related to Climate Engineering but rather deal with fostering decarbonisation, transforming certain industry sectors towards a carbon neutral status quo or developing strategies to offset CO₂ emissions. Technologies to deliberately engineer the climate, e.g. by taking CO₂ out of the air or inducing heat mitigation, are not mentioned.

The Masterplan is accompanied by several other projects, institutions or networks. One of them is the **“Climate Technology Center & Network”** (CTCN), which facilitates the transfer of Austrian based climate technologies worldwide and with a focus on emerging and developing countries, in particular.²⁵ In their report, the network lists different activities and several green technologies. The results are similar as to before, as the report mentions only energy related technologies and does not list CEs at all.

¹⁹ Farmer, A. (2010)

²⁰ Federal Republic of Austria. (1995), Art. 23d

²¹ Ibid., Art. 10

²² Ibid., Art. 11 (7)

²³ Schmelz, C., Rajal, B., & Toth, C. (2012)

²⁴ Bundeskanzleramt (2019)

²⁵ Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (2015)

A general perspective on the Green Tech sector paints a similar picture. In the report “**Österreichische Umwelttechnik-Wirtschaft**” by the Austrian Ministry of Climate Action and Energy and the Ministry for Digital and Economic Affairs²⁶, which gives an overview of the fields of developments within climate technologies in Austria, the following six major fields are stated as drivers for the sector:

- Renewable energy technologies
- Energy efficiency technologies
- Water and wastewater technologies
- Waste technologies, recycling, circular economy
- Air pollution control
- Noise protection, Instrumentation and control engineering, environmental monitoring

As with the earlier examples, CE is not explicitly mentioned in this context. Instead, it becomes a sidenote, as one of the funding experts interviewed within the report refers to CCS as one of the R&D topics of great interest in the future.²⁷

Furthermore, the report on “**GreenTech Innovation**”²⁸ lists different development fields within the sector of innovative green technologies and lists Austria in a global comparison to other countries. According to the report, Austria is leading in the areas of electromobility and energy efficiency. The term “Climate Engineering Technology” or technologies that are similar to the above-mentioned definition do not appear in the report.

Concluding from these reports, it appears that Austria is investing in and supporting the Green Technology development in the country. The **Masterplan Umwelttechnologie**, in particular, proves the importance of this sector to the Austrian government. Climate engineering, however, does not seem to be part of this masterplan.

²⁶ Schneider, H.W., Pöchlacker-Tröscher, G., Demiroglu, D., Luptáček, P., & Wagner, K. (2020)

²⁷ Ibid., p. 220

²⁸ Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (2016)

2. Climate engineering-specific legal developments

The following section provides an overview of the legal and policy developments pertaining to climate engineering (CE) technologies in Austria. It examines relevant laws and policies and identifies, where applicable, the national authorities involved in the implementation and enforcement of such laws and policies. Whilst limited overall, most relevant legal and policy developments relate to carbon capture and storage (CCS) technologies.

i. Existence of dedicated Austrian policy on CE:

With regards to current policies, CE is mentioned in the context of Austrians activities to become a carbon neutral state. The two most important policy papers regarding the strategy of Austria to achieve that goal are the “**Long-Term Strategy 2050**” (LTS)²⁹ and the “**Government Programme 2020 – 2024**”³⁰. The LTS contains Austria’s target to become carbon neutral by 2050. The Government Programme 2020 – 2024 can be seen as an update to the LTS as it brought the carbon neutrality target forward by 10 years to 2040. While the former explicitly mentioned CE as an activity to achieve emission neutrality, the later does not list this technological field any longer.

Long-Term Strategy 2050

In 2019, following the conclusion of the Paris climate agreement³¹ and the enactment of regulation (EU) 2018/1999 on the Governance of the Energy Union and Climate Action³², the Austrian Federal Ministry for Sustainability and Tourism published the Long-Term Strategy 2050 (LTS). The report provides the strategy to lower greenhouse gas emissions and the objective to become carbon neutral by 2050. Among the transformation of different carbon emitting or climate relevant sectors, such as energy, industry, transport, buildings, agriculture and forestry, the report also mentions two different approaches to CE:

The first approach is **Carbon dioxides capture and utilisation** (CCU), which is designed to “capture CO₂ from industrial processes (point sources) and to feed it into a technical application.”³³ The concept of CCU contributes to the goal to create a circular economy, in which all resources are reused. One application is to transform CO₂ into synthetic methane (natural gas). To do this, the captured CO₂ is injected into a geological structure together with green hydrogen and then converted into synthetic methane by the bacteria residing there. This gas promises all the technical advantages of natural gas but is CO₂ neutral and could be used as fuel for air traffic for example. Another promising approach is

²⁹ Federal Ministry for Sustainability and Tourism (2019)

³⁰ Federal Republic of Austria (2020a)

³¹ COP 21 (2015)

³² Regulation (EU) 2018/1999

³³ Federal Ministry for Sustainability and Tourism (2019), p. 37



the cultivation of microalgae that use the captured CO₂ for their photosynthesis, turning CO₂ and sunlight into biomass for further utilisation.

The second approach is **Carbon dioxide capture and storage (CCS)**, which is about technologies that “capture CO₂ from industrial processes (point sources) and permanently prevent it from being released into the atmosphere.”³⁴ Here, instead of transforming or reusing the CO₂, the carbon dioxide is stored within a geological underground structure. As stated in the report, this approach prevents the alternate use of underground structures. Furthermore, it needs specific storage requirements, as CCS projects are only viable when long-term safety and environmental protection can be guaranteed.

Although the LTS mentions these technologies, they also point out that **Austria’s current position towards CCU / CCS is very critical** for two different reasons:

- The risk argument: “Austria sees substantial hurdles and uncertainties with these technological solutions in terms of domestic storage capacity and ensuring permanent and safe storage.”³⁵
- The space argument: “It must be noted here that secured storage capacity that is generally suitable for CO₂ is very limited in Austria. The current potential domestic storage capacity is estimated at between 400 and 510 million tonnes of CO₂, or up to 6.5 times the current annual CO₂ emissions in Austria. The transport of CO₂ to storage facilities outside of Austria can be considered as an alternative or long-term solution.”³⁶

Based on these arguments, CE appears to be seen as an emergency solution which is to be avoided if possible. However, the substantial reduction of greenhouse gas emissions that is required to achieve the goal of CO₂ neutrality might require far-reaching changes, not only by transforming CO₂ emitting areas, but also by storing carbon captured from the atmosphere. As an alternative to CE, the LTS presents natural sinks, like swamp lands or forests, as a more environmentally friendly solution which might cover some of the remaining emissions.

Following up on the possibility to transform social structures, using natural sinks and storing carbon through CE, the report delivers four scenarios that map four possible pathways to the future. Each pathway reflects on the degree of CCS to be used to capture carbon:

- “Pathway A (...) is based on the high use of renewable energy, far-reaching efficiency improvements, and substantial changes in consumption patterns (lifestyle). Remaining emissions will be compensated by natural sinks (forest) (...) and by **the moderate use of CCS/CCU**.”
- Pathway B focuses on the (somewhat lower) expansion of renewable energy and efficiency improvements as well as on the import of bioenergy and hydrogen for use in multiple sectors (industry, transport, heating). A **substantially higher degree of CCS/CCU** than in pathway A must be used to compensate for the remaining emissions.
- Pathway C does without the import of bioenergy and hydrogen, and renewable resources in the country including forest and agricultural biomass are used to a high degree. This results in a

³⁴ Ibid.

³⁵ Ibid., p. 15

³⁶ Ibid., p. 17

reduction in the forest as a natural carbon sink (...). This means that **the CCS/CCU option must be used to a relatively high degree** to compensate for the remaining greenhouse gas emissions.

- Pathway D assumes the needs-oriented import of bioenergy and hydrogen, as in pathway B. The use of domestic forest biomass and carbon capture in the forest are assumed as in scenario 2 (section 6.1.3). For this reason, **CCS/CCU are not used.**³⁷

Following the arguments stated above and which are repeated throughout the report, the bottom line is to use CCU / CCS only if necessary and unavoidable. This critical stance is also taking form in a moratorium that prohibits CCS projects in Austria, as will be explained more in detail in the next chapter. Despite the moratorium, the report acknowledges that the technology could develop further and that “new research findings by 2050 should not be ruled out”³⁸. However, as was stated in the chapter before, it seems as if this further research plays a deferred role, as no funding for CCU / CCS technologies (or CE at all) is foreseen in the **Masterplan Umwelttechnologie**. Instead, the current strategy to achieve climate neutrality focusses on transforming current social and industry sectors or using existing ecosystems (natural sinks such as forests) to capture carbon. CCU / CCS should only be used when absolutely necessary (see the four different pathways)³⁹.

ii. Existence of dedicated Austrian laws on CE:

In 2011 the National Assembly passed the **Federal Act on the Prohibition of the Geological Storage of Carbon Dioxide**⁴⁰, a moratorium that bans the storage of carbon within geological structures in the federal territory of Austria. The only exception to this moratorium is for projects that are explorative in character and follow a research purpose for the development or testing of new products or processes. This exception also reduces the geological storage of carbon dioxide to a total volume of less than 100 000 tonnes.⁴¹

The moratorium follows the EU directive 2009/31/EC on the geological storage of carbon dioxide.⁴² With the aim of stabilising greenhouse gas concentration in the atmosphere, the directive urges the EU member states to support the research and development of CCS technology. This includes ways to capture carbon from industrial installations, its transportation to a storage site, as well as the search for and injection of carbon into suitable underground geological formations.

Although this directive has been supported by most member states, who also allow geological storage of CO₂, some member states have decided against CO₂ storage on their territory due to unsuitability of their geology (e.g., Finland, Luxembourg and the Brussels Capital Region of Belgium). Other member states do not allow it at or restrict it (Austria, Czech Republic, Estonia, Germany, Ireland, Latvia, Slovenia and Sweden).⁴³

³⁷ Ibid., p. 18, emphasis by the author.

³⁸ Ibid., p. 37

³⁹ Ibid., p. 18

⁴⁰ Federal Republic of Austria (2011b)

⁴¹ Ibid., §2 and §3

⁴² Directive 2009/31/EC

⁴³ Report from the Commission to the European Parliament and the Council on implementation of Directive 2009/31/EC (2014)



Despite the current moratorium, it is unclear whether the prohibition will always remain in the future. The act on the prohibition of the geological storage of carbon dioxide will be re-evaluated every five years, meaning that the moratorium could also be lifted. As the possibility of new research findings by 2050 should not be ruled out, the **Long-Term Strategy 2050** also states that “a possible contribution of CCS technology to climate mitigation should be approached with a certain openness, as it permanently removes CO₂ from the carbon cycle.”⁴⁴

iii. Proposals for dedicated law:

- none

iv. Responsibility for enforcement:

According to the bespoke **Federal Act on the Prohibition of the Geological Storage of Carbon Dioxide**, the Federal Minister of Economy, Family and Youth is entrusted with the enforcement of the law. The evaluation of this act is incumbent on the Federal Government on the proposal of the Federal Minister of Economy, Family and Youth in agreement with the Federal Minister of Agriculture, Forestry, Environment and Water Management and the Federal Minister of Transport, Innovation and Technology.⁴⁵

v. Significant legal cases:

- none

vi. Current debates and future policy and/or legal developments:

There are current public debates in Austria concerning climate change policies in general which might also favour CE in the future, depending on the development of the discourse.

One debate is the **Klimavolksbegehren**, a grass roots campaign that aims for a referendum to inscribe the protection of the climate as one of the main principles in the Austrian constitution.⁴⁶ In case the referendum succeeds, it might change Austrians’ perspective on CE, as the referendum fosters the stance on climate neutrality and raises the need for possible solutions. Promoted as a “bridging technology which will make an important contribution to the decarbonisation of the industry”⁴⁷, CE could be a suitable way to achieve climate neutrality in the short term.

vii. Conclusion:

In a nutshell, the current stance towards CE (especially CCU or CCS) is a critical one. This is reflected in the active moratorium that prohibits the storage of CO₂ in commercial contexts and only allows research projects up to a certain amount. However, the goal to achieve climate neutrality as well as public debates such as the Klimavolksbegehren, might force the government to rethink the position. If the transformation of societal sectors towards climate neutrality or the use of natural sinks to capture carbon is insufficient to make Austria a net-zero CO₂ country, CE could be an option to close the gap, as the presented pathways of the LTS show. In this case, the moratorium that is currently active could also be lifted.

⁴⁴ Federal Ministry for Sustainability and Tourism (2019), p. 37

⁴⁵ Federal Republic of Austria (2011b)

⁴⁶ Klimavolksbegehren (n.a.)

⁴⁷ Federal Ministry for Sustainability and Tourism (2019), p. 42



3. Domain-specific legal issues

This section examines the legal implications of climate engineering in a Austrian context with respect to specific legal domains with a high socio-economic impact. The legal domains covered include human rights law, environmental law, and climate change law.

3.1 Human Rights law

With regards to human rights law there have not been any legal issues that link directly to CE. However, there are examples where the government of Austria has been accused of violations of basic human rights by not doing enough to fight climate change. Those cases might in the future put pressure on Austria to make use of CE, as one tool to tackle climate change.

Human rights law in Austria is defined by the United Nations Universal Declaration of Human Rights and the according series of comprehensive human rights agreements under international law, which have been ratified by the country.⁴⁸ This guarantees that every person living in Austria enjoys the rights documented in the declaration, such as freedom of opinion and speech, privacy of the individual, the protection of citizens through preventive measures by the state and also from the state or guaranteed education and health care through schools, hospitals, teachers and doctors. Furthermore, as a member of the Council of Europe, Austria is also part of the European Convention on Human Rights⁴⁹. Several other agreements regarding special human rights issues are agreed upon by the Austrian government. For example, in early 2007 it signed the International Convention for the Protection of All Persons from Enforced Disappearance and the International Convention on the Rights of Persons with Disabilities.

The latter becomes relevant in the following court case. In March 2021, an Austrian citizen filed a complaint with the European Court of Human Rights against the Austrian government, known as **Mex M v Austria**. The citizen suffered from a temperature-dependent form of multiple sclerosis (MS) and is therefore “directly affected by Climate-Crisis induced increase in average temperature and heatwaves since 2003”⁵⁰, as stated in the application form. While it is not possible to sue for climate protection in Austria, the complaint route is via fundamental and human rights.⁵¹ The petitioner claims that the Austrian government failed to combat climate change more quickly and effectively. Thus, its inaction on the climate crisis has violated his constitutional right to family and private life under Article 8 of the European Convention on Human Rights.

In another case, **Greenpeace et al. v. Austria**⁵², the NGO Greenpeace asked the constitutional court to invalidate two tax laws passed by the Austrian government. Both laws favour air travelling as they exempt the value-added taxes on cross-border flights and exempt kerosene taxes on national flights in 2020. Greenpeace also alleges that “the tax breaks infringe on the right to life and liberty guaranteed by Article 8 of the European Convention on Human Rights.”⁵³ The reasoning here is that the tax

⁴⁸ Federal Republic of Austria (n.a.)

⁴⁹ European Court of Human Rights (1950)

⁵⁰ Krömer, P. (2021)

⁵¹ Wien ORF (2021)

⁵² Verfassungsgerichtshof (2020)

⁵³ Grantham Research Institute (n.a.)



exemptions will contribute to climate change as they promote using flights instead of traveling by train. The case was dismissed as inadmissible in September 2020, as rail passengers cannot sue over preferential tax treatment given to air travel.

The reported cases do not directly address human rights law in the context of CE, but could form arguments for the use of CE in the near future.

3.2 Environmental law

Environmental laws in Austria are regulated on national level as well as on the level of the provinces: On the provincial level are topics such as nature conservation, land usage and planning, whereas most environmental matters, such as water, waste forestry mineral raw materials, and others are assigned to the federal level⁵⁴. Also, the administrative and executive competence in Austria regarding laws with relevance to climate engineering is split between the following three ministries:

- The Federal Ministry for Climate Protection, Environment, Energy Mobility, Innovation and Technology
- The Federal Ministry for Agriculture, Regions and Tourism
- The Federal Ministry for Digitalisation and Business Location

In the following, the most important environmental laws on a federal level will be summarized. These become important, as they might – directly or indirectly – influence the regulation of CE in the future.

The Austrian **Abfallwirtschaftsgesetz** manages the waste disposal in Austria. In accordance with the precautionary principle and sustainability, waste management shall be geared towards avoiding harmful or detrimental effects on humans, animals and plants, their livelihoods, and their natural environment. It is also to regulate and minimise effects that otherwise impair general human well-being and emissions of air pollutants or climate-relevant gases.⁵⁵ The general vision is a circular economy as also described in the EU Circular Economy Strategy and the EU Circular Economy Action Plan.⁵⁶ This strategy is in favour of technologies that make CO2 reusable, like CSU technologies, for example.

The **Umweltförderungsgesetz** is a law, updated in 2020, to provide substantial funds for domestic environmental promotion. The goal of the act is the protection of the environment through proper sewage disposal, use of renewable energy sources, measures abroad that serve to implement national, EU or international environmental and climate protection targets, securing and remediating contaminated sites, and the protection, restoration and conservation of biodiversity.⁵⁷ As CE does touch upon the targets defined in this law, it could also become subject of funding under this law. Currently, most of the investments go into transforming the existing industries towards climate neutrality.

In 1978 the Austrian Parliament voted for a ban on nuclear energy, the **Federal Constitutional Act for a Nonnuclear Austria**⁵⁸ prohibits the building of power plants in Austria as well as the storage of nuclear weapons on national territory. This stand against nuclear energy, which is also anchored in the

⁵⁴ Federal Republic of Austria. (1995), Art. 10 & 11

⁵⁵ Federal Ministry for Climate Action, Environment, Energy, Mobility, Innovation and Technology (2002)

⁵⁶ Federal Republic of Austria (2020a)

⁵⁷ Federal Republic of Austria (2020b)

⁵⁸ Federal Republic of Austria (1999)



constitution, leads to tension between Austria and the EU. The EU's decision to classify nuclear energy as an environmentally friendly energy source in the context of the EU taxonomy, caused the Austrian Federal Minister for Climate Protection, Environment, Energy, Mobility, Innovation and Technology (BMK), Leonore Gewessler, to threaten to sue the EU.⁵⁹ According to a study conducted on behalf of the BMK, nuclear power is not an environmentally friendly energy source. This definition undermines the intention of the EU Taxonomy to fund and support climate friendly energy sources.⁶⁰

The laws listed here can support the use of CE in the future. The first two laws become relevant for CE (especially CSU) as the technologies promise a path towards the goal to create a circular and carbon neutral economy. The third law, which prohibits the use of nuclear energy, closes down an alternative path to achieve the beforementioned goal and can thus also be seen as a law which may support the use of CCU and CCUS technologies.

3.3 Climate change law

The climate laws are mainly concerned with decarbonizing Austria's industry. They follow the results of the Paris climate agreement⁶¹ and the EU regulation 2018/1999⁶² to make Europe carbon neutral by 2050. There are three laws that are particularly important to achieve the goal of carbon neutrality and which have relevance to CE.

The Austrian **Climate Protection Act (Klimaschutzgesetz)**⁶³ defines the greenhouse gas emission thresholds for six sectors: Waste, energy and industry, fluorinated gas, buildings, agriculture, and transport. Furthermore, article 4 creates a National Climate Protection Committee. The committee is comprised of different stakeholders. Among them representatives of the provinces, federal ministries involved in climate change and representatives from trade unions, industry, and agricultural associations. The goal of the committee is to advise on fundamental issues, in particular on the long-term reduction of greenhouse gas emissions towards a low-carbon society. The act has been concretized in a **table of measures, published in April 2020**⁶⁴. The report lists several activities planned by the federation and the individual provinces, set between beginning of 2019 until 2020. The listed activities aim at decarbonisation, the funding of new energy sources (like solar energy) or the transformation of the mobility sector (e.g. through E-Taxis or the expansion of the necessary infrastructure). There are no measures listed that can be defined as Climate Engineering Technologies. In one column, the table asks for the expected impact of the activities and how much CO₂ emissions can be reduced. Most of the activities do not give any information on that. In the same year, the University of Graz published an **Evaluation of Climate Protection Act**⁶⁵. The evaluation states that the act has not been able to meet the goals it set itself. The compliance with obligations under international and European Union law was only possible due to extensive certificate purchases or because of remaining allowances from previous purchases. The report further states that, in view of the period 2021 - 2030, significantly measures are necessary in order to achieve the emission reductions required and that the

⁵⁹ Kurmayer, N.J. (2021)

⁶⁰ Lünenbürger, S., Kottmann, M., & Reiter, K. (2021)

⁶¹ COP 21 (2015)

⁶² Regulation (EU) 2018/1999 Of The European Parliament And Of The Council of 11 December 2018 on the Governance of the Energy Union and Climate Action

⁶³ Federal Republic of Austria (2011a)

⁶⁴ Federal Republic of Austria (2020c).

⁶⁵ Schulev-Steindl, E., Hofer, M. & Franke, L. (2020)



act itself needs to be improved. One major weakness they point out is the lack of substantive governance and accountability mechanisms. Based on the evaluation, one could argue that Climate Engineering might become important in the near future to achieve the goals of CO₂ reduction.

The **Climate and Energy Fund Act** supports climate neutrality by funding the transition of areas of energy and mobility transition, climate change and awareness raising. In line with the strategy to make Austria a climate neutral state in 2040, their goal is to develop a CO₂-free economy and society by “strengthening the innovative power of domestic companies and the sustainable use of regional resources”.⁶⁶ This Fund, among others (see above), offers potential finances for the research & development of CE in Austria.

The recent **Ökosoziale Steuerreformgesetz 2022**⁶⁷ reforms the current tax system in Austria and introduces a carbon levy of 30 euros per tonne. This levy will start in June 2022 and rise to 55 euros per tonne in 2025. The reform also implements several tax amendments for ecological business investments and a regional climate bonus as a reimbursement for every Austrian citizen.

These climate laws show the two different approaches taken by the current government to tackle climate change. (1) The first two acts are supporting the ongoing transformation of the Austrian industry towards carbon neutrality by funding climate friendly innovations and sustainable pathways. (2) The third act is a taxation of CO₂-based industries. Both laws affect CE technology as (1) is the funding environment for the further development of the technology and (2) becomes a future reason to use and implement CE, especially because of its capability to capture carbon and thus reduce CO₂ emissions.

⁶⁶ Klima- und Energiefonds (n.a.)

⁶⁷ Federal Republic of Austria (2022)

4. Overview of gaps and challenges

This section provides an overview of the regulatory gaps and challenges surrounding climate engineering in Austria. It builds on the laws and policies identified in the previous sections.

Concluding from the beforementioned laws there appears to be several challenges and conflicts with regards to CE. The main conflict arises around Carbon Capture and Storage technologies.

On the one hand, Austria's position on CCS technology is very clear. Through the moratorium, the government is speaking out against the development and use of CCS and instead supports and funds alternative pathways to reach the zero emissions goal. Those pathways focus on decarbonization, the transformation of industries or using natural ways of storing carbon (e.g., natural sinks like forests). Also, the current funding guidelines and strategies that focus on green technology and achieve CO₂ do not mention CE technology in particular but rather focus on other technologies that support the goals mentioned before. This means that although decarbonisation strategies are being pursued, they are aimed more at the transformation of industrial sectors - either by promoting sustainable technologies or by taxing CO₂ emissions.

On the other hand, the ambitious goals of becoming CO₂-neutral by 2040, the Climate Protection Act, which defines carbon thresholds for different industry sectors, the tax regulations, which make CO₂ emissions more expensive, and the regulations on waste, which foster a circular economy, all support the use of CE (in particular CSU). Especially with regards to the evaluation of the Climate Protection Act⁶⁸, which states that the current path does not reduce the CO₂ emissions to meet the planned goals, and with regards to court cases charging Austria's lack of action against climate change, the pressure to reconsider the government's current stance on CE might change in the near future and make the technology a necessity to become a carbon neutral country.

⁶⁸ Schulev-Steindl, E., Hofer, M. & Franke, L. (2020)



5. Conclusion

Concluding from the report we can say that CE is already a topic in Austria, although the debate around the use of CE has already passed.

One reason for that is the clear stance against certain applications of CE, as the development and use CCS and CCU in Austria is prohibited under the “Federal Act on the Prohibition of the Geological Storage of Carbon Dioxide”. It only allows the research of these technologies on a small scale. Reasons for that are (a) a precautionary stand towards CE, as the use of the technology is still too risky and (b) the spatial requirements are not given, as the nation state of Austria does not have the space for the geological storage of extracted carbon. However, the current laws already offer a framework for the development of CE. The Climate and Energy Fund Act, as well as the current turn towards green technologies, supports this. Furthermore, the laws on waste management also require a shift towards a circular economy, which would be supported by CSU technologies.

As the need to tackle climate change rises, not only because of the self-defined goal of reaching carbon neutrality by 2040 but also because of possible Human Rights Infringements, the search for solutions becomes inevitable. Austria’s current strategies to address the challenges ahead is to invest green technologies, to focus on decarbonisation, mobility transformation or transitions in the energy sector and to tax CO₂ emissions. The use of CE however, is not part of their approach.

Thus, the question of whether CE might play a role in Austria in the future highly depends on the success of the planned activities to transform the different carbon emitting sectors. As was depicted in the Long Term Strategy report, there are different pathways that can be foreseen today. If the goals cannot be achieved through the measures taken, then the critical position towards CE might have to be reconsidered.

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Annex 9.3 National legal case study: Climate engineering in the United Kingdom ○

D4.2 Comparative analysis of national legal case studies

December 2022



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D4.2 National legal case studies: Annex 9.3 Climate engineering in the United Kingdom

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Work Package lead	Trilateral Research (TRI)		
Partner name	Trilateral Research (TRI)		
Lead Author(s)	Julie Vinders, Ben Howkins (TRI)		
Other contributors	Rowena Rodrigues (TRI)		
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Keywords

Climate engineering; United Kingdom; greenhouse gas removal; carbon dioxide removal; solar radiation management; human rights law; environmental law; climate change law



The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Greenhouse gas removal (GGR)	Refers to climate engineering technologies which remove greenhouse gases from the atmosphere. GGR is understood to be broader than CDR, as it includes the potential for removing greenhouse gases other than carbon dioxide.
Carbon dioxide removal (CDR)	Refers to climate engineering technologies which remove carbon dioxide from the atmosphere.
Solar radiation management (SRM)	Refers to technologies that seek to enhance the earth's albedo, i.e. the earth's ability to reflect the sun's radiation to reduce the warming effect.

Table 2: List of Abbreviations

Term	Explanation
BECCS	Bioenergy carbon capture and storage
BEIS	Department for Business, Energy & Industrial Strategy (UK)
CAT	Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment
CB	Carbon budget
CBD	Convention on Biological Diversity



CCC	Committee on Climate Change
CCR	Carbon capture ready
CCS	Carbon capture and storage
CCUS	Carbon capture usage and storage
CDR	Carbon Dioxide Removal
CE	Climate engineering
CEDAW	Convention on the Elimination of All Forms of Discrimination Against Women
CO ₂	Carbon dioxide
COP	Conference of the Parties
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
DAC	Direct air capture
DACCS	Direct air carbon capture and storage
DoA	Description of Action
EA	Environment Agency
ECHR	European Convention on Human Rights
ECtHR	European Court of Human Rights
EIA	Environmental Impact Assessment
EOR	Enhanced oil recovery
ETS	Emissions Trading Scheme
FOIA	Freedom of Information Act 2000
FOISA	Freedom of Information (Scotland) Act 2002
GGR	Greenhouse Gas Removal
GHG	Greenhouse gas
HoC	House of Commons
HoL	House of Lords
HSE	Health & Safety Executive
ICCPR	International Covenant on Civil and Political Rights

ICERD	International Convention on the Elimination of All Forms of Racial Discrimination
ICESCR	International Covenant on Economic, Social and Cultural Rights
IEA	International environmental agreement
IPCC	Intergovernmental Panel on Climate Change
MEA	Multilateral environmental agreement
MtCO ₂ e	Metric tonnes of carbon dioxide equivalent
NDC	Nationally determined contributions
NSTA	North Sea Transition Authority
OEP	Office for Environmental Protection
PC	Project Coordinator
SAI	Stratospheric Aerosol Injection
SEA	Strategic Environmental Assessment
SEPA	Scottish Environment Protection Agency
SoS	Secretary of State
SRM	Solar Radiation Management
UDHR	Universal Declaration of Human Rights
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
WP	Work Package

Abstract

The objective of this study is to review the current state of the law and legal responses on climate engineering in the United Kingdom, as evidenced in policy, legislation, case law and regulation. It focuses on issues affecting and/or contributing to the protection of fundamental human rights, environmental law obligations and principles, and climate change targets under UK climate change law. The study sets out the extent to which these legal domains are capable of regulating climate engineering, before highlighting gaps and challenges in the existing legal frameworks.

A summary overview of the main findings and legal issues surrounding climate engineering in the UK is provided in section 3.1.3 of the TechEthos D4.2 Comparative analysis of national legal case studies. This report is primarily aimed at informing the UK government and UK policy makers regarding the regulatory challenges of climate engineering in the UK. Furthermore, it provides further background to readers to the specific UK context of the main points and key regulatory challenges identified in the comparative analysis to which this report is annexed.



1. Introduction

Climate engineering presents many significant legal issues that impact socio-economic equality and fundamental rights in the United Kingdom (UK). This study provides an overview of those legal issues and challenges.

This study analyses relevant laws and policies from the UK legal system in relation to climate engineering. For TechEthos project and this national legal case study, we have used the following definition for climate engineering:

Climate engineering (CE), also known as geoengineering, refers to “... the deliberate large-scale intervention in the Earth’s climate system, in order to moderate global warming.”¹

For more information about the TechEthos technology families and their innovation ecosystems, visit: <https://www.techethos.eu/resources/>

This **introduction** sets out the purpose of the UK legal case study, and describes the scope and limitations of the study, before providing a high-level overview of the UK legal system and current state of climate engineering in the UK. **Section II** of this study explores the existing and proposed laws and policies that specifically address climate engineering. **Section III** explores the legal implications of climate engineering in relation to specific legal domains, including human rights law, environmental law and climate change law. **Section IV** provides an overview of the gaps and challenges in relation to the regulation of climate engineering. **Section V** concludes the case study, followed by a reference list.

1.1 Purpose of the UK legal case study

The objective of this study is to review the current state of the law and legal responses on climate engineering in the UK, as evidenced in policy, legislation, case law and regulation. We prepared this study through desk research, using legal research and academic databases such as WestLaw UK.

Whilst there is no dedicated body of law addressed directly at climate engineering technologies, many existing legal frameworks, such as environmental laws, still apply and cover climate engineering activities, including the regulation of environmental damage resulting from them. Legal and policy discourse in the UK has mostly focused on the need for climate engineering to achieve climate law and policy targets, and a general recognition that such targets cannot be achieved without deploying climate engineering technologies. At the same time, there is a need for more research to increase the scientific knowledge base around the use of such technologies and mitigate potential risks of harm to the environment and human health.

This study is part of a series of national legal case studies prepared in the TechEthos project covering three technology families: climate engineering, neurotechnologies, and digital extended reality. A complementary report covers the international and European Union law dimensions of the three

¹ Shepherd, J., Caldeira, K., Cox, P., Haigh, J., Keith, D., Launder, B., & Mace, G. (2009) *Geoengineering the Climate: Science, Governance, and Uncertainty*. Available at: https://royalsociety.org/~media/royal_society_content/policy/publications/2009/8693.pdf.

technology families. The following table provides an overview of the nine country studies conducted as part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

Table 3: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Scope and Limitations

This study was prepared as part of the TechEthos project's work package on policy, legal and regulatory analysis. Therefore, the scope is demarcated by that project task's workplan. The legal issues related to climate engineering are too vast to be covered comprehensively in a study of this size. Therefore, this national legal case study seeks to provide a high-level overview of the legal implications of climate engineering in the UK, focusing on a pre-defined range of topics and legal frameworks with significant human rights and socio-economic impacts that are of high policy relevance, particularly in the European context.

The primary focus of the legal analysis in this case study is on UK-wide laws in relation to the regulation of climate engineering technologies. Where there are relevant differences between legal systems in the UK in relation to the regulation of climate engineering, such as between the laws of England and Wales, and Scotland, those differences are drawn out. This report takes into account the legal and policy developments in the UK in relation to climate engineering up to November 2022.

1.3 Overview of the UK legal system

Constitutional governance and devolution

The United Kingdom is a unitary State with devolved administrations in Scotland, Northern Ireland and Wales.² These administrations were established through Acts of Parliament and have powers passed to them from the UK Parliament. The UK system is typically described as asymmetrical, meaning that each devolved administration has a varying degree of powers. Those powers that are retained with the UK Parliament are described as reserved powers. There are three legal systems in the UK, with England and Wales falling under the same legal system, and separate legal systems for Scotland and Northern Ireland.³

The constitutional governance of the UK and its devolved administrations, rests on the principle of parliamentary sovereignty. This means that the UK Parliament is the supreme legal authority to make

² *United Kingdom / European Committee of the Regions*, [Online]. Available at: <https://portal.cor.europa.eu/divisionpowers/Pages/UK-intro.aspx>.

³ *Practical Law Environment* (2022) *Wales: devolution of environmental powers / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/8-501-7826?comp=pluk&transitionType=Default&contextData=\(sc.Default\)&OWSessionId=a8f8e0611c2e48aeb3608ff5489b2ff5&skipAnonymous=true&firstPage=true](https://uk.practicallaw.thomsonreuters.com/8-501-7826?comp=pluk&transitionType=Default&contextData=(sc.Default)&OWSessionId=a8f8e0611c2e48aeb3608ff5489b2ff5&skipAnonymous=true&firstPage=true).

and revoke laws.⁴ In principle, courts cannot overrule legislation and the Parliament cannot pass laws which cannot be changed by future Parliaments.⁵ The principle of parliamentary sovereignty also covers the devolved administrations, meaning that these administrations are established on the basis of Acts of Parliament, and that the UK Parliament can – in principle – also revoke these laws.

The UK Parliament comprises the House of Commons, which constitutes the lower chamber, and the House of Lords, as the upper chamber. Proposed law can be introduced by any Member of Parliament as a Bill, which each House of Parliament gets to debate and approve or reject. Approved Bills become law after receiving Royal Assent and are then known as Acts.⁶ In Scotland, the Scottish Government can present Bills to the Scottish Parliament. The Scottish Parliament is unicameral, and once a Bill is passed and it has received Royal Assent, it becomes an Act of the Scottish Parliament.⁷ The Northern Ireland Assembly is the devolved legislature for Northern Ireland. Bills passed by the Assembly and given Royal Assent become Acts of the Assembly.⁸ In Wales, Bills passed by the Senedd and given Royal Assent become Acts of the Senedd Cymru.⁹

UK legal system and sources of law

Unlike most other States, the UK does not have one self-contained Constitution which sets out governance principles, fundamental rights, and the rules of State. Instead, UK constitutional law comprises a variety of documents, including statutes, conventions, judicial decisions, and treaties.¹⁰

The UK is a common law jurisdiction, which means that the legal system is based on court precedent. This means that lower courts are bound by judicial decisions made by higher courts. In addition to judge-made law, sources of law in the UK include legislation (Acts adopted by the UK Parliament, or Parliaments of the devolved administrations), as well as international law and retained EU law.

⁴ *Parliamentary Sovereignty / UK Parliament*, [Online]. Available at: <https://www.parliament.uk/site-information/glossary/parliamentary-sovereignty/#:~:text=Parliamentary%20sovereignty%20is%20a%20principle,that%20future%20Parliament%20cannot%20change>.

⁵ Ibid.

⁶ Cabinet Office (2013) *Legislative process: taking a bill through Parliament / Gov.uk*, [Online]. Available at: <https://www.gov.uk/guidance/legislative-process-taking-a-bill-through-parliament#:~:text=Once%20a%20bill%20has%20been,introduced%20into%20Parliament%20by%20ministers>.

⁷ Scotland Act 1998, c. 46, s. 28; *Bills and Laws / The Scottish Parliament*, [Online]. Available at: <https://www.parliament.scot/bills-and-laws/about-bills/how-a-bill-becomes-an-act>.

⁸ Northern Ireland Act 1998, c. 47, s. 5; *Law Making in the Northern Ireland Assembly / Northern Ireland Assembly*, [Online]. Available at: <http://www.niassembly.gov.uk/assembly-business/legislation/bills-explained/>.

⁹ Government of Wales Act 2006, c. 32, s. 107; *Legislation / Welsh Parliament*, [Online]. Available at: <https://senedd.wales/senedd-business/legislation/>.

¹⁰ See, *Constitutional law – Overview / LexisPSL*, [Online]. Available at: [https://www.lexisnexis.com/uk/lexispsl/publiclaw/document/413479/5CYB-SMH1-DYY6-F311-00000-00/Constitutional law overview](https://www.lexisnexis.com/uk/lexispsl/publiclaw/document/413479/5CYB-SMH1-DYY6-F311-00000-00/Constitutional%20law%20overview); *What is the UK Constitution? / UCL The Constitution Unit*, [Online]. Available at: <https://www.ucl.ac.uk/constitution-unit/explainers/what-uk-constitution>.



UK judiciary & court structure

Courts and tribunals in the UK are responsible for the enforcement of laws. Scotland's judiciary is separate from the rest of the UK.¹¹ The table below provides a simplified overview of the structure of courts and tribunals in the UK:

Table 4: Overview of court structure in England and Wales, Northern Ireland, and Scotland

Type of court	England and Wales; and Northern Ireland ¹²	Scotland
Court of first instance	Magistrates' court (criminal) Crown Court (serious crimes) County Court (civil)	Justice of the Peace Courts (summary crimes only) Sheriff Courts (criminal and civil)
Appeals court	High Court Court of Appeal	Sheriff Appeal Court
Court of last instance	UK Supreme Court	The Court of Session (supreme civil court) The High Court of Justiciary (supreme criminal court)

International law in the UK

The UK is a signatory to a wide range of international laws and treaties. This includes international human rights law, international environmental law, and international climate law. As a dualist state, international law cannot be invoked in national courts unless it is transposed into national law. In relation to many international laws, the UK has legislated at the national level to transpose the provisions of international law into domestic law, such as the Human Rights Act 1998, which implements the European Convention of Human Rights (ECHR).¹³

European Union law: implications of the UK's withdrawal from the EU

Many areas of UK law are influenced by EU law. As a dualist state, many EU laws with indirect effect, such as Directives, have been transposed into domestic EU law. In 2016, the UK voted to leave the European Union. At the end of the transition period in December 2020, many EU laws were retained in

¹¹ Although some reserved tribunals are administered by HM Courts and Tribunal Service. See, *Other courts and tribunals / Scottish Courts and Tribunals*, [Online]. Available at: <https://www.scotcourts.gov.uk/the-courts/the-tribunals/other-courts-and-tribunals>.

¹² The Northern Irish court structure corresponds to that of England and Wales, although courts and tribunals are administered separately by the Judiciary Northern Ireland. See, *Court Sittings and Court Structure / Judiciary NI*, [Online]. Available at: <https://www.judiciaryni.uk/court-sittings-and-court-structure>; *Structure of the Courts & Tribunals system / Courts and Tribunals Judiciary*, [Online]. Available at: <https://www.judiciary.uk/about-the-judiciary/our-justice-system/court-structure/>.

¹³ Human Rights Act 1998, c. 42; European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950.

UK law by the European Union (Withdrawal) Act 2018.¹⁴ The Trade and Cooperation Agreement signed by the EU and the UK in 2020, recognises the right of both parties to regulate within their territories, including environmental regulation.¹⁵ As such, it is expected that UK law and EU law will gradually diverge.¹⁶ Furthermore, a recent Bill to revoke most of the retained EU law was introduced to the House of Commons in September 2022. The heavily contested Bill sets out that all retained EU law will be repealed by December 2023 unless it has been explicitly transposed into UK domestic law.¹⁷ The Bill has been criticised by various opponents, including the Welsh and Scottish governments,¹⁸ and may still be subject to further review.¹⁹

1.4 Current state of climate engineering in the UK

The UK Government generally refers to the terms greenhouse gas removal (GGR) and Solar Radiation Management (SRM) as technologies that “aim to counteract human-caused climate change by deliberate large-scale intervention in the Earth’s natural systems. They are sometimes referred to as ‘geo-engineering’ or ‘climate engineering’.”²⁰ GGR as a group of technologies includes Carbon Dioxide Removal (CDR), with GGR also referring to the possibility of removing other greenhouse gases.²¹

Since the 2019 amendment to the Climate Change Act 2008 reflecting the net-zero by 2050 target,²² the UK Government has taken various steps to investigate the role GGR technologies can play in meeting its climate targets. It has been estimated that the GGR sector will need to be scaled up to remove between 60 and 150 MtCO₂e by 2050 if the UK is to reach its net zero target by 2050.²³ The UK Government is therefore investing in various schemes with a focus on research, development and

¹⁴ European Union (Withdrawal) Act 2018, s. 2.

¹⁵ Trade and Cooperation Agreement between the United Kingdom of Great Britain and Northern Ireland, of the one part, and the European Union and the European Atomic Energy Community, of the other part, entry into force 1 May 2021, Treaty Series No.8 (2021) (TCA), article 123 (2).

¹⁶ Coxall M. and Souter K. (2021) *Environmental Law and Practice in the UK (England and Wales): Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=(sc.Default)&firstPage=true).

¹⁷ Department for Business, Energy & Industrial Strategy (2022) *The Retained EU Law (Revocation and Reform) Bill 2022 / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/news/the-retained-eu-law-revocation-and-reform-bill-2022>.

¹⁸ Moran S. (2022) “Unfettered authority”? *The Retained EU Law (Revocation and Reform) Bill in Wales / Welsh Parliament: Senedd Research*, [Online]. Available at: <https://research.senedd.wales/research-articles/unfettered-authority-the-retained-eu-law-revocation-and-reform-bill-in-wales/>.

¹⁹ O’Carroll L. (2022) ‘Sunak may deprioritise Rees-Mogg Brexit bill to switch off 2,400 EU laws’, *The Guardian*, 27 October 2022, [Online]. Available at: <https://www.theguardian.com/law/2022/oct/27/sunak-may-deprioritise-brexit-bill-to-switch-off-2400-eu-laws>.

²⁰ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government’s view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

²¹ Ibid.

²² The Climate Change Act 2008 (2050 Target Amendment) Order 2019, No. 1056, s. 2.

²³ Simon R., et al (2021) *Greenhouse gas removal methods and their potential UK deployment: A report published for the Department for Business, Energy and Industrial Strategy by Element Energy and the UK Centre for Ecology and Hydrology*. Element Energy and the UK Centre for Ecology & Hydrology, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026988/qgr-methods-potential-deployment.pdf, p. 76.



deployment, and wants to better understand the costs, feasibility, as well as environmental and societal impacts.²⁴

In its pursuit to develop an evidence base for GGR, the UK government has, for instance, supported the launch of an £8.6 million GGR research programme,²⁵ launched a £31.5 million programme to support GGR demonstrator projects over a 4.5 year period,²⁶ and committed £100 million through its Energy Innovation Programme to help decarbonise industry and includes the exploration of Carbon Capture Usage and Storage (CCUS) solutions.²⁷ Similarly, the Scottish Government established a £180 million Emerging Energy Technologies Fund (EETF) to support CCS, including CDR technologies in Scotland.²⁸ Co-funded by the UK Energy Innovation Programme, C-Capture and Drax successfully delivered Europe's first Bioenergy Carbon Capture and Storage (BECCS) pilot capturing the first CO₂ at a BECCS plant in North Yorkshire in February 2019.²⁹ Drax has since signed a deal with Mitsubishi Heavy Industries for world's largest deployment of negative emissions in power generation.³⁰

In addition to funding GGR research and pilots, the UK Government has been investigating policy options to support GGR deployment in the UK. In 2019, Vivid Economics published a report commissioned by the Government which sets out the policy opportunities and challenges surrounding GGR in the UK.³¹ Challenges include the cost and source of funding of GGR, defining accounting methodologies to quantify negative emissions, scientific uncertainty linked to the immaturity of most GGR technologies and associated cost of uncertainties, and policy interactions and coordination

²⁴ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

²⁵ Ibid.

²⁶ UKRI (2021), *UK invests over £30m in large-scale greenhouse gas removal* / UK Research and Innovation, [Online]. Available at: <https://www.ukri.org/news/uk-invests-over-30m-in-large-scale-greenhouse-gas-removal/>.

²⁷ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>; Department for Business, Energy & Industrial Strategy (2022) *Notice: Hydrogen BECCS Innovation Programme: successful projects* / Gov.uk, [Online]. Available at:

<https://www.gov.uk/government/publications/hydrogen-beccs-innovation-programme-successful-projects>.

²⁸ Cabinet Secretary for Net Zero, Energy and Transport, *Renewable and low carbon energy: Emerging Energy Technologies Fund* / Scottish Government, [Online]. Available at: <https://www.gov.scot/policies/renewable-and-low-carbon-energy/emerging-energy-technologies-fund/#:~:text=The%20EETF%20will%20provide%20capital,with%20our%20Hydrogen%20Policy%20State%20ment>.

²⁹ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>; Drax (2019) *Carbon dioxide now being captured in first of its kind BECCS pilot* / Drax [Online]. Available at:

https://www.drax.com/press_release/world-first-co2-beccs-ccus/.

³⁰ Drax (2021) *Drax and Mitsubishi Heavy Industries sign pioneering deal to deliver the world's largest carbon capture power project* / Drax [Online]. Available at: https://www.drax.com/press_release/drax-and-mitsubishi-heavy-industries-sign-pioneering-deal-to-deliver-the-worlds-largest-carbon-capture-power-project/.

³¹ Vivid Economics (2019) *Greenhouse Gas Removal (GGR) policy options – Final Report*. London: Vivid Economics, [Online]. Available at: <https://www.gov.uk/government/publications/greenhouse-gas-removal-policy-options>.

between different sectors and government departments.³² The report explores four policy pathways for encouraging GGR, setting out the strengths and weaknesses for each one. It suggests that the imposition of GGR obligations as a percentage of carbon content on wholesale suppliers of fossil fuels and agricultural products may be the preferred policy pathway given its effectiveness and certainty over carbon quantity as well as minimal distributional impacts.³³

The UK Government commissioned the National Infrastructure Commission (NIC) in 2020 to assess the role of GGR in delivering on the UK's climate targets and the policies required to encourage their take up.³⁴ The study focused on engineered greenhouse gas removals requiring economic infrastructure, including Direct Air Capture (DAC) and BECCS, as opposed to alternative methods, such as afforestation, peatland restoration, and enhanced marine weathering.³⁵ The study recognises the need for GGR technologies to offset emissions from sectors hard to decarbonise and predicts that GGR will become a major infrastructure sector in the UK over the next few decades.³⁶ The NIC makes eight actionable recommendations and encourages the UK Government to act quickly to help mobilise GGR activities in the UK and create the right policy incentives.³⁷

Element Energy and the UK Centre for Ecology & Hydrology published a report in October 2021 on behalf of BEIS on the analysis of the costs and deployment potential of GGR in the UK.³⁸ It found that significant uncertainty remains around the cost of GGR, required resources and potential timeline for GGR deployment, and that further research is needed to update evidence base for GGR.³⁹

The £31.5 million GGR demonstrators programme (GGR-D) funded by the UK Research and Innovation Fund (UKRI) started in April 2021 and runs until October 2025.⁴⁰ It will assess sustainable routes for the large-scale deployment of GGR technologies. The programme consists of five demonstrator projects which focus on biochar, enhanced rock weathering, peatland restoration, perennial biomass crops, and woodland creation and management.⁴¹ The programme is coordinated by CO2RE, the Greenhouse Gas Removal Hub, which conducts GGR research and evaluates economically, socially and environmentally scalable GGR solutions over the course of the GGR-D programme.⁴² The research focuses on the

³² Ibid, p. 4.

³³ Ibid, p. 5.

³⁴ *Greenhouse gas removal technologies / National Infrastructure Commission*, [Online]. Available at: <https://nic.org.uk/studies-reports/greenhouse-gas-removals/#:~:text=The%20UK%20government%20must%20commit,by%20the%20National%20Infrastructure%20Commission>.

³⁵ HM Treasury (2020) *Policy Paper: NIC Greenhouse Gas Removal Technologies Study: Terms of Reference / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/publications/national-infrastructure-strategy/nic-greenhouse-gas-removal-technologies-study-terms-of-reference>.

³⁶ *Engineered greenhouse gas removals: In brief / National Infrastructure Commission*, [Online]. Available at: <https://nic.org.uk/studies-reports/greenhouse-gas-removals/engineered-greenhouse-gas-removals/>.

³⁷ *Greenhouse gas removal technologies: Recommendations / National Infrastructure Commission*, [Online]. Available at: <https://nic.org.uk/studies-reports/greenhouse-gas-removals/#tab-recommendations>.

³⁸ Simon R., et al (2021) *Greenhouse gas removal methods and their potential UK deployment: A report published for the Department for Business, Energy and Industrial Strategy by Element Energy and the UK Centre for Ecology and Hydrology*. Element Energy and the UK Centre for Ecology & Hydrology, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026988/ggr-methods-potential-deployment.pdf.

³⁹ Ibid, p. v.

⁴⁰ *GGR Directorate CO2RE Hub / UK Research and Innovation*, [Online]. Available at: <https://gtr.ukri.org/projects?ref=NE%2FV013106%2F1#tabOverview>.

⁴¹ *The UK Greenhouse Gas Removal from the Atmosphere Research Programme / Greenhouse Gas Removal: Research Programme*, [Online]. Available at: <https://www.ggrprogramme.org.uk/>; *What we do / CO2RE The Greenhouse Gas Removal Hub*, [Online]. Available at: <https://co2re.org/what-we-do/>.

⁴² *What we do / CO2RE*, [Online]. Available at: <https://co2re.org/what-we-do/>.



environmental, economic, social, cultural, ethical, legal and governance issues of GGR, with a view to developing supportive policy options, an evaluation framework for scalable technologies, and linking GGR initiatives to enhance capacity within the UK and beyond.⁴³

Research coming out of the CO2RE group suggests that the legal nature of greenhouse gas (GHG) removals and the regulatory model adopted for GGR projects will have an influence on the cost and efficiency of GGR activities.⁴⁴ Creating a market for GHG removal units to be traded similarly to the market for emissions trading, and bundling GGR methods together to create fungibility, can help upscale the GGR sector and create positive policy outcomes.⁴⁵

⁴³ Ibid.

⁴⁴ Macinante J., Ghaleigh, N. S. (2022) 'Regulating Removals: Bundling to Achieve Fungibility in GGR 'Removal Units' *University of Edinburgh School of Law Research Paper Series, No 2022/05*, [Online]. Available at: <http://dx.doi.org/10.2139/ssrn.4064970>; the Royal Society and Royal Academy of Engineering (2018) *Greenhouse gas removal*. The Royal Society and the Royal Academy of Engineering, [Online]. Available at: https://royalsociety.org/topics-policy/projects/greenhouse-gas-removal/?utm_source=royalsociety.org&utm_medium=redirect&utm_campaign=greenhouse-gas-removal.

⁴⁵ Ibid.



2. Climate engineering-specific legal developments

This section presents an overview of the legal developments pertaining to climate engineering in the UK. It examines relevant policies and laws in relation to climate engineering and identifies the national authorities involved in the implementation and enforcement of such laws and policies.

UK policy on climate engineering

The UK Government published and regularly updates its position on greenhouse gas removal (GGR) technologies and solar radiation management (SRM) in a policy paper.⁴⁶ GGR refers to technologies aimed at, as the name says, removing greenhouse gases from the atmosphere, and include afforestation and reforestation, bioenergy with carbon capture and storage (BECCS), direct air capture (DAC) and marine fertilisation.⁴⁷ GGR is understood to be broader than carbon dioxide removal (CDR), in the sense that it includes the possibility of also removing other greenhouse gases.⁴⁸ The position paper is brief but clear regarding SRM, stating that the Government is not currently deploying and does not plan to deploy SRM.

The policy paper describes the Government's priority to "tackle the root cause of climate change by reducing emissions of greenhouse gases from human activities, and adapting to those impacts that are unavoidable."⁴⁹ It goes on to say that it recognises the role GGR will need to play in meeting the UK's net zero targets in order to meet its commitments under the 2015 Paris Agreement.⁵⁰ This position was informed by the Committee on Climate Change (CCC), which was established under the 2008 Climate Change Act to act as the government's independent advisor on climate change.⁵¹ The CCC advised that, on the basis of the UK's updated legal commitment to tackling climate change, GGR will be necessary to offset emissions from sectors where it will be difficult to reduce emissions.⁵²

The UK's position with regard to climate engineering has gained significance and urgency following the UK's legal commitment to achieving net-zero emissions by 2050.⁵³ In its Net Zero Strategy, the UK Government set out the ambition of deploying CCUS at scale in line with our ambition to capture up to 20-30 metric tonnes of carbon dioxide, per year, by 2030.⁵⁴ After all, the CCC advised the UK

⁴⁶ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

⁴⁷ Ibid.

⁴⁸ Ibid.

⁴⁹ Ibid.

⁵⁰ Ibid.

⁵¹ Climate Change Act 2008, s. 32.

⁵² Committee on Climate Change (2016) *UK climate action following the Paris Agreement*. Committee on Climate Change, [Online]. Available at: <https://www.theccc.org.uk/publication/uk-action-following-paris/>, p. 42.

⁵³ Climate Change Act 2008, s. 1 (1) as amended by the Climate Change Act 2008 (2050 Target Amendment) Order 2019 (S.I. 2019/1056), articles 1 and 2.

⁵⁴ Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at:

Government that GGR is not just an option, but a necessity.⁵⁵ Whilst UK policy now recognises the role climate engineering will have to play in helping to meet the UK's climate targets, details as to what that role will look like remain under development. This, however, creates an opportunity to develop a governance scheme for climate engineering technologies that builds on broad public support.⁵⁶

UK law on climate engineering

There is no comprehensive body of law that directly addresses climate engineering technologies in the UK. Nevertheless, there are a few laws directly concerned with specific climate engineering, or greenhouse gas removal technologies, as commonly referred to in the UK. Regulation of CCS is most developed, with the Energy Act 2008 providing a licensing regime for offshore storage of CO₂.⁵⁷ Together with The Storage of Carbon Dioxide (Licensing etc.) Regulations 2010,⁵⁸ the Act transposes the provisions from the EU Directive on the geological storage of CO₂ into UK law.⁵⁹ The North Sea Transition Authority (NSTA and formerly the Oil and Gas Authority) is the licensing authority for offshore CO₂ storage in the UK, except for Scotland's territorial sea, for which Scottish Ministers have the authority.⁶⁰ A 2011 amendment to the Act extended the licensing regime to onshore and adjacent internal waters in the UK.⁶¹ Unlicensed CCS activities are prohibited.⁶²

The Climate Change Act 2008 recognises that removals of greenhouse gases are part of the mix with regard to UK domestic action on climate change.⁶³ Yet the Act limits the definition of 'removals' to those achieved "due to land use, land use change or forestry activities in the United Kingdom."⁶⁴ Engineered technologies, such as BECCS, DAC, seem to be excluded from the Act, as opposed to 'natural' forms of greenhouse gas removal activities, such as afforestation and reforestation.

Large-scale afforestation is covered by the Environmental Impact Assessment Regulations.⁶⁵ Furthermore, the UK Government has supported the review of existing regulations by the Convention

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf, p. 21 and 126-128.

⁵⁵ Committee on Climate Change (2019) *Net Zero: The UK's contribution to stopping global warming*. Committee on Climate Change, [Online]. Available at: <https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/>, p. 23; Department for Business, Energy & Industrial Strategy (2022) *Energy Security Bill factsheet: Carbon dioxide transport and storage regulatory investment model / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-carbon-dioxide-transport-and-storage-regulatory-investment-model>.

⁵⁶ Lezaun J. et al (2021) 'Governing Carbon Dioxide Removal in the UK: Lessons Learned and Challenges Ahead' *Frontiers in Climate*, 3:673859, [Online]. DOI: 10.3389/fclim.2021.673859, p. 1.

⁵⁷ The Energy Act 2008; Department for Business, Energy & Industrial Strategy (published 2013, updated 2019) *Guidance: UK carbon capture, usage and storage / Gov.uk*, [Online]. Available at: <https://www.gov.uk/guidance/uk-carbon-capture-and-storage-government-funding-and-support#international-collaboration-on-ccus>.

⁵⁸ The Storage of Carbon Dioxide (Licensing etc.) Regulations 2010, No. 2221.

⁵⁹ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, (CCS Directive).

⁶⁰ Energy Act 2016, part 2, s. 78

⁶¹ The Storage of Carbon Dioxide (Amendment of the Energy Act 2008 etc.) Regulations 2011, s. 2.

⁶² Energy Act 2008, s. 2.

⁶³ Climate Change Act, s. 15 (2).

⁶⁴ Ibid, s. 29 (1) (b).

⁶⁵ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: [https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-](https://www.gov.uk/government/publications/geo-engineering-research-the-government-s)



on Biological Diversity (CBD) and contributed to work under the London Protocol on marine dumping within the context of GGR technologies and marine fertilisation.⁶⁶

Whilst there is no dedicated body of law that governs climate engineering technologies, many existing laws and legal frameworks would apply nonetheless if such activities were to be carried out. Section 3 explores how a number of legal frameworks would apply to climate engineering.

Proposals for dedicated law

The Energy Bill (previously Energy Security Bill) was introduced to the House of Lords (HoL) on 6 July 2022. At the time of writing, the bill was at the committee stage in the HoL.⁶⁷ The bill covers a wide range of energy-related topics and includes a provision about the licensing of CO₂ transport and storage.⁶⁸ The bill will establish a regulatory framework for CCUS and seeks to remove market barriers to attract private investment by providing:⁶⁹

- Financial assistance
- CO₂ transport and storage licencing framework
- Funded decommissioning programme and asset re-use
- Special administration regime
- Statutory transfer scheme

Furthermore, the bill proposes to amend the meaning of ‘removals’ under the Climate Change Act 2008 (see section 3.3.2 of this case study), to include ‘engineered’ removals, so that such removals will count towards carbon budgets within the meaning of the Climate Change Act 2008.⁷⁰

This bill is an interesting legal development regarding the regulatory regime for CCS, particularly in relation to transport and storage of carbon dioxide. It is a step by the UK government in the direction of creating a regulatory framework for climate engineering technologies and may serve as an example to other jurisdictions struggling with similar regulatory challenges. Furthermore, the financial support is a clear signal of the UK government that it wishes to attract private investment. The government recognises the need for such investment if it wants to create a CCS sector capable of capturing 20-30 metric tonnes of CO₂ a year, by 2030.⁷¹ Whilst an interesting legal development, it appears that the bill

[view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management](https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management); Town and Country Planning (Environmental Impact Assessment) Regulations 2017, No. 571.

⁶⁶ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

⁶⁷ House of Lords (2022) *Energy Bill [HL] / Parliamentary Bills UK Parliament*, [Online]. Available at: <https://bills.parliament.uk/bills/3311>.

⁶⁸ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022); House of Lords (2022) *Energy Bill [HL] / Parliamentary Bills UK Parliament*, [Online]. Available at: <https://bills.parliament.uk/bills/3311>.

⁶⁹ Department for Business, Energy & Industrial Strategy (2022) *Guidance: Energy Security Bill factsheet: Carbon dioxide transport and storage regulatory investment model*, [Online]. Available at: <https://www.gov.uk/government/publications/energy-security-bill-factsheets/energy-security-bill-factsheet-carbon-dioxide-transport-and-storage-regulatory-investment-model>.

⁷⁰ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022), s. 111.

⁷¹ Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf, p. 21 and 126-128.



has been put on hold by the new administration to prioritise emergency support for businesses in light of the energy crisis.⁷²

At the time of writing in November 2022 there are no proposals for dedicated law on other types of climate engineering technologies in the UK.

Responsibility for enforcement

The UK Government has wide-ranging responsibilities under international and national human rights law, environmental law and climate change law. Various Government departments are tasked with implementing such laws. Furthermore, various regulatory bodies have been established, often as independent regulators or advisory bodies, tasked with overseeing and enforcing the implementation of such laws, and regulating activities which are affected by or may impact such laws.

The Secretary of State for Business, Energy and Industrial Strategy (BEIS) is the Government department responsible for areas of business, industrial strategy, science, research and innovation, energy and clean growth, and climate change.⁷³ Furthermore, regulatory powers can be further delegated to regional and local authorities, such as in relation to planning.⁷⁴

Various executive agencies and arms-length organisations⁷⁵ are responsible for overseeing, regulating or implementing specific areas of policy. With respect to human rights, for instance, the Equality and Human Rights Commission is the statutory body established for the protection of human rights and has a set of enforcement powers.⁷⁶ The Commission acts as a centre of excellence and national contact point for human rights law issues.⁷⁷ In Scotland, the Scottish Human Rights Commission fulfils a similar role, and so does the Wales Committee for Wales.⁷⁸ In relation to the environment, the Environment Agency is the responsible agency in England.⁷⁹ In Scotland, the Scottish Environment Protection Agency (SEPA) fulfils a similar role and so does Natural Resources Wales for Wales.⁸⁰ Furthermore, the Health & Safety Executive is the responsible government agency for health, safety and welfare in connection with work, and control of dangerous substances and certain emissions into the atmosphere.⁸¹

Following the recent enactment of the Environment Act 2021, the Office for Environmental Protection (OEP) was established with the principal objective 'to contribute to environmental protection, and the

⁷² Pickard J. and Thomas N. (2022) 'UK energy security bill paused to prioritise support for business' *Financial Times*, 15 September 2022, [Online]. Available at: <https://www.ft.com/content/5abde541-3f5d-463e-8b10-683016d10a3b>.

⁷³ Department for Business, Energy and Industrial Strategy, *About us / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/organisations/department-for-business-energy-and-industrial-strategy/about>.

⁷⁴ Town and Country Planning Act 1990, c. 8, s. 1.

⁷⁵ An arm's length organisation refers to 'a specific category of central government public bodies that is administratively classified by the Cabinet Office', see: *Guidance: Cabinet Office (2022) Public bodies / Gov.uk*, [Online]. Available at: [https://www.gov.uk/guidance/public-bodies-reform#:~:text=An%20arm's%20length%20bodies%20\(%20ALBs,classified%20by%20the%20Cabinet%20Office](https://www.gov.uk/guidance/public-bodies-reform#:~:text=An%20arm's%20length%20bodies%20(%20ALBs,classified%20by%20the%20Cabinet%20Office).

⁷⁶ Equality Act 2006, c. 3, s. 1 and 20.

⁷⁷ *Who we are / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/about-us/who-we-are>.

⁷⁸ Equality Act 2006, c. 3, s. 7; *Wales Committee / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/amdanor-comisiwn-yng-nghymru/wales-committee>.

⁷⁹ Environment Act 1995, c. 25, s. 1.

⁸⁰ *Ibid*, s. 9-10 and 20.

⁸¹ Health and Safety at Work etc. Act 1974, c. 37.



improvement of the natural environment.⁸² The OEP has certain enforcement powers to hold the Government to account for failure to comply with environmental laws.⁸³

The Climate Change Act 2008 establishes the Committee on Climate Change (CCC) as advisory body on climate targets and carbon budgets.⁸⁴ Whilst not an enforcement body in the strict sense of the word, the UK Government is obliged to respond to the CCC's assessment of progress made towards achieving the climate target for 2050 and progress towards meeting interim carbon budgets.⁸⁵

The North Sea Transition Authority (NSTA, formerly known as the Oil and Gas Authority) is a private company owned by the Secretary of State for BEIS and regulates the UK oil, gas and carbon storage industries.⁸⁶ The NSTA regulates offshore CCS, and acts as the licensing authority for approving and issuing storage permits.⁸⁷

Finally, the UK judiciary is responsible for the enforcement of the laws that apply in the context of climate engineering. Alleged infringements of such laws will be adjudicated by the appropriate court or tribunal, depending on their specific scope and jurisdiction.

Significant legal cases

There is only a limited number of known legal cases specifically concerned with climate engineering activities in the UK. In 2021, the Court of Appeal, in the case of *R (ClientEarth) v Secretary of State for BEIS*, upheld a decision that the Secretary of State had not acted unlawfully by granting planning permission to Drax for the construction of two gas-fired generating units at an existing power station in North Yorkshire.⁸⁸ In its decision, the Court found that the Secretary of State had rightfully determined that the national need for carbon capture ready (CCR) fossil fuel generation outweighed the adverse environmental and climate change implications, such as associated GHG emissions.⁸⁹ Indeed, the Court found that the Secretary of State had acted in line with its Overarching National Policy Statement (NPS) for Energy (EN-1), which stated that the 'weight given to GHG emissions in a particular case was for the decision-maker to decide.'⁹⁰ This case illustrates the possible tensions between the reliance on fossil-fuel based power generation for energy security reasons, emission reduction targets and environmental protection objectives. A careful balance must be struck between seemingly competing objectives. It appears that, in this case, the fact that the gas-powered units were 'carbon

⁸² Environment Act 2021, c. 30, s. 23 (1).

⁸³ Ibid, s. 31 – 41.

⁸⁴ Climate Change Act 2008, c. 27, s. 32.

⁸⁵ Ibid, s. 36 and 37.

⁸⁶ *Our Mission Statement / North Sea Transition Authority*, [Online]. Available at:

<https://www.nstauthority.co.uk/about-us/our-mission-statement/>.

⁸⁷ Energy Act 2016, c. 20; *UK carbon dioxide storage / North Sea Transition Authority*, [Online]. Available at:

<https://www.nstauthority.co.uk/licensing-consents/carbon-storage/>.

⁸⁸ *R (ClientEarth) v Secretary of State for Business, Energy and Industrial Strategy* [2021] EWCA Civ 43 (21 January 2021); *Carbon capture and storage: UK policy and regulatory regime: Judicial review challenge to approval of Drax gas Turbines, CCR assessment / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/Document/Ib5556d5de83211e398db8b09b4f043e0/View/FullText.html?comp=pluk&ppcid=2ca3c9c81e9945599dcb0a664a362a76&originationContext=assetPage&transitionType=KnowHowItem&contextData=\(sc.Default\)&OWSessionId=7f4c8e4f2c614130bedbc67269c95eab&skipAnonymous=true&firstPage=true#co_anchor_a367822](https://uk.practicallaw.thomsonreuters.com/Document/Ib5556d5de83211e398db8b09b4f043e0/View/FullText.html?comp=pluk&ppcid=2ca3c9c81e9945599dcb0a664a362a76&originationContext=assetPage&transitionType=KnowHowItem&contextData=(sc.Default)&OWSessionId=7f4c8e4f2c614130bedbc67269c95eab&skipAnonymous=true&firstPage=true#co_anchor_a367822).

⁸⁹ Ibid.

⁹⁰ *Practical Law Environment* (2021) *Court of Appeal dismisses ClientEarth appeal concerning approval of Drax gas turbines / Thomson Reuters Practical Law*, [Online]. Available at:

[https://uk.practicallaw.thomsonreuters.com/w-029-3443?originationContext=document&transitionType=DocumentItem&contextData=\(sc.Default\)&ppcid=6404a5d594484947913a0f6843c82b18](https://uk.practicallaw.thomsonreuters.com/w-029-3443?originationContext=document&transitionType=DocumentItem&contextData=(sc.Default)&ppcid=6404a5d594484947913a0f6843c82b18).

capture ready' played a role in this balancing exercise. It is worth noting that the policy's lack of a requirement for a quantitative assessment, meant that the matter was indeed left to the judgment of the Secretary of State and that the Court was unable to adjudicate on the merits of that judgment.⁹¹

Similarly, the claimant in the recent case of *Friends of the Earth and others v the Secretary of State for BEIS* claimed that the Government's Net Zero Strategy lacked detail and ambition in light of the Climate Change Act 2008 and the Government's obligation to meet the sixth Carbon Budget.⁹² Interestingly, the Court acknowledged the CCC's criticism of the Government's Net Zero Strategy 'for failing to quantify the effect of each policy and proposal on emission reductions.'⁹³ The case also invoked human rights law in the context of demanding greater climate action, and is considered in more detail in section 3.1.2 of this report.⁹⁴ The human rights ground in the case was dismissed, illustrating that invoking human rights in the context of climate action is not a straightforward exercise.

Current debates and future policy and/or legal developments

The UK Government is implementing its Net Zero Strategy, including its ambition to develop a GGR sector capable of removing 20-30 MtCO₂ by 2030.⁹⁵ To achieve this ambition, the UK Government is investigating policy options to support GGR deployment in the UK.⁹⁶ Furthermore, various legal amendments have been proposed to remove barriers to GGR deployment, such as the HoL Energy Bill which seeks to clarify the definition of 'removals' under the Climate Change Act 2008.⁹⁷ Other significant policy and legal developments are identified throughout this case study.

⁹¹ *R (ClientEarth) v Secretary of State for Business, Energy and Industrial Strategy* [2021] EWCA Civ 43 (21 January 2021), para 96.

⁹² *R (on the application of Friends of the Earth, ClientEarth, Good Law Project and Joana Wheatley) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (18 July 2022), para. 261 (iii) and (iv); Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf.

⁹³ *R (on the application of Friends of the Earth, ClientEarth, Good Law Project and Joana Wheatley) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (18 July 2022), para. 215

⁹⁴ *Ibid*, ground 3, paras. 261-279.

⁹⁵ Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf, p. 21 and 126-128.

⁹⁶ See, Vivid Economics (2019) *Greenhouse Gas Removal (GGR) policy options – Final Report*. London: Vivid Economics, [Online]. Available at: <https://www.gov.uk/government/publications/greenhouse-gas-removal-policy-options>.

⁹⁷ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022), s. 111.



3. Domain-specific legal issues

There is only a limited number of UK laws that explicitly mention climate engineering technologies. Many existing legal frameworks would nonetheless apply to climate engineering and impact the manner in which such technologies may be deployed. This section examines the legal implications of climate engineering in the context of UK human rights law, environmental law, and climate change law.

3.1 UK human rights law

The UK human rights law framework lays down the fundamental rights and principles that apply in the UK. Furthermore, UK human rights law provides avenues for accessing justice for alleged human rights violations. Climate engineering has potential to affect human rights in different ways, both positively and negatively. This section examines the key sources of UK human rights law and considers how human rights law may be impacted by climate engineering.

3.1.1 Sources of human rights law

The UK endorsed the United Nations (UN) Universal Declaration of Human Rights (UDHR) in 1948,⁹⁸ and has since signed and ratified 7 core United Nations Human Rights Treaties:

- Convention against Torture and Other Cruel and Inhuman or Degrading Treatment or Punishment (CAT)⁹⁹
- International Covenant on Civil and Political Rights (ICCPR)¹⁰⁰
- Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)¹⁰¹
- International Convention on the Elimination of All Forms of Racial Discrimination (ICERD)¹⁰²
- International Covenant on Economic, Social and Cultural Rights (ICESCR)¹⁰³
- Convention on the Rights of the Child (CRC)¹⁰⁴
- Convention on the Rights of Persons with Disabilities (CRPD)¹⁰⁵

The UK does not have one single codified constitution. The Human Rights Act 1998 is the primary piece of human rights legislation in the UK. The UK was involved in the drafting of the ECHR and was one of

⁹⁸ Universal Declaration of Human Rights (8 December 1948), G.A. Res. 217(A) III.

⁹⁹ Convention against Torture and Other Cruel Inhuman or Degrading Treatment or Punishment (entered into force 26 June 1987), 1465 U.N.T.S. 85, signed by the UK on 15 March 1985, ratified on 8 December 1988.

¹⁰⁰ International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res. 2200A (XXI), signed by the UK on 16 September 1968, ratified on 20 May 1976.

¹⁰¹ Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13, signed by the UK on 22 July 1981, ratified on 7 April 1986.

¹⁰² International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD), signed by the UK on 11 October 1966, ratified on 7 March 1969.

¹⁰³ International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res. 2200A (XXI), 993 U.N.T.S. 3, signed by the UK on 16 September 1968, ratified on 20 May 1976.

¹⁰⁴ Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3, signed by the UK on 19 April 1990, ratified on 16 December 1991.

¹⁰⁵ Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106, signed by the UK on 30 March 2007, ratified on 8 June 2009.



the first to ratify the Convention in 1951.¹⁰⁶ The Human Rights Act is the UK's incorporation of the European Convention on Human Rights (ECHR) into domestic law.¹⁰⁷ The articles of the ECHR are referred to as 'the Convention Rights' and are contained in Schedule 1 of the Act.¹⁰⁸ The rights can be split between substantive rights (e.g. the right to life, right to private life) and procedural rights (e.g. the right to a fair trial). The Act means that individuals can seek justice in a British court for alleged human rights violations. The Act also means that public bodies are required by law to respect and protect human rights in carrying out public functions.¹⁰⁹ In general, Parliament will make laws that are compatible with the rights set out in the Act, although the principle of Parliamentary sovereignty means that it could in theory pass laws that are incompatible.¹¹⁰ Furthermore, Courts are required to interpret legislation insofar as possible in a way that is compatible with the Convention rights.¹¹¹

This means that, in relation to climate engineering, individuals have a right to legal recourse if they believe their human rights have been violated because of climate engineering activities. In regulating climate engineering, Parliament needs to ensure such regulation is compatible with the Convention rights and Courts would be required to interpret legislation in light of the Convention rights.

A Bill of Rights Bill was introduced to the House of Commons in June 2022, seeking to reform UK human rights law by repealing and replacing the Human Rights Act 1998.¹¹² The Bill was prompted by the UK Government's pledge in 2019 to "update the Human Rights Act and administrative law to ensure there is a proper balance between rights of individuals, our vital national security and effective government."¹¹³ The Bill was criticised by the Law Society, stating it would "damage the rule of law and make it harder for people to protect their rights."¹¹⁴ At the time of writing, Bill's legislative passage had been paused, as the new Government reassesses the way to deliver this agenda.¹¹⁵

Another noteworthy legal development in the context of human rights and climate engineering, is the Clean Air (Human Rights) Bill as introduced in the House of Lords on 19 May 2022.¹¹⁶ The Bill seeks to establish a right to breathe clean air, and was prompted by the death of a nine-year old due to air pollution-induced asthma.¹¹⁷ Whilst there is no explicit mention of climate engineering in the Bill, such

¹⁰⁶ Ministry of Justice (2022) *Collection: Human Rights: The UK's international human rights obligations / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/collections/human-rights-the-uks-international-human-rights-obligations#:~:text=The%20United%20Kingdom%20was%20one,1998%2C%202010%20and%202021%20respectively.>

¹⁰⁷ Human Rights Act 1998, introductory text.

¹⁰⁸ Ibid, s. 1, schedule 1 (1), (3).

¹⁰⁹ Ibid, s. 6 (1).

¹¹⁰ *The Human Rights Act / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/human-rights/human-rights-act>; Human Rights Act 1998, s. 19.

¹¹¹ Human Rights Act 1998, s. 3.

¹¹² *Bill of Rights Bill* [as introduced] (2022). Parliament: House of Commons. Bill no [117].

¹¹³ Conservative and Unionist Party (2019) *Get Brexit Done: Unleash Britain's Potential – The Conservative and Unionist Party Manifesto 2019*, [Online]. Available at: https://assets-global.website-files.com/5da42e2cae7ebd3f8bde353c/5dda924905da587992a064ba_Conervative%202019%20Manifesto.pdf, p. 48.

¹¹⁴ *Human Rights Act reforms and the Bill of Rights Bill / The Law Society*, [Online]. Available at: <https://www.lawsociety.org.uk/topics/human-rights/human-rights-act-reforms>.

¹¹⁵ Elgot J. (2022) *Liz Truss halts Dominic Raab's bill of rights plan / The Guardian*, [Online]. Available at: <https://www.theguardian.com/law/2022/sep/07/liz-truss-halts-dominic-raab-bill-of-rights-plan>; (2022) *Human Rights Act reforms and the Bill of Rights Bill / The Law Society*, [Online]. Available at: <https://www.lawsociety.org.uk/topics/human-rights/human-rights-act-reforms>.

¹¹⁶ *Clean Air (Human Rights) Bill* [as introduced] (2022). Parliament: House of Lords. Bill no 5.

¹¹⁷ Fuller G. (2022) *'Ella's law' bill seeks to establish right to clean air in the UK / The Guardian*, [Online]. Available at: <https://www.theguardian.com/environment/2022/may/20/ellas-law-bill-right-to-clean-air-uk-pollution-jenny-jones>.



activities may nonetheless be affected by the passing of this Bill. The inherent connection between air pollutants and greenhouse gases is worth noting, because these often originate from similar emission sources.¹¹⁸ This means that a measure targeting air pollution can have both synergistic and antagonistic effects on emissions of other pollutants. For example, a measure aimed at improving air quality, such as car-free days, may also result in a drop in CO₂ emissions originating from car traffic. The effect, however, may not automatically be synergistic, as traffic may simply be shifted elsewhere. As such, it is important to align air quality measures with climate change measures.

The following section examines the implications climate engineering may have on the existing human rights law framework in the UK. Whilst there is seemingly limited case law on environmental matters invoking the Human Rights Act 1998, the European Court of Human Rights (ECtHR) case law on such matters informs the way UK courts are to interpret the Convention rights,¹¹⁹ and is therefore referenced on various occasions in the following sections.

3.1.2 Human rights law implications of climate engineering

Climate engineering has the potential to affect various human rights, both positively and negatively. Ultimately, climate engineering seeks to mitigate global warming, thereby avoiding, or at least minimising, potentially catastrophic effects of climate change on the environment and livelihoods. In doing so, climate engineering may positively impact various human rights, by enhancing and protecting the right to life, the right to a healthy environment, the right to private life, and the right to property. On the other hand, climate engineering technologies by themselves may be associated with a risk of negatively affecting the environment and human health.

The ECHR and UK Human Rights Act do not explicitly provide for certain rights pertaining to the environment, such as the right to a healthy environment, food, water, and health. Nevertheless, the ECtHR has recognised these rights within the meaning of the existing Convention rights through the Court's case law.¹²⁰ Indeed, rights pertaining to the environment and quality of life, are often considered within the meaning of other Convention rights, including the right to life, the prohibition of inhuman or degrading treatment, the right to respect for private and family life, the right to freedom of expression, the right to an effective remedy, the protection of property.¹²¹ These rights have served the legal basis for a series of recent climate change-related case applications to the ECtHR.¹²² The position the ECtHR will take in these cases influences the ways in which human rights may be relied on in relation to climate

¹¹⁸ See, for instance, European Environment Agency (2011), 'Air pollution impacts from carbon capture and storage (CCS)' *European Environment Agency*, Technical Report No 14/2011, p.43. Available at: <https://www.eea.europa.eu/publications/carbon-capture-and-storage>, p. 13.

¹¹⁹ Human Rights Act 1998, s. 2 (1).

¹²⁰ See, *Human rights and health / Council of Europe*, [Online]. Available at: <https://www.coe.int/en/web/impact-convention-human-rights/human-rights-and-health#:~:text=Although%20there%20is%20no%20specific,being%20in%20many%20different%20circumstances>; ECtHR (2022) *Factsheet – Environment and the European Convention on Human Rights*. European Court of Human Rights, Press Unit, [Online]. Available at: https://www.echr.coe.int/documents/fs_environment_eng.pdf; European Court of Human Rights (2020) *Case of Hudorovič and Others v. Slovenia*, 10 March 2020, Nos. 24816/14 and 25140/14, CE:ECHR:2020:0310JUD002481614.

¹²¹ ECtHR (2022) *Guide to the case-law of the European Court of Human Rights: Environment*. Council of Europe/European Court of Human Rights, [Online]. Available at: https://echr.coe.int/Documents/Guide_Environment_ENG.pdf.

¹²² See, *Duarte Agostinho and Others v. Portugal and 32 Other States*, Relinquishment in favour of the Grand Chamber, 30 June 2022, No. 39371/20; *Verein KlimaSeniorinnen Schweiz and Others v. Switzerland*, Relinquishment in favour of the Grand Chamber, 29 April 2022, No. 53600/20; *Carême v. France*, Relinquishment in favour of the Grand Chamber, 7 June 2022, No. 7189/21.

change and climate engineering in a UK context. The right to life and the right to respect for private and family life in relation to climate engineering are considered in further detail below.

Substantive rights – The right to life

The Human Rights Act 1998 provides that “everyone’s right to life shall be protected by law.”¹²³ This means that no one is allowed to end someone’s life, that the Government has a positive obligation to take measures to protect the right to life, and that the Government must consider the right to life when making decisions that might affect life or life expectancy.¹²⁴ The right to life is considered an ‘absolute right’, meaning this right cannot be restricted under any circumstances.¹²⁵ The article itself provides for limited circumstances under which the deprivation of life is not to be regarded as inflicted, such as in self-defence from unlawful violence, to make a lawful arrest, to stop escape from lawful detainment, or to quell a riot or insurrection.¹²⁶

The ECtHR has interpreted the positive obligation of States to safeguard the right to life under article 2 of the Convention to apply to any activity, public or private, within its jurisdiction.¹²⁷ ECtHR case law also indicates that a States’ positive obligation to protect the right to life, extends to industrial activities considered dangerous by their very nature.¹²⁸ This arguably applies to climate engineering as well considering that the risks associated with these activities may include pollution, such as during the transportation of CO₂ or following a leak of stored CO₂ as part of CCS activities. This means that, in the context of climate engineering, the UK Government has an obligation to protect the right to life in its decision-making processes, such as when authorising, commissioning and overseeing climate engineering projects, whether these are publicly or privately funded activities. As such, the Government is obliged to prevent and mitigate climate engineering activities that may infringe the right to life.

The flipside to this, is that one could argue that by permitting and funding climate engineering activities, the UK Government is acting on its positive obligation to protect the right to life. Such a claim was made in the case of *Friends of the Earth and others v the Secretary of State for BEIS*, in which the claimant argued that the Government’s Net Zero Strategy lacked detail and ambition in light of the Climate Change Act 2008 and the Government’s obligation to meet the sixth Carbon Budget.¹²⁹ Drawing on parallels with

¹²³ Human Rights Act 1998, schedule 1, article 2.

¹²⁴ *Article 2: Right to life / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/human-rights-act/article-2-right-life>.

¹²⁵ *How are your rights protected? / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/what-are-human-rights/how-are-your-rights-protected>.

¹²⁶ Human Rights Act 1998, schedule 1, article 2 (2); *Article 2: Right to life / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/human-rights-act/article-2-right-life>.

¹²⁷ ECtHR (2022) *Guide on Article 2 of the European Convention on Human Rights: Right to life*. Council of Europe/European Court of Human Rights, [Online]. Available at: https://www.echr.coe.int/Documents/Guide_Art_2_ENG.pdf, p. 8.

¹²⁸ ECtHR (2022) *Guide to the case-law of the European Court of Human Rights: Environment*. Council of Europe/European Court of Human Rights, [Online]. Available at: https://echr.coe.int/Documents/Guide_Environment_ENG.pdf; *Case of Öneriyildiz v. Turkey*, 30 November 2004, No. 48939/99, ECLI:CE:ECHR:2004:1130JUD004893999, para. 71; *Case of Budayeva and Others v. Russia*, 20 March 2008, Nos. 15339/02, 21166/02, 20058/02, 11673/02 and 15343/02, ECLI:CE:ECHR:2008:0320JUD001533902, para. 130; *Case of Kolyadenko and Others v Russia*, 28 February 2012, Nos. 17423/05, 20534/05, 20678/05, 23263/05, 24283/05 and 35673/05, ECLI:CE:ECHR:2012:0228JUD001742305, para. 158; *Case of Brincat and Others v Malta*, 27 July 2014, Nos. 60908/11, 62110/11, 62129/11, 62312/11 and 62338/11, ECLI:CE:ECHR:2014:0724JUD006090811, para. 101.

¹²⁹ *R (on the application of Friends of the Earth, ClientEarth, Good Law Project and Joana Wheatley) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (18 July 2022), para. 261 (iii)

the human rights law basis in the Dutch *Urgenda* case,¹³⁰ the claimant invoked the UK Government's obligations "under articles 2, 8 and [Article 1 of Protocol 1] [of the Human Rights Act 1998] to take effective action against climate change because this represents a real and "imminent threat" to "life, quality of life and to property".¹³¹ The Court, however, rejected this ground, stating that the Court's obligation under the Human Rights Act to interpret legislation in a manner compatible with the Convention rights,¹³² only applies to the extent that the ordinary interpretation of the provisions concerned (in this case sections 13 and 14 of the Climate Change Act 2008) would be incompatible with the Convention rights.¹³³ This case illustrates that invoking human rights to demand climate action in itself is not self-evident, let alone to specifically mandate climate engineering activities that are beneficial to society and human life.

Substantive rights – The right to respect for private and family life

The right to respect for private and family life is explicitly protected by the Human Rights Act 1998.¹³⁴ ECtHR case law suggests that the scope of States' positive obligations in relation to this right largely overlap with those in relation to the protection of the right to life.¹³⁵ As such, so do the principles developed by the ECtHR in relation to planning and environmental matters.¹³⁶

Similar to the right to life, the State's objective to protect right to respect for private and family life extends to industrial activities considered dangerous by their nature and applies to both public and privately funded activities. In relation to climate engineering, it is the UK Government's obligation to consider the right to respect for private and family life when authorising and overseeing climate engineering activities. The risks associated with these activities may include pollution, such as during the transportation of CO₂ or following a leak of stored CO₂ as part of CCS activities. Whilst there are no current legal cases on CCS specifically, the ECtHR has found a violation of the right to respect for private and family life in the context of industrial pollution and the treatment of waste.¹³⁷ The principles

and (iv); Department for Business, Energy & Industrial Strategy (2021) *Net Zero Strategy: Build Back Greener*. HM Government, [Online]. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf.

¹³⁰ *In de zaak van De Staat der Nederlanden tegen Stichting Urgenda*, arrest, Hoge Raad, 20 december 2019, ECLI:NL:HR:2019:2006; for unofficial English translation see *The State of the Netherlands v Stichting Urgenda*, judgement, Supreme Court of the Netherlands, 20 December 2019, ECLI:NL:HR:2019:2007.

¹³¹ *R (on the application of Friends of the Earth, ClientEarth, Good Law Project and Joana Wheatley) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (18 July 2022), para. 261 (i).

¹³² Human Rights Act 1998, s. 3 (1).

¹³³ *R (on the application of Friends of the Earth, ClientEarth, Good Law Project and Joana Wheatley) v Secretary of State for Business, Energy and Industrial Strategy* [2022] EWHC 1841 (18 July 2022), para. 265.

¹³⁴ Human Rights Act 1998, schedule 1, article 8.

¹³⁵ *Case of Öneriyildiz v. Turkey*, 30 November 2004, No. 48939/99, ECLI:CE:ECHR:2004:1130JUD004893999, paras 90 and 160; ECtHR (2022) *Guide to the case-law of the European Court of Human Rights: Environment*. Council of Europe/European Court of Human Rights, [Online]. Available at:

https://echr.coe.int/Documents/Guide_Environment_ENG.pdf, p. 10.

¹³⁶ *Case of Budayeva and Others v. Russia*, 20 March 2008, Nos. 15339/02, 21166/02, 20058/02, 11673/02 and 15343/02, ECLI:CE:ECHR:2008:0320JUD001533902, para. 133; ECtHR (2022) *Guide to the case-law of the European Court of Human Rights: Environment*. Council of Europe/European Court of Human Rights, [Online]. Available at: https://echr.coe.int/Documents/Guide_Environment_ENG.pdf, p. 10.

¹³⁷ See, for instance, *Lopez Ostra v. Spain*, 9 December 1994, No.16798/90, ECLI:CE:ECHR:1994:1209JUD001679890; *Taskin and Others v. Turkey*, 10 November 2004, No. 46117/99, ECLI:CE:ECHR:2004:1110JUD004611799; *Fadeyeva v. Russia*, 9 June 2005, No. 55723/00, ECLI:CE:ECHR:2005:0609JUD005572300; *Giacomelli v. Italy*, 2 November 2006, No. 59909/00, ECLI:CE:ECHR:2006:1102JUD005990900. See also ECtHR (2022) *Factsheet – Environment and the European Convention on Human Rights*. European Court of Human Rights, Press Unit, [Online]. Available at: https://www.echr.coe.int/documents/fs_environment_eng.pdf.



developed through this case law may apply to climate engineering activities, for example when a leak in a CCS storage facility results in pollution of the local environment and air quality.

The right to respect for family and private life is particularly significant, as the threshold for determining infringement of this right has been established to be lower than the threshold for determining infringement of the right to life. The ECtHR case law suggests that the right to respect for private and family life can be violated when the *quality* of life is affected due to harm associated with industrial activities, without the need for life itself to be endangered.¹³⁸ This means that the UK Government, in meeting its positive obligations under the Human Rights Act 1998, would be expected to give due regard to the right to private and family life and the impact on the quality of life when authorising or overseeing climate engineering activities. This also means that individuals or communities whose quality of life is affected by climate engineering activities, would generally have a right of access to a legal remedy. This is considered further in more detail in the section below.

Procedural rights – The right to a fair and public hearing

Procedural human rights relate to rights of individuals during official processes and include rights such as the right to a fair and public hearing,¹³⁹ and the right to an effective remedy.¹⁴⁰ The Human Rights Act 1998 provides an avenue for individuals to seek an effective remedy in UK courts for alleged human rights violations. As such, the Act implements the right to an effective remedy as provided by the ECHR.¹⁴¹ The right to an effective remedy includes access to the ECtHR for alleged human rights violations if all domestic legal remedies have been exhausted.¹⁴²

The right to a fair and public hearing is enshrined in article 6 of schedule 1 of the Human Rights Act 1998.¹⁴³ This right not only refers to the right to a fair trial in relation to criminal proceedings but entitles all individuals to a fair and public hearing in relation to civil rights and obligations, and when a public authority is making a decision that has an impact on those rights.¹⁴⁴ The 'civil' limb of this article may be relied on in disputes over 'civil rights' which are recognised under domestic law.¹⁴⁵ So depending on the 'civil rights' provided by UK law, individuals have a right to a fair and public hearing in relation to alleged violations of those rights. For instance, UK law provides certain 'civil rights' relevant to climate engineering activities and the right to a fair trial, such as the right of local communities to be consulted with respect to development planning applications,¹⁴⁶ or to make representations in relation to

¹³⁸ See, for instance, *Fadeyeva v. Russia*, 9 June 2005, No. 55723/00, ECLI:CE:ECHR:2005:0609JUD005572300; *Factsheet – Environment and the European Convention on Human Rights*. European Court of Human Rights, Press Unit, [Online]. Available at: https://www.echr.coe.int/documents/fs_environment_eng.pdf, p. 14.

¹³⁹ Human Rights Act 1998, schedule 1, article 6.

¹⁴⁰ European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950, article 13.

¹⁴¹ *Ibid*; *The Human Rights Act / Equality and Human Rights Commission*, [Online]. Available at:

<https://www.equalityhumanrights.com/en/human-rights/human-rights-act#:~:text=Article%2013%20makes%20sure%20that,to%20make%20sure%20this%20happens.>

¹⁴² European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950, article 34.

¹⁴³ Human Rights Act 1998, schedule 1, article 6.

¹⁴⁴ *Ibid*, article 6 (1); *Article 6: Right to a fair trial / Equality and Human Rights Commission*, [Online]. Available at: <https://www.equalityhumanrights.com/en/human-rights-act/article-6-right-fair-trial#:~:text=Article%206%20protects%20your%20right,your%20civil%20rights%20or%20obligations..>

¹⁴⁵ *Guide to the case-law of the European Court of Human Rights: Environment*. Council of Europe/European Court of Human Rights, [Online]. Available at:

https://echr.coe.int/Documents/Guide_Environment_ENG.pdf, p. 17.

¹⁴⁶ Planning Act 2008, s. 47.



planning applications for major infrastructure projects.¹⁴⁷ Climate engineering activities will be subject to domestic regulation, such as planning regulation and other environmental regulation, considered in more detail in section 3.2. The right to a fair and public hearing under the Human Rights Act provides a legal remedy should such civil rights be violated in relation to climate engineering activities.

3.2 UK environmental law

UK environmental law is concerned with the protection of the environment and human health. Much of UK environmental regulation originated from the EU law.¹⁴⁸ The environmental regulatory regime in the UK covers a variety of areas, ranging from the Environmental Permitting Regime including pollution prevention and control, waste management and industrial emissions, to water, waste management, contaminated land, conservation and biodiversity, environmental impact assessments, and climate change.¹⁴⁹ Climate change is considered separately in section 3.3.

3.2.1 Sources of UK environmental law

International environmental law in the UK

UK environmental law comprises a variety of sources. International environmental law is an important source of UK environmental law, as the UK is a State Party to various international environmental agreements. As a dualist state, and in line with the principle of parliamentary supremacy, international environmental laws and principles generally require transposition into domestic law to have legal effect. The UK has signed and ratified the following International or Multinational Environmental Agreements (IEA/MEA) which are relevant in the context of climate engineering:

- Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (Basel Convention)¹⁵⁰
- Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention)¹⁵¹
- Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention)¹⁵²
- Convention on Biological Diversity (CBD)¹⁵³
- Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention)¹⁵⁴

¹⁴⁷ Ibid, s. 51 (1) (b).

¹⁴⁸ Coxall M. and Souter K. (2021) *Environmental Law and Practice in the UK (England and Wales): Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=(sc.Default)&firstPage=true).

¹⁴⁹ Ibid.

¹⁵⁰ Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (entered into force 5 May 1992) 1673 U.N.T.S 57 (Basel Convention), signed by the UK on 6 October 1989, ratified on 7 February 1994.

¹⁵¹ Convention for the Protection of the Marine Environment of the North-East Atlantic (entered into force 25 March 1997) 2354 U.N.T.S. 67 (OSPAR Convention), ratified by the UK on 15 July 1997.

¹⁵² Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (entered into force 30 October 2001) 2161 U.N.T.S. 447 (Aarhus Convention), signed by the UK on 25 June 1998, ratified on 23 February 2005.

¹⁵³ Convention on Biological Diversity (entered into force 29 December 1993) 1760 U.N.T.S. 79 (CBD), signed by the UK on 12 June 1992, ratified on 3 June 1994.

¹⁵⁴ Convention on Environmental Impact Assessment in a Transboundary Context (entered into force 10 September 1997) 1989 U.N.T.S. 309 (Espoo Convention), signed by the UK on 26 February 1991, ratified on 10 October 1997.



- Convention on Long-Range Transboundary Air Pollution (Geneva Convention)¹⁵⁵
- Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention) and the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (as amended in 2006) (London Protocol)¹⁵⁶
- Convention on the Transboundary Effects of Industrial Accidents (Helsinki Convention)¹⁵⁷
- Minamata Convention on Mercury (Minamata Convention)¹⁵⁸
- Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention)¹⁵⁹
- Stockholm Convention on Persistent Organic Pollutants (Stockholm Convention)¹⁶⁰

Many of these IEA/MEAs are legally binding, and the rules and principles of which have found their way into domestic environmental legislation in the UK. Furthermore, these international regimes influence policy and guidance on environmental matters, such as climate engineering. In 2007, for instance, OSPAR adopted a decision on the safe storage of CO₂ in geological formations, and a separate decision to prohibit the storage of CO₂ streams in the water column or seabed.¹⁶¹ It also issued guidelines for risk assessment and management of CO₂ storage.¹⁶² Furthermore, the UK ratified the article 6 amendment to the 1996 London Protocol, allowing the transboundary export of CO₂ for offshore geological storage.¹⁶³ Once the amendment enters into force, the 'placement of matter into the sea ... for marine geoengineering activities listed in annex 4...[will be permissible] under a permit.'¹⁶⁴ Furthermore, contracting parties are urged to adopt the precautionary approach into the consideration of these techniques.¹⁶⁵ Currently, ocean fertilisation is the only marine geoengineering activity listed in annex 4, although this may be updated in the future.¹⁶⁶

¹⁵⁵ Convention on Long-Range Transboundary Air Pollution (entered into force 16 March 1983) 1302 U.N.T.S. 217 (Geneva Convention), signed by the UK on 13 November 1979, ratified on 15 July 1982.

¹⁵⁶ Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (entered into force 30 August 1975) 1046 U.N.T.S. 120 (London Convention), ratified by the UK on 17 November 1975; 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (entered into force 24 March 2006) ATS 11 (London Protocol).

¹⁵⁷ Convention on the Transboundary Effects of Industrial Accidents (entered into force 19 April 2000) 2105 U.N.T.S. 457 (Helsinki Convention), signed by the UK on 18 March 1992, ratified on 5 August 2002.

¹⁵⁸ Minamata Convention on Mercury (entered into force 16 August 2017) 3202 U.N.T.S. C.N. 560.2014 (Minamata Convention), signed by the UK on 10 October 2013, ratified on 23 March 2018.

¹⁵⁹ Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (entered into force 24 February 2004) 2244 U.N.T.S. 337 (Rotterdam Convention), signed by the UK on 11 September 1998, ratified on 17 June 2004.

¹⁶⁰ Stockholm Convention on Persistent Organic Pollutants (entered into force 17 May 2004) 2256 U.N.T.S. 119 (Stockholm Convention), signed by the UK on 11 December 2001, ratified on 17 January 2005.

¹⁶¹ OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations (adopted 2007, Ostend); OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed (adopted 2007, Ostend).

¹⁶² OSPAR Commission (2007) *OSPAR Guidelines for Risk Assessment and Management of Storage of CO₂ Streams in Geological Formations* (Reference number: 07-12)

¹⁶³ Amendment to Article 6 of the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 (adopted on 30 October 2009, not yet entered into force).

¹⁶⁴ Ibid, article 6bis (1).

¹⁶⁵ IMO (2022) *Marine geoengineering techniques for climate change mitigation – LP/LC evaluates potential for marine environment effects* / International Maritime Organisation, [Online]. Available at: <https://www.imo.org/en/MediaCentre/PressBriefings/pages/Marine-geoengineering.aspx>.

¹⁶⁶ Eustice G. (2014) *Explanatory Memorandum on the Amendments to the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972 (London Protocol) to Regulate Marine Geoengineering*. Foreign & Commonwealth Office. Available at:

Retained EU environmental law

Much of UK environmental regulation originates from the EU law.¹⁶⁷ Closely related to the Espoo Convention, is the UK law on Environmental Impact Assessments (EIAs)¹⁶⁸ which was based on an EU Directive.¹⁶⁹ Following Brexit, most environmental laws were retained in UK law through the European Union (Withdrawal) Act 2018,¹⁷⁰ albeit with some amendments put in place to ensure their proper functioning after the Transition Period.¹⁷¹ The Trade and Cooperation Agreement between the EU and the UK recognises the right of both parties to regulate within their territories, including environmental regulation.¹⁷² As such, it is expected that UK law and EU law will gradually diverge.¹⁷³

Post-Brexit: The Environment Act 2021

In the context of the new regulatory environment post-Brexit, the UK Government passed the Environment Act 2021 in November 2021.¹⁷⁴ The Act makes provision about 'targets, plans and policies for improving the natural environment'¹⁷⁵ and covers areas such as air quality and emissions, nature and biodiversity, environmental improvement plans, waste and resource efficiency, water, conservation, and chemicals regulation. It also establishes an Office for Environmental Protection (OEP) whose function is to 'contribute to environmental protection, and the improvement of the natural environment.'¹⁷⁶

It is important to note that in Scotland, Wales and Northern Ireland, environmental regulation is a (partly) devolved power.¹⁷⁷ This means that not all provisions of the Environment Act 2021 apply in the

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/376395/EM_Misc_9.2014.pdf, p. 4.

¹⁶⁷ Coxall M. and Souter K. (2021) *Environmental Law and Practice in the UK (England and Wales): Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=(sc.Default)&firstPage=true).

¹⁶⁸ Town and Country Planning (Assessment of Environmental Effects) Regulations 1988, now replaced by the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, No. 571.

¹⁶⁹ Council Directive 85/337/EEC of 27 June 1985 on the assessment of the effects of certain public and private projects on the environment (OJ L175/40, 5.7.1985), repealed by Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment (OJ L124/1, 25.4.2014)

¹⁷⁰ European Union (Withdrawal) Act 2018, s. 2.

¹⁷¹ Coxall M. and Souter K. (2021) *Environmental Law and Practice in the UK (England and Wales): Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=(sc.Default)&firstPage=true). See, for instance, the European Union (Future Relationship) Act 2020, s 21; and the Trade and Cooperation Agreement between the United Kingdom of Great Britain and Northern Ireland, of the one part, and the European Union and the European Atomic Energy Community, of the other part, entry into force 1 May 2021, Treaty Series No.8 (2021) (TCA), article 391 on 'non-regression from levels of protection'.

¹⁷² Trade and Cooperation Agreement between the United Kingdom of Great Britain and Northern Ireland, of the one part, and the European Union and the European Atomic Energy Community, of the other part, entry into force 1 May 2021, Treaty Series No.8 (2021) (TCA), article 123 (2).

¹⁷³ Coxall M. and Souter K. (2021) *Environmental Law and Practice in the UK (England and Wales): Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/6-503-1654?transitionType=Default&contextData=(sc.Default)&firstPage=true).

¹⁷⁴ Environment Act 2021

¹⁷⁵ Ibid, introductory text.

¹⁷⁶ Ibid, s. 23 (1).

¹⁷⁷ See, Scotland Act 1998, s. 29 in conjunction with schedule 5; Government of Wales Act 2006, schedule 7A; Northern Ireland Act 1998, s. 6 in conjunction with schedule 3.



devolved administrations.¹⁷⁸ The Northern Ireland Assembly, however, passed the Environment (2021 Act) (Commencement and Saving Provision) Order (Northern Ireland) 2022 on February 2022, bringing the provisions of the Environment Act 2021 into Northern Irish law, and extending the remit of the OEP.¹⁷⁹

3.2.2 Environmental law implications of climate engineering

Climate engineering technologies involve a variety of activities that may impact the environment and human health. Currently there is still a lot of scientific uncertainty surrounding the risks of climate engineering activities in relation to the environment and human health. The risks associated with climate engineering, are also heavily dependent on the specific climate engineering technology or activity, and the methods, materials, and processes involved.¹⁸⁰

Climate engineering and the Net Biodiversity Gain

Climate engineering may be impacted by the Environment Act 2021 to the extent that it involves areas, substances or activities that fall within the scope and remit of the Act. An important change regarding planning law in England, for instance, is the requirement for Net Biodiversity Gain in relation to planning.¹⁸¹ This means that a net gain for biodiversity is now a condition for planning permission for new developments and nationally significant infrastructure projects.¹⁸² This may impact the feasibility and cost of the development of a BECCS plant, or other climate engineering programme that requires planning permission. On the other hand, however, it may be argued that climate engineering activities could contribute to the protection of biodiversity and conservation of nature. Quantifying actual gains and establishing a causal link between the climate engineering activity and the enhanced protection of biodiversity may not be straightforward. Furthermore, there does not seem to be a consensus as to whether additional biomass growth will positively or negatively impact biodiversity, suggesting that more research may be required.¹⁸³

Emissions and chemical substance regulation

Climate engineering technologies such as BECCS may have negative environmental implications, for example on land requirements and air quality. First, the biomass for BECCS must be grown somewhere, which may put pressure on the availability of land for other purposes, such as food production. Second,

¹⁷⁸ Reid, C. (2022) 'Environment Act 2021', *Scottish Planning and Environmental Law*, 209, 16-17, [Online]. Available at: <https://discovery.dundee.ac.uk/ws/portalfiles/portal/71696149/EnvironmentAct21dec.pdf>.

¹⁷⁹ Department of Agriculture, Environment and Rural Affairs (2022) *Assembly approves new environmental provisions for Northern Ireland* / Department of Agriculture, Environment and Rural Affairs, [Online]. Available at: <https://www.daera-ni.gov.uk/news/assembly-approves-new-environmental-provisions-northern-ireland>.

¹⁸⁰ See, the distinction between CDR and SRM activities more generally, and the characteristics of climate engineering techniques and technologies more specifically, at: *Climate Engineering / TechEthos*, [Online]. Available at: <https://www.techethos.eu/climate-engineering/>.

¹⁸¹ Environment Act 2021, part 6; Reid, C. (2022) 'Environment Act 2021', *Scottish Planning and Environmental Law*, 209, 16-17, [Online]. Available at: <https://discovery.dundee.ac.uk/ws/portalfiles/portal/71696149/EnvironmentAct21dec.pdf>, p. 17.

¹⁸² Reid, C. (2022) 'Environment Act 2021', *Scottish Planning and Environmental Law*, 209, 16-17, [Online]. Available at: <https://discovery.dundee.ac.uk/ws/portalfiles/portal/71696149/EnvironmentAct21dec.pdf>, p. 17.

¹⁸³ See, for example, Hof C. et al (2018) 'Bioenergy cropland expansion may offset positive effects of climate change mitigation for global vertebrate diversity', *PNAS*, 115 (52), [Online]. Available at: <https://doi.org/10.1073/pnas.1807745115>, p. 13294; in contrast with Donnison C. et al (2021) 'Land-use change from food to energy: meta-analysis unravels effects of bioenergy on biodiversity and cultural ecosystem services', *Environmental Research Letters*, 16 (11), [Online]. Available at: <https://doi.org/10.1088/1748-9326/ac22be>.

the biomass would need to be transported to the power generation and CCS plant. Currently, 65% of the UK biomass used for heat and power is imported.¹⁸⁴ Growing the bioenergy sector for the purpose of BECCS may increase emissions from importing additional biomass to the UK, which would add to the UK's emissions budget.¹⁸⁵ Once at the power plant, biomass is converted into bioenergy. During this process, the CO₂ released from the biomass is captured, transported, and stored at a storage site. Each different stage brings its own risks to the environment and regulatory challenges. CO₂ may accidentally be released during any of these stages, contributing to climate change. Furthermore, the high concentration of CO₂ in one place may pose a risk of harm to human health. Whilst this would not generally be an issue for an offshore storage site, a carbon leak at an onshore site may cause harmful effects to human health including asphyxiation by displacing oxygen.¹⁸⁶ There are no onshore storage sites in the UK, and current regulation restricts the storage of CO₂ to internal waters and offshore.¹⁸⁷ Nevertheless, research into the safe onshore storage of CO₂ has been conducted elsewhere and could inform future policy.¹⁸⁸

In the UK, CO₂ is classed as a 'substance hazardous to health' and workplace exposure is limited by regulation.¹⁸⁹ Whilst this concerns exposure at much higher concentrations, it is relevant to note existing regulation regarding CO₂ exposure and compare these to the risks associated with CO₂ capture, transportation and storage.

A British proposed CCS project, cancelled in 2015,¹⁹⁰ relied on technology using amine-based post-combustion CCS.¹⁹¹ Amine compounds, such as nitrosamines and nitramines are possible carcinogens. The environmental toxicity of individual compounds is not well understood.¹⁹² It is not clear whether chemicals are being used in ongoing CCS projects, such as the Drax CCS project.¹⁹³

SRM activities such as stratospheric aerosol injection (SAI), involve the use of certain chemicals to reflect sunlight back into space. Proposals range from using finely powdered salt and calcium carbonate, to sulphur dioxides.¹⁹⁴ The latter is a strictly regulated air pollutant, triggering air quality standards regulations to apply.¹⁹⁵ Indeed, sulphur dioxide emissions are associated with significant risks of harm

¹⁸⁴ Whitaker J., *Can we increase sustainable bioenergy production in the UK?* / UK Centre for Ecology & Hydrology, [Online]. Available at: <https://www.ceh.ac.uk/news-and-media/blogs/can-we-increase-sustainable-bioenergy-production-uk>.

¹⁸⁵ See section 3.3.1 on the Climate Change Act 2008 and carbon budgets.

¹⁸⁶ HSE, *General hazards of Carbon Dioxide / Health and Safety Executive*, [Online]. Available at: <https://www.hse.gov.uk/carboncapture/carbondioxide.htm>.

¹⁸⁷ The Storage of Carbon Dioxide (Amendment of the Energy Act 2008 etc.) Regulations 2011, No. 2453.

¹⁸⁸ See, for example, the ENOS project, funded by Horizon 2020 under grant agreement No. 653718. DOI: <https://doi.org/10.3030/653718>; *Enabling decarbonisation of the fossil fuel-based power sector and energy intensive industry / ENOS*, [Online]. Available at: <http://www.enos-project.eu/about/>.

¹⁸⁹ Control of Substances Hazardous to Health Regulations 2002 (COSHH), No. 2677.

¹⁹⁰ BBC (2017) 'UK government spent £100m on cancelled carbon capture project', *BBC News*, [Online]. Available at: <https://www.bbc.co.uk/news/uk-scotland-scotland-business-38687835>.

¹⁹¹ SEPA (2014) *Carbon Capture and Storage / Scottish Environment Protection Agency*, [Online]. Available at: <https://www.sepa.org.uk/regulations/climate-change/carbon-capture-and-storage/>.

¹⁹² Natural Scotland and SEPA (2015) *Review of amine emissions from carbon capture systems*. Version 2.01, Natural Scotland and Scottish Environment Protection Agency, [Online]. Available at: <https://www.sepa.org.uk/media/155585/review-of-amine-emissions-from-carbon-capture-systems.pdf>.

¹⁹³ Drax (2021) *Drax and Mitsubishi Heavy Industries sign pioneering deal to deliver the world's largest carbon capture power project / Drax*, [Online]. Available at: https://www.drax.com/press_release/drax-and-mitsubishi-heavy-industries-sign-pioneering-deal-to-deliver-the-worlds-largest-carbon-capture-power-project/.

¹⁹⁴ Geoengineering Monitor (2021) *Stratospheric Aerosol Injection (Technology Briefing) / Geoengineering Monitor*, [Online]. Available at: <https://www.geoengineeringmonitor.org/2021/02/stratospheric-aerosol-injection/>.

¹⁹⁵ The Air Quality Standards Regulation 2010, No. 1001.



to the environment,¹⁹⁶ which may have been a contributing factor to informing the Government's policy on SRM.

Developing criteria for the sustainable operation of climate engineering technologies, such as a whole life-cycle carbon assessment, would help take into account possible negative externalities or unforeseen environmental impacts. Whilst desirable, establishing such criteria would be a challenging exercise, given the often location- and context-specific risks and challenges associated with such technologies.¹⁹⁷

Waste regulation and CO2 storage

The UK waste framework regulation is another area of law influenced by international and EU law. As mentioned above in section 3.2.1, the UK is party to the OSPAR Convention on the Protection of the Marine Environment of the North-East Atlantic, and the London Protocol to the London Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter.¹⁹⁸ Waste regulation is particularly relevant in relation to storage of CO2 as part of CCS activities, as it may be argued that CO2 is essentially a waste gas that results from energy production.¹⁹⁹ The EU CCS Directive defines the purpose of CCS as the 'permanent containment of CO2'.²⁰⁰ Similarly, the UK's Energy Act 2008 considers the 'storage of carbon dioxide' to mean 'storage with a view to its permanent disposal, or as an interim measure prior to its permanent disposal'.²⁰¹

Correspondingly, 'waste', under EU and UK domestic law, is defined as 'any substance or object which the holder discards or intends or is required to discard'.²⁰² The London Protocol places a general prohibition on the dumping of wastes and other matter except for those materials listed in Annex 1.²⁰³ 'Dumping' means the 'deliberate disposal into the sea of wastes or other matter', as well as 'any storage of wastes or other matter in the seabed and the subsoil thereof'.²⁰⁴ Disposal of wastes or other matter is not considered 'dumping' if it is incidental, or it is placed or abandoned for a purpose other than mere disposal thereof.²⁰⁵ As such, the meaning of CO2 storage within the context of CCS is remarkably close to the definition of dumping, which would trigger a prohibition on the geological storage of CO2

¹⁹⁶ See, for instance, Department for Environment, Food & Rural Affairs (2022) *National Statistics: Emissions of air pollutants in the UK – Sulphur dioxide (SO2)* / Gov.uk, [Online]. Available at: <https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-sulphur-dioxide-so2#:~:text=SO2%20can%20also%20combine%20with,as%20forests%20and%20freshwater%20habitats.>

¹⁹⁷ Broad O., Butnar I. and Cronin J. (2021) *Can BECCS help us get to net zero?* / The Bartlett, UCL, [Online]. Available at: <https://www.ucl.ac.uk/bartlett/news/2021/jul/can-beccs-help-us-get-net-zero>.

¹⁹⁸ Convention for the Protection of the Marine Environment of the North-East Atlantic (entered into force 25 March 1997) 2354 U.N.T.S. 67 (OSPAR Convention), ratified by the UK on 15 July 1997; 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (entered into force 24 March 2006) ATS 11 (London Protocol).

¹⁹⁹ Sheridan P. (2009) *Carbon Capture and Storage – don't ignore the waste connections* / CMS Law-Now, [Online]. Available at: https://www.cms-lawnow.com/ealerts/2009/02/carbon-capture-and-storage-dont-ignore-the-waste-connections?cc_lang=en.

²⁰⁰ Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 on the geological storage of carbon dioxide and amending Council Directive 85/337/EEC, European Parliament and Council Directives 2000/60/EC, 2001/80/EC, 2004/35/EC, 2006/12/EC, 2008/1/EC and Regulation (EC) No 1013/2006, article 1 (2).

²⁰¹ Energy Act 2008, c. 32, s. 17 (2) (a).

²⁰² Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives (OJ L312/3, 22.11.2008); Environmental Protection Act 1990, c. 43, s. 75 (2).

²⁰³ 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (entered into force 24 March 2006) ATS 11 (London Protocol), article 4 (1) (1).

²⁰⁴ Ibid, article 1 (4) (1).

²⁰⁵ Ibid, article 1 (4) (2).

storage into the seabed. One could argue that CCS with Enhanced Oil Recovery (EOR) would mean that CO₂ is stored not merely for the purpose of its disposal, but also to extract oil from partially depleted reservoirs where the CO₂ would be stored.²⁰⁶ Whilst controversial, since it reinforces reliance on fossil fuels, it may facilitate the development of a CCS sector. In any case, an amendment to the 1996 London Protocol and a decision under the OSPAR Convention seek to remove the ambiguity of the status of CO₂ storage in the context of waste regulation.²⁰⁷ Once these amendments enter into force, the transboundary export of CO₂ for the safe offshore storage of CO₂ in geological formations will be allowed and classed as falling outside the waste regulations.²⁰⁸

These legislative changes clarify that the offshore geological storage of CO₂ should be considered as distinct from the ‘deliberate disposal into the sea of wastes’, or at least permissible within the general prohibition of marine dumping of waste.²⁰⁹ Nevertheless, the exact difference between ‘waste disposal’ and ‘CO₂ storage with a view to its permanent disposal’ remains ambiguous. Should the regulatory regime concerning CO₂ storage be ever expanded to include onshore storage for instance, the relation to waste regulatory frameworks would certainly need to be addressed. The EU CCS Directive, does seek to amend the EU’s waste framework by excluding CO₂ ‘captured and transported for the purposes of geological storage’ from the definition of waste and therefore from the scope of the waste framework.²¹⁰

Environmental procedure: access to information, public participation, and environmental justice

The Aarhus Convention stipulates the international rules and principles regarding access to information, public participation, and access to justice in environmental matters.²¹¹ While, the Aarhus Convention has not been transposed into UK domestic law word for word, many of its rules and principles have found their way into domestic UK law, partly through retained EU law.

For instance, the UK provides access to environmental information, covered under article 4 of the Aarhus Convention, through the Freedom of Information Act (FOIA) 2000.²¹² Public participation is covered by planning law, including the Town and Country Planning (Environmental Impact Assessment) Regulations 2017, the Planning Act 2008, and the Localism Act 2011. Planning applications for major infrastructure projects are regulated by the Planning Act 2008, as amended by the Marine and Coastal Access Act 2009, the Localism Act 2011, the Growth and Infrastructure Act 2013, the Infrastructure Act 2015, the Housing and Planning Act 2016 and the Wales Act 2017. Furthermore, the EU Regulation on

²⁰⁶ See, for instance, *CCS with CO₂-Enhanced Oil Recovery / SCCS*, [Online]. Available at: <https://www.sccs.org.uk/ccs-with-co2enhanced-oil-recovery>.

²⁰⁷ OSPAR Decision 2007/2 on the Storage of Carbon Dioxide Streams in Geological Formations (adopted 2007, Ostend); OSPAR Decision 2007/1 to Prohibit the Storage of Carbon Dioxide Streams in the Water Column or on the Sea-bed (adopted 2007, Ostend); Amendment to Article 6 of the 1996 Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and other Matter 1972 (adopted on 30 October 2009, not yet entered into force).

²⁰⁸ Ibid.

²⁰⁹ 1996 Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (entered into force 24 March 2006) ATS 11 (London Protocol), article 1 (4) (1).

²¹⁰ Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste (OJ L 114, 27.4.2006) as amended by Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 (OJ L 312/3, 22.11.2008) and Directive 2009/31/EC of the European Parliament and of the Council of 23 April 2009 (OJ L 140/114, 5.6.2009), article 2 (1) (a).

²¹¹ Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (entered into force 30 October 2001) 2161 U.N.T.S. 447 (Aarhus Convention), signed by the UK on 25 June 1998, ratified on 23 February 2005.

²¹² Freedom of Information Act 2000, s 1 (for England, Wales and Northern Ireland; see Freedom of Information (Scotland) Act 2002 (FOISA), s. 1 for Scotland).



trans-European energy infrastructure impacts the planning process for energy infrastructure, such as a (BE)CCS plant.²¹³

The public participation requirement is relevant in respect of specific developments, such as the planning application for a BECCS plant, and is generally part of the EIA process.²¹⁴ Furthermore, UK planning law allows individuals to make representations about major infrastructure projects.²¹⁵ Consultation, publicity and notification requirements provide opportunities for the general public to participate in the decision-making process, and the Secretary of State has a duty to inform the public on how the results from the consultation process have been incorporated or otherwise addressed.²¹⁶

Public participation is also required in relation to the development of plans, programmes and policies. Such participation generally occurs as part of a Strategic Environmental Assessment (SEA).²¹⁷ In designating national policy statements, the Secretary of State determines the requirements for consultation and publicity requirements as he or she deems appropriate.²¹⁸ The consultation procedure involves bringing 'relevant documents to the attention of the persons who, in the authority's opinion, are affected or likely to be affected by, or have an interest in the decisions involved in the assessment and adoption of the plan or programme concerned [...].'²¹⁹ With respect to climate engineering, however, it may not be straightforward to find out in advance who is likely to be affected the activities. Climate engineering may have an environmental effect on biodiversity, air, water, or soil quality. This effect may be wide ranging and include multiple communities, potentially not limited to the UK alone. It is unclear, how current public participation requirements are to be addressed effectively in respect of climate engineering plans and activities.

In any case, public participation is an important aspect of policy development and legislative processes and is considered essential for the protection of fundamental human rights in relation to the environment.²²⁰ Furthermore, public consultation promotes the rule of law, by helping scrutinise bills and ensure final laws are evidence-based, effective and coherent.²²¹ In line with the principles of the Aarhus Convention, FOIA and UK planning law provide mechanisms for appeal and access to justice in relation to environmental access to information and public participation.²²² As such, the Government would be expected to incorporate the principles of public participation and access to justice in its approach to regulating climate engineering.

²¹³ Regulation (EU) No 347/2013 of the European Parliament and of the Council of 17 April 2013 on guidelines for trans-European energy infrastructure and repealing Decision No 1364/2006/EC and amending Regulations (EC) No 713/2009, (EC) No 714/2009 and (EC) No 715/2009.

²¹⁴ Town and Country Planning (Environmental Impact Assessment) Regulations 2017, s. 4 (1) (b).

²¹⁵ Planning Act 2008, s. 51 (1) (b).

²¹⁶ Town and Country Planning (Environmental Impact Assessment) Regulations 2017, s. 30 (d) (iii).

²¹⁷ The Environmental Assessment of Plans and Programmes Regulations 2004, No. 1633, regulation 13.

²¹⁸ Planning Act 2008, part 2, s. 5 (4) and s. 7 (2) (3).

²¹⁹ The Environmental Assessment of Plans and Programmes Regulations 2004, No. 1633, regulation 13, (2) (b).

²²⁰ Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (entered into force 30 October 2001) 2161 U.N.T.S. 447 (Aarhus Convention), signed by the UK on 25 June 1998, ratified on 23 February 2005, preamble and article 1.

²²¹ Bingham Centre for the Rule of Law (2016) *Written evidence to the House of Lords Constitution Committee / Parliament.uk*, [Online]. Available at:

<http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/constitution-committee/legislative-process/written/41147.html>; Chapter 3: Consultation and pre-legislative scrutiny / *parliament.uk*, [Online]. Available at:

https://publications.parliament.uk/pa/ld201719/ldselect/ldconst/27/2706.htm#_idTextAnchor028.

²²² See, for example, Planning Act 2008, s. 118; Freedom of Information Act 2000, part V.



Liability for environmental damage

Civil and criminal liability for environmental damage is governed by the Environmental Damage (Prevention and Remediation) (England) Regulations 2015.²²³ The Regulations establish strict liability for environmental damage caused by regulated activities under EU law, as listed in Schedule 2.²²⁴ The Regulations also establish liability for damage caused by any activity not listed in Schedule 2, if the operator acted intentionally or negligently.²²⁵ Schedule 2 covers the operation of permitted installations, waste management operations, mining waste, discharges requiring authorisation, water abstraction and impoundment, dangerous substances, plant protection products and biocidal products, transport, genetically modified organisms and the transboundary shipment of waste.²²⁶

These regulations establish that an operator is liable for environmental damage caused by these listed activities, or by any other activity if the operator acted with intent or negligently. Obligations of operators are centred around the prevention and remediation of environmental damage.²²⁷ Failure to do so, can give rise to civil liability, as well as a warning, formal caution, or criminal prosecution, in line with standard criminal responses.²²⁸

These regulations essentially implement the ‘polluter-pays’ principle of international environmental law, which provides that those who cause environmental damage, should bear the costs for it.²²⁹ Climate engineering activities are not explicitly listed in Schedule 2 of the regulations. Nevertheless, certain climate engineering technologies may involve activities that fall within the meaning of those listed in Schedule 2. This might trigger the regulatory regimes of Schedule 2 to apply and establish a form of strict liability for failure to prevent or remediate environmental damage. CCS, for instance, involves the capturing transportation and storage of carbon dioxide, involving a risk of pollution at each stage of the process. Furthermore, the storage of CO₂ may trigger the application of waste regulations, and give rise to liability for failure to comply with them.

Moreover, operators of climate engineering technologies would be liable for intentionally or negligently causing environmental harm, regardless of whether the activity is listed in Schedule 2 or not.²³⁰ This imposes a general duty to prevent and remediate environmental damage in relation to climate engineering activities.

In practice, however, it may not be so easy to ascribe liability for a failure to prevent or remediate environmental harm caused by climate engineering activities. In some possible instances, it may be straightforward to establish liability for environmental harm caused by climate engineering activities. An example could be that the CCS operator is held responsible for local air or water pollution caused by a CO₂ storage leak. Other climate engineering activities, such as Stratospheric Aerosol Injection (SAI), may affect the climate at a global scale, and could have unforeseen negative consequences on different

²²³ Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (SI 2015/810)

²²⁴ Ibid, Regulation 5 (1) and (2).

²²⁵ Ibid.

²²⁶ Ibid, schedule 2.

²²⁷ Ibid, Part 2 and 3.

²²⁸ Environment Agency (2020) *Policy Paper: Environmental damage offences* / Gov.uk, [Online]. Available at: <https://www.gov.uk/government/publications/offence-response-options-environment-agency/environmental-damage-offences>.

²²⁹ See for instance (2022) *What is the polluter pays principle?* / The London School of Economics and Political Science, [Online]. Available at: <https://www.lse.ac.uk/granthaminstitute/explainers/what-is-the-polluter-pays-principle/#:~:text=The%20'polluter%20pays'%20principle%20is,human%20health%20or%20the%20environment.>

²³⁰ Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (SI 2015/810), Regulation 5 (2).



climates in a variety of places. It may be challenging to retrace the environmental harm back to the original and precise climate engineering activity or to establish and quantify its contributory factor.

Furthermore, the Regulations impose a duty on operators to take all practical steps to prevent environmental damage if the threat of environmental damage is 'imminent'.²³¹ The risk of environmental degradation caused by climate engineering may not always be considered imminent but may be a long-term risk. For example, some research suggests that bioenergy cropland expansion for the purpose of BECCS may negatively affect biodiversity based on possible scenarios for the year 2080.²³²

On top of that, the Regulations only apply to environmental damage or a risk of environmental damage that is *significant*.²³³ The use of certain chemicals by a single operator, such as sulphur dioxide for SAI or amine for CCS, may not be sufficient to constitute a significant risk of harm to the environment. The cumulative effect of the use of chemicals by all operators combined, however, may constitute a significant risk of harm to the environment, without triggering the liability regime for single operators.

For these reasons, it is recommended that an independent body is established or appointed, to regulate and oversee all climate engineering activities in the UK and monitor the overall impact of the sector on the environment. This way, the actual combined risk of climate engineering can be monitored and controlled. Furthermore, it is recommended that Schedule 2 of the Regulations is expanded to include climate engineering activities. This removes any ambiguity as to whether certain climate engineering activities fall within the meaning of Schedule 2 or not and establishes a strict liability regime for operators. Whilst allocating accountability may be challenging due to the difficulty of establishing causation, it would help clarify operators' responsibilities in relation to the prevention and remediation of environmental harm. As climate engineering is specifically aimed at "... the deliberate large-scale intervention in the Earth's climate system, in order to moderate global warming,"²³⁴ it is pertinent that such activities have a positive environmental impact and are aligned to wider sustainability objectives. Establishing a liability regime for failing to prevent or remediate environmental harm helps to ensure that climate engineering is deployed in a sustainable manner.

The flipside to this, is that certain nature-based climate engineering techniques enhance nature's ability to store harmful chemicals, such as carbon and mercury.²³⁵ Enhancing sinks, such as by peatland restoration currently being tested in the UK as part of the CO₂RE project,²³⁶ may have wider positive environmental impacts, which strengthens the mandate for exploring such techniques further. It is nonetheless important to consider an appropriate regulatory regime for minimising and remediating the negative environmental impacts of climate engineering.

²³¹ Ibid, Regulation 13.

²³² HoF C. et al (2018) 'Bioenergy cropland expansion may offset positive effects of climate change mitigation for global vertebrate diversity', *PNAS*, 115 (52), [Online]. Available at: <https://doi.org/10.1073/pnas.1807745115>, p. 13294.

²³³ Environmental Damage (Prevention and Remediation) (England) Regulations 2015 (SI 2015/810), Regulation 4, Schedule 1 and 3.

²³⁴ Shepherd, J., Caldeira, K., Cox, P., Haigh, J., Keith, D., Launder, B., & Mace, G. (2009) *Geoengineering the Climate: Science, Governance, and Uncertainty*. Available at: https://royalsociety.org/~media/royal_society_content/policy/publications/2009/8693.pdf.

²³⁵ See, for instance, Haynes K. M. et al (2017) 'Gaseous mercury fluxes in peatlands and the potential influence of climate change' *Atmospheric Environment*, 154, [Online]. Available at: <https://doi.org/10.1016/j.atmosenv.2017.01.049>.

²³⁶ *Why peatland restoration? / CO₂RE The Greenhouse Gas Removal Hub*, [Online]. Available at: <https://co2re.org/qqr-projects/peatland-restoration/>.



3.3 UK climate change law

UK climate change law refers to legislation concerned with the reduction of greenhouse gas emissions, emission trading schemes, and regulating the impacts and adaptation to climate change. In the UK, climate change law is comprised of and influenced by international climate law, retained EU law, and domestic climate change law. The UK Climate Change Act 2008 was the first of its kind worldwide to establish a comprehensive legal framework for reducing emissions and adapting to a changing climate.²³⁷ In 2019, the UK became the first major economy to legally commit itself to net-zero by 2050.²³⁸ The Scottish Government went even further, by committing to achieving net-zero by 2045, and declared a national climate emergency.²³⁹ This section explores the UK legal framework on climate change law in more detail and examines its implications on the development and deployment of climate engineering technologies.

3.3.1 Sources of UK climate change law

International climate law in the UK

The UK is party to the United Nations Framework Convention on Climate Change (UNFCCC), and adopted the Paris Agreement in 2016.²⁴⁰ In December 2020, the UK communicated its Nationally Determined Contributions (NDCs) within the meaning of article 4 of the Paris Agreement to the UNFCCC Secretariat, committing to a 68% reduction in GHG emissions by 2030.²⁴¹ Following COP26, held in Glasgow in 2021, the UK Government further detailed how it plans to achieve this reduction by 2030. At the COP27 in Sharm el-Sheikh in November 2022, the UK government reaffirmed its commitment to and progress towards meeting its emission reduction targets, and made a series of funding commitments to support climate mitigation and adaptation globally.²⁴²

²³⁷ OECD (2021) *In Practice: The United Kingdom's pioneering Climate Change Act / OECD*, [Online]. Available at: <https://www.oecd.org/climate-action/ipac/practices/the-united-kingdom-s-pioneering-climate-change-act-c08c3d7a/>.

²³⁸ Department for Business, Energy & Industrial Strategy and The RT Hon Chris Skidmore MP (2019) *News story: UK becomes first major economy to pass net zero emissions law / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/news/uk-becomes-first-major-economy-to-pass-net-zero-emissions-law>.

²³⁹ The Climate Change (Emissions Reduction Targets) (Scotland) Act 2019, s. A1 (1) and (2); Climate Change Secretary Roseanna Cunningham (2019), *The Global Climate Emergency – Scotland's Response: Climate Change Secretary Roseanna Cunningham's Statement to the Scottish Parliament on 14 May 2019 / Scottish Government*, [Online]. Available at: <https://www.gov.scot/publications/global-climate-emergency-scotlands-response-climate-change-secretary-roseanna-cunninghams-statement/>.

²⁴⁰ United Nations Framework Convention on Climate Change (entered into force 21 March 1994) 1771 U.N.T.S. 107, signed by the UK on 12 June 1992, ratified on 8 December 1993; Paris Agreement (entered into force 4 November 2016) 3156 U.N.T.S., signed by the UK on 22 April 2016, ratified on 18 November 2016.

²⁴¹ Department for Business, Energy & Industrial Strategy (2020) *United Kingdom of Great Britain and Northern Ireland's Nationally Determined Contribution*. UK Government, [Online]. Available at: <https://www.gov.uk/government/publications/the-uks-nationally-determined-contribution-communication-to-the-unfccc>.

²⁴² Coleman C. (2022) *COP27: Progress and outcomes / UK Parliament: House of Lords Library*, [Online]. Available at: <https://lordslibrary.parliament.uk/cop27-progress-and-outcomes/#heading-6>.



Retained EU climate law

Prior to Brexit, the UK was subject to EU climate law, including the EU's NDC of a 40% reduction in GHGs by 2030,²⁴³ and other laws and policies, such as the EU Emissions Trading System.²⁴⁴ Following the end of the Transition Period, the UK Government adopted the Climate and Energy (Revocation) (EU Exit) Regulations 2021, which revoked many EU climate and energy laws that no longer had practical application to the UK following its withdrawal from the EU.²⁴⁵ To replace the EU ETS, the UK established the UK ETS scheme, considered further in section 3.3.2.

Domestic climate law: the Climate Change Act 2008

The main piece of domestic climate law is the Climate Change Act, originally adopted in 2008, and amended in 2019 to reflect the UK's updated climate target.²⁴⁶ The Act is built around four pillars: (i) a goal, (ii) a pathway, (iii) a toolkit, and (iv) a monitoring framework.²⁴⁷

The goal is the legally binding emissions target to reduce greenhouse gas emissions by 2050. The original 2008 Act had set this goal at 80% reduction compared to 1990 levels based on the advice from the CCC.²⁴⁸ This goal was updated to 100% reduction, or 'net-zero' by 2050 following the 2019 amendment to the 2008 Climate Change Act.²⁴⁹ The revised target came about following the publication of the 2018 IPCC report and updated advice from the CCC.²⁵⁰

The pathway, as described by the Act, refers to legally-binding 'carbon budgets', or interim targets for reducing UK greenhouse gas emissions over five-year periods.²⁵¹ To date, the UK Government has set six carbon budgets in agreement with the Climate Change Committee, each budget covering a five-year

²⁴³ Rix O. and Priestley S. (2020) *EU policy and action on climate change / UK Parliament: House of Commons Library*, [Online]. Available at: <https://commonslibrary.parliament.uk/eu-policy-and-action-on-climate-change/>.

²⁴⁴ *EU Emissions Trading System (EU ETS) / European Commission: Climate Action*, [Online]. Available at: https://climate.ec.europa.eu/eu-action/eu-emissions-trading-system-eu-ets_en.

²⁴⁵ The Climate and Energy (Revocation) (EU Exit) Regulations 2021, SI 2021 No. 519.

²⁴⁶ Climate Change Act 2008; Climate Change Act 2008 (2050 Target Amendment) Order 2019 (S.I. 2019/1056).

²⁴⁷ CCC (2020), *CCC Insights Briefing 1: The UK Climate Change Act*. CCC, [Online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/10/CCC-Insights-Briefing-1-The-UK-Climate-Change-Act.pdf>.

²⁴⁸ Climate Change Act 2008, s. 1 (1); Turner A. (2008) *Letter: Advice on the long-term (2050) target for reducing UK greenhouse gas emissions*. CCC, [Online]. Available at: <https://www.theccc.org.uk/publication/letter-interim-advice-from-the-committee-on-climate-change/>.

²⁴⁹ Climate Change Act 2008, s. 4.

²⁵⁰ CCC (2020), *CCC Insights Briefing 1: The UK Climate Change Act*. CCC, [Online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/10/CCC-Insights-Briefing-1-The-UK-Climate-Change-Act.pdf>, p. 3; Climate Change Act 2008, s. 1 (1); Climate Change Act 2008 (2050 Target Amendment) Order 2019 (S.I. 2019/1056), articles 1 and 2.

²⁵¹ Wilkinson S. (2019) *The road to net zero / The Law Society: Gazette*, [Online]. Available at: <https://www.lawgazette.co.uk/legal-updates/the-road-to-net-zero/5101588.article>; IPCC (2018) *Global Warming of 1.5°C: An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Cambridge University Press, Cambridge, UK and New York, USA, [Online]. Available at: <https://doi.org/10.1017/9781009157940>; CCC (2020), *CCC Insights Briefing 1: The UK Climate Change Act*. CCC, [Online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/10/CCC-Insights-Briefing-1-The-UK-Climate-Change-Act.pdf>, p. 3.



period between 2008 and 2037.²⁵² Figure 1 below shows the UK's legally binding carbon budgets (CB) (six columns) against the UK's net annual GHG emissions to date.

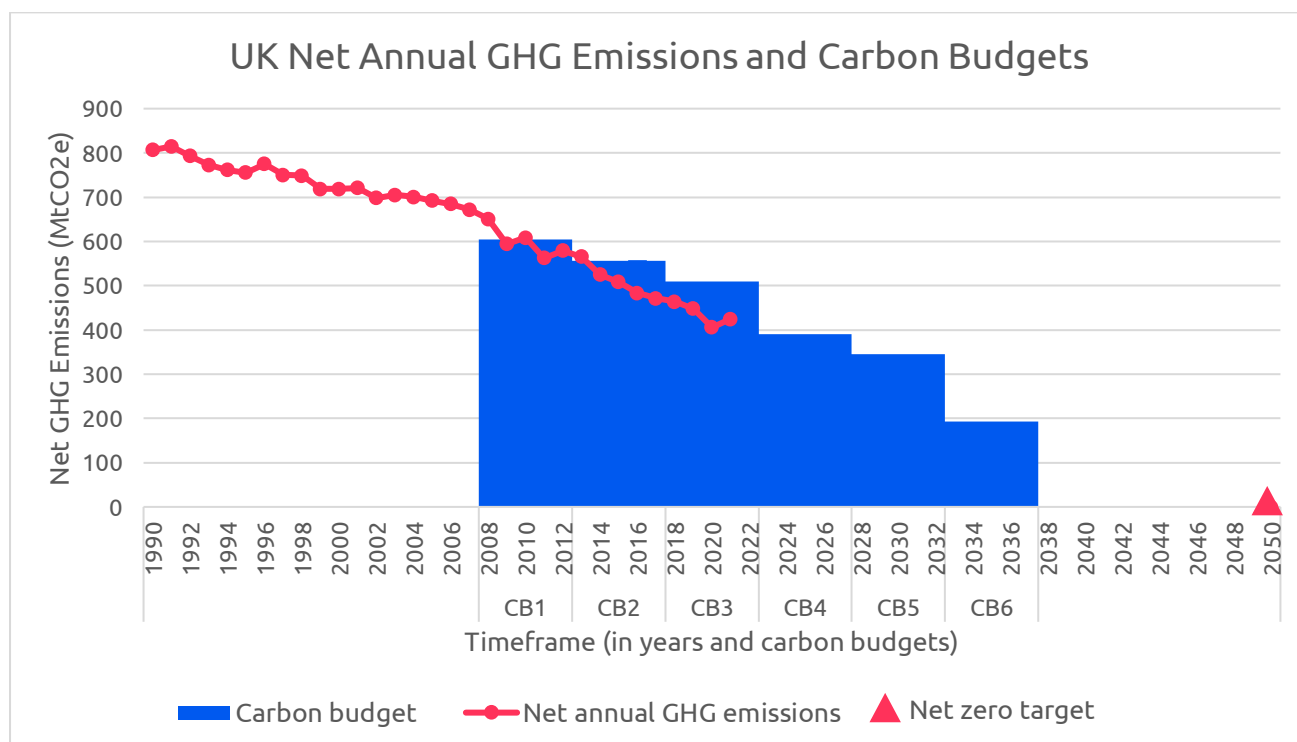


Figure 1: UK net annual GHG emissions and carbon budgets²⁵³

To deliver on this pathway, the Climate Change Act imposes a duty on the Secretary of State to prepare proposals and policies that enable the carbon budgets to be met.²⁵⁴ The Secretary of State must then present a report detailing its proposals and policies for meeting the carbon budgets to Parliament.²⁵⁵ Such proposals and policies are considered the part of the 'toolkit' pillar of the Climate Change Act.²⁵⁶

²⁵² See, Department for Business, Energy & Industrial Strategy (2016) *Carbon Budgets* / Gov.uk, last updated 13 July 2021, [Online]. Available at: <https://www.gov.uk/guidance/carbon-budgets#setting-of-the-fifth-carbon-budget-2028-2032>; The Carbon Budget Order 2009, SI 2009 No. 1259; The Climate Change Act 2008 (Credit Limit) Order 2011, SI 2011 No. 1602; The Climate Change Act 2008 (Credit Limit) Order 2016, SI 2016 No. 786; Carbon Budgets Order 2011, SI 2011 No. 1603; Carbon Budgets Order 2016, SI 2016 No. 785; Carbon Budget Order 2021, SI 2021 No. 750.

²⁵³ Adapted by the author from Department for Business, Energy & Industrial Strategy (2022) *National Statistics: Final UK greenhouse gas emissions national statistics: 1990 to 2020: 2020 UK greenhouse gas emissions: final figures – data tables (Excel)*. Gov.uk, [Online]. Available at: <https://www.gov.uk/government/statistics/final-uk-greenhouse-gas-emissions-national-statistics-1990-to-2020>; Department for Business, Energy & Industrial Strategy (2022) *2021 UK greenhouse gas emissions, provisional figures*. National Statistics, [Online]. Available at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1064923/2021-provisional-emissions-statistics-report.pdf.

²⁵⁴ Climate Change Act 2008, c. 27, s. 13.

²⁵⁵ Ibid, s. 14.

²⁵⁶ CCC (2020), *CCC Insights Briefing 1: The UK Climate Change Act*. CCC, [Online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/10/CCC-Insights-Briefing-1-The-UK-Climate-Change-Act.pdf>, p. 3.

The 2008 Act established the CCC as advisor to the Secretary of State on the 2050 target, carbon budgets, and on the inclusion of international aviation and shipping emissions in domestic emission sources calculations.²⁵⁷ Furthermore, the CCC is tasked with laying before Parliament a report on the progress made towards the 2050 target and meeting the carbon budgets.²⁵⁸ The CCC comprises two Committees, covering mitigation and adaptation. Members are experts and politically impartial, so that the CCC can provide independent and evidence-based advice to the Government.²⁵⁹ As such, the CCC fulfils the monitoring role under the Climate Change Act. Furthermore, the Government has an obligation to respond to the CCC's advice and assessment, which establishes an annual cycle of policy development.²⁶⁰

3.3.2 Climate change law implications of climate engineering

In its sixth carbon budget, the UK Government commits to reducing its net GHG emissions by 78% by 2035. For the first time, this carbon budget includes the UK's share of international aviation and shipping emissions.²⁶¹ In order to meet this target, the CCC recommends the UK Government takes the following four key steps:²⁶²

1. Take up low-carbon solutions
2. Expand low carbon energy supplies
3. Reduce demand for carbon-intensive activities
4. Invest in land and land use change, and greenhouse gas removals.

This is a clear indication by the CCC that greenhouse gas removals should be considered part of the mix of tools to take climate action. Furthermore, the Government's current policy reflects the CCC's view that GGR technologies will be essential to achieve the UK's climate targets.²⁶³ To date, options for GGR in the UK have mostly focused on BECCS, DACCS and wood in construction.²⁶⁴ Section 1.5 above highlighted various such projects currently underway in the UK.²⁶⁵ In addition, the CO2RE project is

²⁵⁷ Climate Change Act 2008, c. 27, s. 33-35.

²⁵⁸ Ibid, s. 36.

²⁵⁹ CCC (2020), *CCC Insights Briefing 1: The UK Climate Change Act*. CCC, [Online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/10/CCC-Insights-Briefing-1-The-UK-Climate-Change-Act.pdf>, p. 4.

²⁶⁰ Ibid.

²⁶¹ Department for Business, Energy & Industrial Strategy, Prime Minister's Office, 10 Downing Street, The Rt Hon Kwasi Kwarteng MP, The Rt Hon Alok Sharma MP, and The Rt Hon Boris Johnson MP (2021) *Press Release: UK enshrines new target in law to slash emissions by 78% by 2035* / Gov.uk, [Online]. Available at: <https://www.gov.uk/government/news/uk-enshrines-new-target-in-law-to-slash-emissions-by-78-by-2035>.

²⁶² CCC (2020) *Sixth Carbon Budget* / *Climate Change Committee*, [Online]. Available at: <https://www.theccc.org.uk/publication/sixth-carbon-budget/>.

²⁶³ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government's view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

²⁶⁴ CCC (2020) *The Sixth Carbon Budget: Greenhouse gas removals*. Climate Change Committee, [Online]. Available at: <https://www.theccc.org.uk/wp-content/uploads/2020/12/Sector-summary-GHG-removals.pdf>.

²⁶⁵ See, for instance, UKRI (2021), *UK invests over £30m in large-scale greenhouse gas removal* / UK Research and Innovation, [Online]. Available at: <https://www.ukri.org/news/uk-invests-over-30m-in-large-scale-greenhouse-gas-removal/>.



testing mostly nature based GGR technologies.²⁶⁶ SRM is not currently being considered by the Government.²⁶⁷

Whilst the policy direction is clear, certain legal challenges remain. As previously mentioned, the Climate Change Act limits the definition of ‘removals’ to those achieved “due to land use, land use change or forestry activities in the United Kingdom.”²⁶⁸ Engineered technologies, such as BECCS, DACCS, are seemingly excluded from the Act, in contrast to ‘natural’ forms of greenhouse gas removal activities. The Energy Bill, introduced to the HoL on 6 July 2022, proposes to amend the meaning of ‘removals’ to include ‘engineered’ removals, so that such removals will count towards carbon budgets within the meaning of the Climate Change Act 2008.²⁶⁹ A legal amendment like this would affirm the UK’s policy direction and clarify the legal status of removals achieved by climate engineering under the UK climate law regime.

This alludes to a more general legal uncertainty at the international climate law level, and the meaning of ‘removals’ within the context of the Paris Agreement. Article 4 of the Paris Agreement refers to achieving ‘a balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases...’.²⁷⁰ The Paris Agreement does not provide a definition of ‘sinks’, and it therefore remains unspecified whether ‘removals by sinks’ refers to nature-based sinks alone or may also include engineered sinks, such as BECCS or DACCS. Interestingly, the French version of the Paris Agreement refers to ‘...un équilibre entre les émissions anthropiques par les sources et les absorptions anthropiques...’, which translates to a balance between emissions from anthropogenic emissions by sources and anthropogenic sinks or removals.²⁷¹ Clarification of this legal ambiguity would be welcomed to provide greater certainty as to the legality of climate engineering technologies in the national and international context. After all, the IPCC climate mitigation pathways published in 2018 all rely on the assumption that climate engineering technologies will be deployed in order to limit global warming in line with the objective of the Paris Agreement.²⁷²

Furthermore, an important distinction must be made between different types of climate engineering techniques. Policy and legal developments should be developed to appropriately reflect and govern these different types. UK policy towards GGR is very different from SRM, with the UK Government investing in various GGR programmes and projects, whilst refraining from further exploring SRM.²⁷³ As such, it is important that the regulatory regime for climate engineering is developed in such a way that

²⁶⁶ GGR Projects / CO2RE: The Greenhouse Gas Removal Hub, [Online]. Available at: <https://co2re.org/ggr-projects/>.

²⁶⁷ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government’s view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

²⁶⁸ Climate Change Act, s. 29 (1) (b).

²⁶⁹ Energy Bill [HL], HL Bill 39 (as introduced on 6 July 2022), s. 111.

²⁷⁰ Paris Agreement (entered into force 4 November 2016) 3156 U.N.T.S., signed by the UK on 22 April 2016, ratified on 18 November 2016, article 4 (1).

²⁷¹ Accord De Paris (French language version of the Paris Agreement) (entered into force 4 November 2016) 3156 U.N.T.S., signed by the UK on 22 April 2016, ratified on 18 November 2016, article 4 (1).

²⁷² IPCC (2018) *Global Warming of 1.5 °C: An IPCC Special Report on the impacts of global warming of 1.5 °C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty*. Cambridge University Press, Cambridge, UK and New York, USA, [Online]. Available at: <https://doi.org/10.1017/9781009157940>, 4.1.

²⁷³ Department for Business, Energy & Industrial Strategy (published 2013, last updated 2020) *Policy paper: Geo-Engineering: the government’s view*. Department for Business, Energy & Industrial Strategy, [Online]. Available at: <https://www.gov.uk/government/publications/geo-engineering-research-the-government-s-view/uk-governments-view-on-greenhouse-gas-removal-technologies-and-solar-radiation-management>.

it recognises the various types of climate engineering technologies and appropriately governs them. This includes providing greater clarity regarding the legal status of ‘nature-based’ and ‘engineered’ GGR technologies, as well as the definition of ‘removals’ within the meaning of the Climate Change Act, and at the international climate law level.

A study conducted in 2020 highlights the importance of a strategic legal framework for action against climate change.²⁷⁴ Based on stakeholder interviews on the success of the UK Climate Change Act, most interviewees felt that the Act had established a firm long-term framework and a clear direction of travel.²⁷⁵ Furthermore, most of the respondents felt that the Act had helped inform UK climate policy and become more forward looking. Some also felt the Act helped increase policy certainty and protect against political backsliding.²⁷⁶ This research indicates that a regulatory framework, such as the UK Climate Change Act, can help increase policy certainty and protect a long-term commitment such as a climate target from short-term politics. Furthermore, such a framework can help increase long-term predictability, which is key for making investment decisions, particularly in the context of climate engineering. As such, the framework created by the Climate Change Act may serve as an example for future climate engineering regulatory frameworks, to increase policy certainty and long-term predictability. Legal amendments, such as proposed clarification in the Energy Bill of the definition of ‘removals’ within the meaning of the Climate Change Act, are important steps towards the development of a body of law that appropriately regulates climate engineering technologies. A UK Government report from 2010 suggested that the UN would ultimately be the appropriate body to provide the regulatory framework for climate engineering at the international level.²⁷⁷

The UK ETS and governing removals

The Climate Change Act also makes provision for GHG emission trading schemes.²⁷⁸ Following Brexit, the UK Emissions Trading Scheme (UK ETS) was established to replace the UK’s participation in the EU ETS.²⁷⁹ The cap-and-trade scheme applies to energy intensive industries, power generation sector and aviation.²⁸⁰ UK regulators set a cap on the total amount of carbon that can be emitted per sector. Businesses covered by the scheme receive free carbon allowances and can buy additional emission allowances at auction or trade with other scheme participants.²⁸¹ By putting a price on carbon emissions, the scheme creates a financial incentive to reduce emissions in these sectors.

In March 2022, the UK ETS Authority, which comprises the four UK Governments, launched a joint consultation on the further development of the UK ETS.²⁸² In the consultation document, the Authority

²⁷⁴ Averchenkova A., Fankhauser S., and Finnegan J. J. (2021) ‘The impact of strategic climate legislation: evidence from expert interviews on the UK Climate Change Act’ *Climate Policy*, 21 (2), [Online]. Available at: <https://doi.org/10.1080/14693062.2020.1819190>.

²⁷⁵ Ibid.

²⁷⁶ Ibid.

²⁷⁷ House of Commons Science and Technology Committee (2010) *The Regulation of Geoengineering: Fifth Report of Session 1009-10*. House of Commons, London, [Online]. Available at: <https://publications.parliament.uk/pa/cm200910/cmselect/cmsctech/221/221.pdf>.

²⁷⁸ Climate Change Act 2008, c. 27, s. 44.

²⁷⁹ The Greenhouse Gas Emissions Trading Scheme Order 2020, SI 2020 No. 1265.

²⁸⁰ Department for Business, Energy & Industrial Strategy (2022) *Guidance: Participating in the UK ETS / Gov.uk*, [Online]. Available at: <https://www.gov.uk/government/publications/participating-in-the-uk-ets/participating-in-the-uk-ets#who-the-uk-ets-applies-to>; Greenhouse Gas Emissions Trading Scheme Order 2020, SI 2020 No. 1265, schedule 1 and 2.

²⁸¹ Ibid.

²⁸² Department for Business, Energy & Industrial Strategy, Welsh Government, The Scottish Government, and Department of Agriculture, Environment and Rural Affairs (Northern Ireland) (2022) *Consultation outcome: Developing the UK Emissions Trading Scheme (UK ETS)*, [Online]. Available at: <https://www.gov.uk/government/consultations/developing-the-uk-emissions-trading-scheme-uk-ets>.



recognises that the UK ETS may, in time, become a market for GGR. At the same time, however, it recognises that the inclusion of GGR into the UK ETS market should not weaken the incentive to reduce emissions as a primary objective.²⁸³ Furthermore, challenges of additionality, double counting, the permanency of carbon removals, and effective monitoring, reporting and verification of emission reductions must be overcome before GGR technologies can reasonably be included in the UK ETS.²⁸⁴ Also, wider land management goals and impacts must be taken into consideration to create the right incentives for GGR methods and offer wider environmental benefits or land management goals, such as through nature-based GGR.²⁸⁵ Finally, future policies to include GGR in the UK ETS must give due consideration to the different types of GGR techniques and their current state of deployment, to support their deployment and ensure their proper functioning in the market.²⁸⁶

It has been suggested elsewhere that the legal and financial nature of carbon removal ‘units’ would need to be clarified for the creation of a market that includes carbon removals.²⁸⁷ Policy makers will need to determine how to scale up the GGR market, and whether or not to include social and environmental outcomes in the creation of regulatory incentives for GGR investments.²⁸⁸ For example, such outcomes could incorporate human rights, public participation and biodiversity considerations, to ensure climate engineering contributes to wider societal and environmental objectives than climate mitigation alone. In any case, removals generated by diverse GGR methods are likely to have different characteristics. It has therefore been proposed that characterising removal units as ‘property’ would help the development of a GGR market by providing a material benefit.²⁸⁹ Furthermore, the creation of standardised GGR removal units and the ‘bundling’ of GGR projects to create fungibility would contribute to the proper functioning of an ETS market that includes carbon removal units.²⁹⁰ Standardisation, particularly if achieved at the level of the International Standards Organisation (ISO), would open the door to international trading of GGR removal units.²⁹¹

²⁸³ UK ETS Authority (2022) *Developing the UK Emissions Trading Scheme (UK ETS): A joint consultation of the UK Government, the Scottish Government, the Welsh Government and the Department of Agriculture, Environment and Rural Affairs of Northern Ireland*. UK Government, Scottish Government, Welsh Government and the Department of Agriculture, Environment and Rural Affairs for Northern Ireland, [Online]. Available at:

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1067125/developing-the-uk-ets-english.pdf, p. 128.

²⁸⁴ Ibid.

²⁸⁵ Ibid, p. 129.

²⁸⁶ Ibid.

²⁸⁷ Macinante J. and Ghaleigh N. S. (2022) ‘Regulating Removals: Bundling to Achieve Fungibility in GGR ‘Removal Units’’, *University of Edinburgh School of Law Research Paper Series, No 2022/05*, [Online]. Available at: <https://dx.doi.org/10.2139/ssrn.4064970>.

²⁸⁸ Ibid, p. 27.

²⁸⁹ Ibid, p. 26.

²⁹⁰ Ibid, p. 27.

²⁹¹ Ibid, p. 28.

4. Overview of gaps and challenges

The UK is committed to deploying climate engineering to help meet its climate change targets. Existing legal frameworks, however, impact the manner in which climate engineering may be deployed. Certain legal gaps and challenges will need to be addressed to ensure UK regulation is adequately equipped to govern climate engineering. This section highlights the key gaps and challenges identified with respect to UK human rights law, environmental law and climate change law.

UK human rights law

- The UK human rights law framework incorporates various rights which may be affected by climate engineering activities. Victims of alleged human rights violations have access to legal recourse through the UK courts and tribunals, and ultimately also through the ECtHR. Furthermore, the Government has a positive obligation to protect human rights in exercising its duties and functions. In the context of climate engineering, this means that human rights must be given due regard, such as when approving planning permission for a CO₂ storage site. Furthermore, the threshold for triggering an interference with the right to respect for private and family life is seemingly lower than that for the right to life. The right to respect for private and family life can be interfered with when the *quality* of life is affected, as has seen in ECtHR case law concerning harm caused by industrial activities.
- Climate engineering seeks to prevent climate change, which in itself is likely to affect life and the quality of life of present and future generations on a global scale. As such, it may be argued that climate engineering can protect and enhance human rights. A UK recent case, however, illustrated that invoking human rights to demand greater climate action is not self-evident, let alone to mandate climate engineering.

UK Environmental law

- The UK environmental law framework is primarily concerned with the protection of today's environment and human health. Climate engineering is considered an 'essential' mitigation tool by the UK Government, and will have to play a key role in achieving the UK's climate targets. As such, climate engineering will be deployed to prevent future harm to the environment and human health caused by dangerous climate change. Furthermore, climate engineering is concerned with the prevention of global effects of climate change, whereas environmental regulation is primarily concerned with local impacts, such as on air quality, soil, water, waste and local communities. Finally, environmental principles tell us to take a precautionary approach to deploying technologies for which there is a limited scientific knowledge base. On the other hand, urgent climate action is needed, and climate engineering are considered essential if climate targets are to be achieved. As such, there is a tension between environmental law objectives and the need for climate engineering to help meet the UK's climate targets. This tension might need to involve amendments to environmental law to incorporate the future interests of the environment and human health.
- Climate engineering technologies may have negative environmental consequences, depending on the way they are deployed and operated. Furthermore, scientific uncertainty means that some risks to the environment and human health are not yet fully understood. Developing criteria for the sustainable operation of climate engineering, such as whole life-cycle assessments, would help assess these risks and account for possible negative externalities. Developing such criteria will not be a straightforward exercise, and must be able to account for the specific characteristics of various climate engineering technologies in different contexts.

- Greater clarity is needed regarding the scope and requirements for the Net Biodiversity Gain as introduced by the Environment Act 2021. Climate engineering technologies may have local and context-specific impacts on biodiversity and are likely to require a case-by-case assessment. Furthermore, impacts on biodiversity may differ between the short and long term. Scientific uncertainty means that measuring and quantifying actual gains, as well as establishing a causal link between the climate engineering activity and the impact on biodiversity may not be straightforward.
- It may be argued that CO₂ is essentially a waste gas that results from energy production. Whilst some legal amendments seek to clarify that CO₂ storage in offshore sites is compatible with international waste regulations, ambiguity concerning the difference between the permanent disposal of CO₂ at a storage site and the definition of waste remains. It is recommended that the relation between CO₂ storage and waste regulations is clarified, to provide greater certainty to operators of the applicable regulation to CCS activities, which would help normalise operations and encourage uptake.
- UK law makes provision for public participation in environmental decision making, is primarily focused on engagement with local communities. This, however, fails to incorporate communities which may be affected by the wide-ranging impacts of climate engineering. It is unclear how public participation principles can best be incorporated in respect of climate engineering. The Government would be expected to give public participation and access to justice due consideration in its approach to regulating climate engineering.
- Environmental Damage Regulations may fall short of adequately protecting against a possible negative cumulative effect of climate engineering activities in the UK. It is therefore recommended that an independent body is established or appointed, to regulate and oversee all climate engineering activities in the UK and monitor the cumulative impact of the sector on the environment. This body could also collaborate internationally to monitor climate engineering activities elsewhere. This way, the actual combined risk of climate engineering can be monitored and controlled.

UK Climate change law

- The UK Government has committed to growing a GGR sector to help meet its climate targets under the Climate Change Act. To clarify which climate engineering technologies are within the scope of the UK Government's commitment, it is recommended that the definition of GGR is clarified. This includes clarifying the legal status of nature-based approaches and 'engineered' technologies. As such, it is recommended that policy and legal developments are developed to appropriately reflect and govern these types of climate engineering techniques according to their distinct characteristics and associated risks.
- The definition and legal status of removals must also be clarified. The current proposed amendment to the Climate Change Act is a step towards clarifying legal status of removals achieved by climate engineering under the UK climate law regime. This could serve as an example on the international climate law level and the remaining ambiguity under the Paris Agreement as to the inclusion of 'engineered' removals within the meaning of article 4. Furthermore, standardisation would open the door to the future inclusion of removals in emission trading schemes.
- The strategic framework provided by the Climate Change Act allows for the inclusion of long-term and interim climate targets, as well as a cycle of policy development. Furthermore, the independent role of the CCC has been instrumental to informing the Government's view on climate engineering. As such, the framework provided by the Climate Change Act may serve as an example to further inform the regulatory regime related to climate engineering in the UK and beyond.
- Given the global impacts of climate engineering, international coordination, such as by the UN, is essential. There may be a need for a dedicated agreement at the regional or international level to

standardise the governance of climate engineering and carbon removals, and strengthen international collaboration to monitor environmental impacts. The UK could play an instrumental role in such an initiative.

5. Conclusion

This UK case study sets out the most prevalent legal and policy issues surrounding climate engineering in the UK. Whilst steering clear of SRM, the UK Government has set out in the direction of the large-scale deployment of GGR technologies. Ongoing policy and legal developments therefore make the UK case study an interesting one to continue to follow from an international perspective. The UK's environmental law framework will need to be adapted to become adequately equipped to regulate GGR technologies in the UK. Furthermore, the Government has an obligation to protect human rights as it develops a GGR sector. UK environmental law framework restricts climate engineering to the extent that it poses a risk to the environment and human health. Whilst climate engineering seeks to prevent future risk of harm to the environment caused by climate change, current environmental regulation is limited to the protection of today's environment and human health. Further research may be required to understand the role SRM might be able to play in the UK's commitment to tackling climate change. Such research will likely need to focus on whether SRM can be considered safe for the environment and human health, and whether it should be deployed at all. In contrast, further research into GGR technologies will likely need to focus on the ways these technologies can best be deployed and regulated to maximise their benefits and mitigate potential risks.

The tension between environmental law objectives and climate engineering for the purpose of meeting climate change targets, is not limited to the UK. It is likely that this tension will need to be addressed both at the national and international level. Furthermore, the UK Government will need to develop ways of incorporating public participation into climate engineering decision-making. International collaboration will be key to adequately monitor the impacts of climate engineering on a wider, if not global, scale. Whilst this cannot be achieved alone, the UK should take the lead and align its GGR commitments to other climate engineering initiatives elsewhere. The UK's Climate Change Act, and the role of the CCC as independent advisor, could inform the development of a regulatory regime of climate engineering in the UK and beyond.



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Annex 9.4 National Legal Case Study: Neurotechnologies in Germany



D4.2 Comparative analysis of national legal case studies

December 2022



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D4.2 National legal case studies: Annex 9.4 - Neurotechnologies in Germany

Work Package	WP4 Policy, legal and regulatory analysis		
Lead Partner	Trilateral Research (TRI)		
Lead Author(s)	Lisa Häberlein (EUREC)		
Other contributors	Julie Vinders, Ben Howkins (TRI)		
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Keywords

Neurotechnologies; Germany; brain computer interfaces; deep brain stimulation; functional magnetic resonance imaging; human rights law; privacy and data protection law; criminal law; civil law; evidence law.

The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Neurotechnology	Devices and procedures used to access, monitor, investigate, manipulate, and/or emulate the structure and function of the neural systems of natural persons. ¹

Table 2: List of Abbreviations

Term	Explanation
ABFTA	Ausschuss für Bildung, Forschung und Technikfolgenabschätzung
AGG	Allgemeines Gleichbehandlungsgesetz
AI	Artificial Intelligence
BCI	Brain Computer Interface
BDSG	Bundesdatenschutzgesetz
BGB	Bürgerliches Gesetzbuch
BGH	Bundesgerichtshof
BMBF	Bundesministerium für Bildung und Forschung
BVerfG	Bundesverfassungsgericht

¹ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

CHRB	Convention on Human Rights and Biomedicine
DBS	Deep brain stimulation
DFG	Deutsche Forschungsgemeinschaft
DS-GVO	Datenschutz-Grundverordnung
fMRI	Functional magnetic resonance imaging
MPG	Gesetz über Medizinprodukte
NKR	Nationaler Normenkontrollrat
StGB	Strafgesetzbuch
TAB	Büro zur Technikfolgenabschätzung
THS	Tiefe Hirnstimulation
Vzbv	Verbraucherzentrale Bundesverband
XR	Digital extended reality

Abstract

The objective of this study is to review the current state of the law on and legal responses to neurotechnologies in Germany, as evidenced in policy, legislation (including, where applicable, proposals to create new law or adapt existing law in response to neurotechnological developments), case law and regulation. It focuses on those issues affecting and/or contributing to fundamental human rights and freedoms, socio-economic inequalities, and stimulation of innovation within the domains of human rights law, privacy and data protection law, the use of neurotechnologies in criminal and civil legal proceedings, and liability for harms under tort, contract and criminal law. This sets out the extent to which these legal domains already regulate neurotechnologies, before highlighting the ongoing gaps and challenges in the existing legal frameworks.

A summary overview of the main findings and legal issues surrounding neurotechnologies in Germany is provided in Section 4.1.1 of the TechEthos Deliverable 4.2 summary comparative overview, to which this individual national legal case study report is annexed. In conjunction with the other national legal case studies on neurotechnologies and the other two technology families, namely climate engineering and digital extended reality (XR) technologies, this report provides the basis for the various neurotechnology-specific and cross-cutting regulatory challenges outlined in the summary comparative overview. This report is primarily aimed at informing relevant stakeholders, including German policymakers and regulators, of the main regulatory gaps and challenges applicable to neurotechnologies in Germany.



1. Introduction

Neurotechnologies present many significant legal issues that impact socio-economic equality and fundamental rights in Germany. This study provides an overview of those legal issues and challenges.

This study analyses relevant laws and policies from the German legal system in relation to neurotechnologies. There is no comprehensive or dedicated legislation in Germany governing this technology family, but many elements of existing laws and policies would apply to the use of such technologies. For the purpose of the TechEthos project and this national legal case study, we have used the following definition for neurotechnologies:

Neurotechnologies refers to devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons.²

The definition for this technology family is based on the TechEthos factsheets, as developed by work package 1 team members as part of the initial horizon scan.³ For more information about the TechEthos technology families and their innovation ecosystems, visit: <https://www.techethos.eu/resources/>.

1.1 Purpose of the German national legal case study

The objective of this study is to review the current state of the law on and legal responses to neurotechnologies in Germany, as evidenced in policy, legislation, case law and regulation. Since there is no specific neurolaw in Germany, this study highlights and explore those which laws could be specifically relevant to neurotechnological applications in Germany. For this purpose, current debates and future policy and legal developments are referred to. In addition, proposals for special neurotechnology laws and existing laws that are or could be relevant for emerging neurotechnologies in the future are mentioned. Exemplary domain-specific legal issues are described to reflect the breadth and depth of legal dimensions. These are primarily problem areas that may challenge the German legal system and mostly remain unanswered at present, e.g., questions about neurorights being discussed as a complement to existing law, neuroimaging, brain computer interfacing techniques, or deep brain stimulation. Consideration is given to human rights dimensions as well as to legislation at the European and German national levels, considering public law (academic freedom), civil law (data protection and informed consent) and criminal law (end of life decisions).

In addition to the reasons mentioned above, the selection of Germany as a national legal case study is intended to complement the other national legal case studies on neurotechnologies, specifically, and the other technology families, more generally. For the purposes of this deliverable, at least one common

² OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

³ TechEthos (2022) *Technology Factsheet: Climate Engineering / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Climate-Engineering_website.pdf; TechEthos (2022) *Technology Factsheet: Neurotechnologies / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Neurotechnologies_website.pdf; TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.



law jurisdiction and at least one civil law jurisdiction was selected for each of the three technology families, to ensure a full range of legal frameworks would inform the comparative analysis. As an extensive study of EU law (and international law) in relation to the three technology families has been conducted for Deliverable 4.1, it was decided that it would be beneficial to represent both EU and non-EU jurisdictions in the national legal case studies, in order to explore both how EU law is operationalised at a national level, as well as how non-EU frameworks differ from the approaches of EU Member States.

This study was prepared through desk research, using legal academic literature and legislation tracker databases, such as... It is part of a series of national legal case studies prepared in the TechEthos project covering three technology families, namely: climate engineering, neurotechnologies, and digital extended reality (XR). A complementary report covers the international and European Union law dimensions of the three technology families (D4.1 of the TechEthos project).⁴ The following table provides an overview of the nine country studies conducted as part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

Table 3: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Structure of the case study

Section II explores the existing and proposed laws and policies in Germany that specifically address neurotechnologies. **Section III** explores the legal implications of neurotechnologies in relation to selected legal domains. **Section IV** provides an overview of the gaps and challenges in relation to the regulation of neurotechnologies. **Section V** concludes the case study, followed by a reference list at the end.

1.3 Scope and Limitations

This national legal case study was prepared as part of TechEthos Work Package 4 on policy, legal and regulatory analysis of the three identified families of technologies, namely climate engineering technologies, neurotechnologies and digital extended reality (XR) technologies. The following results are based on desk research and do not represent a comprehensive analysis of all possible legal issues pertaining to neurotechnologies. Rather, this study focuses on a set of pre-defined issues which are likely to have a high socio-economic impact. As the legal situation regarding the use of neurotechnologies in Germany is still in its early stages, international academic publications as well as the voices of researchers from German-speaking countries and the current public discourse were considered with the attempt to relate ongoing debates to existing law and to describe possible scenarios. The domain-specific legal issues described herein therefore have an exemplary character.

⁴ Santiago, N., et al. (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.

1.4 Overview of the German legal system

The legal system in Germany is divided into civil law and public law, whereby civil law regulates the legal relations of individual citizens to each other and has as its core in the **German Civil Code** (in German "Bürgerliches Gesetzbuch", BGB), which contains regulations for everyday life, for example for guardianship.⁵ In contrast, public law regulates the relationship of the individual to the public authority and the relationship of the public powers to each other. Public law includes, for example, criminal and procedural law as well as constitutional law and international law. The law system is founded on the principles laid out by the **Basic Law** (in German "Grundgesetz"), the constitution of the Federal Republic of Germany.⁶ The articles of the Basic Law stand above all other German legal norms and determine the fundamental state system and value decisions. It is made up of the national, **federal government** (in German "Bund") and the 16 **regional states** (in German "Länder"). The powers and functions of the federal government and the regional states are strongly separated.⁷ For further information on the German legal system see the report developed by the SATORI project.⁸ Both have their own executive, legislative and judiciary branches with several instances within each of the five independent branches of court, which are distinguished by the terms "**ordinary jurisdiction**" (in German "ordentliche Gerichtsbarkeit") and "**special jurisdiction**" (in German "besondere Gerichtsbarkeit"). The ordinary jurisdiction comprises the civil and criminal courts, while the special jurisdiction includes administrative courts, labour courts, social courts and finance courts.⁹

Federal legislative power

Federal legislative power is divided between the **German parliament** (in German "Bundestag"), which is directly elected by the German citizens and the **German federal council** (in German "Bundesrat") which represents the governments of the 16 regional states. Thus, in Germany's federal system, the regional states hold a considerable share of the powers of the state and are also involved in the legislative process. Generally, the parliament has more influence than the federal council and is the most important body pertaining to the adoption of a new law or the amendment of existing law. However, the agreement of the federal council in the legislative process is often required, since federal legislation frequently has to be executed by state or local agencies. The deputies and parliamentary groups of the parliament can introduce new legal proposals or amendments as drafts.¹⁰ Here the debate, consultation and vote on the bill takes place after a fixed procedure. The federal council gets all the laws to vote and can even reject a draft depending on the nature of the law. The **Mediation Committee** is a body that acts between the parliament and the federal council. If the consent of the parliament is required for a law, the parliament and the federal government may also request the convening of the Mediation Committee to reach an agreement.¹¹ The **Federal Court of Justice** (in

⁵ Bürgerliches Gesetzbuch (BGB) (German Civil Code) (1900). Available at: <https://www.buergerliches-gesetzbuch.info/> (Accessed: 04 November 2022).

⁶ Grundgesetz für die Bundesrepublik Deutschland (Basic Law for the Federal Republic of Germany) (1949). Available at: <https://www.bundestag.de/gg> (Accessed: 04 November 2022).

⁷ Deutscher Bundestag (German Parliament) (n.d.) *Der Bundesrat (German Federal Council)*. Available at: <https://www.bundestag.de/parlament/grundgesetz/gg-serie-05-bundesrat-634568> (Accessed: 04 November 2022).

⁸ Nagel, S. K., Nagenborg, M., Reijers, W., Benčin, R., Strle, G., Nedoh, B. (2015) *Ethics Assessment in Different Countries. Germany. (D1.1 of the project SATORI)*. Available at: <http://satoriproject.eu/media/4.e-Country-report-Germany.pdf> (Accessed: 04 November 2022).

⁹ Pötzsch, H. (2009) *Die Deutsche Demokratie (The German Democracy)*. 5th edn. Bonn: Bundeszentrale für politische Bildung (Federal Agency for Civic Education).

¹⁰ In the context of this study, no existing or proposed laws explicitly addressing the topic could be found in the field of neurotechnology by means of a keyword search.

¹¹ Deutscher Bundestag (German Parliament) *Mediation Committee*. Available at: <https://www.bundestag.de/en/committees/mediation> (Accessed: 04. November 2022).



German “Bundesgerichtshof”, BGH) is the supreme court of the federal republic of Germany¹². The **Federal Constitutional Court** (in German “Bundesverfassungsgericht”, BVerfG), represents both an independent constitutional body of the justice system ranking alongside the other supreme federal bodies and the supreme court at federal level¹³.

Associated bodies

However, there are other bodies supporting the legislative sector, such as councils, commissions and organisations that could play an important role, especially in the future development of neurotechnologies. For example, there is scientific policy advice for the German Bundestag by the Office of Technology Assessment at the German Bundestag (in German “Büro zur Technikfolgenabschätzung”, TAB)¹⁴. One of its main tasks is to analyse the potentials and effects of scientific and technological developments comprehensively and in a forward-looking manner and to explore the associated social, economic, ecological opportunities and risks. On this basis, action requirements and possibilities are pointed out to the committees and members of the Bundestag. The **Committee on Education, Research and Technology Assessment** (in German “Ausschuss für Bildung, Forschung und Technikfolgenabschätzung”, ABFTA) forms a permanent rapporteur group each legislative period with one member from each parliamentary party in the Bundestag¹⁵. The **National Regulatory Control Council** (in German “Nationaler Normenkontrollrat”) advises the German federal government as an independent body to ensure the necessary level of transparency on the compliance costs of legislation for decision makers in government and parliament as to make clear which cost and time requirements may arise from laws, ordinances and administrative regulations for citizens, businesses and public authorities¹⁶. The **German Ethics Council** (in German “Deutscher Ethikrat”) on the other hand, is an independent council of experts that monitors the ethical, societal, scientific, medical and legal issues as well as potential consequences, particularly in the field of the life sciences and their application to human beings. The **Data Ethics Commission** (in German “Datenethikkommission”) is an independent advisory body in the field of digital policy established by the German Federal Government in 2018¹⁷. To name just one more relevant body, organisations like the **Federation of German Consumer Organisations** (in German “Verbraucherzentrale Bundesverband”, vzbv) are associations organised at state level, dedicated to consumer protection on the basis of a state mandate and to provide advisory services on, for example, AI applications, data protection and product safety¹⁸. The following text refers to some of these structures to show where neurotechnologies are or could be considered in the German legal system.

¹² The Federal Court of Justice. Available at:

https://www.bundesgerichtshof.de/EN/Home/homeBGH_node.html;jsessionid=468D92B51CDC9037A945CF23ACAD1AEB.1_cid359 (Accessed: 04 November 2022).

¹³ The Federal Constitutional Court. Available at:

https://www.bundesverfassungsgericht.de/EN/Homepage/home_node.html (Accessed: 04 November 2022).

¹⁴ Büro zur Technikfolgenabschätzung (Office of Technology Assessment at the German Bundestag).

Available at: <https://www.tab-beim-bundestag.de/english/> (Accessed: 24 October 2022).

¹⁵ Ausschuss für Bildung, Forschung und Technikfolgenabschätzung (Committee on Education, Research and Technology Assessment). Available at: <https://www.bundestag.de/bildung> (Accessed: 04 November 2022).

¹⁶ Nationaler Normenkontrollrat (National Regulatory Control Council). Available at:

<https://www.normenkontrollrat.bund.de/nkr-en> (Accessed: 04 November 2022).

¹⁷ Datenethikkommission (Data Ethics Commission). Available at: <https://www.bmi.bund.de/DE/themen/it-und-digitalpolitik/datenethikkommission/datenethikkommission-node.html> (Accessed: 04 November 2022).

¹⁸ Verbraucherzentrale Bundesverband (vzbv) (The Federation of German Consumer Organisations). Available at: <https://www.vzbv.de/en> (Accessed: 04 November 2022).

Criticism of the jurisdiction

The legal system enjoys a high reputation in Germany. Nevertheless, there is much criticism of the jurisdiction, most of which is not directed against the judicial organs but against shortcomings for which the legislator is responsible. Criticism is directed at the fact that there are too many laws, which are becoming a flood of standards, that the laws are too complicated and abstract for laypersons, that court proceedings take too long, cause enormous costs and then possibly end without a judgement, or that courts are interfering more and more so that political conflicts become legal disputes.¹⁹

1.5 Current state of neurotechnologies in Germany

The National Regulatory Control Council (in German "Nationaler Normenkontrollrat", NKR) recently called for reform of the legislative process in Germany. Chairman of the NKR, Lutz Göbel, stated that laws are often passed overly fast and under time pressure, leading to errors and undesirable consequences, as well as a lot of bureaucracy. He suggested involving more experts in the process in advance²⁰. This demand also allows conclusions to be drawn about the development of neurotechnologies and their legal implications, as far as better knowledge of the brain could lead to better-designed laws and fairer legal procedures. Researchers like Eckhardt et al. call for legislators to keep a close eye on the situation to ensure the safety and efficacy of neurotechnological products. They describe that the current relatively widespread assignment of nonmedical bioelectronic products to medical products, with their more burdensome testing procedures, hinders technological progress and increases the cost of these products.²¹

Terms like "neuroethics", "neuroright", "neurocrime", and "neurosecurity" (in German "Neuroethik", "Neurorecht", "Neurokriminialität" and "Neurosicherheit") are part of the academic discourse, yet they are not actually recognised in the public discourse. The discipline of "neuro-criminology" (in German "Neurokriminologie"), which deals with the origin of criminal offences and, with increasing urgency, also addresses the question of effective measures of rehabilitation and prevention, is just emerging²².

Hence, there are only limited neurotechnology-specific policy and legal developments in Germany. National debates, that affect neurotechnology either directly, for example, in the academic discourse, or indirectly, for example, in the political debate on the reform of the legal system, tend to be oriented towards the international, especially Anglo-American, discourse. In this respect, however, there are considerations as to whether and to what extent neurotechnologies might influence relevant national laws, such as German criminal law.

Currently, neurotechnology is an internationally dynamic field of research with intensive research activities also existing in Germany. Research institutions, like Fraunhofer and Max-Planck play an

¹⁹ Pötzsch, H. (2009) *Die Deutsche Demokratie (The German Democracy)*. 5th edn. Bonn: Bundeszentrale für politische Bildung (Federal Agency for Civic Education).

²⁰ Nationaler Normenkontrollrat (National Regulatory Control Council) (2022) *Welcome to the NKR website*. Available at: <https://www.normenkontrollrat.bund.de/nkr-en> (Accessed: 04 November 2022).

²¹ Eckhardt, A., Abegg, A., Seferovic, G., Ibric, S., Wolf, J. (2022) *Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik (When people network their bodies with technology. Fundamentals and perspectives of non-medical bioelectronics)*. Bern: ETH Zürich, p. 22. Available at: <https://www.research-collection.ethz.ch/bitstream/handle/20.500.11850/565525/1/9783728141385.pdf> (Accessed: 04 November 2022).

²² Duttge, G. (2015) 'Einsatz von Neurotechnologie: Zukunftsperspektiven eines modernen Sanktionensystems?', in Kathrin Höffler (ed.). *Brauchen wir eine Reform der freiheitsentziehenden Sanktionen?* Göttinger Studien zu den Kriminalwissenschaften. Universitätsverlag Göttingen. 27th edn. p. 116.

important role in this area, although no research results could be found in the context of this study on keywords such as “neuroright”, and the like²³. The same applies to funding programmes like the one already launched in 2004 by the Federal Ministry of Education and Research (in German “Bundesministerium für Bildung und Forschung”, BMBF) to establish the basic structural framework in the field of computational neuroscience in Germany.²⁴ It can be assumed that legal issues related to neurotechnologies will play an important part in projects like the before mentioned or, for example, in those of the German Research Foundation (in German “Deutsche Forschungsgemeinschaft”, DFG), responsible for the promotion of science and research in the Federal Republic of Germany, which deals with the topic as well, for example by means of publications, but also by initiating conferences or by funding initiatives.²⁵

²³ Eckhardt, A., Abegg, A., Seferovic, G., Ibric, S., Wolf, J. (2022): ‘Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik’. Bern, Switzerland: TA-SWISS 78. p. 187. Available at: <https://doi.org/10.3218/4138-5> (Accessed: 24 October 2022).

²⁴ With the funding programme “National Bernstein Network Computational Neuroscience” (NNCN), the BMBF aims at supporting structures that bundle, strengthen and network the outstanding expertise available in Germany in the experimental and theoretical neurosciences. Available at: <https://www.bmbf.de/bmbf/de/forschung/gesundheit/lebenswissenschaftliche-grundlagenforschung/nationales-bernstein-netzwerk-computational-neuroscience.html> (Accessed 04. November 2022).

²⁵ Deutsche Forschungsgemeinschaft (DFG) (German Research Foundation). Available at: https://www.dfg.de/en/dfg_profile/what_is_the_dfg/index.html (Accessed: 04 November 2022).



2. Neurotechnology-specific legal and policy developments

This section presents an overview of the legal and policy developments pertaining to neurotechnologies in Germany. It examines relevant policies and laws in relation to neurotechnologies and identifies the national authorities involved in the implementation and enforcement of such laws and policies.

Current debates and future policy and legal developments

Discussions around the topic of neurotechnologies and its legal implications were limited in scope and showed signs of fatigue even before not too many years ago. The German Philosopher and Psychologist Stephan Schleim argued in 2012 that “evidence for an impending normative ‘**neuro-revolution**’ is scarce and neuroscience may instead **gradually improve legal practice** in the long run, particularly where normative questions directly pertain to brain-related questions”.²⁶ It is only recently that practical and normative questions of neuroscience have come into focus of law, for which there is now a **multifaceted discussion** - not only about the possible impact of neuroscience on **criminal law**, but also with regard to the level of **civil law**.²⁷ Considering that neurotechnological devices can influence sensory perception and cognitive as well as emotional states, reflections focus on the connection between freedom of the will and culpability.²⁸ For example, there is the concern that neurotechnologies may challenge existing notions of **free will and culpability** and threaten established social practices of punishment. For example, brain stimulation or surgery as an alternative to punishment has been discussed in criminal law contexts since brain stimulation research of the 1950s to 1970s. Culpability changed by neuroscience will demand corresponding **modifications of legal standards to improve current practices**.²⁹ However, Germany seems behind the international trend towards diversification of types of punishment. The current criminal law system and criminal procedure applicable to adults in Germany, especially in contrast to youth criminal law, which provides a differentiated spectrum of intervention options depending on the need for rehabilitation according to individual maturity development and socialisation, is considered to be in urgent need of revision, insofar as the options for punishment are limited to the alternative of a financial penalty or imprisonment.³⁰ Already in 2000, the Commission

²⁶ Schleim, S. (2012) ‘Brains in context in the neurolaw debate: The examples of free will and “dangerous” brains’, *International Journal of Law and Psychiatry*, 35(2), p. 104-111. Available at: <https://doi.org/10.1016/j.ijlp.2012.01.001> (Accessed: 24 October 2022).

²⁷ Spranger, T. M. (2015) ‘Prolegomena zu den praktischen Herausforderungen der Neurowissenschaften (Prolegomena to the practical challenges of neuroscience)’, *Jahrbuch für Wissenschaft und Ethik*, 19th edn.(1), pp. 61-64.

²⁸ Duttge, G. (2015) ‘Einsatz von Neurotechnologie: Zukunftsperspektiven eines modernen Sanktionensystems?’, in Kathrin Höffler (ed.). *Brauchen wir eine Reform der freiheitsentziehenden Sanktionen? Göttinger Studien zu den Kriminalwissenschaften*. Universitätsverlag Göttingen. 27th edn. p. 111.

²⁹ Schleim, S. (2012) ‘Brains in context in the neurolaw debate: The examples of free will and “dangerous” brains’, *International Journal of Law and Psychiatry*, 35(2), p. 104-111. Available at: <https://doi.org/10.1016/j.ijlp.2012.01.001> (Accessed: 24 October 2022).

³⁰ Duttge, G. (2015) ‘Einsatz von Neurotechnologie: Zukunftsperspektiven eines modernen Sanktionensystems?’, in Kathrin Höffler (ed.). *Brauchen wir eine Reform der freiheitsentziehenden Sanktionen? Göttinger Studien zu den Kriminalwissenschaften*. Universitätsverlag Göttingen. 27th edn. p. 111.

called for a reform of the criminal penalty system to finally meet the requirements of the transformed social, technical and criminal policy framework.³¹

With regard to the emerging special discipline of neurocriminology, the possibility of developing effective measures for crime prevention and rehabilitation is discussed and explored.³²

As far as autonomous people can determine and act in accordance with their own will, their autonomy might be affected as soon as third parties intervene in the process of will determination and capacity to act, without the informed consent of the affected person. "This could be the case, for example, if a stimulating headset – automatically controlled by means of Artificial Intelligence (AI) – changes people's moods to such an extent that, although they may comfortably perceive themselves as stronger and more self-assured, at the same time through their aggressive and insensitive behaviour they destroy valued social relationships"³³ (In the future, particularly neuroelectronic applications could raise the question of which will is to be taken into account in the execution of laws. Questions concerning neurotechnologies and self-determination might therefore affect all areas of law in which there is a connection with people's capacity for decision-making and action. However, these considerations are not without addressing the problem that German criminal law bases the central concept of culpability on a "merely fictional, logically contradictory and empirically indefensible concept of freedom of will",³⁴ inasmuch as it is assumed "(...) that human beings are capable of free, responsible, moral self-determination and are therefore able to decide for what is right and against what is wrong (...) "³⁵. Since any resultant alternation cannot be empirically proven, this means that it also cannot be proven that a person could have acted differently, i.e. that there would have been at least two alternative options for action at a given time, the concept of culpability is replaced by the civil law concept of responsibility, which demands existing norms to be recognised as such and incorporated into one's behaviour.

It is worth mentioning that the scientific discourse that relates to **German criminal law (StGB)** and the neurosciences is oriented toward the international, especially the Anglo-American discussion. These discussions illustrate that **neuroethics, neurolaw, neurorights and neurosecurity are interdisciplinary fields**.³⁶ This aspect is also being recognised by the Deutsche Forschungsgemeinschaft (DFG), central self-governing research funding organisation in Germany. Legal experts, psychiatrists and ethicists are discussing the **challenges that neuroscience poses to the legal system**. Knowing the neuroscience is an area that is generally well suited to international cooperation, the research funding organisation enabled researchers to learn about research and cooperation opportunities in Germany at the international congress on "Brain, Behaviour and Emotions" in 2019.³⁷

³¹ Ibid. p. 112.

³² Ibid. p. 216f.

³³ Eckhardt A., Abegg A., Seferovic G., Ibric S., Wolf J. (2022) *Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik (When people network their bodies with technology. Fundamentals and perspectives of non-medical bioelectronics)*. Bern: ETH Zürich, p. 187. Available at: <https://www.research-collection.ethz.ch/bitstream/handle/20.500.11850/565525/1/9783728141385.pdf> (Accessed: 04 November 2022).

³⁴ Roth, G. (2015) 'Strafrechtliche Willensfreiheit und zivilrechtliche Freiheit der Willensbestimmung aus Sicht der Hirnforschung (Criminal law freedom of will and civil law freedom of will determination from the perspective of brain research)', *Jahrbuch für Wissenschaft und Ethik*, 19th edn. (1), p. 65-76.

³⁵ Ibid, citing BGHSt 2, 194, 200. The decisions of the federal court (Bundesgerichtshof) in criminal matters are a collection edited by the members of the federal court.

³⁶ Schleim, S. (2021) 'Neurorights in History: A Contemporary Review of José M. R. Delgado's "Physical Control of the Mind" (1969) and Elliot S. Valenstein's "Brain Control" (1973)', *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022).

³⁷ DFG (2019) *Fachtagung unterstreicht Kooperationspotenzial in den Neurowissenschaften (Symposium highlights potential for cooperation in neuroscience)*. Available at:

Proposals for dedicated law

By making the discourse more international and interdisciplinary, also international rights such as human rights become a focus of attention. This raises the question of whether existing **human rights** legislation is adequate to protect mental privacy or whether new rights need to be created.³⁸ According to many lawyers and other experts, human rights relevant for neurotechnological devices, are not adequately protected by existing laws. This situation has been already addressed by **Chile**, which in 2021 drafted a constitution **to protect brain data and prohibit their use without informed consent** which however was rejected by the public in a referendum.³⁹ Four main neurorights have been identified to facilitate the discussion of ethical, legal and social questions that neurotechnology raises.⁴⁰ Now, the debate is about whether these rights are to be understood in absolute terms, so that no restriction would be justified, or whether they are to be understood in relative terms, so that the consent of the individual or the protection of the rights of others could justify their restriction. Features of neurotechnology have different implications on the four identified neurorights, although, in clinical practice or everyday applications, all neuroright might be involved.⁴¹

1. The human right to **cognitive liberty** (also called **mental self-determination**) which includes two aspects:
 - a) **access** to neurotechnologies and
 - b) **protection against** their coercive and unconsented use⁴²

Cognitive liberty is considered the most fundamental neuroright, giving an individual the right and freedom to determine their own mental processes.⁴³

https://www.dfg.de/dfq_profil/geschaeftsstelle/dfq_praesenz_ausland/lateinamerika/berichte/2019/190624_fachtagung/index.html (Accessed: 26 September 2022).

³⁸ Vidal C. (2022) Neurotechnologies under the Eye of Bioethics. eNeuro. Jun 17;9(3): ENEURO.0072-22.2022. Available at: DOI: 10.1523/ENEURO.0072-22.2022 (Accessed 04. November 2022) referring to Rainey et al. 2020, Ienca 2021 and Yuste et al. 2021.

³⁹ Guzmán, L. H. (2022) 'Chile: Pioneering the protection of neurorights', *The UNESCO Courier*. Available at: <https://en.unesco.org/courier/2022-1/chile-pioneering-protection-neurorights> (Accessed: 24 October 2022) as well as Stuenkel, O. (2022) 'Chile's Rejection of the New Constitution Is a Sign of Democratic Maturity', *Carnegie Endowment for International Peace*, 08 September. Available at: <https://carnegieendowment.org/2022/09/08/chile-s-rejection-of-new-constitution-is-sign-of-democratic-maturity-pub-87879> (Accessed: 04 November 2022).

⁴⁰ Schleim, S. (2021) 'Neurorights in History: A Contemporary Review of José M. R. Delgado's "Physical Control of the Mind" (1969) and Elliot S. Valenstein's "Brain Control" (1973)', *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022) referring to Bubitz 2013, Ienca M., Andorno R. (2017) and Ienca, M. (2021).

⁴¹ Schleim, S. (2021) 'Neurorights in History: A Contemporary Review of José M. R. Delgado's "Physical Control of the Mind" (1969) and Elliot S. Valenstein's "Brain Control" (1973)', *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022).

⁴² Schleim, S. (2021) 'Neurorights in History: A Contemporary Review of José M. R. Delgado's "Physical Control of the Mind" (1969) and Elliot S. Valenstein's "Brain Control" (1973)', *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022). Examples of the relevance of these two aspects are given later in the section "Use of civil rights and data protection law in the German legal system" under "Advocating the needs of patients".

⁴³ The concept of self-determination is described in more detail throughout this study.



Potential legal case: “People might demand access to the means to change their psychological processes in a desired way and they need to be protected from their coercive and involuntary application”.⁴⁴

2. The human right to **mental privacy** emphasising the personal and sensitive nature of brain data, similar to personal data which might give away private information someone wants to hide in their behaviour in certain contexts, such as a person’s health condition, sexual preference, or political views.⁴⁵ The question arises whether the psychological meaning of the recorded signals can be derived from the brain alone or must be interpreted first. An additional level of interpretation makes today’s neurotechnology seem less problematic from the perspective of neurorights to the extent that psychological assessments are only complemented by neurotechnologies, such as neuroimaging, and do not replace them.⁴⁶
3. The human right to **mental integrity** refers to a **brain-computer interface** that could be misused to alter a person’s psychological processes. Legal questions essentially depend on how central notions like **privacy** or **personal identity** are understood.
4. The human right to **psychological continuity** means people’s perception of their own identity in the course of time. The neuroright to psychological continuity could be violated when neurotechnology is used to change someone’s personality or personal identity. Legal questions essentially depend on how central notions like privacy or personal identity are understood.⁴⁷

The following list is intended to provide an initial overview of the laws which are affected by or referred to in connection with the development of neurotechnologies or, at least, could be in the future. This is not a comprehensive list, but rather names those laws that were identified during desk research, particularly of academic texts in the German-speaking world.:

- German criminal code (StGB);⁴⁸
- Medical product law (Medical Products Act, MPG);⁴⁹
- German Basic Law (Art 3 Non-discrimination, Art. 5 academic freedom);⁵⁰
- General equal treatment law (in German “Allgemeines Gleichbehandlungsgesetz”, AGG);⁵¹
- Federal Data Protection Act (in German “Bundesdatenschutzgesetz”, BDSG);⁵²

⁴⁴ Schleim, S. (2021) ‘Neurorights in History: A Contemporary Review of José M. R. Delgado’s “Physical Control of the Mind” (1969) and Elliot S. Valenstein’s “Brain Control” (1973)’, *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022).

⁴⁵ The Federal Data Protection Act regulates the use of personal data in research. See: Data Protection Act (Bundesdatenschutzgesetz), 20.12.1990. English: https://www.gesetze-im-internet.de/englisch_bdsq/. (Accessed: 04. November 2022).

⁴⁶ Schleim, S. (2021) ‘Neurorights in History: A Contemporary Review of José M. R. Delgado’s “Physical Control of the Mind” (1969) and Elliot S. Valenstein’s “Brain Control” (1973)’, *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022).

⁴⁷ Ibid.

⁴⁸ Bundesamt für Justiz (Federal Office of Justice) (2021) *Strafgesetzbuch (German Criminal Code)*. Available at: http://www.gesetze-im-internet.de/englisch_stgb/index.html (Accessed: 04 November 2022).

⁴⁹ Bundesamt für Justiz (Federal Office of Justice) (n.d.) *Gesetz über Medizinprodukte (Medical Products Act)*. Available at: <https://www.gesetze-im-internet.de/mpg/> (Accessed: 04 November 2022).

⁵⁰ Bundesamt für Justiz (Federal Office of Justice) (n.d.) *Grundgesetz für die Bundesrepublik Deutschland (German basic law)*. Available at: <https://www.gesetze-im-internet.de/gg/> (Accessed: 04. November 2022).

⁵¹ Bundesamt für Justiz (Federal Office of Justice) (n.d.) *General Act on Equal Treatment*. Available at: https://www.gesetze-im-internet.de/englisch_agg/index.html (Accessed: 04. November 2022).

⁵² Bundesamt für Justiz (Federal Office of Justice) (n.d.) *Federal Data Protection Act (BDSG)*. Available at: https://www.gesetze-im-internet.de/englisch_bdsq/index.html (Accessed: 04. November 2022).

- EU fundamental rights: mental integrity,⁵³ non-discrimination,⁵⁴ and freedom of thought;⁵⁵
- International human rights law (e.g., Universal Declaration of Human Rights, Art 10 right to fair trial,⁵⁶ The Convention on Human Rights and Biomedicine (CHRB) Art. 5 §2,⁵⁷ The Convention on the Rights of the Child.⁵⁸

The next section considers the implications of neurotechnologies on these laws in greater detail. The cases discussed could often be assigned to multiple legal issues. The aim of the following exemplary analysis is to provide a broad picture of human rights, EU fundamental rights and German national law.

⁵³ European Union agency for Fundamental Rights (FRA) *Article 3 - Right to integrity of the person*. Available at: <https://fra.europa.eu/en/eu-charter/article/3-right-integrity-person> (Accessed: 04. November 2022).

⁵⁴ European Union Agency for Fundamental Rights (FRA) *Article 21 - Non-discrimination*. Available at: <https://fra.europa.eu/en/eu-charter/article/21-non-discrimination#:~:text=1.,2> (Accessed 04. November 2022).

⁵⁵ European Agency for Fundamental Rights (FRA) *Article 10 - Freedom of thought, conscience and religion*. Available at: <https://fra.europa.eu/en/eu-charter/article/10-freedom-thought-conscience-and-religion> (Accessed: 04. November 2022).

⁵⁶ United Nations (UN) *Universal Declaration of Human Rights*. Available at: <https://www.un.org/en/about-us/universal-declaration-of-human-rights> (Accessed: 04. November 2022).

⁵⁷ Council of Europe *Convention for the protection of Human Rights and Dignity of the Human Being with regard to the Application of Biology and Medicine: Convention on Human Rights and Biomedicine (ETS No. 164)*. Available at: <https://www.coe.int/en/web/conventions/full-list?module=treaty-detail&treaty-num=164> (Accessed: 04. November 2022).

⁵⁸ United Nations International Children's Emergency Fund (UNICEF) *Convention on the Rights of the Child*. Available at: (Accessed: 04. November 2022). <https://www.unicef.org/child-rights-convention/convention-text> (Accessed: 04. November 2022).

3. Domain-specific legal issues

This section examines the legal implications of neurotechnologies in the context of the German legal system.

The following sections analyse some of the ways in which neurotechnologies may be governed by German law and policy. Specific legal issues are identified in relation to the relevant legal framework(s) and then analysed in greater depth, with each discussion including specific references to existing (and proposed) law and an explanation of how the law may apply to the use of neurotechnologies.

3.1 The human right to fair trial: More evidence-based decisions in criminal justice through neuroimaging techniques

Neuroimaging has already found its way into the courtroom to prove the lack of or reduced culpability of defendants.⁵⁹ While the research findings of neuroimaging concerning the potential causes or therapies of mental illnesses are undisputed, however, possible areas of application in the forensic context still seem to be insufficiently defined, both in the German-speaking world and in the international arena. Obstacles result primarily from differences in the understanding and terminology of mental illness. In contrast to the great enthusiasm of the early years, the use of neuroimaging in the forensic context is now being questioned since superiority in terms of accuracy in comparison to other methods in criminal justice does not necessarily result. Therefore, the adequate translation between biological findings and the requirement of the legal system appears to be central in order to ultimately define the role and the scope of validity of neuroimaging procedures.⁶⁰

Even if the technology has not yet been applied in Germany, assuming for the moment the results of this study are correct, in recent cases **neurogenetics** (in German “Neurogenetik”) and neuroimaging evidence led to mitigated sentences demonstrating a tendency towards aggressive behaviour or the presence of a mental disorder.⁶¹ In the future, functional magnetic resonance imaging (**fMRI**) could offer numerous opportunities in criminal trials. However, there are also fears that its use could **violate human rights**. The feeling is emerging that existing human rights may not be sufficient to respond to challenges to human rights principles with regard to the advancement of neurotechnologies.⁶² As

⁵⁹ More detailed information can be found, for example in Schleim, S. (2012) ‘Brains in context in the neurolaw debate: The examples of free will and “dangerous” brains’, *International Journal of Law and Psychiatry*. Available at: DOI: 10.1016/j.ijlp.2012.01.001 or in Komorowski, A., Kautzky, A., Vanicek, T., Lanzenberger, R., Kasper, S. (2019) Neuroimaging in the forensic context – possibilities and limitations, *Journal für Neurologie, Neurochirurgie und Psychiatrie*. Available at: <https://www.kup.at/kup/pdf/14354.pdf#search='hirnbildgebung'>.

⁶⁰ Komorowski, A., Kautzky, A., Vanicek, T., Lanzenberger, R., Kasper, S. (2019) Neuroimaging in the forensic context – possibilities and limitations, *Journal für Neurologie, Neurochirurgie und Psychiatrie*. Available at: <https://www.kup.at/kup/pdf/14354.pdf#search='hirnbildgebung'> (Accessed: 04. November 2022).

⁶¹ Schleim, S. (2021) ‘Neurorights in History: A Contemporary Review of José M. R. Delgado’s “Physical Control of the Mind” (1969) and Elliot S. Valenstein’s “Brain Control” (1973)’, *Frontiers in Human Neuroscience*. Available at: DOI: 10.3389/fnhum.2021.703308 (Accessed: 24 October 2022), referring to media reports on two cases decided in Italy in 2009 and 2011 widely discussed in the scientific community, e.g., Feresin, E. (2009) ‘Lighter sentence for murderer with “bad genes”’, *Nature*. Available at: <https://doi.org/10.1038/news.2009.1050> (Accessed: 04 November 2022).

⁶² Ienca M., Andorno R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy* 13(5). Available at: DOI 10.1186/s40504-017-0050-1 (Accessed: 24 October 2022).

human rights have emerged as specific responses to recurring threats to basic human interests⁶³, human dignity⁶⁴ or the requirements of a good life⁶⁵, Ienca and Andorno argue that neurotechnologies have the potential to have an impact on human rights such as the human right to **mental privacy, the right to a fair trial** or the **principle against self-incrimination**⁶⁶. The **German Ethics Council**⁶⁷ dealt with questions around the topic of applying neuroimaging (in German "Hirnbildgebung") techniques in the courtroom at its autumn meeting in 2013 where it was emphasised that the **multitude of data** obtained through neuroimaging **must first be put into context**. In that regard, Reinhard Merkel, a member of the German Ethics Council, stated that **neuroimaging could not replace traditional psychiatric reports**, but for the time being can only "cautiously" supplement them.⁶⁸ Even if the scientific community collaborates with experts from the field of psychology, neurobiology, mathematics, psychiatry, philosophy and other disciplines, neurotechnologies are still largely an untouched issue for human rights law.⁶⁹ However, given that the ongoing "neuro-revolution" might reshape some of the ethical and legal understandings, the implications raised by neurotechnologies for the inherent qualities of human beings requires a prompt and adapted response from human rights law, the authors argue. In particular, they insist that the growing sensitivity and availability of neurodevices in the coming years will require the emergence of new rights, or at least the evolution of traditional rights, to meet the challenges of neurotechnological developments.

3.2 A potential threat to the emerging right of mental integrity: Hacking of medical devices in brain-computer interfacing technology

Brain-Computer-Interfacing technologies (BCI) are technical devices that are used in patients as well as healthy people to control medical devices solely through brain activity. The associated risks are still largely unexplored. However, these technologies may be vulnerable to the emerging concept of **neurocrime** and **can affect the cognition, behaviour, self-determination, autonomy, or agency and privacy of individuals**, for example through malicious brain hacking.

Given the fact that legal questions essentially depend on how central notions like mental privacy or personal identity are understood, the question remains whether there is a need to explicitly recognise neurorights in fundamental rights law. The EU Charter of Fundamental Rights states in Article 3, the right to integrity of the person, that "[E]veryone has the right to respect for his or her physical and mental integrity". Still, it seems necessary to determine what exactly is to be protected when it comes to mental integrity, what constitutes the core of, for example, a person's identity, and with which brain areas this correlates. Neurorights might be difficult for third parties to measure objectively or

⁶³ Ibid, referring to Nickel 1987.

⁶⁴ Ibid, referring to Habermans 2010.

⁶⁵ Ibid, referring to Fagan 2005.

⁶⁶ Ibid.

⁶⁷ The German Ethics Council deals with the great questions of life and provides opinions and recommendations for orientation for society and politics. It was constituted on April 11, 2008, on the basis of the Ethics Council Act and succeeded the National Ethics Council established by the Federal Government in 2001. The members are appointed by the President of the German Bundestag. More information can be found here: <https://www.ethikrat.org/en/?cookieLevel=not-set&cHash=4cedc8fcdda0b368d4409bb0febbe036> (Accessed: 26. September 2022).

⁶⁸ Medical community (2013) 'Neurobildgebung: Wie beeinflussen Bilder vom Gehirn unser Menschenbild?', Deutsches Ärzteblatt, 29 November [online]. Available at: <https://www.aerzteblatt.de/nachrichten/56759/Neurobildgebung-Wie-beeinflussen-Bilder-vom-Gehirn-unser-Menschenbild> (Accessed: 26 September 2022).

⁶⁹ Examples linking neurotechnologies and human rights issues are described later in the following section.

empirically, as they are associated with a person's choices, their potential moral values, their experiences, and their biography, for example.⁷⁰

As biological information carries private and sensitive data, whose access or manipulation by malicious actors can cause significant physical (including life-threatening), psychological or social harm to users of the technology, privacy and information security issues are emerging. In other words, brain-computer interfacing technologies can **threaten neuro-security**. In this context, the concept of computer crime is extended to neural devices. Instead of brain-computer interface, the term "**human-machine interface**" (in German "Mensch-Maschine-Schnittstelle") is often preferred in the German-speaking research landscape. Eckhardt et al. assume that this is an attempt not to reduce human beings exclusively to their brains. In addition, this term indicates differences regarding the underlying conception of human beings and linguistic classifications⁷¹.

Furthermore, the concern is being expressed that **brain-computer-interfaces (BCIs) could be hacked**, as can happen with other medical devices⁷². As **regulation tends to advance much slower than technology**, and existing **security policies are often unable to accommodate the accelerating technological changes**, there is an awareness of the existing dangers, such as the **increase in criminal acts, due to gaps and inadequate legal and regulatory coverage**.⁷³ More and more medical devices such as cardiac pacemakers, surgical equipment and monitors are becoming connected and equipped in such a way that they can transmit important data on a patient's state of health via data links and can also be controlled remotely. Remote control, i.e., external, non-encrypted control of the administration of medication in insulin pumps, is regarded by researchers as particularly dangerous. Rios and Butts succeeded in demonstrating an attack scenario by programming a sender that transmits on a suitable frequency and identifies as a legitimate **remote control of an insulin pump**. Using a self-developed app, the researchers controlled this transmitter. Thus, vulnerabilities in the medical device system could allow attacks to hack into devices, reprogramme them or equip them with malicious software.⁷⁴

Similarly, Halperin et al. (2008) experimentally demonstrated that hackers could wirelessly interfere with the security and privacy of, for example, an already commercialised implanted **cardiac defibrillator**. In their experiment, hackers were able to use homemade and low-cost devices to modify

⁷⁰ Eckhardt, A., Abegg, A., Seferovic, G., Ibric, S., Wolf, J. (2022): 'Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik'. Bern, Switzerland: TA-SWISS 78. Available at: <https://doi.org/10.3218/4138-5> (Accessed: 24 October 2022).

⁷¹ Ibid. p. 211.

⁷² See for example Ienca M., Haselager P. (2016) 'Hacking the brain: brain-computer interfacing technology and the ethics of neurosecurity', *Ethics and Information Technology* 18 [online]. Available at: DOI: 10.1007/s10676-016-9398-9 (Accessed: 24 October 2022), or Ienca, M., Andorno, R. (2017) 'Towards new human rights in the age of neuroscience and neurotechnology', *Life Sciences, Society and Policy*. Available at: DOI: 10.1186/s40504-017-0050-1 (Accessed: 04. November 2022), as well as Schleim, S. (2012) 'Brains in context in the neurolaw debate: The examples of free will and "dangerous" brains', *International Journal of Law and Psychiatry*, 35(2), p. 104-111. Available at: <https://doi.org/10.1016/j.ijlp.2012.01.001> (Accessed: 24 October 2022).

⁷³ Ienca M., Haselager P. (2016) 'Hacking the brain: brain-computer interfacing technology and the ethics of neurosecurity', *Ethics and Information Technology* 18 [online]. Available at: DOI: 10.1007/s10676-016-9398-9 (Accessed: 24 October 2022).

⁷⁴ Beuth, P. (2019) 'Diese App kann Menschen töten', *Spiegel Netzwelt*, 17 July [online]. Available at: <https://www.spiegel.de/netzwelt/apps/hacker-demonstrieren-schwachstelle-in-insulinpumpen-diese-app-kann-toeten-a-1277742.html> (Accessed: 24 October 2022).

a patient's therapies, switch off therapies altogether and trigger potentially deadly processes such as ventricular fibrillation.⁷⁵

3.3 The lack of reliable findings and unresolved questions in deep brain stimulation

In neurotechnology, deep brain stimulation (DBS) (in German “Tiefe Hirnstimulation”, THS) refers to a neuromodulation treatment involving implantation of a pulse generator called “brain pacemaker” that sends signals to specific parts of the brain via implanted electrodes. Deep brain stimulation falls under the regime of **medical product law**, namely the **Medical Products Act (MPG)** stating that a clinical trial of a medical device may not be started in Germany until an ethics committee and the higher federal authority have given their approval.⁷⁶ In this respect, it is still an open question, whether the use of an electrode in a new area of the brain affects the intended purpose of the medical device or whether it does not affect it. A reliable clarification of this question has not yet been provided.⁷⁷

In 2017, the DFG addressed the topic of deep brain stimulation in the article “Tiefe Hirnstimulation. Stand der Wissenschaft und Perspektiven” and considers interventions in the brain particularly problematic from a legal and ethical perspective. This is because the human brain is regarded as the biological basis of central aspects of the self-image, such as self-awareness and moral capacity. Experiences with psychosurgery in the 20th century⁷⁸ nourished considerable fears in this respect. Even though deep brain stimulation does not raise any fundamentally new ethical and legal issues when used in approved indications and in the area of its clinical testing, analysing and answering ethical and legal questions associated with its research and clinical application is of great importance so that protective framework conditions can be created, and allow the full therapeutic potential to be realised⁷⁹. In addition, it must be examined how the applicable legal regulation and ethical standards are applied in these matters⁸⁰.

Elliot S. Valenstein made specific recommendations for the ethical review of deep brain stimulation procedures and recommended that firstly, members of review boards “should be as independent as possible from doctors or researchers carrying out the procedure; second, alternatives should be considered and an ombudsman should be involved to represent the patient’s perspective, particularly for children; third, there should be a clear rationale for the proposed procedure; and fourth, when patients are involved there should be honesty on whether they directly benefit from the procedure or are rather used for experimental purposes”.⁸¹

⁷⁵ Ienca, M., Haselager, P. (2016) ‘Hacking the brain: brain–computer interfacing technology and the ethics of neurosecurity’, *Ethics and Information Technology* 18, pp. 117–129 referring to Halperin et al. 2008 [online]. DOI: 10.1007/s10676-016-9398-9.

⁷⁶ Justiz (Federal Office of Justice) (2021) *Gesetz über Medizinprodukte (Medical Products Act)*. Available at: <https://www.gesetze-im-internet.de/mpg/>

⁷⁷ Deutsche Forschungsgemeinschaft (DFG) (2019): Guidelines for Safeguarding Good Research Practice. Code of Conduct, p. 69ff. Available at: https://www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/kodex_gwp_en.pdf (Accessed 04. November 2022).

⁷⁸ Ibid. p. 64, referring to Valenstein 1973 and 1986.

⁷⁹ Ibid. p. 64, referring to Clausen 2009.

⁸⁰ Ibid. p. 64 referring to Clausen 2011.

⁸¹ Schleim 2021. Also see for example the DFG Guidelines for Safeguarding Good Research Practice. Available at:

https://www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/kodex_gwp_en.pdf. (Accessed: 04. November 2022).



Since 2018, data protection law is also applicable in Germany - the General Data Protection Regulation (GDPR) (in German "Datenschutz-Grundverordnung", DS-GVO)⁸² next to the Federal Data Protection Act (in German "Bundesdatenschutzgesetz", BDSG).⁸³ In this regard, informed consent is considered a fundamental standard of biomedical ethics, which is also anchored legally, for example in the **Genetic Diagnostics Act, § 8 and 9** (in German "Gendiagnostikgesetz") at federal level. Since there is a broad **lack of reliable findings on long-term courses, side effects and on the impact on quality of life**, patient information is only possible to a limited extent⁸⁴ which threatens the requirement of **properly and comprehensively informing patients** about the type of intervention, its goals, risks and possible side effects, as well as other evaluated treatment options. In the case of patients who cannot give their consent, the legal representative may decide within the **framework of custody or guardianship law**.

3.4 BCI-based communication in medical choices to ensure equal treatment and non-discrimination

Taking on another perspective, the use of neurotechnological devices may confer certain advantages on users to foster equal treatment or non-discrimination in relation to the **general equal treatment law** (in German "Allgemeines Gleichbehandlungsgesetz", AGG) and Article 3 of **German Basic Law** and the **non-discrimination law** (in German "Nichtdiskriminierungsrecht").

One form of discrimination might be that seemingly neutral legislation or procedures can have a de facto discriminatory effect, for example in obtaining informed consent from people unable to speak and gesture. Advances in using neurotechnologies as communication tools are already being considered as potential decision-making devices that could help in ensuring patient's participation in medical choices, thus taking into account their interests, needs and wishes. Brain interfacing technologies, for example, can open up new ways of communicating for people who would otherwise be severely challenged or completely lack opportunities to communicate.⁸⁵ In the academic discourse, BCI-based informed consent procedures are viewed critically, since, for example, discussing and varying treatments as well as withdrawing from consent cannot be realised at any time, given that the application of the technology is complex.⁸⁶ However, the opportunity created by BCI, namely, to give patients a voice and thus to allow them to exercise their right to information and consent to medical interventions according to **the Convention on Human Rights and Biomedicine (CHRB)**, is highly valued.⁸⁷ Catley and Pywell for example argue that even if the patient's responses would not meet all the requirements for legally valid informed consent, acknowledging that BCI cannot replace custody or guardianship, "yes", and "no"

⁸² Bundesministerium der Justiz (Federal Ministry of Justice) *Datenschutz-Grundverordnung (DS-GVO) (General Data Protection Regulation) (GDPR)* Available at: https://www.bmj.de/DE/Themen/FokusThemen/DSGVO/DSVGO_node.html (Accessed: 04. November 2022).

⁸³ Federal Office of Justice *Federal Data Protection Act (BDSG)*. Available at: https://www.gesetze-im-internet.de/englisch_bdsq/index.html (Accessed: 04. November 2022).

⁸⁴ Deutsche Forschungsgemeinschaft (DFG) (2019): Guidelines for Safeguarding Good Research Practice. Code of Conduct, p. 73. Available at: https://www.dfg.de/download/pdf/foerderung/rechtliche_rahmenbedingungen/gute_wissenschaftliche_praxis/kodex_gwp_en.pdf (Accessed 04. November 2022).

⁸⁵ Spranger, T., M. (2014) 'Prolegomena zu den praktischen Herausforderungen der Neurowissenschaften', in: Sturma, D., Honnfelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, p. 62.

⁸⁶ Further elaboration on the difficulties of application can be found in Röding C. (2014) 'Obtaining informed consent through use of brain-computer interfaces? Future perspectives in medical health care', in: Sturma, D., Honnfelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, 107ff.

⁸⁷ Röding C. (2014) 'Obtaining informed consent through use of brain-computer interfaces? Future perspectives in medical health care', in: Sturma, D., Honnfelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, p. 107ff.

answers could be used to identify whom the patient wished to have as a guardian⁸⁸. The authors therewith make a strong argument that the wishes of patients expressed with the aid of BCI must be respected in the greatest possible way the law allows.

3.5 FMRI techniques in medical treatment and end-of-life decisions

The **personal right** includes the **right to self-determined dying** in the context of **personal autonomy**. The personal right is not explicitly mentioned in the German Basic Law but derives from Article 1 and 2 on human dignity.⁸⁹ It is to be regarded as a fundamental right, comparable to the rights of freedom. Indirectly, however, the personal right influences civil law as well as criminal law, where behaviour that particularly violates the private sphere is punishable. In 2020, the **Federal Constitutional Court** declared the ban on the **business-like promotion of suicide (Section 217 StGB)** to be unconstitutional on the grounds that severely ill or disabled people are often de facto unable to exercise the right to end their lives, meaning that they are dependent on the willingness of others to fulfil their wish to die.⁹⁰ This caused an intense debate among experts and the public. In the specific case, it is being examined whether the underlying offences of the paragraphs § 211 (murder), §§ 212 and 213 (homicide) and §216 (assisted suicide) of the StGB are fulfilled. Suicide is not a criminal offence under German law, so assisted suicide also remains unpunished. In this case, however, case law examines whether other criminal offences such as homicide or omission to assist (§ 323c StGB) are fulfilled.⁹¹ FMRI techniques are considered to have important potential in treatment and end-of-life decisions for people who are otherwise unable to communicate, insofar as fMRI allows the patient's autonomy to be respected and ensures that medical decisions are made in their best interests.⁹² Regarding the putative four neurorights, the right to access neurotechnologies as well as protection from their coercive use can be highlighted here as well as in the before mentioned case of equal treatment and non-discrimination.

3.6 Right to academic freedom

For all the risks associated with bioelectronics, the opportunities it opens should not be ignored. The focus on research and innovation has its basis in the fact that **academic freedom** is guaranteed in **Article 5 of German Basic Law**. In this regard, it is necessary to examine how the opportunities offered by neurotechnologies can be exploited and whether desired innovations can be facilitated or promoted. As with technological innovations in general, it must be decided at the discretion of the legislator, and thus also of society, which risks are considered broadly acceptable.⁹³

⁸⁸ Catley, P., Pywell, S. (2014) 'The ethical imperative of ascertaining and respecting the wishes of the minimally conscious patient facing a life-or-death decision', in: Sturma, D., Honnefelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, p. 79.

⁸⁹ Bundesamt für Justiz (Federal Office of Justice) (n.d.) *Grundgesetz für die Bundesrepublik Deutschland (German basic law) Art 2*. Available at: https://www.gesetze-im-internet.de/gg/art_2.html (Accessed: 04. November 2022).

⁹⁰ Bundesverfassungsgericht (BVerfG) (The Federal Constitutional Court) *Urteil des Zweiten Senats vom 26. Februar 2020 (Judgment of the Second Senate on 26 February 2020)- 2 BvR 2347/15 -, Rn. 1-343*, Available at: https://www.bundesverfassungsgericht.de/SharedDocs/Entscheidungen/DE/2020/02/rs20200226_2bvr234715.html (Accessed: 04. November 2022).

⁹¹ You can find more detailed information here: Deutsches Referenzzentrum für Ethik in den Biowissenschaften *Sterbehilfe (assisted suicide) - rechtliche Regelungen (legal regulations)*. Available at: <https://www.drze.de/im-blickpunkt/sterbehilfe/rechtliche-regelungen> (Accessed: 04. November 2022).

⁹² Catley, P., Pywell, S. (2014) 'The ethical imperative of ascertaining and respecting the wishes of the minimally conscious patient facing a life-or-death decision', in: Sturma, D., Honnefelder, L., Fuchs, M. (eds.). *Jahrbuch für Wissenschaft und Ethik*, 19. De Gruyter, p. 77.

⁹³ Eckhardt, A., Abegg, A., Seferovic, G., Ibric, S., Wolf, J. (2022): 'Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik'. Bern, Switzerland: TA-SWISS 78. Available at: <https://doi.org/10.3218/4138-5> (Accessed: 24 October 2022). p. 22ff.

4. Overview of gaps and challenges

This section highlights the main gaps and challenges identified in the previous sections.

Medical bioelectronic devices have already been used successfully for several decades. Examples include devices for measuring the electrical activity of the heart, for stimulating the heart muscle (e.g., cardiac pacemakers) as well as those for electrical stimulation of the brain. By enabling the acquisition of new skills and characteristics, neurotechnologies create a more permeable boundary between human beings and machines. This can have a strong impact on society's conception of humanity, the status of human beings and the way people interact with each other.⁹⁴ Numerous challenges continue to exist, such as ensuring the stability of the components under special conditions, their compatibility, and the necessary energy supply and efficiency. The National Regulatory Control Council (in German “Nationaler Normenkontrollrat”, NKR) recently called for reforming the legislative process in Germany. Chairman of the NKR Lutz Göbel stated that laws are often passed overly fast and under time pressure, leading to errors and undesirable consequences, as well as a lot of bureaucracy. He suggested involving more experts in the process in advance.⁹⁵ This demand also allows conclusions to be drawn about the development of neurotechnologies and their legal implications, insofar as better knowledge of the brain could lead to better-designed laws and fairer legal procedures. Scientific and engineering research in the field of non-medical and medical devices is closely intertwined, also from an ethical and legal point of view.⁹⁶ Consequently, researchers like Eckhardt et al. call for legislators to keep a close eye on the situation to ensure the safety and efficacy of neurotechnological products. They describe that the current relatively widespread assignment of nonmedical bioelectronic products to medical products, with their more burdensome testing procedures, hinders technological progress and increases the cost of these products.⁹⁷

⁹⁴ Ibid.

⁹⁵ Nationaler Normenkontrollrat (National Regulatory Control Council). Available at: <https://www.normenkontrollrat.bund.de/nkr-en> (Accessed: 04 November 2022).

⁹⁶ Eckhardt, A., Abegg, A., Seferovic, G., Ibric, S., Wolf, J. (2022): ‘Wenn Menschen ihren Körper mit Technik vernetzen. Grundlagen und Perspektiven nicht-medizinischer Bioelektronik’. Bern, Switzerland: TA-SWISS 78. Available at: <https://doi.org/10.3218/4138-5> (Accessed: 24 October 2022). p. 20.

⁹⁷ Ibid. p. 22f.

5. Conclusion

There are currently no significant cases in Germany that directly relate to neurotechnological applications. Also, in the German legal system, there is no explicit neuroright that could be applied to neurotechnologies. This means that the large body of legislation must be analysed regarding legal issues that are or potentially will be related to neurotechnologies. The analysis presented here is intended to serve as an example to show how wide-ranging the possible legal implications in the field of neurotechnologies can be. It is noticeable that these are often questions that do not necessarily point directly to legal issues relevant to neurotechnologies, such as the need for scientific findings to be reliable in order to serve as the basis for comprehensive patient consent.

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Annex 9.5 National Legal Case Study: Neurotechnologies in Ireland

D4.2 Comparative analysis of national legal case studies ○

December 2022



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D4.2 National legal case studies: Annex 9.5 – Neurotechnologies in Ireland

Work Package	WP4 Policy, legal and regulatory analysis		
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Partner name	Trilateral Research (TRI)		
Lead Author(s)	Julie Vinders, Ben Howkins, Iva-Nicole Mavrlja (TRI)		
Other contributors	Aindrias Cullen (TRI)		
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The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three to four technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Bunreacht na hÉireann	Constitution of Ireland
Dáil Éireann	Lower house of the Irish Parliament
Neurotechnologies	Devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons
Oireachtas	Irish Parliament
Seanad Éireann	Upper house of the Irish Parliament
Taoiseach	Irish Prime Minister

Table 2: List of Abbreviations

Term	Explanation
BCI	Brain computer interfaces
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CFREU	Charter of Fundamental Rights of the European Union
CJEU	Court of Justice of the European Union
CRC	International Covenant on Civil and Political Rights
CRC	Convention on the Rights of the Child

CRPD	Convention on the Rights of Persons with Disabilities
DBS	Deep Brain Stimulation
DNA	Deoxyribonucleic acid
DoA	Description of Action
DPC	Irish Data Protection Commission
ECHR	European Convention on Human Rights
ECoG	Electrocorticography
ECtHR	European Court of Human Rights
EEG	Electroencephalogram
eISB	Electronic Irish statute book
EU	European Union
fMRI	Functional Magnetic Resonance Imaging
GDPR	General Data Protection Regulation
HPRA	Health Products Regulatory Authority
HRCDC	Health Research Consent Declaration Committee
HRR	Health Research Regulations
ICERD	International Convention on the Elimination of All Forms of Racial Discrimination
ICESCR	International Covenant on Economic, Social and Cultural Rights
ISIS	Irish Sentencing Information System
IVDD	<i>In-Vitro</i> Diagnostic Devices
MDR	Medical Devices Regulation (EU)
MEG	Magnetoencephalography
NAI	Neurological Alliance of Ireland
NCA	National Competent Authority
PC	Project Coordinator
PIAB	Personal Injury Assessment Board
TAS	Treatment Abroad Scheme
WP	Work Package

Abstract

The objective of this study is to review the current state of the law on and legal responses to neurotechnologies in Ireland, as evidenced in policy, legislation (including, where applicable, the existence of proposals to create new law or adapt existing law in response to those neurotechnological developments), case law and regulation. It focuses on those issues affecting and/or contributing to fundamental human rights and freedoms, socio-economic inequalities, and stimulation of innovation within the domains of human rights law, privacy and data protection law, the use of neurotechnologies in criminal and civil legal proceedings, and liability for harms under tort, contract and criminal law. This study sets out the extent to which these legal domains already regulate neurotechnologies, before highlighting the ongoing gaps and challenges in the existing legal frameworks.

A summary overview of the main findings and legal issues surrounding neurotechnologies in Ireland is provided in Section 4.1.2 of the TechEthos Deliverable 4.2 summary comparative overview, to which this individual national legal case study report is annexed. In conjunction with the other national legal case studies on neurotechnologies and the other two technology families, namely climate engineering and digital extended reality (XR) technologies, this report provides the basis for the various neurotechnology-specific and cross-cutting regulatory challenges outlined in the summary comparative overview. This report is primarily aimed at informing relevant stakeholders, including Irish policymakers and regulators, of the main regulatory gaps and challenges applicable to neurotechnologies in Ireland.



1. Introduction

Neurotechnologies present many significant legal issues that impact socio-economic equality and fundamental rights in Ireland. This study provides an overview of those legal issues and challenges.

This study analyses relevant laws and policies from the Irish legal system in relation to neurotechnologies. There is no comprehensive or dedicated legislation in Ireland governing this technology family, although many elements of existing laws and policies in Ireland would apply to the use of such technologies. For the purpose of the TechEthos project and this national legal case study, we have used the following definition for neurotechnologies:

- **Neurotechnologies** refers to devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons.¹

The definition for this technology family is based on the TechEthos factsheets, as developed by work package 1 team members as part of the initial horizon scan.² For more information about the TechEthos technology families and their innovation ecosystems, visit: <https://www.techethos.eu/resources/>.

1.1 Purpose of the Irish legal case study

The objective of this study is to review the current state of the law on and legal responses to neurotechnologies in Ireland, as evidenced in policy, legislation, case law and regulation. We prepared this study through desk research, using legal research and academic databases such as the electronic Irish Statute Book (eISB).

Whilst there are no specific laws and policies on neurotechnologies in Ireland, many existing laws and policies (including human rights law, privacy and data protection law, use in criminal, civil and evidence law) are relevant and are likely to apply to the use of such technologies, including any harms resulting from them (covering tort, contract and criminal law in relation to liability for harms).

This study is part of a series of national legal case studies prepared in the TechEthos project covering three technology families: climate engineering, extended digital reality, and neurotechnologies. A complementary report covers the international and European Union law dimensions of the three technology families. The following table provides an overview of the nine national legal case studies conducted as part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

¹ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

² TechEthos (2022) *Technology Factsheet: Climate Engineering / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Climate-Engineering_website.pdf; TechEthos (2022) *Technology Factsheet: Neurotechnologies / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Neurotechnologies_website.pdf; TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.

Table 3: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Structure of the study

Section II explores the existing and proposed laws and policies that specifically address neurotechnologies. **Section III** explores the legal implications of neurotechnologies in relation to specific legal domains, including human rights law, privacy and data protection, use in criminal and civil legal proceedings, and liability for harms. **Section IV** provides an overview of the gaps and challenges in relation to the regulation of neurotechnologies. **Section V** concludes the case study followed by a reference list at the end.

1.3 Scope and limitations

This national legal case study of Ireland was prepared as part of the TechEthos project's work package 4 on policy, legal and regulatory analysis. Therefore, the scope is demarcated by the project task's workplan. The legal issues related to neurotechnologies are too vast to be covered comprehensively in a report of this size. Therefore, this national legal case study seeks to provide a high-level overview of the legal implications of neurotechnologies in Ireland, focusing on a pre-defined range of topics and legal frameworks with significant human rights and socio-economic impacts that are of high policy relevance. This defined scope allows for the comparative analysis of legal implications with the other TechEthos national legal case studies on neurotechnologies, namely Germany and the U.S.

1.4 Overview of the Irish legal system

Ireland is a unitary, parliamentary republic. Its legislature, the Oireachtas, is comprised of the *Dáil Éireann* (lower house) and the *Seanad* (upper house). The head of State is the Irish President, whilst the head of government is the *Taoiseach* (Prime Minister). Like most anglophone jurisdictions, Ireland is part of the common law family of legal systems, meaning its body of laws gradually evolved through judicial decisions. Much of Irish legal origins can be traced back to the common law of England.³ However, particularly since the Irish partition from the United Kingdom in 1921, Irish law has increasingly evolved into its own legal tradition.⁴ Sources of Irish law include case law, as well as legislation enacted by the *Oireachtas*, the Irish Constitution as enacted in 1937, and European Union law.⁵ International law, such as international treaties to which Ireland is party, may be incorporated into domestic law through Acts of the *Oireachtas*.⁶

³ Byrne, R. (1996) *The Irish legal system*. Dublin: Butterworths, p. 4.

⁴ *History of the Law in Ireland* / An tSeirbhís Chúirteanna Courts Service [Online]. Available at: <https://www.courts.ie/history-law-ireland>.

⁵ Byrne, R. (1996) *The Irish legal system*. Dublin: Butterworths, p. 5-7.

⁶ Constitution of Ireland (Bunreacht na hÉireann) (enacted by the People 1st July 1937, in operation as from 29th December 1937), Article 29 (6); Byrne, R. (1996) *The Irish legal system*. Dublin: Butterworths, p. 8.



The Irish legal system is comprised of various laws and statutes which govern several principles. The most fundamental law in Ireland is the Irish Constitution or *Bunreacht na hÉireann* which informs the validity of all other laws in Ireland. Other laws which are worth examining to inform the use of neurotechnologies include: criminal laws, evidence laws, and criminal procedure laws. Also relevant to this national legal case study is the Data Protection Act 2018 as examined in relation to issues surrounding privacy and data protection. Additional rules which may govern the working of the courts include Rules of the Superior Courts. Although these are not official pieces of regulation, they are informed by legislation and the Constitution.

The Irish Constitution:

The Irish Constitution (*Bunreacht na hÉireann*) sets out the fundamental principles which inform all parts of the Irish government including the legislative, executive and the judiciary. The importance of the Irish Constitution is found in its power to outline the way in which laws are written and executed. The Constitution also lays out fundamental rights, including personal rights and family rights, which are found in Articles 40 to 44. Furthermore, it advises the judiciary power in Ireland on how to act. For example, Articles 34 to 37 of the Irish Constitution outlines the basic laws of the Courts in Ireland including the powers and limitations of each Court that exists in Ireland.⁷ Articles 38 and 39 of the Constitution define the basic principles of trials of various offences. Notably, Article 38.1 finds that no person may be tried in a court of law without the observance of their due process rights.⁸ All laws enacted by the Oireachtas have to be compatible with the Irish Constitution.⁹

International and European Union law:

Ireland is party to a number of international treaties. The Irish Constitution recognises “principles of international law as its rule of conduct in relations with other States”.¹⁰ As a dualist legal system, international law becomes part of Irish domestic law through express incorporation by or under an Act of the Oireachtas.¹¹ This dualist aspect is expressed and enshrined in the Constitution, which states that “[n]o international agreement shall be part of the domestic law of the State save as may be determined by the Oireachtas.”¹² Some of the main United Nations (UN) treaties to which Ireland is a signatory, and which are relevant to this national legal case study, include the International Covenant on Civil and Political Rights (ICCPR), the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD), the International Covenant on Economic, Social and Cultural Rights (ICESCR), the Convention on the Rights of the Child (CRC), and the Convention on the Rights of Persons with Disabilities (CRPD).¹³

⁷ Bunreacht na hÉireann, Article 34-37.

⁸ Ibid Article 38 (1).

⁹ Sheridan, P. (2021) *Civil Law in Ireland / Lawyers in Ireland* [Online]. Available at: <https://www.lawyersireland.eu/civil-law-in-ireland#:~:text=The%20Irish%20legal%20system%20has,breaches%20of%20provisions%20of%20contract>

¹⁰ Bunreacht na hÉireann, Article 29 (3).

¹¹ Ibid Article 29 (6); *Treaties* / Department of Foreign Affairs, [Online]. Available at: <https://www.dfa.ie/our-role-policies/international-priorities/international-law/treaties/>.

¹² Bunreacht na hÉireann, Article 29(6).

¹³ International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.



Furthermore, Ireland is a Member State of the Council of Europe and incorporated the European Convention on Human Rights into Irish domestic law through an Act of the Oireachtas in 2003.¹⁴

Ireland is an EU Member State since 1973, and is subject to European Union laws, including Regulations, Directives, and Decisions.¹⁵

Irish court system

The Irish court system is split between two types of disputes: civil law proceedings and criminal law proceedings.¹⁶ Ireland has five distinct types of court, operating in a hierarchy. With a few exceptions, the district court is generally speaking the country's court of first instance, followed by the Circuit Court, High Court, Court of Appeal and Supreme Court.¹⁷ Ireland operates a jury system, and the right to a jury trial is recognised as a constitutional right for indictable criminal offences.¹⁸

1.5 Current state of neurotechnologies in Ireland

There are limited neurotechnology-specific policy and legal developments in Ireland. Neuroscience in itself is still a relatively young field.¹⁹ Some neurotechnologies, such as deep brain stimulation, are recognised procedures for treating neurological disorders, such as dystonia.²⁰ However, due to cost and lack of economies of scale, patients in Ireland are typically referred to hospitals elsewhere in the EU under the Treatment Abroad Scheme (TAS), or to hospitals the UK, in order to receive treatment.²¹

¹⁴ European Convention on Human Rights Act 2003 (Number 20 of 2003), Act of the Oireachtas (Ireland).

¹⁵ *Ireland* / European Union, [Online]. Available at: https://european-union.europa.eu/principles-countries-history/country-profiles/ireland_en.

¹⁶ *What the Courts do* / An tSeirbhís Chúirteanna Court Service, [Online]. Available at: <https://www.courts.ie/what-courts-do>.

¹⁷ *Ibid.*

¹⁸ Bunreacht na hÉireann, Article 38 (5).

¹⁹ *Irish Brain Council* / Neuroscience Ireland, [Online]. Available at: <https://neuroscienceireland.com/neuroscience-advocacy/>.

²⁰ *Ibid.*

²¹ *Ibid*; Regulation (EEC) No 1408/71 of the Council of 14 June 1971 on the application of social security schemes to employed persons and their families moving within the Community (OJ L 149, 5.7.1971, p. 2); Regulation (EEC) No 574/72 of the Council of 21 March 1972 fixing the procedure for implementing Regulation (EEC) No 1408/71 on the application of social security schemes to employed persons and their families moving within the Community, (OJ L 74, 27.2.1972, p. 1); Health Information and Quality Authority (2012) *Health technology assessment of a national deep brain stimulation service in Ireland*. Health Information and Quality Authority, [Online]. Available at: https://www.nai.ie/assets/45/114E52E4-0202-6A35-112B70131738C8D7_document/HTA-Deep-Brain-Stimulation-Service.pdf.



2. Neurotech-specific legal developments

This section provides an overview of the legal and policy developments pertaining to neurotechnologies in Ireland. It examines relevant policies and laws in relation to neurotechnologies and identifies the national authorities involved in the implementation and enforcement of such laws and policies.

Irish policy on neurotech

The Irish Department of Health is the governmental institution which seeks to improve the health and wellbeing of all people in Ireland.²² Headed by the Minister of Health, the Department of Health is responsible for setting the government's strategic health objectives. The Statement of Strategy 2021-2023 is the department's corporate strategy over a three-year period.²³ Whilst technological innovation and digitisation is seen as a key enabler, the policy document makes no reference to neurotechnologies. The Irish Health Services Executive is the publicly funded body responsible for the provision of health services. The National Strategy & Policy for the Provision of Neuro-Rehabilitation Services in Ireland does not explicitly refer to neurotechnological developments, such as advances in neuroimaging, as part of its overall vision.²⁴

Since 2013, the Irish Brain Council has provided a platform for policy development and advocacy in relation to brain research.²⁵ It is an umbrella organisation of groups and professional societies with an interest in brain research. The Irish Brain Council is committed to 'promoting neuroscience advocacy in Ireland through public outreach, legislative engagement, strategic partnership and individual member engagement.'²⁶ In its inaugural position paper of March 2017, the Irish Brain Council recognises the need for developing networks in order to create economies of scale in accessing emerging technologies, and sees access to emerging technologies as a means to becoming leader in brain health and research.²⁷ In this position paper, the Irish Brain Council also calls for legislative change and policy development to support brain health and research in Ireland.²⁸ Ireland's health information landscape is fragmented,

²² *About the Department of Health* / gov.ie, [Online]. Available at: <https://www.gov.ie/en/organisation-information/7d70f7-about-the-department-of-health/>.

²³ Department of Health (2021) *Department of Health: Statement of Strategy 2021-2023*. [Online]. Available at: <https://www.gov.ie/en/organisation-information/0fd9c-department-of-health-statement-of-strategy-2021-2023/#:~:text=supporting%20people%20to%20lead%20healthy,health%20and%20social%20care%20service,p.6.>

²⁴ Health Services Executive (2019) *National Strategy & Policy for the Provision of Neuro-Rehabilitation Services in Ireland: from Theory to Action*. [Online]. Available at: <https://www.hse.ie/eng/services/list/4/disability/neurorehabilitation/national-strategy-policy-for-the-provision-of-neuro-rehabilitation-services-in-ireland.pdf>.

²⁵ NAI, Irish Brain Council and Novartis (2015) *Meeting Report: Brain Research in Ireland – Delivering on the Potential*. Nai, Irish Brain Council and Novartis, [Online]. Available at: https://irishbraincouncil.files.wordpress.com/2015/05/brain_research_in_ireland_report.pdf.

²⁶ *Advocacy* / The Irish Brain Council, [Online]. Available at: <https://irishbraincouncil.com/advocacy/>.

²⁷ Clarke, S., et al. (2017) *Building a Supportive Framework for Brain Research in Ireland: Inaugural Position Paper – The Irish Brain Council*. Irish Brain Council, [Online]. Available at: <https://neuroscienceireland.com/wp-content/uploads/2017/03/ibc-position-paper-march-2017.pdf>, p. 12-13.

²⁸ *Ibid* 15.



and strong health information policies and legislation are required to support the introduction of new systems or technologies, such as electronic health records.²⁹

In addition to the Irish Brain Council, there are a number of not-for-profit organisations that seek to advance neuroscience and brain research in Ireland. Neuroscience Ireland, for instance, is Ireland's National Neuroscience Society. Established in 2005, this charitable organisation advocates for greater public and political awareness to advance neuroscience in Ireland.³⁰ The Neurological Alliance of Ireland (NAI) represents over thirty organisations advocating for the rights of people with a neurological condition in Ireland.³¹

Irish law on neurotech

There are no Irish laws that explicitly mention the regulation of neurotechnologies. Medical devices in general are regulated by the Health Products Regulatory Authority (HPRA) as the Competent Authority (CA) in Ireland.³² Medical devices legislation, which in Ireland is predominantly derived from the EU, distinguishes between three types of devices: general medical devices, active implantable medical devices, and *in-vitro* medical devices. Regulation 2017/45 on Medical Devices (MDR) and Regulation 2017/746 on *In-Vitro* Diagnostic Devices (IVDR) were adopted to replace earlier Directives and significantly strengthen the regulation of medical devices across the EU.³³ As Regulations, these EU laws are directly applicable in all EU Member States and do not need to be transposed into national law.³⁴

The MDR is the main piece of EU legislation applicable to the use of neurotechnologies and the introduction of such technologies on the Irish market. The MDR and its implications for the use of neurotechnologies in Ireland is considered in more detail in Section 3.4 below.

Proposals for dedicated law

There are no known active proposals for dedicated legislation on neurotechnologies in Ireland.

Responsibility for enforcement

The Department of Health is the Irish governmental department responsible for the development of the country's health policy and strategic objectives. The Health Services Executive is the national healthcare service and is publicly funded.³⁵ The Health Products Regulatory Authority (HPRA) is the Irish

²⁹ Rogers, M. et al. (2019) 'Building a supportive framework for brain research in Ireland: Inaugural position paper of the Irish Brain Council' *European Journal of Neuroscience*, 49, 1362-1370, [Online]. Available at: <https://doi.org/10.1111/ejn.14351> pp.1367-1368.

³⁰ *About us* / Neuroscience Ireland, [Online]. Available at: <https://neuroscienceireland.com/about/>.

³¹ *About us* / Neurological Alliance of Ireland, [Online]. Available at: https://www.nai.ie/go/about_us.

³² *Regulatory Information* / HPRA [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>.

³³ Regulation (EU) 2017/45 of the European Parliament and of the Council of 5 April 2017 on Medical Devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directive 90/385/EEC and 93/42/EEC, (OJ L 117, p. 1); Regulation (EU) 2017/746 of the European Parliament and of the Council of 5 April 2017 on in vitro diagnostic medical devices and repealing Directive 98/79/EC and Commission Decision 2010/227/EU, (OJ L 117, p. 176); *Regulatory Information* / HPRA [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>.

³⁴ *Regulatory Information* / HPRA [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>; Consolidated version of the Treaty on the Functioning of the European Union (2012) OJ C326/47, article 288.

³⁵ *HSE Organisational Structure* / HSE, [Online]. Available at: <https://www.hse.ie/eng/about/who/>.



regulator for medicines and medical devices.³⁶ It is the National Competent Authority (NCA) within the meaning of the MDR and regulates health products including devices to ensure they comply with relevant standards and legislation.³⁷

Significant legal cases

The most significant case law relates to the admissibility of neuroscientific evidence in legal proceedings for the purposes of *inter alia* establishing a relevant defence, such as insanity,³⁸ in criminal law cases, as well as quantifying injuries for the purposes of awarding damages in civil law cases (see further Section 3.3 below).³⁹

Current debates and future policy and/or legal developments

Whilst there are limited debates in Ireland on neurotechnologies specifically, various brain institutions are calling for more policy and legislative development in relation to brain research and health information sharing. The Irish Brain Council, in its 2017 inaugural paper, is calling for legislative change and policy development to support brain health and research in Ireland.⁴⁰ The Health Information and Quality Authority is also calling to reform Ireland's national health information system.⁴¹ The current lack of legislation hinders the coordination of information sharing between various health institutions.⁴²

³⁶ Keena C. (2018) *Implant Files: Medical devices may have caused more than 1,000 health incidents last year* / The Irish Times, [Online]. Available at: <https://www.irishtimes.com/news/ireland/irish-news/implant-files-medical-devices-may-have-caused-more-than-1-000-health-incidents-last-year-1.3708071>.

³⁷ *What We Regulate and How We Regulate* / HPRA, [Online]. Available at: <http://www.hpra.ie/homepage/about-us/how-we-regulate>; *Medical Devices* / European Medicines Agency, [Online]. Available at: <https://www.ema.europa.eu/en/human-regulatory/overview/medical-devices>; Regulation (EU) 2017/45 of the European Parliament and of the Council of 5 April 2017 on Medical Devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directive 90/385/EEC and 93/42/EEC, (OJ L 117, p. 1).

³⁸ *DPP v Ramzan* [2018] IESCDET 34, [2018] 2JIC 0512.

³⁹ *Oliver Bennett v John Codd and Wallace Taverns Ltd* [2020] IEHC 554, [2020] 11 JIC 0301.

⁴⁰ Clarke, S., et al. (2017) *Building a Supportive Framework for Brain Research in Ireland: Inaugural Position Paper – The Irish Brain Council*. Irish Brain Council, [Online]. Available at: <https://neuroscienceireland.com/wp-content/uploads/2017/03/ibc-position-paper-march-2017.pdf>, p. 15.

⁴¹ Health Information and Quality Authority (2019) *The Need to Reform Ireland's National Health Information System: to support the delivery of health and social care services*. Health Information and Quality Authority, Dublin, [Online]. Available at: <https://www.hiqa.ie/sites/default/files/2021-10/The-need-for-reform-of-the-health-information-system.pdf>.

⁴² *Ibid* 6.



3. Domain-specific legal issues

This section examines the legal implications of neurotechnologies in an Irish context with respect to specific legal domains with a high socio-economic impact. The legal domains covered include human rights law, privacy and data protection law, use in legal systems (criminal, civil and evidence law), and liability for harms (tort, contract and criminal).

The following sections discuss some of the ways that neurotechnologies are or may be governed by Irish law and policy within the frameworks of human rights (Section 3.1), privacy and data protection (Section 3.2), use in legal systems (Section 3.3), and liability for harms (Section 3.4). Each section begins with a brief introduction to the relevant legal issues and a summary of the Irish legal framework. Specific legal issues within the identified legal frameworks are then presented in more detail, with each discussion including specific references to existing (and proposed) law(s) and an explanation of how the law(s) may apply to neurotechnologies in Ireland. Overall, whilst there is no dedicated Irish law regulating the use of neurotechnologies, many aspects are subject to the identified domains of the Irish legal system.

3.1 Human rights law

The purpose of this section is to firstly (Section 3.1.1) outline the applicable human rights law frameworks under domestic and international law, focusing on four major sources, namely: the Irish Constitution, statutory law enacted by the *Oireachtas*, international human rights law and regional human rights law, including relevant EU law. In the second part of this section (Section 3.1.2), and before considering how the various sources of the right to privacy might protect against the misuse of brain and other neural data generated through the use of neurotechnologies (see Section 3.2.1), the prospective use of neurotechnologies for the purposes of rehabilitating criminal offenders will be situated against the protection afforded by the unenumerated constitutional right to bodily integrity.

3.1.1 Sources of Irish human rights law

The human rights law framework in Ireland includes a variety of national and international legal sources. The primary source of human rights law in Ireland is the Irish Constitution, one of the stated purposes of which is “that the dignity and freedom of the individual may be assured”.⁴³ Whilst several unenumerated constitutional rights have been recognised by the courts, including the right to bodily integrity (see Section 3.1.2), the right to privacy (see Section 3.2.1) and the right to be free from torture not to be subject to inhuman or degrading treatment or punishment,⁴⁴ the majority of fundamental rights are explicitly contained in the text of the Irish Constitution. Here, protected rights are grouped into personal rights,⁴⁵ family rights,⁴⁶ education rights,⁴⁷ children’s rights,⁴⁸ private property rights,⁴⁹ and religious rights.⁵⁰ In the context of neurotechnologies, the most applicable includes the following:

⁴³ Bunreacht na hÉireann, preamble.

⁴⁴ See, e.g., *The State (C.) v. Frawley* [1976] IR365.

⁴⁵ Bunreacht na hÉireann, Article 40.

⁴⁶ Ibid Article 41.

⁴⁷ Ibid Article 42.

⁴⁸ Ibid Article 42A.

⁴⁹ Ibid Article 43.

⁵⁰ Ibid Article 44.



- **Right to life;**⁵¹
- **Right to a fair trial;**⁵²
- **Right to equality before the law;**⁵³
- **Freedom of expression;**⁵⁴
- **The rights of the family,**⁵⁵ including **the rights of children;**⁵⁶
- **Freedom of conscience.**⁵⁷

An additional source of human rights law in Ireland is statutory law enacted by the *Oireachtas*, including:

- **The European Convention on Human Rights Act (2003)**, which gives “further effect” to the eponymous European Convention on Human Rights (ECHR), the cornerstone of the Council of Europe human rights law framework.⁵⁸ Domestic courts in Ireland are required to interpret and apply Irish law compatibly with the ECHR, while “every organ of the State” is similarly required to perform its functions “in a manner compatible with the State’s obligations under the Convention provisions.”⁵⁹
- **The Irish Human Rights and Equality Commission Act (2014)**, which creates the Irish Human Rights and Equality Commission (*Coimisiún na hÉireann um Chearta an Duine agus Comhionannas*)⁶⁰ and establishes a positive duty on public bodies to “eliminate discrimination”, “promote equality of opportunity”, and “protect the human rights of its members”.⁶¹

As an EU Member State, the **Charter of Fundamental Rights of the European Union** (CFREU)⁶² is applicable to the Irish government when implementing EU law. This means that the transposition of an EU directive or the passing of legislation to align with an EU regulation must be in accordance with the various rights contained therein, including the right to health,⁶³ the right to education,⁶⁴ and the right to rest.⁶⁵

⁵¹ Ibid Article 40.3.

⁵² Ibid Article 38.1.

⁵³ Ibid Article 40.1.

⁵⁴ Ibid Article 40.6.1.

⁵⁵ Ibid Article 41.

⁵⁶ Ibid Article 42A.

⁵⁷ Ibid Article 44.2.1.

⁵⁸ European Convention on Human Rights Act 2003, preamble.

⁵⁹ Ibid s.2(1)-3(1).

⁶⁰ Irish Human Rights and Equality Commission Act 2014, s.9.

⁶¹ Ibid, s.42(1)(a)-(c).

⁶² Charter of Fundamental Rights of the European Union (CFREU) (entry into force 18 December 2009) 2000/C 364/01.

⁶³ Ibid, Article 35.

⁶⁴ Ibid, Article 14.

⁶⁵ Ibid, Article 31(2).



In addition to constitutional, statutory and regional human rights law, Ireland is a state party to a number of United Nations (UN) international human rights law treaties, including the following:

- **International Covenant on Economic, Social and Cultural Rights (ICESCR);**⁶⁶
- **International Covenant on Civil and Political Rights (ICCPR);**⁶⁷
- **Convention on the Elimination of All Forms of Discrimination against Women (CEDAW);**⁶⁸
- **International Convention on the Elimination of All Forms of Racial Discrimination (ICERD);**⁶⁹
- **Convention on the Rights of the Child (CRC);**⁷⁰
- **Convention on the Rights of Persons with Disabilities (CRPD).**⁷¹

3.1.2 Human rights law implications

Neurotechnologies have the potential to impact human rights in many ways, both positively and negatively. In relation to some rights in particular contexts, neurotechnologies have the potential to enhance the enjoyment of rights, such as when neurotechnologies provide innovative treatment options that positively impact the right to health. In other situations, however, the use of neurotechnologies may interfere with protected human rights, for instance if use in the courtroom violates the prohibition on self-incrimination as guaranteed under international human rights law. Building upon the analysis in TechEthos Deliverable 4.1 of the various human rights protected under international and EU law that neurotechnologies may enhance and/or interfere with,⁷² this section explores the right to bodily integrity in relation to the prospective use of neurotechnologies in the criminal justice system for the purposes of staging medical interventions designed to rehabilitate offenders.

Right to bodily integrity

A key conceptual component of putative “neurorights” is the right to mental integrity, the progenitor for which is rooted in the more widely recognised and protected right to bodily integrity.⁷³ Indeed, although not explicitly contained within the Irish Constitution, the right to bodily integrity has been recognised by the courts as an unenumerated constitutional right guaranteeing protection against the physical intrusion on a person’s body, as well as freedom from torture and inhumane treatment.⁷⁴ Thus

⁶⁶ International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3.

⁶⁷ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI).

⁶⁸ Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13.

⁶⁹ International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX).

⁷⁰ Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3

⁷¹ Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

⁷² Santiago, N. et al. (2022) *TechEthos D4.1: Analysis of International and EU law and policy*. TechEthos Project Deliverable. Available at: <https://www.techethos.eu/>

⁷³ Ienca, M. (2021) Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields. Council of Europe. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

⁷⁴ Doyle, O. (2008) *Constitutional Law: Text, Cases and Materials*. Dublin: Clarus Press. p.124.



framed as a negative right,⁷⁵ the constitutional basis for this right is Article 40.3.1, which provides that “The State guarantees in its laws to respect, and, as far as practicable, by its laws to defend and vindicate the personal rights of the citizen.”⁷⁶ In the most widely cited judicial pronouncement on the right to bodily integrity, it is understood

to mean that no mutilation of the body or any of its members may be carried out on any citizen under authority of the law except for the good of the whole body and that no process which is or may, as a matter of probability, be dangerous or harmful to the life or health of the citizens or any of them may be imposed (in the sense of being made compulsory) by an Act of the Oireachtas.⁷⁷

Further case law has since considered the parameters of the protection against intrusions into physical integrity, with the Irish Court of Appeal extending this right and recognising that “[b]odily integrity includes psychological integrity.”⁷⁸ Protection for the latter right may be seen as closely connected to or a direct analogue for the so-called neuroright to mental integrity, which is conceptualised as protecting against harms arising from neurotechnology-related forced intrusion into and/or alteration of an individual’s neural processes.⁷⁹ In addition to protection as a matter of constitutional law, Ireland is a Member State of the European Union (EU), whose Charter of Fundamental Rights (CFREU) provides that “everyone has the right to respect for his or her physical and mental integrity”,⁸⁰ as well as being a state party to international human rights laws treaties establishing protection for bodily and/or mental integrity.⁸¹ As ratified by Ireland in 2018, the Convention on the Rights of Persons with Disabilities (CRPD), for instance, states that “[e]very person with disabilities has a right to respect for his or her physical and mental integrity on an equal basis with others.”⁸²

The issue of bodily integrity and the associated aspect of psychological integrity may be examined against prospective uses of neurotechnology in rehabilitative treatment of criminal offenders. Although the use of medical interventions for criminal rehabilitation has been limited to date,⁸³ emerging technologies involving direct brain interventions such as deep-brain stimulation (DBS) or neurotherapy may become more prevalent in the future.⁸⁴ The critical ethical-legal questions surrounding the use of such technologies relates to consent and the right to bodily and mental integrity. Several scholars have pointed to the potential ethical issues of using neurotechnologies for the purposes of treating offenders, for instance, noting that the right of voluntary consent should be given by the offender to interfere with their brain.⁸⁵ Other scholars, such as Douglas, have considered that committing a crime

⁷⁵ A negative right may be defined as the right not to be subjected to actions (usually abusive) by another person or group. Where the person is subjected to, for instance, an abusive act by another person or institution, it may be said their negative right (such as the one for bodily integrity) is being breached.

⁷⁶ Bunreacht na hÉireann, Article 40.3.1.

⁷⁷ *Ryan v. Attorney General* [1962] No.913 P; *Ryan v Attorney General* [1965] IR 294.

⁷⁸ *McDonnell v The Governor of Wheatfield Prison* [2015] IECA 216, [2015] 2 ILRM 361, [58].

⁷⁹ Ienca, M. and Andorno, R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>

⁸⁰ Charter of Fundamental Rights of the European Union 2012/C 326/02, Article 3.

⁸¹ See, e.g., International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI).

⁸² Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106, Article 17.

⁸³ Douglas, T. (2014) ‘Criminal Rehabilitation Through Medical Intervention: Moral Liability and the Right to Bodily Integrity’, *The Journal of Ethics*, Vol. 18(1), pp.101-122. DOI: <https://doi.org/10.1007/s10892-014-9161-6>

⁸⁴ Gkotsi, G.M., Benaroyo, L. (2012) ‘Neuroscience and the Treatment of Mentally Ill Criminal Offenders: Some Ethical Issues’ *Journal of Ethics in Mental Health*, 6 (Supplement).

⁸⁵ See, e.g., Craig, J.N. (2016) ‘Incarceration, Direct Brain Intervention, and the Right to Mental Integrity- a Reply to Thomas Douglas’ *Neuroethics*, 9 (1); Gkotsi, G.M., Benaroyo, L. (2012) ‘Neuroscience and the

may render individuals morally liable for accepting certain types of medical treatment, prospectively including neuroscientific interventions.⁸⁶ However, this view may be considered particularly problematic in the context of invasive neurotechnological procedures, such as DBS.⁸⁷

The Irish criminal justice system has adopted several ways in which treatment is proposed for those who have come into contact with the criminal justice system. One of such ways is through Drug Treatment Courts. Drug Treatment Courts in Ireland provide a programme for treatment and rehabilitation of individuals who have pleaded guilty or have been found guilty of violent crimes in the District Court.⁸⁸ Individuals are referred to the programme by the District Court Judge, but participation is voluntary.⁸⁹ Similarly, where individuals with mental disorders present to the District Court, the Bail Act 1997 finds the Court may consider appropriate conditions for granting bail.⁹⁰ These may include attending psychiatric centres. However, the District Court does not have a statutory power to impose custody to psychiatric centres or other treatment facilities. They may comment on the need for treatment, or inquire that *An Garda Síochána* (see Section 3.3 below) uses their power to place them under custody,⁹¹ but consent to and participation in treatment is done on a voluntary basis.⁹² Based on current trends, it seems any novel rehabilitative treatment proposals, including neuroscientific techniques, would solely be considered on a voluntary basis.

3.2 Privacy and data protection law

Neurotechnologies collect and process brain and other neural data that can be used to gain insights into brain activity, mental states and emotions, primarily for the purposes of medical treatment and research, but also increasingly for consumer-directed purposes. The collection and processing of such data, however, raises significant concerns related to privacy and data protection law. In Ireland, there are multiple sources of privacy and data protection law, including the Constitution, statute and the common law, as well as the State's obligations under international law and, in particular, EU law. Of particular importance is the General Data Protection Regulation (GDPR), which establishes a comprehensive framework for privacy and data protection that is directly applicable in all EU Member States.⁹³ Ireland has given "further effect"⁹⁴ to this provision through its enactment of the Data Protection Act 2018 and, moreover, assumed an active role in shaping how this regulation applies in practice.

Treatment of Mentally Ill Criminal Offenders: Some Ethical Issues' *Journal of Ethics in Mental Health*, 6 (Supplement); Kirchmair, L. (2019) 'Objections to Coercive Neurocorrectives for Criminal Offenders- Why Offenders' Human Rights Should Fundamentally Come First' *Criminal Justice Ethics*, 38 (1).

⁸⁶ Douglas, T. (2014) 'Criminal Rehabilitation Through Medical Intervention: Moral Liability and the Right to Bodily Integrity' *The Journal of Ethics*, Vol. 18(1), pp.101-122. DOI: <https://doi.org/10.1007/s10892-014-9161-6>

⁸⁷ Deep-brain stimulation involves the use of surgically implanted devices to deliver electrical stimulation to targeted areas deep in the brain. It may be used for treatment of movement disorders and is being proposed for use on other neurological disorders although this is still debated in the scientific industry (Gkotsi, G.M., Benaroyo, L. (2012) 'Neuroscience and the Treatment of Mentally Ill Criminal Offenders: Some Ethical Issues' *Journal of Ethics in Mental Health*, 6 (Supplement).)

⁸⁸ The Courts Service of Ireland. (2022) *What Happens in The Drug Treatment Court* / [Online]. Available at: <https://www.courts.ie/what-happens-drug-treatment-court-0>.

⁸⁹ Loughran, H., Hohman, M., Carolan, F., Bloomfield, D. (2015) 'Practice Note: The Irish Drug Treatment Court' *Alcoholism Treatment Quarterly*, 33 (1).

⁹⁰ Bail Act 1997, s. 6 (1) (b).

⁹¹ This may be carried out under section 12 of the Mental Health Act 2001.

⁹² Whelan, D. (2007) 'Fitness for Trial in The District Court: The Legal Perspective', *Judicial Studies Institute Journal*, 2 (1).

⁹³ Consolidated version of the Treaty on the Functioning of the European Union C-326/49, Article 288.

⁹⁴ Data Protection Act 2018, preamble.

The hosting of the European headquarters of multiple Big Tech multinational corporations, including Google, Meta and LinkedIn, has enabled the Irish Data Protection Commission (DPC), the domestic “supervisory authority” constituted in accordance with the GDPR,⁹⁵ to monitor the data processing activities of these companies for compliance with the GDPR, both in Europe and extraterritorially.⁹⁶ The latter is underscored by the judgements of *Schrems I*,⁹⁷ and *Schrems II*,⁹⁸ following an action brought before the Irish High Court against Facebook Ireland, from which a request for a preliminary ruling⁹⁹ resulted in the Court of Justice of the European Union (CJEU) invalidating two separate adequacy determinations by the European Commission,¹⁰⁰ leading to first the Safe Harbour and latterly the Privacy Shield data transfer and sharing agreements between the U.S. and the EU being struck down. Although an agreement in principle for a new Trans-Atlantic Data Privacy framework between the EU and the US has since been reached,¹⁰¹ this highlights a general point relating to the scope of this inquiry, namely: it should be borne in mind that whilst the focus of this section is upon specific aspects of privacy and data protection law in Ireland, the wider legal implications of and issues associated with the GDPR for the regulation of neurotechnologies in the EU, as analysed in TechEthos Deliverable 4.1,¹⁰² are also relevant.

3.2.1 Privacy

The various applications of neurotechnologies, both within and outside clinical and research contexts, present a wide range of challenges related to the right to privacy, including discriminatory use and unwanted disclosure of potentially highly sensitive information, as well as intrusion into the inner sanctum of the brain.¹⁰³ The right to privacy in Ireland is protected by various legal frameworks, including the Constitution, statutes and statutory instruments, as well as the State’s obligations under international law and EU law.

The right to privacy is not expressly provided for nor guaranteed by the Constitution of Ireland but is considered to be an unenumerated right implicitly embedded within it.¹⁰⁴ Through case law it has been recognised that although not “an unqualified right”, nor “specifically guaranteed by the Constitution, the right to privacy is one of the fundamental personal rights of the citizen which flow from the Christian and democratic nature of the state.”¹⁰⁵ This right was first recognised by a 4:1 majority of the Supreme Court in the context of marital relations, with Walsh J holding that “Article 41 of the Constitution

⁹⁵ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Article 51.

⁹⁶ McLaughlin, S. (2018) ‘Ireland: A Brief Overview of the Implementation of the GDPR’, *European Data Protection Law Review*, vol.4:2, pp.227-234, pp.234. DOI: 10.21552/edpl/2018/212.

⁹⁷ Judgement of the Court (Grand Chamber) of 6 October 2015 Case C-362/14 *Maximillian Schrems v Data Protection Commissioner*.

⁹⁸ Judgement of the Court (Grand Chamber) of 16 July 2020 Case C-311/18 *Data Protection Commissioner v Facebook Ireland Limited and Maximillian Schrems*.

⁹⁹ Consolidated version of the Treaty on the Functioning of the European Union C-326/49, Art.267.

¹⁰⁰ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.45.

¹⁰¹ European Commission. (2022) *European Commission and United States Joint Statement on Trans-Atlantic Data Privacy Framework* / European Commission [Online]. Available at: https://ec.europa.eu/commission/presscorner/detail/en/ip_22_2087

¹⁰² Santiago, N. et al. (2022) *TechEthos D4.1: Analysis of International and EU law and policy*. TechEthos Project Deliverable. Available at: <https://www.techethos.eu/>

¹⁰³ Jwa, A.S., and Poldrack, R.A. (2022) ‘Addressing privacy risk in neuroscience data: from data protection to harm prevention’, *Journal of Law and the Biosciences*, vol.9:2, pp.1-25.DOI: <https://doi.org/10.1093/jlb/lsac025>

¹⁰⁴ Kelleher, D. (2015) *Privacy and Data Protection Law in Ireland* (2nd Edition. Bloomsbury) pp.7.

¹⁰⁵ *Kennedy v Ireland* [1987] I.R. 587 at 591.



guarantees the husband and wife against...invasion of their privacy by the State.”¹⁰⁶ Following this, the High Court held that the “personal rights of the citizen”¹⁰⁷ include an unenumerated general right to privacy which protects against the “deliberate, conscious and unjustified interference” with the telephone conversations of private parties by State agents.¹⁰⁸

It has been observed that there are “many different facets of the right to privacy”, with particular aspects of the right having application to various other constitutional rights, including the right to voting under Article 16, the rights of certain litigants under Article 34, the right to freedom from arrest and detention under Article 40.4, the right to inviolability of the dwelling under Article 40.5, the rights to freedom of opinion, assembly and association under Article 40.6.1, the rights of the family under Article 41 (including with regard to education under Article 42), the right of private property under Article 43 and the right to freedom of conscience and free practice of religion under Article 44,¹⁰⁹ as well as the right to personal autonomy implicit in Articles 40.3.1 and 40.3.2 and the commitment to respect for human dignity and freedom of the individual in the preamble.¹¹⁰

Aspects of the right to privacy are also protected by statutes and statutory instruments.¹¹¹ For example, the Privacy and Electronic Communications Regulations 2011, as amended in 2019,¹¹² refer to “the right to privacy” of users and subscribers in the context of itemised billing for electronic communications services.¹¹³ Additionally, the European Convention on Human Rights Act (2003) requires that when “interpreting and applying any statutory provision or rule of law, a court shall, in so far as is possible, subject to the rules of law relating to such interpretation and application, do so in a manner compatible with the State’s obligations under the Convention provisions.”¹¹⁴ It also requires that every organ of the State performs “its functions in a manner compatible with the State’s obligations under the Convention provisions.”¹¹⁵ This means that both courts and public bodies are required to uphold the various rights contained in the European Convention on Human Rights (ECHR), including the right of everyone “to respect for his private and family life, his home and his correspondence.”¹¹⁶

Regarding its obligations under international law, Ireland ratified the International Covenant on Civil and Political Rights (ICCPR) in December 1989, Article 17 of which provides that “[n]o one shall be subjected to arbitrary or unlawful interference with his privacy, family, home, or correspondence, nor to unlawful attacks on his honour and reputation.” Further, as indicated above, Ireland has signed and ratified the ECHR and is therefore obligated to respect the right to private and family life under Article 8. Lastly, following its accession to membership of the EU (formerly the European Economic Community) in January 1973, Ireland is bound by the Charter of Fundamental Rights of the European Union (CFREU) when implementing EU law,¹¹⁷ Article 7 of which provides that “[e]veryone has the right to respect for his or her private and family life, home and communications.”

A key consideration emerging from the foregoing is whether the right to privacy, as effected by international and domestic law, including constitutional law, protects against interference with brain and other neural data generated through the use of neurotechnologies. In the case law identified above

¹⁰⁶ *McGee v Attorney General* [1974] IR 284 at 313.

¹⁰⁷ Bunreacht na hÉireann, Article 40.3.1.

¹⁰⁸ *Kennedy v Ireland* [1987] I.R. 587 at 592.

¹⁰⁹ *Norris v The Attorney General* [1984] I.R. 36 at 100-101.

¹¹⁰ *Schrems v Data Protection Commissioner* [2014] IEHC 310 at 53.

¹¹¹ Kelleher, D. (2015) *Privacy and Data Protection Law in Ireland* (2nd Edition. Bloomsbury) pp.27.

¹¹² European Communities (Electronic Communications Networks and Services) (Privacy and Electronic Communications) (Amendment) Regulations 2019.

¹¹³ European Communities (Electronic Communications Networks and Services) (Privacy and Electronic Communications) Regulations 2011, Reg.7(2).

¹¹⁴ European Convention on Human Rights Act 2003, s.2(1).

¹¹⁵ *Ibid* s.3(1).

¹¹⁶ European Convention on Human Rights (ECHR) (as amended by Protocols 11, 14 and 15) (entry into force 3 September 1953) E.T.S. 5, 4.XI.1950, Article 8.

¹¹⁷ Charter of Fundamental Rights of the European Union 2012/C 326/02, Article 51(1).



it has been recognised that the Constitution provides for a general right to privacy, which establishes that the privacy interests of private citizens are protected against intrusion by the State and State agents. However, the specific circumstances in which the right to privacy was recognised as being engaged related to the sexual relationship of private citizens and the unlawful interference with private citizens' communications, neither of which have straightforward application to the privacy challenges associated with neurotechnologies.

The right to privacy under the ECHR, however, is potentially more applicable. In this context, brain and other neural data might be considered analogous to genetic and biometric data, including cellular samples, DNA profiles and dactyloscopic data, the collection and/or retention of which has been determined by the European Court of Human Rights (ECtHR) in various cases before it to constitute a *prima facie* interference with the right to respect for private life.¹¹⁸ Also relevant here is the interpretation of the right to privacy under Article 8 to protect information relating to an individual's health, including mental health.¹¹⁹ Should the ECtHR recognise through a declaration, decision, advisory opinion or judgement that these or another basis for privacy protection are applicable to brain and other neural data, such protections may also be made available as a matter of domestic law, with Irish courts bound by the European Convention on Human Rights Act to "take due account of the principles laid down by those declarations, decisions, advisory opinions, opinions and judgements."¹²⁰

3.2.2 Data protection

The wide range of primarily clinical applications of neurotechnologies raises a variety of potential challenges in relation to Irish data protection law, chief among which is the legal status of, and protection afforded to, brain and other neural data. Ireland has signed and ratified a number of international data protection law treaties, including those relating to the automatic processing of personal data,¹²¹ national compliance bodies and transborder data flows.¹²² In addition to its obligations under international law, Ireland has also enacted various data protection statutes and statutory instruments. The E-Privacy Regulations,¹²³ for instance, establish specific rules applicable "to the processing of personal data in connection with the provision of publicly available electronic communication services",¹²⁴ including that "the listening, tapping, storage or other kinds of interception or surveillance of communications and the related traffic data by persons other than users, without the consent of the users concerned, is prohibited."¹²⁵ The primary statutory source of data protection law in Ireland, however, is the Data Protection Acts 1988 to 2018, implementing the Council of Europe Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data,¹²⁶

¹¹⁸ See, e.g., *Case of S. and Marper v. The United Kingdom* (Application nos.30562/04 and 30566/04) (4 December 2008); *Case of Gaughran v. The United Kingdom* (Application no.45245/15) (13 February 2020).

¹¹⁹ See, e.g., *Case of Surikov v. Ukraine* (Application no.42788/06) (26 January 2017); *Case of Mockutė v. Lithuania* (Application no.66490/09) (27 February 2018).

¹²⁰ European Convention on Human Rights Act 2003, s.4

¹²¹ Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data (ETS No. 108) (entry into force 10 October 1985).

¹²² Additional Protocol to the Convention for the Protection of Individuals with regard to Automatic Processing of Personal Data, regarding supervisory authorities and transborder data flows (ETS No. 181) (entry into force 1 July 2004).

¹²³ European Communities (Electronic Communications Networks and Services) (Privacy And Electronic Communications) Regulations 2011.

¹²⁴ *Ibid* Reg.3(1).

¹²⁵ *Ibid* Reg.5(1).

¹²⁶ CETS 108.



the European Union (EU) Data Protection Directive 95/46/EC,¹²⁷ and Regulation 2016/679,¹²⁸ respectively.

The latter General Data Protection Regulation (GDPR) seeks to enhance individuals' rights to privacy and data protection by establishing a comprehensive framework for the governance of data processing that is directly applicable in all EU Member States, including Ireland.¹²⁹ The Data Protection Act 2018 gives "further effect" to this provision,¹³⁰ for instance by creating a supervisory authority pursuant to Article 51 GDPR,¹³¹ while also promoting closer alignment with EU data protection law by repealing, subject to certain exceptions,¹³² the majority of the provisions contained in the Data Protection Act 1988 as amended by the Data Protection (Amendment) Act 2003.¹³³ Both the Data Protection Act 2018 and the GDPR apply "to the processing of personal data wholly or partly by automated means and to the processing other than by automated means of personal data which form part of a filing system or are intended to form part of a filing system."¹³⁴ When "processing" personal data, for instance by collecting, recording or disseminating such information,¹³⁵ data controllers and processors are required to comply with various principles,¹³⁶ including that personal data is processed lawfully, fairly and "for one or more specified, explicit and legitimate purposes".¹³⁷

The concept of "personal data" is not separately defined in the Data Protection Act 2018 and thus, in accordance with s.2(2),¹³⁸ the term has the same expansive meaning as provided for in the GDPR, namely "any information relating to an identified or identifiable natural person ('data subject'); an identifiable natural person is one who can be identified, directly or indirectly, in particular by reference to an identifier such as a name, an identification number, location data, an online identifier or to one or more factors specific to the physical, physiological, genetic, mental, economic, cultural or social identity of that natural person".¹³⁹ Although not defined specifically, reference to mental identity may indicate that brain and other neural data are likely to be treated as personal data, particularly as it has been noted that such data is uniquely related to an individual when collected and processed through neurotechnologies such as electroencephalography (EEG) and functional magnetic resonance imaging

¹²⁷ Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data OJ L 281.

¹²⁸ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119.

¹²⁹ Ibid Art.3; Consolidated version of the Treaty on the Functioning of the European Union C-326/49, Article 288.

¹³⁰ Data Protection Act 2018, preamble.

¹³¹ Ibid s.11.

¹³² Ibid s.8(1)(a)-(b); s.8(2)-(3).

¹³³ Ibid s.7.

¹³⁴ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.2(1).

¹³⁵ Ibid Art.4(2).

¹³⁶ Data Protection Act 2018, s.71(1); Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.5.

¹³⁷ Data Protection Act 2018, s.71(1)(a)-(b).

¹³⁸ "Subject to subsection (1), a word or expression used in this Act, other than in Part 5, that is also used in the Data Protection Regulation has, unless the context otherwise requires, the same meaning in this Act as it has in that Regulation."

¹³⁹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.4(1).

(fMRI).¹⁴⁰ There are also various neurotechnological applications the effective use of which may require the processing of personal data so defined. For instance, it has been suggested that the optimum functioning and operability of various brain computer interfaces (BCIs), as used for a variety of clinical and consumer-related purposes, depends on the calibration of, and is therefore constitutive of a potentially identifying link between, the brain signal recordings obtained by the device and its user.¹⁴¹

Alongside the requirements relating to the processing of personal data, both the GDPR and the Data Protection Act 2018 regulate the processing of special categories of personal data, the definition for and types of data included within which are substantially similar.¹⁴² In accordance with Article 9(4) GDPR, pursuant to which it is provided that “Member States may maintain or introduce further conditions, including limitations, with regard to the processing of genetic data, biometric data, or data concerning health”,¹⁴³ s.41 and s.46-54 of the Data Protection Act 2018 specifies a range of circumstances in which the processing of special category personal data is permitted,¹⁴⁴ including for purposes of employment and social welfare law,¹⁴⁵ legal advice and legal proceedings,¹⁴⁶ and insurance and pension purposes.¹⁴⁷ The processing of special category personal data outside of these specified circumstances is subject to compliance with Article 9 GDPR,¹⁴⁸ which identifies a number of exceptions to the prohibition on the processing of such data,¹⁴⁹ including that the “data subject has given explicit consent”.¹⁵⁰ In the context of neurotechnologies, the attainment of explicit and informed consent may be difficult to achieve, particularly in circumstances where the consequences are not fully known or are still being understood.

Of the various circumstances in which the processing of special category personal data is permitted, most relevant to neurotechnologies such as neuroimaging, neuromodulation and neurostimulation, the primary application of which is in a clinical context for a range of diagnosis, treatment,¹⁵¹ and research purposes,¹⁵² is s.53 of the Data Protection Act 2018. This provision permits as lawful the processing of special categories of personal data “where it is necessary for public interest reasons in the area of public health”, such as “protecting against serious cross-border threats to health and ensuring high standards of quality and safety of health care and of medicinal products and medical devices.”¹⁵³ There are a range of medical neurotechnology applications, including invasive neurosurgical procedures such as Deep

¹⁴⁰ Ienca, M., and Malgieri, G. (2022) ‘Mental data protection and the GDPR’, *Journal of Law and the Biosciences*, vol.9:1, pp.1-19. DOI: <https://doi.org/10.1093/jlb/lzac006>

¹⁴¹ Rainey, S., et al. (2020) ‘Is the European Data Protection Regulation sufficient to deal with emerging data concerns relating to neurotechnology?’, *Journal of Law and the Biosciences*, vol.7:1, pp.10. DOI: <https://doi.org/10.1093/jlb/lzaa051>

¹⁴² Data Protection Act 2018, s.2(1); Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.9(1).

¹⁴³ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.9(4).

¹⁴⁴ Data Protection Act 2018, s.41, 45-54.

¹⁴⁵ Ibid s.46.

¹⁴⁶ Ibid s.47.

¹⁴⁷ Ibid s.50.

¹⁴⁸ Ibid s.45(b).

¹⁴⁹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.9(2)(a)-(j).

¹⁵⁰ Ibid Art.9(2)(a).

¹⁵¹ See, e.g., Ning, S. et al. (2022) ‘Neurotechnological Approaches to the Diagnosis and Treatment of Alzheimer’s Disease’, *Frontiers in Neuroscience*, 16 (854992). DOI:10.3389/fnins.2022.854992.

¹⁵² See, e.g., Vázquez-Guardado, A., Yang, Y., Bandodkar, A.J., et al. (2020) ‘Recent advances in neurotechnologies with broad potential for neuroscience research’, *Nature Neuroscience*, vol.23, pp.1522-1536. DOI: <https://doi.org/10.1038/s41593-020-00739-8>

¹⁵³ Data Protection Act 2018, s.53(a)-(b).

Brain Stimulation (DBS) and neuroimaging techniques such as fMRI, EEG and the more invasive electrocorticography (ECoG), through which the processing of special category personal data in the form of data concerning health may accordingly be lawful, subject to the implementation of “suitable and specific measures to safeguard the fundamental rights and freedoms of data subjects”.¹⁵⁴ More challenging is the example of newly emerging consumer neurotechnologies, for which it has been suggested the enhanced level of protection prospectively afforded to brain and other neural data classified as “data concerning health” may not be applicable as a result of the data being collected and processed for non-clinical health-related applications and therefore falling outside the scope of medical device regulatory regimes.¹⁵⁵ The exception to this is if such devices are used in the context of health-related research, in relation to which the broad remit of Section 3 of the Health Research Regulations (HRRs) will likely apply (see Section 3.2.3 below).¹⁵⁶

Finally, both the GDPR and the Data Protection Act 2018 introduce various rights of the data subject, including a right of access,¹⁵⁷ a right not to be subject to a decision based solely on automated processing, including profiling,¹⁵⁸ and a right to erasure.¹⁵⁹ The particular characteristics of brain and other neural data, however, may pose significant challenges to ensure effective realisation of these rights.¹⁶⁰ For example, the right to erasure, also known as the “right to be forgotten”,¹⁶¹ enables data subjects to request the deletion of their personal data by data controllers, yet there are various potential challenges to the realisation of this right in practice, including the potential re-identifiability of brain data and other neural data, the retention of “unconscious” brain and other neural data of which the data subject is unaware, and the risk of negatively impacting the accuracy of predictive models.¹⁶²

3.2.3 Health research

As noted above, notwithstanding the overall increase in consumer-facing applications, the primary use case of neurotechnologies is in a clinical context for a variety of treatment and research purposes, including exploring functions of the brain, deciphering neural code, and gaining an improved

¹⁵⁴ Ibid s.53.

¹⁵⁵ Ienca, M., et al. (2022) ‘Towards a Governance Framework for Brain Data’, *Neuroethics*, vol.15. DOI: <https://doi.org/10.1007/s12152-022-09498-8>; Rainey, S., et al. (2020) ‘Is the European Data Protection Regulation sufficient to deal with emerging data concerns relating to neurotechnology?’, *Journal of Law and the Biosciences*, vol.7:1, pp.14. DOI: <https://doi.org/10.1093/jlb/lcaa051>

¹⁵⁶ Data Protection Act 2018 (Section 36(2)) (Health Research) Regulations 2018.

¹⁵⁷ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.15; Data Protection Act 2018, s.91.

¹⁵⁸ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.22; Data Protection Act 2018, s.89.

¹⁵⁹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.17; Data Protection Act 2018, s.92.

¹⁶⁰ Ienca, M. et al. (2022) ‘Towards a Governance Framework for Brain Data’, *Neuroethics*, vol.15. DOI: <https://doi.org/10.1007/s12152-022-09498-8>

¹⁶¹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.17.

¹⁶² Ienca, M. et al. (2022) ‘Towards a Governance Framework for Brain Data’, *Neuroethics*, vol.15. DOI: <https://doi.org/10.1007/s12152-022-09498-8>



understanding of neurological diseases and disorders.¹⁶³ Such neuroscientific research can also be used to uncover cognitive mechanisms which may help to evidence and explain different behavioural findings.¹⁶⁴ In recognition of the importance of research and innovation,¹⁶⁵ the GDPR provides that where data “processing is necessary” for inter alia scientific research, including health research, such data processing is exempt from the prohibition on the processing of special categories of personal data,¹⁶⁶ a category which includes “data concerning health”.¹⁶⁷ To avail of this exception, however, such research must also be “in accordance with Article 89(1)”,¹⁶⁸ through which the EU identifies some of the general features of the framework of “appropriate safeguards” to be established by the Member States, such as to “ensure that technical and organizational measures are in place in particular in order to ensure respect for the principle of data minimisation”,¹⁶⁹ but in general leaves the specific content of its implementation to the discretion of the Member States.

In Ireland, the Health Research Regulations (HRR),¹⁷⁰ as effectuated under Article 36(2) of the Data Protection Act 2018,¹⁷¹ institute a framework of “appropriate safeguards” pursuant to Article 89(1) GDPR, accordingly requiring that the processing of personal data for the purposes of health research is compliant with a range of “suitable and specific measures”¹⁷² relating to governance,¹⁷³ processes and procedures.¹⁷⁴ The broad definition of “health research” as “research for the purpose of human health”, including “research that is specifically concerned with innovative strategies, devices, products or services for the diagnosis, treatment or prevention of human disease or injury” and “research with the goal of improving the diagnosis and treatment (including the rehabilitation and palliation) of human disease and injury and of improving the health and quality of life of individuals”,¹⁷⁵ indicates that health research involving the use of neurotechnologies will be subject to compliance with these requirements.

The various “suitable and specific” measures are designed to “safeguard the fundamental rights and freedoms of the data subject”,¹⁷⁶ and firstly require that personal data is processed “as is necessary to achieve the object of the health research” and not “in such a way that damage or distress is, or is likely to be, caused to the data subject”.¹⁷⁷ Data controllers are then further required to establish appropriate governance structures, including by attaining ethical approval from a research ethics committee,¹⁷⁸ following on from which “processes and procedures relating to the management and conduct of health research” must be put in place,¹⁷⁹ such as “controls to limit access to the personal data undergoing

¹⁶³ Stieglitz, T. (2021) ‘Why Neurotechnologies? About the Purposes, Opportunities and Limitations of Neurotechnologies in Clinical Applications’, *Neuroethics*, vol.14, pp.5-16, pp.5. DOI: <https://doi.org/10.1007/s12152-019-09406-7>.

¹⁶⁴ Diamond, A. and Amso, D. (2008) ‘Contribution of Neuroscience to Our Understanding of Cognitive Development’, *Current Directions in Psychological Science*, vol.17:2, pp.136-141. DOI: <https://doi.org/10.1111%2Fj.1467-8721.2008.00563.x>

¹⁶⁵ Kirwan, M. et al. (2021) ‘What GDPR and the Health Research Regulations (HRRs) mean for Ireland: “explicit consent” – a legal analysis’, *Irish Journal of Medical Science*, vol.190, pp.515-521, pp.516. DOI: <https://doi.org/10.1007/s11845-020-02331-2>

¹⁶⁶ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Article 9(2)(j).

¹⁶⁷ Ibid Article 9(1).

¹⁶⁸ Ibid Article 9(2)(j).

¹⁶⁹ Ibid Article 89(1).

¹⁷⁰ Data Protection Act 2018 (Section 36(2)) (Health Research) Regulations 2018.

¹⁷¹ Ibid preamble.

¹⁷² Ibid Reg.3(1).

¹⁷³ Ibid Reg.3(1)(b).

¹⁷⁴ Ibid Reg.3(1)(c).

¹⁷⁵ Ibid Reg.3(2)(a)(i)-(v).

¹⁷⁶ Ibid Reg.3(1).

¹⁷⁷ Ibid Reg.3(1)(a).

¹⁷⁸ Ibid Reg.3(1)(b)(i).

¹⁷⁹ Ibid Reg.3(1)(c).



processing in order to prevent unauthorised consultation, alteration, disclosure or erasure of personal data”.¹⁸⁰ The final two requirements under Reg.3(1) are for data controllers to make “arrangements to ensure that personal data are processed in a transparent manner”,¹⁸¹ as well as to ensure the “explicit consent” of the data subject has been obtained “prior to the commencement of the health research”.¹⁸²

The requirement to obtain “explicit consent” relates to the processing of the data subject’s “personal data for the purpose of specified health research, either in relation to a particular area or more generally in that area or a related area of health research, or part thereof,”¹⁸³ and is considered to be one of the most significant procedural challenges for healthcare researchers.¹⁸⁴ However, whilst in principle mandatory, the HRRs enable health researchers to apply for a consent declaration from the Health Research Consent Declaration Committee (HRCDC),¹⁸⁵ as constituted by the HRRs,¹⁸⁶ the granting of which means that the public interest in granting the declaration outweighs the competing interest in obtaining explicit consent from the data subject.¹⁸⁷ Prior to making such an application, however, the data controller must have first carried out a data protection impact assessment and obtained “ethical approval of the health research from a research ethics committee.”¹⁸⁸ There are also various procedural requirements with which data controllers are required to comply, including that the application is made in writing and evidences, inter alia, “that the controller has a valid and lawful basis for the processing of the personal data, and that the controller meets one of the conditions in Article 9(2)” GDPR.¹⁸⁹ A declaration of exemption can only then be granted by the HRCDC where these procedural requirements have been fully complied with and it “is satisfied that the public interest in carrying out the research significantly outweighs the public interest in requiring the explicit consent of the data subject”.¹⁹⁰

These requirements relating to a declaration of exemption, particularly the threshold for the public interest in carrying out the research to *significantly outweigh* the public interest in attaining explicit consent, goes beyond what is required by the GDPR and it has been suggested that this may limit the scope for the awarding of a declaration of exemption.¹⁹¹ The requirement for “explicit consent” is similarly not stipulated in Article 89(1) GDPR, and scholars have suggested that this may effectively negate the research exemption as provided for in Article 9(2)(j).¹⁹² For healthcare researchers, therefore, this may in practice impose a significant technical and bureaucratic burden, one effect of which may be an overall “chilling effect”¹⁹³ on the conducting of health research in Ireland, with possible implications for neuroscientific research involving the use of neurotechnologies. For healthcare research participants, however, this acts as a safeguard against non-consensual interference and ensures effective protection of personal data, which may be of particular importance in the context of neurotechnological healthcare research given the sensitivity and intimacy of the type of personal data being processed.

¹⁸⁰ Ibid Reg.3(1)(c)(iv).

¹⁸¹ Ibid Reg.3(1)(d).

¹⁸² Ibid Reg.3(1)(e).

¹⁸³ Ibid Reg.3(1)(e).

¹⁸⁴ Clarke, N. et al. (2019) ‘GDPR: an impediment to research?’, *Irish Journal of Medical Science*, vol.188, pp.1129-1135. DOI: <https://doi.org/10.1007/s11845-019-01980-2>

¹⁸⁵ Data Protection Act 2018 (Section 36(2)) (Health Research) Regulations 2018, Reg.5(1).

¹⁸⁶ Ibid Reg.7; Schedule.

¹⁸⁷ Ibid Reg.5(2).

¹⁸⁸ Ibid Reg.5(3)(a)-(b).

¹⁸⁹ Ibid Reg.5(4)(a)-(e).

¹⁹⁰ Ibid Reg.5(5).

¹⁹¹ Donnelly, M. and McDonagh, M. (2019) ‘Health Research, Consent and the GDPR Exemption’, *European Journal of Health Law*, vol.26, pp.97-119. DOI: <https://doi.org/10.1163/15718093-12262427>

¹⁹² Kirwan, M. et al. (2021) ‘What GDPR and the Health Research Regulations (HRRs) mean for Ireland: “explicit consent” – a legal analysis’, *Irish Journal of Medical Science*, vol.190, pp.515-521, pp.516. DOI: <https://doi.org/10.1007/s11845-020-02331-2>

¹⁹³ Donnelly M and McDonagh M. (2019) ‘Health Research, Consent and the GDPR Exemption’, *European Journal of Health Law*, vol.26, pp.97-119, pp.118. DOI: <https://doi.org/10.1163/15718093-12262427>



3.3 Use in the Irish legal system

An emerging application of neurotechnologies is in the context of both criminal and civil legal proceedings. In criminal cases, for instance, techniques such as neuroimaging may be used to establish the competency of individuals to stand trial.¹⁹⁴ Brain scans may also form a part of evidence admitted by neuroscience experts to be used to determine the applicability of defences such as insanity and diminished responsibility.¹⁹⁵ Addressing witness and defendant testimonies can also potentially be furnished by neuroscanning techniques. This is relevant in memory elicitations and determining guilt of an individual. Furthermore, some studies have shown brain scans may detect deception.¹⁹⁶

As will be discussed in Section 3.3.1 below, additional proposed uses of neurotechnologies include jury selection, assessing judicial bias in sentencing, and examining the age of criminal responsibility. Following the discussion of the use of neurotechnologies in the criminal justice system, the role of neurotechnologies in civil law proceedings will then be considered (Section 3.3.2). Here, the most prevalent application of neuroimaging may be in tort law cases, in particular personal injury cases where it is alleged by a plaintiff that brain injuries have been sustained. An MRI scan, for instance, creates images of soft tissue injuries that could be used to quantify personal injuries and inform the appropriate remedy in tort law cases.¹⁹⁷

3.3.1 Use in the criminal justice system

Irish criminal law is comprised of several sources including the Constitution, statutes and common law. Relevant legislation includes the Criminal Law (Insanity) Act 2006. Much of the Irish criminal law is derived from English case law, and subsequently Irish case law. This case law is used to inform current legislation and is still a useful tool of interpretation of terms defined within statutes. In its interpretation, case law often has the means to develop the law as it exists and acknowledges where new case law may be introduced. This is particularly important in considering the issue of neurotechnologies. This is as this area of technology is ever evolving, and its incorporation within case law may push for new legislation in the area.

Competency to stand trial

Neurotechnologies may be used to help the court assess a person's competency to stand trial. When considering competency to stand trial in Ireland, the law refers to the "fitness" of a person to be tried in court.¹⁹⁸ The law considers an individual unfit for trial where they are unable to understand nature of proceedings due to a mental disorder.¹⁹⁹ A mental disorder is characterized as mental illness, mental disability, dementia, or any disease of the mind but does not include intoxication.²⁰⁰ Moreover, the law defines who determines fitness. In summary offences, the fitness will be determined by the judge only in the District Court. For indictable offences, fitness will be determined at the court of trial in which the

¹⁹⁴ Kolla, N. J., Brodie, J.D. (2012) 'Application of Neuroimaging in Relationship to Competence to Stand Trial and Insanity' in Simpson, J.R. ed. (2012) *Neuroimaging in Forensic Psychiatry: From the Clinic to the Courtroom*. Chichester, West Sussex: Wiley-Blackwell, pp. 159.

¹⁹⁵ Aono, D., Yaffe, G., Kober, H. (2019) 'Neuroscientific Evidence in the Courtroom: A Review', *Cognitive Research: Principles and Implications*, 4 (40), 2-20.

¹⁹⁶ Reese, B. (2009) 'Using fMRI as a Lie Detector- Are We Lying to Ourselves?', *Journal of Science and Technology*, 19 (1), 206-230; See also, Rusconi, E. and Mitchener-Nissen, T. (2003) 'Prospects of Functional Magnetic Resonance Imaging as Lie Detector', *Frontiers in Human Neuroscience*, 7 (594), 1-12., Pulice, E.B. (2010) 'The Right to Silence at Risk: Neuroscience-Based Lie Detection in The United Kingdom, India, and the United States', *The George Washington International Law Review*, 42 (4), 865-896.

¹⁹⁷ See generally, Alces, P.A. (2018) *The Moral Conflict of Law and Neuroscience*. Chicago: The University of Chicago Press, pp. 183.

¹⁹⁸ Criminal Law (Insanity) Act 2006, s 4.

¹⁹⁹ Ibid s 4 (2).

²⁰⁰ Ibid s 1.



defendant would be tried.²⁰¹ Where the Courts determine an individual is not fit for trial, proceedings will be adjourned²⁰² and the Court may recommend further care in designated centres, especially with the evidence of an approved medical officer.²⁰³ Although it is desired that medical evidence is compiled by the Court for determining fitness, the law does not require it.²⁰⁴

In some cases, brain scanning techniques have been applied to establish competency of individuals. For example, in *O'C (J) v DPP*,²⁰⁵ an order of prohibition of further prosecution was sought due to the applicant's diagnosis of Alzheimer's disease. The application included evidence from a Consultant Psychiatrist and CT scans which showed atrophic changes in the applicant's brain, i.e., brain shrinkage which were evidence of the Alzheimer's disease. In another case, *Geraldine Nolan v Joseph Carrick and Others*²⁰⁶ the court considered medical evidence relating the defendant's mental capacity because they argued they were not competent to stand trial. The mental capacity evidence included severe pain caused from depression and other health issues, mild cognitive impairment, and an evolving pattern of dementia. This evidence included a report from a Consultant Neuropsychiatrist which included evidence of cognitive examinations and MRI scans which depicted ischemic changes in the brain. The Court accepted all psychiatric and psychological evidence presented, however it concluded that it was not satisfied that the defendant lacked capacity. Although there are not many cases presently which consider the use of neurotechnologies in determining fitness for trial, the above cases show the Irish legal system may be headed in this direction.

However, as the law does not presently require medical evidence to be presented before the court, this raises significant doubts about which kind of evidence may be permissible. The Interdepartmental Group,²⁰⁷ which consists of representatives from various governmental departments, has examined issues relating to people with mental illnesses that come into contact with the Irish criminal justice system. Their First Interim Report recommended an amendment to section 4 of the Criminal Law (Insanity) Act which would require medical evidence, such as a report, to be considered before determining fitness to stand trial. This is a welcomed recommendation as it may serve the purpose of outlining exactly what kind of medical evidence is appropriate in such cases. Provisions regarding the requirement of medical evidence could potentially limit or expand admission of neuroscientific evidence which in some cases proposes the ability to determine competency.

Age of Criminal Responsibility

Recent developments in neuroscience and neurotechnologies are changing the way in which we may consider the age of criminal responsibility. In Ireland, the age of criminal responsibility is governed in the Children Act 2001. The legislation lays out that it is presumed no child under the age of twelve years can commit an offence.²⁰⁸ Furthermore, there is a rebuttable presumption that a child who is not less than twelve but under the age of fourteen is incapable of committing an offence because the child did not have the capacity to know that the act or omission concerned is wrong. There is, however, an exception for children ages ten and eleven who are charged with very serious offences such as unlawful killing, rape offences or aggravated sexual assault.²⁰⁹ Any charges brought to children under the age of

²⁰¹ Ibid s 4 (3) (a); s. 4 (4) (a).

²⁰² Ibid s 3 (b).

²⁰³ An approved medical officer is defined as a consultant psychiatrist (as found within the meaning in the Mental Health Act 2001), Criminal Law (Insanity) Act 2006, s 1.

²⁰⁴ Whelan, D. (2007) 'Fitness for Trial in The District Court: The Legal Perspective', *Judicial Studies Institute Journal*, 2 (1).

²⁰⁵ *O'C (J) v DPP* [2002] IEHC 151, [2002] 10 JIC 0804.

²⁰⁶ *Geraldine Nolan v Joseph Carrick and Others* [2013] IEHC 523, [2013] 10 JIC 2505.

²⁰⁷ Government of Ireland. (2016) *First Interim Report of the Interdepartmental Group to Examine Issues Relating to People with Mental Illness Who Come in Contact with the Criminal Justice System*. Dublin: Government of Ireland, pp. 21-22.

²⁰⁸ Children Act 2001, s 52.

²⁰⁹ Criminal Justice Act 2006, s 129.



fourteen are only brought with the consent of the Director of Public Prosecutions.²¹⁰ Minor charges against children are dealt with by the Children Court, and all major charges may be dealt with by the Central Criminal Court.²¹¹

The age of criminal responsibility has been disputed for several years. In 2006 the Report on the Youth Justice Review prepared by the Department of Justice, Equality and Law Reform has found Ireland has the lowest age of criminal responsibility in comparison to the rest of Europe.²¹² This was recently reaffirmed by the European Committee of Social Rights which found the age of criminal responsibility in Ireland not to be in conformity with the European Social Charter.²¹³ Currently, the Department of Justice is reviewing the Children Act 2001, including a consideration for the age of criminal responsibility.²¹⁴ It is, however, still unclear whether the age of criminal responsibility will be changed in Ireland. Further concern about the age of criminal responsibility in Ireland has been raised with the recent case of the Anna Kriégel murder trial. Two boys, aged thirteen at the time, were charged with committing a murder against a fourteen-year-old girl.²¹⁵ The question remains how this case may affect the Irish youth justice, considering the James Bulger trial in England was considered as a turning point in youth justice in the UK,²¹⁶ adopting a more punitive turn.

The development of neuroscience and psychology now allows scientists to make use of brain scanning technologies to examine brain structure and place its findings against developmental theory.²¹⁷ This may allow scientists to better understand at which stage a child may develop parts of the brain responsible for empathy, consequential thinking which in turn may be used to inform the age of criminal responsibility.²¹⁸ Although this does not mean that a brain scan may essentially tell us whether a child is of the age of criminal responsibility, it is useful for creating an informed and comprehensive approach to determining criminal responsibility. Although it is currently unclear whether the age of criminal responsibility will be raised in the context of the Children Act 2001, taking into consideration current neuroscientific and psychological research in the area is useful for determining the minimum age for serious offences. It is likely that neuroscientific findings on brain development may be more widely applied in the future, as they become more robust and accurate.

Jury trial

Neurotechnological techniques such as brain scanning have the potential to assess eligibility of jurors and challenge jurors by identifying underlying biases. The Juries Act 1976 outlines the rules about the eligibility for jury service in Ireland. The law finds that person's incapable of standing on a jury include persons without a sufficient capacity to read, deafness or other permanent infirmity.²¹⁹ It also includes

²¹⁰ The Courts Service of Ireland. (2022) *Children Court*. / [Online]. Available at:

<https://www.courts.ie/children-court>

²¹¹ Ibid.

²¹² Department of Justice, Equality and Law Reform. (2006) *Report on the Youth Justice Review*. Dublin: The Stationery Office.

²¹³ European Social Charter. (2020) *European Committee of Social Rights: Conclusions 2019 Ireland*. Strasbourg: Council of Europe.

²¹⁴ Irish Legal News (2020), 'Ireland Urged to Raise Age of Criminal Responsibility', *Irish Legal News*, 25 March.

²¹⁵ Gallagher, C. (2019) 'Ana Kriégel Murder Trial: The Complete Story', *The Irish Times*, 18 June.

²¹⁶ Stewart, A. (2019) 'Ana Kriégel Murder: What Next for Irish Youth Justice', *BBC News*, 6 November.

²¹⁷ Delmage, E. (2013) 'The Minimum Age of Criminal Responsibility: A Medico-Legal Perspective', *Youth Justice*, 13 (2).

²¹⁸ For a discussion on this topic see: Jha, A. (2011) 'Age of Criminal Responsibility is Too Low, Say Brain Scientists', *The Guardian*, 13 December.

²¹⁹ Juries Act 1976, part I.

persons who suffer from mental illnesses or mental disabilities on an account of residing at a hospital (or a similar institution) or regularly attend treatment by medical practitioners.²²⁰

In the Irish jury system, each side of the case may challenge seven potential jurors without giving any reason and can challenge any number of jurors if they are able to “show cause”. This is called peremptory challenge. Scholars have noted that the peremptory challenge practice reflects a subjective assessment of the likely attitude of the juror to the challenger’s case, based on matters of sex, age, appearance, address, or employment.²²¹ Challenges for cause shown is rarely used in Ireland. Where it does happen, however, the trial judge may decide whether they think the challenge should be upheld. Walsh commented the “challenge without cause” may satisfy the factors under which an individual is rendered ineligible to serve, but beyond this point there is less certainty.²²² It is presumed that the parties challenge the jurors on the basis of cogent reasons- which they would also put through to challenge a juror and discharge the obligations of jury service fairly and impartiality.

The impact of the peremptory challenge may be such that brain scanning technologies may not be soon introduced for jury selection. However, the Irish law does leave this possibility where the “challenges for cause” are being used. The introduction of neuroscientific technology in jury selection could be used to challenge a juror based on their bias which would create a more impartial jury.²²³ Thus, a brain scan could potentially find biased jurors which could be used by the legal counsel as a challenge. In such a case, the trial judge would determine whether this is to be upheld. As Irish judges have traditionally been reluctant to admit scientific evidence within the courtroom setting,²²⁴ the question is left open for future development.

Judge bias

As mentioned above, neurotechnologies have developed assessments by which a person’s underlying bias may be identified. This may be particularly useful to address judge bias. The Irish sentencing system is guided by the Irish constitutional jurisprudence which has given judges broad discretion in relation to sentencing.²²⁵ Depending on the offence committed, minimum or maximum sentences may be applied.²²⁶ For those offences which do not assess sentencing, the Judicial Council publishes sentencing guidelines for superior courts.²²⁷ The guidelines propose examination of personal circumstances which apply as mitigating factors prior sentencing. They may include drug addiction, age, or character.²²⁸ Judges can gather sentencing information through different sources such as The Irish Sentencing Information System (ISIS). The ISIS collected data between 2007 and 2009 and in 2013²²⁹ which provided information on various offences and sentences imposed. The ISIS system has been criticised, however, as the limited sample collected may not accurately reflect sentencing trends.

²²⁰ Ibid.

²²¹ Walsh, D. (2016) *Criminal Procedure*. 2nd edn. Dublin: Round Hall. Ch 20.

²²² Ibid.

²²³ Suskin, Z.D. (2021) ‘Lady Justice may be Blind, but is She Racist? Examining Brains, Biases, and Behaviours Using Neuro-Voir Dire’, *Cambridge Quarterly of Healthcare Ethics*, 30 (4).

²²⁴ Fennell, C. (2020) *The Law of Evidence in Ireland*. 4th edn. London: Bloomsbury Publishing. Ch 7.

²²⁵ Dempsey, L. (2016) ‘The Greater of Two Evils- Examining Sentencing Variations in the Irish Courts: A Critical and Methodological Appraisal’, *University College Dublin Law Review*, 16 (1).

²²⁶ Citizen Information. (2020) *Types of Sentences*.

²²⁷ For example: The Judicial Council. (2022) *Sentencing Guidelines and Information Committee- Sentencing Judgements Guidance for the General Public*. Dublin: The Judicial Council.

²²⁸ Citizen Information. (2022) *Sentencing at Criminal Trials in Ireland*.

²²⁹ Guilfoyle, E., Marder, I. (2021) ‘Using Data to Design and Monitor Sentencing Guidelines: The Case of Ireland’, *Common Law World Review*, 50 (2-3).



Apart from general guidelines, the sentencing system in Ireland has been highly individualised and unstructured.²³⁰ Because of this, scholars have noted a presence of disparities in the Irish sentencing system based on characteristics such as gender, class, race, or nationality.²³¹ The Judicial Council Act 2019 aims to address this by introducing formal sentencing guidelines.²³² To this effect, The Judicial Council's sentencing committee has recently published a public information guide on reasons for sentencing.²³³ The guide aimed to set out sentencing guidelines for a range of offences, however the guide did not adequately address the apparent bias.

Neurotechnologies, such as brain scans, may help us to identify judge bias. Although current research has not identified the possibility of detecting bias with just brain scans, a combination of psychological tests and brain scans have been used to determine implicit biases in individuals²³⁴ (see above in jury trial). Technology in this area is not yet developed to the stage where it may accurately identify bias, particularly is such application was for judges of various courts but may identify a turn towards adoption of a more inclusive legal system. The benefit of identifying bias in judges may potentially help to resolve the widespread issue of sentencing disparities in Ireland.

Another such move is seen with the move towards adoption of artificial intelligence in the Irish legal system. The Department of Enterprise, Trade and Employment has in 2021 published the national strategy for the use of artificial intelligence in Ireland.²³⁵ The Strategy outlines the possibility of the use of artificial intelligence to support sentencing through the use of Automated decision-support tools. Kennedy²³⁶ found a new system is currently being developed by the Judicial Council which aims to replace the Irish Sentencing Information System. Although it is not clear whether the new system will use artificial intelligence, such an adoption may be possible. The adoption of artificial intelligence in the Irish legal system may not comprehensively address issues of judge bias as one of the crucial limitations of such technologies was the possibility of reinforcing existing biases.²³⁷ Comparing the current trends in adopting artificial intelligence is useful against any future applications of neurotechnologies such as brain scans for the purposes of addressing judge bias.

Eliciting Memories

The two main ways in which eliciting memories may be useful to a court is for the purpose of determining guilt in the defendant and eliciting a witness testimony. Neurotechnological advancements may aid memory elicitation through brain scanning techniques. In considering elicitation of memories for witness testimony we find that witnesses can be called to court to testify and provide oral evidence in relation to facts or the character of the accused. The witness testimony procedure in Ireland is the following: The witness must first be sworn in to ensure the truthfulness of their testimony. The testimony is then given through the process of examination by counsel for the party they were called

²³⁰ Dempsey, L. (2016) 'The Greater of Two Evils- Examining Sentencing Variations in the Irish Courts: A Critical and Methodological Appraisal', *University College Dublin Law Review*, 16 (1).

²³¹ For example, see: Bacik, I. (1999) 'The Courts: Consistent Sentencing?' *An Irish Quarterly Review*, 88 (1) ; Brandon, A.M., O'Connell, M. (2017) 'Same Crime: Different Punishment? Investigating Sentencing Disparities Between Irish and Non-Irish Nationals in the Irish Criminal Justice' *The British Journal of Criminology*, 58 (5).

²³² Judicial Council Act 2019.

²³³ Carolan, M. (2022) 'Guide for Public on Reasons for Sentences Published by Body for State's Judges', *The Irish Times*, 23 January.

²³⁴ Greely, H.T. (2013). 'Mind Reading, Neuroscience, and the Law' in Morse, S.J. Roskies, A.L. (eds). *A Primer on Criminal Law and Neuroscience: A Contribution of the Law and Neuroscience Project, Supported by the MacArthur Foundation*. New York: Oxford University Press, pp. 133.

²³⁵ Department of Enterprise, Trade and Employment. (2021) *AI-Here for Good: A National Artificial Intelligence Strategy for Ireland*. Dublin: Government of Ireland, pp. 44.

²³⁶ Kennedy, R. (2021) *Algorithms, Big Data and Artificial Intelligence in the Irish Legal Services Market*. Dublin: Houses of the Oireachtas.

²³⁷ Ibid 30.



for. The examination-in-chief is the person qualified by either counsel to elicit information from the witness and to verify whether the testimony is valid.²³⁸ This is referred to as cross-examination. The application of rules relating to cross-examination is particularly stringent in criminal cases where the fairness of the processes is particularly examined. This is well examined in historic sexual abuse cases where the courts have examined the to balance treatment of historic sexual abuse allegations within the confines of trial.²³⁹

When considering the application of neuroscientific technologies for memory elicitation in such regard, we must pay close attention to the interplay between fairness of trial and credibility issues. Research has shown the possibility of the use of neuroimaging techniques such as fMRIs or PET scans for identifying emotional activation in the brain. The benefit of such technology may be in the finding and resolving of criminal cases, as the court then achieves fairness for the victim. Though, such technology must be entirely precise. Where they may not be precise, they may lead to false convictions and miscarriages of justice. Another point to consider may be the emotional impact on victims where such memory eliciting technology is used.

The Irish courts have generally been reluctant in considering experts in memory elicitation (for example see discussion on admissibility of evidence below). For instance, considering hypnotist evidence for the purpose of memory elicitation was rejected by the courts in *C (N) v DPP*.²⁴⁰ They found the “expertise” under which the memory was recovered had no effective test or control, the effect of which rendered the admission of such evidence “fraught with the risk of unfairness”.²⁴¹ The Law Reform Commission has noted the Irish courts require a high proof of reliability from any novel form of expertise, although they note no formal reliability test is articulated. Thus, the application of novel neuroscientific elicitation techniques may be challenging unless high proof of reliability is provided.

Determining Guilt

As discussed above, certain memory elicitation techniques may be used to determine the guilt of individuals. Neurotechnologies may, in this regard, help detect dishonesty. When considering determination of guilt in Ireland, it is important to consider the issue of self-incrimination and the right of silence. To determine guilt of an individual, the Irish Constitution provides rules on the trial of offences which finds that any person tried criminal charge shall be tried with consideration of due course of law.²⁴² The plea of guilt will be determined by a jury finding beyond reasonable doubt. The constitution also grants the right to silence.²⁴³ The right to silence and the privilege against self-incrimination work concurrently. The right against self-incrimination protects the accused from being required to answer questions by which they would incriminate themselves.²⁴⁴ The two are related to the presumption of innocence afforded to every individual. Therefore, the accused should not be forced to speak to assist the prosecution. The right to silence is not absolute, as certain inferences may be drawn from silence. This is confirmed in case law, where courts find the restriction to the right may be subjected to the test of proportionality.²⁴⁵ The right to silence may be limited where the objective of the inquiry outweighs it.

When a person is first arrested, a member of *An Garda Síochána* has an obligation to inform the arrested individual about the general right to remain silent during questioning²⁴⁶ and the right to legal advice

²³⁸ Fennell, C. (2020) *The Law of Evidence in Ireland*. 4th edn. London: Bloomsbury Publishing. Ch 4.

²³⁹ *DPP v C (C)* [2012] IECCA 86, [2012] 12 JIC 0601.

²⁴⁰ *C (N) v DPP* [2001] IESC 54, [2001] 7 JIC 0502.

²⁴¹ *Ibid.*

²⁴² Bunreacht na hÉireann, Article 38.1.

²⁴³ Confirmed in *Heaney v Ireland* [1996] WJSC-SC 3768, [1996] 1 IR 580.

²⁴⁴ Doyle, O. (2008) *Constitutional Law: Text, Cases and Materials*. Dublin: Clarus Press. Pg 33.

²⁴⁵ *DPP v Stephen Burke* [2019] IECA 239, [2020] 2 IR 527.

²⁴⁶ Citizen Information. (2020) *Right to Silence in Criminal Cases*.



prior to the questioning. The right to a legal counsel in the pre-trial process has been confirmed in case law.²⁴⁷ In relation to collection of forensic evidence in the pre-trial process, the Supreme Court finds the results of forensic testing are objective and they do not depend on the will of the subject.²⁴⁸ Thus, the Court was not satisfied that otherwise lawful collection of forensic sampling taken prior to legal advisor arriving renders subsequent trial where reliance is placed on test results, unfair.

Recent research is attempting to develop neuroscience-based lie detection tests. One of such tests may be using fMRIs to detect deception or lying by individuals²⁴⁹ in, for example, the cross-examination process or by law enforcement during inquiry. This is done through experimentation where individuals are asked to answer questions, some truthfully and to lie in others. The fMRI would assist in identifying the brain regions which are associated in lying. Such lie detection would measure involuntary responses of the brain.²⁵⁰ The question of the right to silence and right against self-incrimination may be raised against this technology. Although this technology is not currently used in Ireland, it is worth questioning how its use may limit the right to silence where the objective of the inquest may be reached by a neuroscientific test. Especially, where such technology would reach the objective. Furthermore, considering that the Irish courts have found certain forensic testing which do not depend on the will of the subject are valid in the pre-trial process, the same may potentially be applied to results of fMRI testing.

Criminal Law Defences (Insanity and Diminished Responsibility)

The Irish criminal law recognises two defences which may stop criminal punishment against an individual as they lack the mental element of the crime, or the *mens rea*. These two are the insanity defence and the diminished responsibility defence. Neurotechnologies may be relevant in this area of criminal law to help courts establish the criminal defence.

The contemporary defence of insanity in Ireland is derived from the *M'Naghten* case.²⁵¹ The case outlined the core of the insanity defence and has been used by Irish Courts until it was codified in 2006. The law today finds that where a person is tried for an offence, the court/jury may consider evidence relating to the accused's mental condition given by a consultant psychiatrist.²⁵² Where such evidence shows that the accused was suffering from a mental disorder and that such mental disorder made the accused not responsible for the act alleged (through not knowing the nature/quality of the act, what they were doing was wrong and where they were unable to refrain to commit the act) the court may find the special verdict- "not guilty by reason of insanity". Case law has considered whether physical conditions such as arteriosclerosis²⁵³ or epilepsy²⁵⁴ may qualify as mental disorders where there may impair the defendant's ability to reason.²⁵⁵ Thus, the law is found to be concerned with the "mind" in its ordinary sense of meaning (including mental faculties of reason, memory and understanding) and not the brain or whether the condition is curable, permanent, or transitory.²⁵⁶

²⁴⁷ *DPP v Gormley and White* [2014] IESC 17, [2014] 2 IR 591.

²⁴⁸ *Ibid.*

²⁴⁹ Rusconi, E., Mitchener-Nissen, T. (2013) 'Prospects of Functional Magnetic Resonance Imaging as Lie Detector' *Frontiers in Human Neuroscience*, 7 (1).

²⁵⁰ Pulice, E.B. (2010) 'The Right to Silence at Risk: Neuroscience-Based Lie Detection in The United Kingdom, India, and the United States' *The George Washington International Law Review*, 42 (4).

²⁵¹ *R v M'Naghten* [1843] 8 E.R. 718, [1843] 10 Cl. & F. 200.

²⁵² Criminal Law (Insanity) Act 2006, s 5.

²⁵³ Arteriosclerosis is a heart condition which restricts blood flow to organs and tissues in the body. In *R v Kemp* [1957] 1 QB 399.

²⁵⁴ *R v Sullivan* [1984] AC 156.

²⁵⁵ Hanly, C. (2015) *An Introduction to Irish Criminal Law*. 3rd edn. Dublin: Gill Education. pp.167.

²⁵⁶ *R v Kemp* [1957] 1 QB 399.



The defence of diminished responsibility in Ireland is influenced by English law. In England, the defence was first introduced as a partial defence where an individual who is charged with murder suffers from a mental disorder that impairs their responsibility for their acts.²⁵⁷ The Irish law now recognises the defence of diminished responsibility.²⁵⁸ The law that where a person is tried for murder and where there is evidence that their mental disorder was such as to diminish their responsibility, but not enough to justify not finding them not guilty by reason of insanity, the court/jury may find the person guilty of manslaughter on the grounds of diminished responsibility.

When considering the term mental disorder, it is important to consider the details of its context. The law outlines a definition for the term (Find above: under competency to stand trial). The Mental Health Act 2001 provides for a more in-depth definition of the term mental disorder, meaning: “mental illness, severe dementia, or significant disability where because of the illness, disability of dementia, there is a serious likelihood of the person concerned causing immediate and serious harm to himself or herself or to other persons”.²⁵⁹ Furthermore, the section goes on to outline the meaning of each of the terms “mental illness”, “severe dementia” and “significant intellectual disability”.²⁶⁰

Although not used at present, brain scanning techniques may be used for identifying mental illnesses or mental disorders for the purposes of establishing a criminal defence. Recent research supports the use of structural brain imaging techniques for supporting diagnosis of a variety of mental disorders including Alzheimer disease, bipolar disorder, or schizophrenia.²⁶¹ Thus, the application of such medical evidence when establishing a criminal defence may be useful, however, it should not be the only marker for such a conclusion. Establishing a mental disorder for the purpose of confirming a defence of insanity or diminished responsibility should be a robust process. It is not clear how Irish law may develop to base the establishment of such defence on the basis of neuroimaging techniques alone, as evidence relating to a mental disorder must be given by a consultant psychiatrist.

3.3.2 Use in civil law

Civil law is the body of law that deals with non-criminal disputes, such as accidents, or breaches of contract. Irish civil law comprises a body of legislation, such as the Civil Liability and Courts Act 2004, and common law concepts, such as negligence (see Section 3.4.1 on liability for harms due to negligence). Civil law disputes may be resolved by a mediator, or before an Irish court of law.²⁶² Neurotechnologies have potential to be used in the resolution of civil law disputes, either through mediation or through the Irish court system. Particularly in relation to personal injuries claims, neurotechnologies offer enhanced ways of assessing the severity of brain injury following an accident for instance. This section explores how neurotechnologies may be used in such cases in more detail.

²⁵⁷ Hanly, C. (2015) *An Introduction to Irish Criminal Law*. 3rd edn. Dublin: Gill Education. Pg 167.

²⁵⁸ Criminal Law (Insanity) Act 2006, s 6.

²⁵⁹ Mental Health Act 2001, s 3.

²⁶⁰ Ibid s 3 (2).

²⁶¹ Falkai, P., Schmitt, A., Andreasen, N. (2018) ‘Forty Years of Structural Brain Imaging in Mental Disorders: Is it Clinically Useful or Not?’ *Dialogues in Clinical Neuroscience*, 20 (3).

²⁶² Sheridan, P. (2021) *Civil Law in Ireland / Lawyers Ireland*, [Online]. Available at: <https://www.lawyersireland.eu/civil-law-in-ireland#:~:text=The%20Irish%20legal%20system%20has,breaches%20of%20provisions%20of%20contract%20.>



Quantifying Personal Injuries

Quantifying a person's injury or suffering may be examined in the scope of civil and criminal proceedings in Irish law. Where brain injuries are sustained, neurotechnological brain scanning techniques may be used to determine an injury and the extent of injury for the purposes of compensation in civil law cases.

Within the context of criminal cases, brain scanning is relevant to claims brought to the Criminal Injuries Compensation Tribunal. The Tribunal assesses compensation claims for persons who suffered an injury as a result of a criminal offence.²⁶³ The criminal injuries compensation scheme does not, however, offer compensation for pain and suffering related to the injury. It only covers any financial loss that has occurred due to the injury.²⁶⁴

All civil personal injury claims in Ireland are brought through the Personal Injury Assessment Board (PIAB). PIAB is an independent State body which is created for the purposes of assessing personal injuries and offering compensation.²⁶⁵ The law which governs the body outlines civil actions which may be brought before PIAB. These include workplace accidents, motor accidents and public liability accidents, but excludes injuries arising from medical negligence.²⁶⁶ Investigations relating to the injury may be carried out by any appropriate person appointed by the court to give expert evidence which assesses a matter of the claim.²⁶⁷ Medical assessments are carried out by medical professionals which normally refers to the claimant's treating practitioner who completes the medical report which accompanies the claim application.²⁶⁸ Additionally, the Personal Injuries Guidelines,²⁶⁹ as published by the Judicial Council, outline the appropriate compensation for a variety of personal injury claims, including head injuries.²⁷⁰ Within the classification of head injuries, the Guidelines outline several categories including most severe brain damage, severe brain damage, serious and moderate brain damage, minor brain damage or head injury, established epilepsy and other epileptic conditions.

Within the scope of personal injury cases relating to brain injuries, brain imaging techniques are frequently used to quantify the brain injury. Brain imaging techniques such as MEG scans or structural MRI may be used to determine brain injuries in patients who have suffered blunt head trauma.²⁷¹ Therefore, including such scans in a personal injuries case is common practice. Although the majority of cases that go through PIAB are resolved through settlement or assessment, some claims may still be brought to court.²⁷² In *Oliver Bennett v John Codd and Wallace Taverns Ltd*,²⁷³ for instance, neuroscientific evidence was relied upon by the Court to determine appropriate damages. In this case, the medical evidence provided in relation to the claimant's brain injury included a report prepared by a consultant neurosurgeon, with CAT CT scans of the brain identifying an injury to the claimant's brain. Therefore, the use of neuro-imaging techniques is used within the scope of assessing damages in personal injury cases and to determine the injury for the purpose of the claim.

²⁶³ Department of Justice. (2022) *Criminal Injuries Compensation Scheme*.

²⁶⁴ Citizen Information. (2022) *Compensation for Victims of Crime*.

²⁶⁵ Personal Injury Assessment Board. (2022) *Personal Injury Assessment Board*.

²⁶⁶ Personal Injuries Assessment Board Act 2003, s 3.

²⁶⁷ Civil Liability and Courts Act 2004, s. 20.

²⁶⁸ Personal Injury Assessment Board. (2022) *Personal Injury Assessment Board*.

²⁶⁹ The Judicial Council. (2021) *Personal Injuries Guidelines*. Dublin: The Judicial Council.

²⁷⁰ Prior to April 2021, The Book of Quantum was the set of guidelines used to establish compensation in relation to personal injury claims.

²⁷¹ Lewine, J.D. et al. (2007) 'Objective Documentation of Traumatic Brain Injury Subsequent to Mild Head Trauma. Multimodal Brain Imaging With MEG, SPECT, and MRI', *Journal of Head Trauma Rehabilitation*, 22 (3).

²⁷² Personal Injury Assessment Board. (2022) *Personal Injury Assessment Board*.

²⁷³ *Oliver Bennett v John Codd and Wallace Taverns Ltd* [2020] IEHC 554, [2020] 11 JIC 0301.



A recent report published by the Law Reform Commission outlines various recommendations, including proposed legislation to cap general damages in personal injuries cases.²⁷⁴ This may have somewhat of an impact on the amounts individuals may receive in damages following personal injuries claims, but is unlikely to have a direct impact on the extent to which brain imaging techniques are relied upon by claimants.

3.3.3 Use in evidence and procedural law

Similar to Irish criminal law, evidence and procedural law in Ireland is derived from several sources. The Irish Constitution is the fundamental source governing the admissibility of evidence in Irish courts, as individuals have constitutional rights to due process that must be guaranteed in legal proceedings. Some important Acts governing evidence law in Ireland include the Criminal Evidence Act 1992 and the Criminal Procedure Act 2010, the latter of which revises a swathe of antecedent criminal procedure legislation. One of the key elements of this provision, which is considered in greater depth below, relates to the admissibility of expert evidence.

Personal injuries are governed by the Personal Injuries Assessment Board Act 2003 and the Personal Injuries Assessment Board (Amendment) Act 2019, which outline the process by which personal injury claims are dealt with in Ireland. Furthermore, the Civil Liability and Courts Act 2004 outlines the procedural aspects of personal injuries. More recently, the Criminal Justice (Forensic Evidence and DNA Database System) Act 2014 was introduced to close legislative gaps in evolving evidence law. The Juries Act 1976 governs laws considering the jury in Ireland. As is true with Criminal law in Ireland, much of the current legislation has been enacted from existing precedent derived from English and Irish case law.

Admissibility of Evidence

In the context of evidence admissibility, neuroscientists may act as expert witnesses in examining various neurological concerns of participants in a trial. This may be done by utilizing neurotechnologies such as brain scans. The Irish courts include expert evidence in a way that aids the court in enhancing knowledge on topics which may be outside of general knowledge. Irish criminal procedure laws provide definitions of expert evidence and expert witnesses. Expert evidence is defined as evidence of fact or opinion given by an expert witness who possess appropriate qualifications or experience about the matter to which the witness's evidence relates.²⁷⁵ Additionally, expert evidence is restricted to only that evidence which is required to enable the Court to determine the proceedings.²⁷⁶ The admissibility of expert evidence has also been confirmed in case law (for example see *AG v Ruddy* [1960]). The Irish courts finds expert evidence is generally permitted to opine on art, science or medicine,²⁷⁷ and the expert witness must demonstrate specialist knowledge which entails their entitlement to give opinion evidence.²⁷⁸ It is necessary for the expert evidence to be relevant in the circumstances of the case.²⁷⁹

Historically, Irish courts were very reluctant to admit expert evidence in the context of insanity or mental illness. This is as expert opinion should be used to inform the jury and not determine the ultimate issue.²⁸⁰ In some cases, courts refused expert evidence which did not establish the defence of insanity,²⁸¹ and the evidence was found to be irrelevant. However, as Ireland has gradually evolved to

²⁷⁴ Law Reform Commission. (2020) *Report: Capping Damages in Personal Injuries Actions*. Dublin: Law Reform Commission.

²⁷⁵ Criminal Procedure Act 2010, s 34 (9).

²⁷⁶ Rules of the Superior Courts (Conduct of Trials) 2016, order 39 (58) (1).

²⁷⁷ *AG (Ruddy) v Kenny* [1960] 94 I.L.T.R. 185. Also found in *Flynn v Bus Atha Cliath* [2012] IEHC 398, [2012] 10 JIC 1101. The court confirmed the entitlement of experts to express opinion.

²⁷⁸ *CDG v JB* [2018] IECA 323, [2018] 10 JIC 0309.

²⁷⁹ Law Reform Commission. (2008) *Consultation Paper: Expert Evidence*. Dublin: Law Reform Commission, pp 38.

²⁸⁰ Fennell, C. (2020) *The Law of Evidence in Ireland*. 4th edn. London: Bloomsbury Publishing. Ch 7.

²⁸¹ *DPP v Kehoe* 1985 WJSC-CCA 150, [1985] IR 444, *DPP v Egan* 1989 WJSC-CCA 1250, [1989] IR 681.



include expert testimony, the Law Reform Commission created a set of recommendations on the main duties of expert evidence.²⁸² Such duties include the duty to provide truthful and impartial expert evidence, state facts and assumptions, taking reasonable care in drafting written reports and confining their evidence to matters within the scope of their expertise.

Ireland seems to be moving towards a gradual acceptance of expert testimonies, with careful consideration given on how it may be admitted in a court setting. This is particularly important in the context of application of neuroscientific evidence in court. In *DPP v. Ramzan*, for instance, the Supreme Court upheld the decision of the trial judge and the Court of Appeal to exclude the expert testimony of a consultant clinical neuropsychologist.²⁸³ However, as observed by the Court of Appeal, this was not a restriction on the admissibility of such evidence per se, but rather borne of the requirement within s.5 of the Criminal Law (Insanity) Act 2006 that “at least one of the witnesses called in support of a defence of insanity must be a consultant psychiatrist.”²⁸⁴ This indicates that neuroscientific evidence in the form of expert testimony provided by clinical experts may be admitted in addition to the evidence of a consultant psychiatrist in support of a defence of insanity, so long as such witnesses “have relevant evidence to give pertaining to an issue or issues of fact”.²⁸⁵

Another point of useful comparison may be the evolution of the use of DNA evidence in Irish evidence laws. The Irish Courts have considered the application of DNA evidence in several cases in which it was used as a basis to identify the perpetrator of a crime.²⁸⁶ It was found that DNA evidence could not make sufficient evidential basis upon which a jury could identify the applicant.²⁸⁷ The Irish Supreme Court went further, giving guidance on the matter of DNA evidence.²⁸⁸ The Court set out general principles of evidence at the law/science interface. The Court held that, where evidence is given to the jury, it must be noted that the evidence is given by an expert and forms opinion evidence. Thus, juries should be reminded of the approach weighting expert evidence.

Recent developments in relation to DNA evidence can in some basic principles be applied to any potential neurotechnologies such as using brain scans to determine the perpetrator. The Irish law certainly leaves the possibility for future adoption of expert neuroscientific evidence, particularly when considering the now widespread adoption of DNA evidence within criminal trials. The extent of its adoption will seemingly be confined to opinion evidence, and as such would be clarified to the jury. Furthermore, considering the Law Reform Commission’s recommendations on the main duties of expert evidence, we may see further development in law outlining the strictness of requirements for the admissibility of neuroscientific evidence. Although it seems at present that the Courts are generally reluctant to admit such evidence, as indicated by the case of *Ramzan*, the unfolding and changeable character of the common law may eventually lead to the admissibility of relevant, impartial, and expert neuroscientific evidence.

3.4 Liability for harms

Neurotechnologies, like any other product or device, are subject to national and European laws related to liability for harms when made available on the Irish market. Liability for harms is closely related to safety regulation, with both seeking to control activities that create a risk of harm.²⁸⁹ Yet there are some

²⁸² Law Reform Commission. (2016) *Report: Consolidation and Reform of Aspects of the Law of Evidence*. Dublin: Law Reform Commission, pp. 7-8.

²⁸³ *DPP v Ramzan* [2018] IESCDT 34, [2018] 2JIC 0512.

²⁸⁴ *DPP v Ramzan* [2016] CCA 42/12, [31].

²⁸⁵ *Ibid.*

²⁸⁶ *DPP v O’Callaghan* [2013] IECCA 46, [2013] 7 JIC 3105, *DPP v Wilson* [2017] IESC 54, [2019] 1 IR 96.

²⁸⁷ *DPP v O’Callaghan* [2013] IECCA 46, [2013] 7 JIC 3105.

²⁸⁸ *DPP v Wilson* [2017] IESC 54, [2019] 1 IR 96.

²⁸⁹ Shavell, S. (1984) ‘Liability for Harm Versus Regulation of Safety’ *The Journal of Legal Studies: The University of Chicago Press*, 13 (2), p. 357-74, [Online]. Available at: <http://www.jstor.org/stable/724240>.



important distinctions. Safety regulation seeks to mitigate the risk of harm *ex ante*, i.e., before products are allowed to be sold on a market. Liability for harms is a regime that applies *ex post*, i.e., following the occurrence of harm and for the purpose of compensating the affected party.²⁹⁰ Irish law on liability for harms is informed by European legislation, as well as the common law tradition. This section examines the legal implications for neurotechnologies in relation to liability for harms, considering tort law, contract law and criminal law.

3.4.1 Liability for harms under tort law

The primary piece of legislation for products liability in Ireland is the Liability for Defective Products Act 1991, which implements the European Products Liability Directive.²⁹¹ The Act provides that a producer is liable in damages in tort for damage caused by a defective product.²⁹² Liability under the Act is tort-based, as opposed to criminal.²⁹³ In the context of neurotechnologies, this means that a producer of neurotechnological products would be liability in tort for any damages caused wholly or partially due to a defect in their product.

Furthermore, neurotechnologies are likely to fall within the remit of the European Medical Devices Regulation (MDR).²⁹⁴ A medical device is used for a medical purpose and used in a physical manner, as supposed to a pharmacological, immunological or metabolic manner.²⁹⁵ The MDR seeks to regulate devices intended for medical purposes. With the increased commercialisation of medical products and devices, and the potential commercialisation of neurotechnologies, it is uncertain to which extent the MDR will apply. If neurotechnologies are developed for both medical and non-medical purposes, such devices would need to comply cumulatively with the requirements applicable to devices for both purposes.²⁹⁶ However, if a neurotechnological device is developed purely for the purpose of its commercial use, it may fall outside the scope of the MDR. Annex XVI of the MDR sets out the list of groups of products without an intended medical purpose that still fall within the scope of the MDR.²⁹⁷ Neurotechnological devices that require an invasive surgical procedure such as a brain implant, are covered.²⁹⁸ Furthermore, 'equipment intended for brain stimulation that apply electrical currents or magnetic or electromagnetic fields ...', such as EEG, would also be covered.²⁹⁹ However, there may be a

²⁹⁰ Kolstad, C.D., Ulen, T.S. and Johnson, G. V. (1990) 'Ex Post Liability for Harm vs. Ex Ante Safety Regulation: Substitutes or Complements?' *The American Economic Review*, 80 (4), pp. 888-901, [Online]. Available at: <https://www.jstor.org/stable/2006714>.

²⁹¹ Liability for Defective Products Act 1991, no. 28; Council Directive of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (85/374/EEC) (07.08.1985, OJ L210/29); *Product Liability and Safety in Ireland: Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

²⁹² Liability for Defective Products Act 1991, no. 28, schedule 1, article 1; *Product Liability and Safety in Ireland: Overview*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

²⁹³ *Product Liability and Safety in Ireland: Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

²⁹⁴ Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (5.5.2017, OJ L117/1).

²⁹⁵ *Regulatory information / Health Products Regulatory Authority*, [Online]. Available at: <http://www.hpra.ie/homepage/medical-devices/regulatory-information>.

²⁹⁶ Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (5.5.2017, OJ L117/1), preamble, para. 12, article 1 (3).

²⁹⁷ Ibid Article 2 (1) and Annex XVI.

²⁹⁸ Ibid Article 2 (1) and Annex XVI, para. 2.

²⁹⁹ Ibid Article 2 (1) and Annex XVI, para. 6.



need to update Annex XVI if a neurotechnological device is developed that would fall outside the scope but should be deemed to fall within the scope of the MDR.

As a common law jurisdiction, Irish law also recognises the doctrine of tort of negligence. This implies that a party, such as a manufacturer or seller, may be liable for the tort of negligence for defective products if (i) there was a duty of care, (ii), there was a breach of that duty, and (iii) the breach caused damaged to the injured party.³⁰⁰ The foundation for the Irish tort of negligence originates from English common law, and includes the case of *Donoghue v Stevenson* (1932).³⁰¹ In relation to neurotechnologies, this means that manufacturers and sellers of neurotechnological devices are likely to have a duty of care towards end-users. Such a duty may be breached, for example, if a manufacturer fails to ensure such devices are safe, or to issue safety warnings.³⁰²

3.4.2 Liability for harms under contract law

The primary pieces of legislation in relation to liability for harms under contract law in Ireland are the Sale of Goods Act 1893 and the Sale of Goods and Supply of Services Act 1980. Furthermore, the EU Directive on the sale of consumer goods also applies in Ireland.³⁰³ Interestingly, the Irish implementation of the EU's sale of goods Directive, does not include the six-month time limit of the Directive within which the lack of conformity must become apparent. As such, sellers liability is subject to the normal contractual limitation period of six years.³⁰⁴

Goods delivered under a contract of sale, must confirm to that contract of sale.³⁰⁵ Lack of conformity gives rise to the consumer right to have the goods brought into conformity, such as by repair or replacement.³⁰⁶ As such, sellers of neurotechnological devices are liable to conform to the contract of sale of such devices. Failure to do so, gives rise to the consumer right to have a device repaired or replaced; have the price reduced; or have the contract rescinded.³⁰⁷ Which solution is most suitable in the case of failure to conform to a contract of sale for neurotechnological devices, requires a case-by-case assessment.

³⁰⁰ *Product Liability and Safety in Ireland: Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

³⁰¹ *Donoghue v Stevenson* [1932] A.C. 562, [1932] UKHL 100, 1932 S.C. (H.L.) 31, 1932 S.L.T. 317, [1932] W.N. 139.

³⁰² *Product Liability and Safety in Ireland: Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

³⁰³ S.I. No. 11/2003 European Communities (Certain Aspects of the Sale of Consumer Goods and Associated Guarantees) Regulations 2003, which implement Directive 1999/44/EC of the European Parliament and of the Council of 25 May 1999 on certain aspects of the sale of consumer goods and associated guarantees (7.7.1999, OJ L171/12).

³⁰⁴ *Product Liability and Safety in Ireland: Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

³⁰⁵ Directive 1999/44/EC of the European Parliament and of the Council of 25 May 1999 on certain aspects of the sale of consumer goods and associated guarantees (7.7.1999, OJ L171/12), article 2 (1).

³⁰⁶ Ibid Article 3.

³⁰⁷ Ibid Article 3.



3.4.3 Liability for harms under criminal law

In relation to criminal liability for harms caused by neurotechnological devices, the European Communities (General Product Safety) Regulations 2004 is the primary piece of legislation in Ireland.³⁰⁸ The Regulations provide an offence for the placement of unsafe products onto the market.³⁰⁹ Furthermore, failure to notify the Director of Consumer Affairs (Ireland's national consumer authority) of unsafe products may also constitute criminal liability.³¹⁰ In relation to neurotechnologies, this means that producers and product distributors of neurotechnological devices may face prosecution if they introduce neurotechnological devices that are unsafe.

Irish law does not provide for the offence of corporate manslaughter. The concept of corporate manslaughter implies that companies and organisations may be found guilty of corporate manslaughter for serious management failures resulting in a gross duty of care breach which caused a person's death.³¹¹ Whilst the Corporate Manslaughter Bill 2016 was introduced to the *Seanad Éireann* to create an 'indictable offence of corporate manslaughter by an undertaking', the Bill lapsed with the dissolution of the Dáil and the Seanad.³¹² Should this Bill, or a new legislative initiative, be reintroduced to the Irish Parliament, this would mean that companies and other undertakings producing neurotechnological devices may be held criminally liable for grossly negligent management causing death.

³⁰⁸ S.I. No. 199/2004 European Communities (General Product Safety) Regulations 2004 which implements Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety (15.1.2002, OJ L11/4).

³⁰⁹ Ibid s. 4 (1).

³¹⁰ Ibid s. 8 (3).

³¹¹ See, for instance, the UK's Corporate Manslaughter and Corporate Homicide Act 2007, c. 19, s. 1.

³¹² *Corporate Manslaughter (No. 2) Bill 2016 (Bill 64 of 2016) / Houses of the Oireachtas*, [Online]. Available at: <https://www.oireachtas.ie/en/bills/bill/2016/64/>.



4. Overview of gaps and challenges

The novel and emerging nature of neurotechnologies means that legal frameworks may not adequately cover all aspects and uses of neurotechnologies. This section sets out the key legal challenges identified in relation to the adequate regulation of neurotechnologies.

Human rights law implications

- Neurotechnologies have the potential to impact human rights in many ways, both positively and negatively. In relation to some rights in particular contexts, neurotechnologies have the potential to enhance the enjoyment of rights, such as when neurotechnologies provide innovative treatment options that positively impact the right to health. In other situations, however, the use of neurotechnologies may interfere with protected human rights, for instance if use in the courtroom violates the prohibition on self-incrimination as guaranteed under international human rights law. The Irish Constitution lays down various human rights, and further unenumerated constitutional rights have emerged through case law, including the right to bodily and psychological integrity.³¹³ In the context of rehabilitative treatment of criminal offenders, this right has the effect of requiring that proposed neurotechnological medical interventions could only occur with the voluntary consent of the offender to participate in such treatment.³¹⁴

Privacy and data protection implications

- The interpretation of the right to privacy under the ECHR, to which Irish courts are required to take account of in the interpretation and application of Irish law,³¹⁵ might offer some protection to brain and other neural data generated through the use of neurotechnologies. In this context, such data might be considered analogous to genetic and biometric data, including cellular samples, DNA profiles and dactyloscopic data, the collection and/or retention of which has been determined by the ECtHR in various cases before it to constitute a prima facie interference with the right to respect for private life.³¹⁶ An additional aspect, most relevant to the clinical use of neurotechnologies, is the interpretation by the ECtHR of the right to privacy under Article 8 to protect information relating to an individual's health, including mental health.³¹⁷
- The primary use case of neurotechnologies is in a healthcare context for clinical treatment and research purposes. In relation to the latter, the Health Research Regulations outlines the various procedural requirements with which healthcare research is required to comply in order to safeguard the rights of data subjects to privacy and data protection, including a conditional obligation to obtain the "explicit consent" of the data subject prior to commencing the research.³¹⁸ Whilst this requirement can be disapplied by attaining a consent declaration from the HRCDC, it has been suggested that the threshold and requirements for this may impose a

³¹³ Bunreacht na hÉireann, Article 40 (3) (i) and (ii).

³¹⁴ Whelan, D. (2007) 'Fitness for Trial in The District Court: The Legal Perspective', *Judicial Studies Institute Journal*, 2 (1).

³¹⁵ European Convention on Human Rights Act 2003, s.4.

³¹⁶ See, e.g., *Case of S. and Marper v. The United Kingdom* (Application nos.30562/04 and 30566/04) (4 December 2008); *Case of Gaughran v. The United Kingdom* (Application no.45245/15) (13 February 2020).

³¹⁷ See, e.g., *Case of Surikov v. Ukraine* (Application no.42788/06) (26 January 2017); *Case of Mockutė v. Lithuania* (Application no.66490/09) (27 February 2018).

³¹⁸ Data Protection Act 2018 (Section 36(2)) (Health Research) Regulations 2018, Reg.3(1)(e).



significant and potentially insurmountable procedural burden on researchers, with resultant implications for the viability of conducting healthcare research in Ireland.

Use in legal systems

- The discussion in Section 3.3 (see above) indicates an emerging trend towards the use of neurotechnologies in the Irish legal system; a trend also reflected in other national legal systems. Although these technologies may be helpful for a variety of trial purposes, including to determine the applicability of the defence of insanity in criminal cases, or to establish brain injury in civil law cases, careful consideration must be given to the protection of individual rights in relation to such proceedings, which are guaranteed under both domestic and international human rights law. The ICCPR, for instance, stipulates the equality of all before the law and guarantees the right to a fair and impartial trial in which the accused has the right to be presumed innocent until proven guilty.³¹⁹ The Irish Constitution also contains specific provisions relating to the trial of offences,³²⁰ including the right of trial by jury in criminal law cases.³²¹ In considering the current and future application of neurotechnologies in the courtroom, it is necessary to ensure that any such use is consistent with the protection of these established rights to due process.

Liability for harms caused by neurotechnologies

- The primary piece of legislation for products liability under tort in Ireland is the Liability for Defective Products Act 1991, which implements the European Products Liability Directive.³²²
- Furthermore, neurotechnologies are likely to fall within the remit of the European Medical Devices Regulation (MDR).³²³ Whilst various neurotechnological devices are likely to fall within the MDR, there may be a need to update Annex XVI if a neurotechnological device is developed that would fall outside the scope but should be deemed to fall within the scope of the MDR.
- As a common law jurisdiction, the doctrine of tort of negligence is also relevant to the regulation of liability for harms resulting from neurotechnologies in Ireland.
- The primary pieces of legislation in relation to liability for harms under contract law in Ireland are the Sale of Goods Act 1893 and the Sale of Goods and Supply of Services Act 1980. Furthermore, the EU Directive on the sale of consumer goods also applies in Ireland.³²⁴
- In relation to criminal liability, the European Communities (General Product Safety) Regulations 2004 is the primary piece of legislation in Ireland.³²⁵
- Whilst the Corporate Manslaughter Bill 2016 was introduced to the Seanad Éireann to create an 'indictable offence of corporate manslaughter by an undertaking', the Bill lapsed with the

³¹⁹ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI), Article 14.

³²⁰ Bunreacht na hÉireann, Article 38.

³²¹ Ibid Article 38(5).

³²² Liability for Defective Products Act 1991, no. 28; Council Directive of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (85/374/EEC) (07.08.1985, OJ L210/29); *Product Liability and Safety in Ireland: Overview / Thomson Reuters Practical Law*, [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-012-9208?transitionType=Default&contextData=(sc.Default)&firstPage=true).

³²³ Regulation (EU) 2017/745 of the European Parliament and of the Council of 5 April 2017 on medical devices, amending Directive 2001/83/EC, Regulation (EC) No 178/2002 and Regulation (EC) No 1223/2009 and repealing Council Directives 90/385/EEC and 93/42/EEC (5.5.2017, OJ L117/1).

³²⁴ S.I. No. 11/2003 European Communities (Certain Aspects of the Sale of Consumer Goods and Associated Guarantees) Regulations 2003, which implement Directive 1999/44/EC of the European Parliament and of the Council of 25 May 1999 on certain aspects of the sale of consumer goods and associated guarantees (7.7.1999, OJ L171/12).

³²⁵ S.I. No. 199/2004 European Communities (General Product Safety) Regulations 2004 which implements Directive 2001/95/EC of the European Parliament and of the Council of 3 December 2001 on general product safety (15.1.2002, OJ L11/4).



dissolution of the Dáil and the Seanad.³²⁶ Should this Bill, or a new legislative initiative, be reintroduced to the Irish Parliament, this would mean that companies and other undertakings producing neurotechnological devices may be held criminally liable for grossly negligent management causing death.

5. Conclusion

Whilst there are no dedicated Irish laws or policies that directly or comprehensively address all applications of neurotechnologies, this national legal case study on the Irish legal system has highlighted that neurotechnologies may have a variety of impacts on existing laws in the specific regulatory domains of human rights, privacy and data protection, use in legal systems, and liability for harms. Overall, it appears that Irish law generally permits the use of neurotechnologies, or at least does not establish explicit restrictions to the use of such technologies. This means that in a clinical context, for instance, neurotechnologies may be increasingly used for the purposes of healthcare treatment and research. Indeed, this may be viewed as consistent with the clear policy objective of the Irish Department of Health to improve the health and wellbeing of the population in Ireland, for which it envisions technological innovation and digitisation as key enablers. A pathway in the future towards increased and more widespread use of neurotechnologies in the provision of healthcare within the Irish healthcare system can thus be envisaged; a trend as already indicated by the accessibility under the TAS Scheme of neurotechnology-based treatment, such as deep brain stimulation (DBS), for the purposes of treating neurological disorders, such as dystonia.³²⁷ Outside of this primary use case, an emerging application of neurotechnologies is in the courtroom, prospective uses of which include to determine the applicability of the defence of insanity in criminal cases and to establish and quantify brain injury in civil law cases. Whilst Section 3.3.3 (above) indicates that Irish courts are generally reluctant to permit the application of neuroscientific evidence in legal proceedings, the increased admissibility of such evidence in other jurisdictions, such as the US, may serve as an influence for domestic inclusion. Indeed, it is generally considered that legal and policy developments occurring internationally and within supranational organisations, such as the EU, are capable of exerting great influence on the direction of law and policy at the level of nation states.³²⁸ In considering the potential for future regulation, most impactful may be the development of technology-neutral laws that are flexible, adaptable and capable of responding to the continual research and development innovations made in relation to both neuroscience and neurotechnologies.

³²⁶ *Corporate Manslaughter (No. 2) Bill 2016 (Bill 64 of 2016) / Houses of the Oireachtas*, [Online]. Available at: <https://www.oireachtas.ie/en/bills/bill/2016/64/>.

³²⁷ *Deep Brain Stimulation / Dystonia Ireland*, [Online]. Available at: <https://www.dystonia.ie/forms-of-dystonia/treatment-options/deep-brain-stimulation/>.

³²⁸ See generally, Bradford, A. (2012) 'The Brussels Effect', *Northwestern University Law Review*, Vol.107, pp.1-68. Available at: https://scholarship.law.columbia.edu/faculty_scholarship/1966.



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Annex 9.6 National Legal Case Study: Neurotechnologies in the United States of America (USA)

D4.2 Comparative analysis of national legal case studies

December 2022



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D4.2 National legal case studies: Annex 9.6 - Neurotechnologies in United States of America (USA)

Work Package	WP4 Policy, legal and regulatory analysis		
Lead Partner	Trilateral Research (TRI)		
Lead Author(s)	Ben Howkins, Julie Vinders (TRI)		
Other contributors	Nicole Santiago (TRI), Vangjel Gjorgjiev (TRI)		
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Keywords

Neurotechnologies; United States of America; brain computer interface; functional magnetic resonance imaging; electroencephalography; human rights law; data privacy law; criminal law; civil law; evidence law.

The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Neurotechnology	Devices and procedures used to access, monitor, investigate, manipulate, and/or emulate the structure and function of the neural systems of natural persons. ¹

Table 2: List of Abbreviations

Term	Explanation
ACHR	American Convention on Human Rights
ADA	Americans with Disabilities Act
ALI	American Law Institute
BCI	Brain computer interface
BIPA	Biometric Information Privacy Act
BMI	Brain machine interface
BRAIN	Brain Research Through Advancing Innovative Neurotechnologies
CAT	Convention against Torture and Other Cruel, Inhuman or Degrading Treatment

¹ OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

CCPA	California Consumer Privacy Act
CED	Convention for the Protection of All Persons from Enforced Disappearance
CEDAW	Convention on the Elimination of All Forms of Racial Discrimination
COPPA	Children's Online Privacy Protection Act
CRC	Convention on the Rights of the Child
CRDH	Centre for Devices and Radiological Health
CRPD	Convention on the Rights of Persons with Disabilities
CST	Competency to stand for trial
DARPA	Defense Advanced Research Projects Agency
DBS	Deep brain stimulation
DoA	Description of Action
EEG	Electroencephalograph
EU	European Union
FD&C	Federal Food, Drug and Cosmetic Act
FDA	Food and Drug Administration
FERPA	Family Educational Rights and Privacy Act
fMRI	Functional magnetic resonance imaging
FTC	Federal Trade Commission
GINA	Genetic Information Nondiscrimination Act
HIPAA	Health Insurance Portability and Accountability Act
HSS	Department of Health and Human Services
IACtHR	Inter-American Court of Human Rights
ICCPR	International Covenant on Civil and Political Rights (ICCPR)
ICERD	International Convention on the Elimination of All Forms of Racial Discrimination

ICESCR	International Covenant on Economic, Social and Cultural Rights
ICRMW	Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families
IDE	Investigational Device Exemption
MPC	Model Penal Code
MRI	Magnetic resonance imaging
N ³	Next-Generation Nonsurgical Neurotechnology
NESD	Neural Engineering System Design
NIH	National Institute of Health
NSF	National Science Foundation
OAS	Organisation of American States
PC	Project Coordinator
PET	Positron Emissions Topography
qEEG	Quantitative electroencephalography
R&D	Research and Development
RUD	Reservation, understanding and declaration
SPECT	Single photon emissions computerized tomography
UAV	Unmanned aerial vehicle
UCC	Uniform Commercial Code
USA	United States of America
WP	Work Package
XR	Digital extended reality

Abstract

The objective of this study is to review the current state of the law on and legal responses to neurotechnologies in the United States of America (USA), as evidenced in legislation (including, where applicable, the existence of proposals to create new law or adapt existing law in response to those neurotechnological developments), case law, regulation and policy. It focuses on those issues affecting and/or contributing to fundamental human rights and freedoms, socio-economic inequalities, and stimulation of innovation within the domains of human rights law, privacy and data protection law, the use of neurotechnologies in criminal and civil law proceedings, and liability for harms under tort, contract and criminal law. The study sets out the extent to which these legal domains already regulate neurotechnologies, before highlighting the gaps and challenges in the existing legal frameworks.

A summary overview of the main findings and legal issues surrounding neurotechnologies in the US is provided in Section 4.1.3 of the TechEthos Deliverable 4.2 summary comparative overview, to which this individual national legal case study report is annexed. In conjunction with the other national legal case studies on neurotechnologies and the other two technology families, namely climate engineering and digital extended reality (XR) technologies, this report provides the basis for the various neurotechnology-specific and cross-cutting regulatory challenges outlined in the summary comparative overview. This report is primarily aimed at informing relevant stakeholders, including US policymakers and regulators, of the main regulatory gaps and challenges applicable to neurotechnologies in the US.



1. Introduction

Neurotechnologies present many significant legal issues that impact socio-economic equality and fundamental rights in the United States of America (USA). This study provides an overview of those legal issues and challenges.

This study analyses relevant laws and policies from the U.S. legal system in relation to neurotechnologies. There is no comprehensive or dedicated legislation in the U.S. governing this technology family, but many elements of existing laws and policies would apply to the use of such technologies. For the purpose of the TechEthos project and this national legal case study, we have used the following definition for neurotechnologies:

Neurotechnologies refers to devices and procedures used to access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons.²

The definition for this technology family is based on the TechEthos factsheets, as developed by work package 1 team members as part of the initial horizon scan.³ For more information about the three TechEthos technology families and their innovation ecosystems, visit: <https://www.techethos.eu/resources/>.

1.1 Purpose of the U.S. legal case study

The objective of this study is to review the current state of the law on and legal responses to neurotechnologies in the U.S., as evidenced in policy, legislation, case law and regulation. Whilst there are no specific laws on neurotechnologies in the U.S., many existing laws (including human rights law, privacy and data protection law, use in criminal, civil and evidence law) are relevant and likely to apply to the use of such technologies, including any harms resulting from them (covering tort, contract and criminal law in relation to liability for harms). Particularly relevant legal developments in the U.S. include the existence of case law on the use and admissibility in legal proceedings of neuroscientific evidence obtained through the use of neurotechnologies, as well as the ongoing debate in legal academic discourse around whether the enactment by various state legislatures of comprehensive data privacy laws may lead to similar legislative developments at the federal level, with potential implications for the regulation of brain and other neural data. At the policy level, various federal agencies are involved in the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative, which seeks

² OECD. (2019) *Recommendation of the Council on Responsible Innovation in Neurotechnology*, OECD/LEGAL/0457.

³ TechEthos (2022) *Technology Factsheet: Climate Engineering / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Climate-Engineering_website.pdf; TechEthos (2022) *Technology Factsheet: Neurotechnologies / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Neurotechnologies_website.pdf; TechEthos (2022) *Technology Factsheet: Digital Extended Reality / TechEthos*, [Online]. Available at: https://www.techethos.eu/wp-content/uploads/2022/05/TechEthos_factsheet_Digital-Extended-Reality_website.pdf.

to advance neuroscientific understanding by developing and applying neurotechnologies for various research purposes.⁴

In addition to the reasons mentioned above, the selection of the U.S. as a national legal case study is intended to complement the other national legal case studies on neurotechnologies, specifically, and the other technology families, more generally. For the purposes of this deliverable, at least one common law jurisdiction and at least one civil law jurisdiction was selected for each of the three technologies families, to ensure a full range of legal frameworks would inform the comparative analysis. As an extensive study of EU law (and international law) in relation to the three technology families has been conducted for Deliverable 4.1, it was decided that it would be beneficial to represent both EU and non-EU jurisdictions in the national legal case studies, in order to explore both how EU law is operationalised at a national level, as well as how non-EU frameworks differ from the approaches of EU Member States.

This study was prepared through desk research, using legal academic literature and legislation tracker databases, such as the Library of Congress⁵ and Open States.⁶ It is part of a series of national legal case studies prepared in the TechEthos project covering three technology families, namely: climate engineering, neurotechnologies, and digital extended reality (XR). A complementary report covers the international and European Union law dimensions of the three technology families (D4.1 of the TechEthos project).⁷ The following table provides an overview of the nine country studies conducted as part of the *Analysis of national legal case studies* (D4.2 of the TechEthos project):

Table 3: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Structure of the case study

Section II explores the existing and proposed laws and policies in the U.S. that specifically address neurotechnologies. **Section III** explores the legal implications of neurotechnologies in relation to four specific legal domains, specifically human rights law (Section 3.1), privacy and data protection law (Section 3.2), use in criminal and civil legal proceedings (Section 3.3), and liability for harms (Section 3.4). **Section IV** provides an overview of the gaps and challenges in relation to the regulation of neurotechnologies. **Section V** concludes the case study, followed by a reference list at the end.

⁴ Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Working Group Report to the Advisory Committee to the Director, NIH. (2014) *Brain 2025 – A Scientific Vision*, p.5-6. Available at: https://braininitiative.nih.gov/sites/default/files/pdfs/brain2025_508c.pdf

⁵ Available at: <https://www.congress.gov/>

⁶ Available at: <https://openstates.org/>

⁷ Santiago, N., et al. (2022). TechEthos D4.1: *Analysis of international and EU law and policy*. TechEthos Project Deliverable. Available at: www.techethos.eu.



1.3 Scope and Limitations

This national legal case study was prepared as part of TechEthos Work Package 4 on policy, legal and regulatory analysis of the three identified families of technologies, namely climate engineering technologies, neurotechnologies and digital extended reality (XR) technologies. The scope of this study is demarcated by the project task's workplan. The U.S. legal system is comprised of both federal law and state law of fifty states, as well as separate but overlapping federal and state court systems. It is thus beyond the scope defined in the workplan to conduct a comprehensive study of all U.S. law and case law with relevance to neurotechnologies. Instead, the aim of this national legal case study is to provide a high-level overview of the legal implications related to the development and use of neurotechnologies, focusing primarily on federal law and referring to selected examples of state law in order to highlight significant and relevant differences. The analysis is structured around four legal frameworks, namely: human rights law, privacy and data protection law, use in criminal and civil law proceedings, and liability for harms. This defined scope allows for a comparative analysis with the other national legal case studies on neurotechnologies in Ireland and Germany, as well as between cross-cutting legal frameworks, such as human rights law, which are applicable to at least two of the three technology families analysed.

1.4 Overview of the U.S. legal system

The U.S. is a federal republic comprised of fifty states plus the District of Columbia, each of which has its own codified Constitution based on the overarching U.S. Constitution. As part of the Anglosphere, its legal system is based on the common law tradition, meaning the ratio decidendi of contemporary and higher court judgements create authoritative precedents which are binding on the decisions of subsequent and lower courts through the doctrine of stare decisis. Such precedents can be traced back to the English common law.⁸ The exception to this is the state of Louisiana, which has a civil law character as a legacy of its colonial past under the jurisdiction of two civil law jurisdictions in Spain and France.⁹

The U.S. Constitution, domestic laws and international treaties are “the supreme Law of the Land”¹⁰ and pre-empt state law, including state constitutions, with the U.S. Constitution also establishing the framework for and power-sharing arrangement between the three branches of government, namely: the legislature, the executive and the judiciary.

The powers of the legislative branch are “vested in a Congress of the United States, which shall consist of a Senate and House of Representatives.”¹¹ The legislative model thus established is bicameral, with the United States Congress, the federal legislative body, being comprised of an upper body, the Senate, consisting of 100 senators, 2 for each state, and a lower body, the House of Representatives, consisting of 435 elected members as “divided among the 50 states in proportion to their total population.”¹²

The powers of the executive branch are “vested in a President of the United States of America”, who is elected as head of state alongside a Vice President to serve office for a four-year term,¹³ which can be

⁸ Pope, H. (1910) ‘The English Common Law in the United States’, *Harvard Law Review*, Vol.24:1, pp.6-30. DOI: <https://doi.org/10.2307/1324643>

⁹ See generally, Ward, R.K. (1997) ‘The French Language in Louisiana Law and Legal Education: A Requiem’, *Louisiana Law Review*, Vol.57:4, pp.1283-1324. Available at: <https://digitalcommons.law.lsu.edu/lalrev/vol57/iss4/7>

¹⁰ U.S. Const. Art.VI §2.

¹¹ U.S. Const. Art.I §1.

¹² The White House. *The Legislative Branch* / [Online]. Available at: <https://www.whitehouse.gov/about-the-white-house/our-government/the-legislative-branch/>

¹³ U.S. Const. Art. II §1.

renewed for a maximum of one extra term.¹⁴ Eligibility requirements for the presidency include being “a natural born Citizen, or a Citizen of the United States”, at least thirty-five years old and a United States resident for fourteen years.¹⁵ The explicit powers of the President include the “Power, by and with the Advice and Consent of the Senate, to make Treaties”, to “appoint Ambassadors, other public Ministers and Consuls, Judges of the Supreme Court, and all other Officers of the United States”, and to “Grant Reprieves and Pardons for Offences against the United States, except in Cases of Impeachment.”¹⁶

The powers of the judicial branch are “vested in one supreme Court, and in such inferior Courts as the Congress may from time to time ordain and establish.”¹⁷ Federal courts are courts of limited jurisdiction, meaning they may only hear the types of “Cases” and “Controversies” listed in the Constitution.¹⁸ Although not provided for in the text of the U.S. Constitution itself, the Supreme Court and other federal courts have the power of judicial review, which means that legislative and executive acts can be struck down if found to be in violation of the U.S. Constitution.¹⁹

The U.S. Constitution:

The U.S. legal system is comprised of a network of both federal and state laws and institutions, at the apex of which is the codified U.S. Constitution. This foundational text inaugurates the U.S. Federal Government, the powers of which, in accordance with the separation of powers doctrine, are divided between three separate branches: legislative powers vested in Congress (the House of Representatives and the Senate),²⁰ executive power granted to the President,²¹ and judicial power conferred to a singular Supreme Court and any such “inferior Courts as the Congress may from time to time ordain and establish.”²² The U.S. Constitution also establishes an elaborate system of checks and balances throughout the U.S. government in order to avoid the concentration of power in any one branch. By way of example, the President as the head of the executive branch is “Commander in Chief of the Army and Navy”,²³ yet it is in the power of Congress to “provide and maintain a [n]avy” and “[t]o declare [w]ar”.²⁴

Since its drafting in 1787 and entry into force in 1789, there have been 27 amendments to the U.S. Constitution, the most recent of which was in 1992.²⁵ The first 10 amendments to the U.S. Constitution encompass the Bill of Rights,²⁶ which establishes various constitutional limits to the exercise of governmental power in order to protect civil liberties, including that “Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the government for a redress of grievances.”²⁷ In addition to the protection of individual rights, the Bill of Rights Amendment also establishes the division of power arrangement between the national government and individual state governments pursuant to the principle of federalism. Specifically, it provides that “[t]he powers not delegated to the United States by the Constitution, nor prohibited by it to the States, are reserved to the States respectively, or to the people.”²⁸ Whilst the legislative powers

¹⁴ U.S. Const. Amend XXII §1.

¹⁵ U.S. Const. Art. II §1.

¹⁶ U.S. Const. Art. II §2.

¹⁷ U.S. Const. Art. III §1.

¹⁸ U.S. Const. Art. III §2.

¹⁹ *Marbury v. Madison*, 5 U.S. 137 (1803).

²⁰ U.S. Const. Art. I §1.

²¹ U.S. Const. Art. II §1.

²² U.S. Const. Art. III §1.

²³ U.S. Const. Art. III §2.

²⁴ U.S. Const. Art. I §VIII.

²⁵ U.S. Const. Amend. XXVII.

²⁶ U.S. Const. Amends. I – X.

²⁷ U.S. Const. Amend I.

²⁸ U.S. Const. Amend. X.



of Congress are enumerated in and delimited by the Constitution, the valid exercise of such powers entails that, in accordance with the Supremacy Clause,²⁹ conflicting state law is pre-empted by the Constitution and federal statutory law.³⁰

International law:

The Supremacy Clause of the U.S. Constitution provides that “all Treaties made, or which shall be made, under the Authority of the United States, shall be the supreme law of the Land”.³¹ As one of the primary sources of international law, the three-stage process by which the U.S. assumes treaty obligations is initiated by the President or another representative of the executive negotiating and signing a treaty and then seeking the formal advice and consent of two-thirds of the Senate,³² the attainment of which enables the President to affirm ratification.³³ However, the status of treaty law as a matter of domestic law is variable. Textually, whilst the Supremacy Clause supports a form of monism through which international law is directly effective as domestic law, the requirement for the advice and consent of the Senate implies that international law is effective as domestic law once transposed into the domestic legal order.³⁴ Addressing this tension, a majority of the Supreme Court observed in *Medellín v. Texas* that “[w]hile a treaty may constitute an international commitment, it is not binding domestic law unless Congress has enacted statutes implementing it or the treaty itself conveys an intention that it be “self-executing” and is ratified on that basis.”³⁵ Although critiqued, particularly for the potential uncertainty around whether a treaty is “self-executing” or not,³⁶ this signals a primarily dualist approach to the status of international law within the domestic legal order, whereby non self-executing treaties require express incorporation through implementing legislation in order to be judicially enforceable in the U.S.³⁷

Some of the core United Nations (UN) treaties to which the U.S. is a state party, and which are relevant to this national legal case study, are situated within the field of international human rights law and include the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD), the International Covenant on Civil and Political Rights (ICCPR), the Convention against Torture and Other Cruel, Inhuman, or Degrading Treatment or Punishment (CAT), and two Optional Protocols to the Convention on the Rights of the Child (CRC) pertaining to the involvement of children in armed conflict and the sale of children, child prostitution and child pornography.³⁸ The U.S. is also a signatory to, but has not ratified, the International Covenant on Economic, Social and Cultural Rights (ICESCR), the

²⁹ U.S. Const. Art VI.

³⁰ Segall, E.J. (2013) ‘Constitutional Change and the Supreme Court: The Article V Problem’, *University of Pennsylvania Journal of Constitutional Law*, Vol.16:2, pp.443-451. Available at: <https://scholarship.law.upenn.edu/jcl/vol16/iss2/5/>

³¹ U.S. Const. Art.VI §2.

³² Ibid.

³³ Telman, D.A.J. (2013) ‘A Monist Supremacy Clause and a Dualistic Supreme Court: The Status of Treaty Law as U.S. Law’, *Valparaiso University Legal Studies Research Paper No.13-6*. Available at: https://scholar.valpo.edu/law_fac_pubs/300/

³⁴ Ibid.

³⁵ *Medellín v. Texas*, 552 U.S. 491 (2008), 505 (citing *Igartúa-De La Rosa v. United States*, 417 F. 3d 145, 150 (CA1 2005) (en banc) (Boudin, C.J.)).

³⁶ See, e.g., *Medellín v. Texas*, 552 U.S. 491 (2008), 538-567 (Breyer, J., dissenting).

³⁷ Congressional Research Service. (2018) *International Law and Agreements: Their Effect upon U.S. Law*. RL32528. Available at: <https://sgp.fas.org/crs/misc/RL32528.pdf>


³⁸ International Convention on the Elimination of All Forms of Racial Discrimination (entered into force 4 January 1969) G.A. Res. 2106 (XX); International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (entered into force 26 June 1987) G.A. Res. 39/46; Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict (entered into force 12 February 2002) G.A. Res. A/RES/54/263; Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography (entered into force 18 January 2002) G.A. Res. A/RES/54/263.

Convention on the Elimination of All Forms of Discrimination against Women (CEDAW), the Convention on the Rights of the Child (CRC) and the Convention on the Rights of Persons with Disabilities (CRPD).³⁹

U.S. court system:

The U.S. court system is comprised of both a federal court system and court systems in each of the 50 states. In relation to the former, the U.S. Constitution provides that “[t]he judicial power of the United States, shall be vested in one supreme Court, and in such inferior courts as the Congress may from time to time ordain and establish.”⁴⁰ The federal court system consists of three hierarchical levels, namely: district courts (the trial court, of which there are 94), circuit courts (first appeal court, of which there are 13) and the Supreme Court of the U.S. – the highest court in the U.S. legal system and the final court of appeal in the federal court system.⁴¹ The state court systems, as established by the constitution and laws of each of the 50 states, mirror the structure of the federal court system, from which they are mostly separate, except where the U.S. Supreme Court exercises its authority to review the decisions of state courts concerning federal law.⁴² Whereas the federal courts are courts of limited jurisdiction determined by the “Cases” and “Controversies” listed in the Constitution,⁴³ state courts are courts of general jurisdiction that can in principle hear all types of cases, whether based on state or federal law.⁴⁴

Table 4: Overview of court structure in the U.S.

	Federal and State Court Hierarchies in the U.S.
Higher  Lower	<ul style="list-style-type: none"> • Supreme Court • Circuit courts • District courts

³⁹ International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

⁴⁰ U.S. Const. Art. III §1.

⁴¹ Office of the United States Attorneys. *Introduction To The Federal Court System* / U.S. Department of Justice [Online]. Available at: <https://www.justice.gov/usao/justice-101/federal-courts>

⁴² Bradley, C.A. (2020) *International law in the US legal system*. 3rd edn. New York: Oxford University Press, pp.3.

⁴³ U.S. Const., Art.III §2.

⁴⁴ Bradley, C.A. (2020) *International law in the US legal system*. 3rd edn. New York: Oxford University Press, pp.2-3.

1.5 Current state of neurotechnologies in the U.S.

Through the various programs carried out as part of the Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) initiative (see Section 2), which involves partners such as the National Institute of Health (NIH), the U.S. Food and Drug Administration (FDA) and the Defense Advanced Research Projects Agency (DARPA), neurotechnologies are widely used for a variety of research and development (R&D) purposes. At the time of writing, the most significant advancements in neurotechnology R&D relate to brain computer or brain-machine interfaces (BCI/BMI), a type of neurotechnological device enabling direct and occasionally bidirectional communication between the brain and an external computer-based system.⁴⁵ Although most commercially available BCIs are non-invasive, most recent R&D efforts have increasingly focused on more invasive implanted BCIs, with Synchron announcing it had received FDA approval to conduct the first human clinical trial of such technology following the granting of \$10 million from the NIH Neural Interfaces Program,⁴⁶ and Neuralink also seeking regulatory clearance from the FDA to begin human trials for its own brain chip implant.⁴⁷ Whilst both are primarily intended to be used as medical devices to restore motor and other functions, as well as to treat neurological disorders, Neuralink has indicated its long-term strategy is to eventually make its BCIs more widely available to the general population.⁴⁸ Paralleling this is the general and significantly increasing trend towards the use of and reliance upon neuroscientific evidence, both in the form of brain scans and expert testimony, for civil and, in particular, criminal legal proceedings.⁴⁹

2. Neurotechnology-specific legal developments

This section presents an overview of the legal developments pertaining to neurotechnologies in the U.S. It examines relevant policies and laws in relation to neurotechnologies and identifies the national authorities involved in the implementation and enforcement of such laws and policies.

U.S. policy on neurotechnologies

The centrepiece of U.S. policy in relation to neurotechnologies is the Brain Research through Advancing Innovative Neurotechnologies (BRAIN) initiative. Launched in 2013, it involves a collaborative partnership between public and private sector bodies, with funding for research provided by various federal governmental agencies, including those connected to the U.S. Department of Health and Human Services (HHS), such as the National Institute of Health (NIH) and the Food and Drug Administration

⁴⁵ Saha, S. et al. (2021) 'Progress in Brain Computer Interface: Challenges and Opportunities', *Frontiers in Systems Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnsys.2021.578875>

⁴⁶ Park, A. (2022) *Sci-fi no more: Synchron implants mind-reading device in first US patient in paralysis trial* / Fierce Biotech [Online]. Available at: <https://www.fiercebiotech.com/medtech/synchron-implants-brain-computer-interface-first-us-patient-paralysis-trial>

⁴⁷ Levy, R. (2022) *Musk approaches brain chip start-up Synchron about deal amid Neuralink delays* / Reuters [Online]. Available at: <https://www.reuters.com/technology/musk-approaches-brain-chip-startup-synchron-about-deal-amid-neuralink-delays-2022-08-19/>

⁴⁸ See, e.g., Neuralink (no date) *Applications* / [Online]. Available at: <https://neuralink.com/applications/>

⁴⁹ Aono, D., Yaffe, G., and Kober, H. (2019) 'Neuroscientific evidence in the courtroom: a review', *Cognitive Research: Principles and Implications*, Vol.4:40. DOI: <https://doi.org/10.1186/s41235-019-0179-y>



(FDA), as well as the National Science Foundation (NSF) and the Defense Advanced Research Projects Agency (DARPA). In response to this “Grand Challenge”, the NIH established a BRAIN Working Group of the Advisory Committee to the Director, NIH, whose report entitled “BRAIN 2025: A Scientific Vision” sets out a 10-year plan for achieving the seven main goals of the BRAIN initiative.⁵⁰ The overall aim can be summarised as “the development and use of tools for acquiring fundamental insight about how the nervous system functions in health and disease.”⁵¹ A follow-up report at the midway point of the initiative in 2019 by the Working Group 2.0 reviewed the progress made in relation to the strategic priorities laid down in the 2025 Report and identified opportunities for the second phase of the initiative.⁵² One of the key overall aims of the BRAIN initiative is the closer integration between neuroscience and neuroethics, in accordance with which the BRAIN Neuroethics Subgroup has developed a Neuroethics Roadmap focusing on the “potential neuroethics implications of new tools and neurotechnologies and their use.”⁵³

As part of its role in the BRAIN initiative, the FDA works with the developers of medical devices to ensure the transparency of the applicable regulatory framework and assist in the bringing of safe and effective products to market.⁵⁴ The Centre for Devices and Radiological Health (CDRH), an entity connected to the FDA, has issued “leapfrog guidance” relating to non-clinical testing and clinical use of implanted brain computer interfaces (BCIs) for patients with paralysis or amputation.⁵⁵ This guidance document provides a series of non-binding recommendations for Q-Submissions and Investigational Device Exemptions (IDEs) intended to inform relevant technology developers and other stakeholders of the process by which medical devices can achieve regulatory approval and enter the healthcare market.⁵⁶ The issuing of guidance relating to implanted BCIs reflects the rapid progress in relation to the development of this technology specifically, and the growing interest in the availability of medical consumer neurotechnology, more generally.⁵⁷ This follows the approval given by the FDA for the use of similar though potentially less invasive deep brain stimulation (DBS) applications, such as Percept PC by Medtronic and the NeuroPace RNS System, to treat movement disorders including Parkinson’s disease, as well as severe epilepsy.⁵⁸ Since the issuing of this guidance document, New York-based Synchron announced that as part of its COMMAND trial it was the first company in the U.S. to implant a BCI into a human patient following the awarding of IDE status by the FDA.⁵⁹ These developments, coupled with

⁵⁰ Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Working Group Report to the Advisory Committee to the Director, NIH. (2014) *Brain 2025 – A Scientific Vision*, p.5. Available at: https://braininitiative.nih.gov/sites/default/files/pdfs/brain2025_508c.pdf

⁵¹ Ibid.

⁵² Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Working Group 2.0 Report to the Advisory Committee to the Director, NIH. (2019) *The Brain Initiative 2.0: From Cells to Circuits, Towards Cures*. Available at: https://braininitiative.nih.gov/sites/default/files/images/brain_2.0_6-6-19-final_revised10302019_508c.pdf

⁵³ Advisory Committee to the Director Working Group on BRAIN 2.0 Neuroethics Subgroup. (2019) *The BRAIN Initiative and Neuroethics: Enabling and Enhancing Neuroscience Advances for Society*. Available at: https://braininitiative.nih.gov/sites/default/files/images/bns_roadmap_11_october_2019_sent_to_acd_for_oct_2019_revised_10282019_508c.pdf

⁵⁴ *Food and Drug Administration & The BRAIN Initiative* / Food and Drug Administration [Online]. Available at: <https://www.braininitiative.org/alliance/food-and-drug-administration/>

⁵⁵ U.S Department of Health and Human Services Food and Drug Administration Centre for Devices and Radiological Health. (2021) *Implanted Brain-Computer Interfaces for Patients with Paralysis or Amputation – Non-clinical Testing and Clinical Considerations*. FDA-2014-N-1130.

⁵⁶ Ibid.

⁵⁷ Ibid.

⁵⁸ Shein, E. (2022) ‘Neurotechnology and the Law’, *Communications of the ACM*, Vol.65:8, pp.16-18. DOI: 10.1145/3542816.

⁵⁹ Ha, K., and Hubin, T. (2022) *Synchron Announces First Human U.S. Brain-Computer Interface Implant* / Businesswire [Online]. Available at: <https://www.businesswire.com/news/home/20220719005248/en/Synchron-Announces-First-Human-U.S.-Brain-Computer-Interface-Implant>

the growing potential for dual-use (i.e., for both civilian and military applications),⁶⁰ have led the Congressional Research Service to include BCIs in the category of emerging and foundational technology the sale of which may be restricted by export controls, such as licensing agreements.⁶¹

The research and development body of the U.S. Department of Defense, DARPA, has been involved in the scientific research and technological development of neurotechnologies, particularly BCIs, since the 1970s.⁶² It supports the BRAIN initiative through its funding of various research and development (R&D) programs into medical and military applications of neurotechnologies.⁶³ Such programs include the Neural Engineering System Design (NESD) program, which seeks to develop implantable neural interfaces to alleviate damage caused by injury or disease to the visual and auditory systems of military personnel,⁶⁴ and the Next-Generation Nonsurgical Neurotechnology (N³) program, which aims to develop non-invasive brain-machine interfaces for a variety of national security applications, including controlling unmanned aerial vehicles (UAVs).⁶⁵

Paralleling this, at the level of civil society in the US there exists the Neurorights Foundation, the primary aim of which is to advocate for the incorporation of five specific so-called “neurorights” into “international human rights law, national legal and regulatory frameworks, and ethical guidelines.”⁶⁶ Its work with national governments, as well as other civil society stakeholders in both the public and private sector, has been particularly influential in proposed and actual legislative reforms recognising so-called “neurorights” in the Republic of Chile.

U.S. laws explicitly covering neurotechnologies

There are currently no known dedicated U.S. laws on neurotechnologies at the federal or state level.

However, medical device legislation, such as the Federal Food, Drug, and Cosmetic Act (1938) (FD&C Act), the Medical Device Amendments to the FD&C Act (1976), and the 21st Century Cures Act (2016), is applicable to neurotechnologies classified as such. The FD&C Act (1938) is the primary statutory authority for the FDA’s regulatory oversight of medical devices,⁶⁷ while the Medical Device Amendments to the FD&C Act (1976) creates a three-tiered risk-based classification system designed to ensure the safety and effectiveness of all medical devices intended for human use.⁶⁸ For devices classified as Class III, there exists “insufficient information” that neither the general controls applicable to Class I devices, nor the performance standards applicable to Class II devices, “are sufficient to provide reasonable assurance of the safety and effectiveness of the device”, with the effect that such devices are subject to premarket approval requirements.⁶⁹ A potential challenge here relates to direct-to-

⁶⁰ European Commission. (2020) *Guidance note – Research with an exclusive focus on civil applications*. Available at: https://ec.europa.eu/research/participants/data/ref/h2020/other/hi/guide_research-civil-apps_en.pdf

⁶¹ Congressional Research Service. (2021) *Export Controls: Key Challenges*. IF11154. Available at: <https://crsreports.congress.gov/product/pdf/IF/IF11154>

⁶² Miranda, R.A., et al. (2015) ‘DARPA-funded efforts in the development of novel brain-computer interface technologies’, *Journal of Neuroscience Methods*, vol.244, pp.52-67. DOI: <https://doi.org/10.1016/j.jneumeth.2014.07.019>

⁶³ See, e.g., *DARPA and the Brain Initiative* [Online]. Available at: <https://www.darpa.mil/program/our-research/darpa-and-the-brain-initiative>

⁶⁴ Arthur, J. *Neural Engineering System Design* / DARPA [Online]. Available at: <https://www.darpa.mil/program/neural-engineering-system-design>

⁶⁵ Sarma, G. *Next-Generational Nonsurgical Neurotechnology* / DARPA [Online]. Available at: <https://www.darpa.mil/program/next-generation-nonsurgical-neurotechnology>

⁶⁶ *Mission* / The Neurorights Foundation [Online]. Available at: <https://neurorightsfoundation.org/mission>

⁶⁷ 21 U.S.C §372.

⁶⁸ 21 U.S.C §360c.

⁶⁹ 21 U.S.C §360c(a)(1)(c).



consumer neurotechnologies that purport to serve health-related purposes, such as improving cognition, but which do not claim to serve a therapeutic benefit, for which the classification as low-risk devices that do not require FDA regulatory approval may represent a regulatory oversight.⁷⁰ More recently, the 21st Century Cures Act has clarified the types of digital health technologies regulated as medical devices within the meaning of the legislation, specifically by excluding those with a software function intended, inter alia, for administrative support of a healthcare facility, the maintenance of a healthy lifestyle, or to serve as electronic patient records.⁷¹

At the state level, a study of bills proposed in U.S. state legislatures between 1992 and 2009 identified nearly 1000 bills for so-called “neurolegislation”, defined as “legislation that explicitly mentions the brain or brain sciences”, of which 290 were enacted into law.⁷² The main categories to which the bills related were (i) brain injury and brain trauma, (ii) health care provision and insurance coverage, (iii) mental health and mental disabilities, (iv) education, early childhood education and special education, and (v) combat veterans and posttraumatic stress disorder.⁷³ Whilst not related to neurotechnologies, specifically, this reflects the gradual transposition of neuroscience into a legislative form or framework.

Proposals for dedicated law on neurotechnologies

There are no active proposals at the federal or state level for dedicated legislation in relation to neurotechnologies. Previously, however, a bill for a National Neurotechnology Initiative Act of Congress was put before the House of Representatives (e.g., H.R.1483⁷⁴) and the Senate (e.g., S.2989⁷⁵). The proposal sought to increase investment in federal neurotechnology research and development,⁷⁶ “coordinate and promote the study of the social, ethical and legal aspects of neurotechnology”,⁷⁷ and establish a National Neurotechnology Coordination Office to be responsible for overseeing implementation of the initiative.⁷⁸ At the state level, a bill introduced to the State of Minnesota House of Representatives in 2021 sought to establish neurodata rights,⁷⁹ such as a right to mental privacy, a right to cognitive liberty, and a right to psychological continuity, as well as a prohibition on the use of BCIs to bypass conscious decision-making,⁸⁰ with resultant civil and criminal penalties for failure to comply.⁸¹ Whereas the establishment of the BRAIN initiative soon after the introduction of the National Neurotechnology Initiative Act is the most likely reason for its limited further progression, it is unclear whether the Minnesota Bill will proceed any further in the legislative process during the 22-23 session.

Responsibility for enforcement

The FDA, the predecessor to which was established by the Pure Food and Drugs Act (1906), is responsible for regulating medical devices, including neurotechnologies classified as such. Its regulatory

⁷⁰ Altimus, C. Helmers-Wegman, E. and Raver, S. (2021) *Neurotechnology – A Giving Smarter Guide*. Milken Institute Center for Strategic Philanthropy. Available at:

<https://milkeninstitute.org/report/neurotechnology-giving-smarter-guide>

⁷¹ 21 U.S.C §360j(o)(1)(A)-(E).

⁷² Shen, F.X. (2016) ‘Neurolegislation: How U.S. Legislators Are Using Brain Science’, *Harvard Journal of Law & Technology*, Vol.29:2, pp.495-526. Available at: https://scholarship.law.umn.edu/faculty_articles/605

⁷³ Shen, F.X. (2016) ‘Neurolegislation: How U.S. Legislators Are Using Brain Science’, *Harvard Journal of Law & Technology*, Vol.29:2, pp.495-526. Available at: https://scholarship.law.umn.edu/faculty_articles/605

⁷⁴ H.R. 1483 – 111th Congress (2009-2010): National Neurotechnology Initiative Act. (2009, March 16). <http://www.congress.gov/>

⁷⁵ S.586 – 111th Congress (2009-2010): National Neurotechnology Initiative Act. (2009, March 12). <http://www.congress.gov/>

⁷⁶ H.R. 1483 – 111th Congress (2009-2010): National Neurotechnology Initiative Act. (2009, March 16) §4a.2.

⁷⁷ Ibid §4b.4

⁷⁸ Ibid §5a.

⁷⁹ HF 424 (Minnesota – 2021 – 2022 Regular Session) §1-2.2.

⁸⁰ Ibid §2.4.

⁸¹ Ibid §2.5 – §4.

powers, as exercised by the Centre for Devices and Radiological Health (CRDH), include banning devices,⁸² ordering device recalls,⁸³ and imposing civil penalties for violations of the FD&C Act (1938).⁸⁴

Significant legal cases

The primary issue in case law involving neurotechnologies is the use and admissibility of neuroscientific evidence in legal proceedings (see Section 3.3 below). Neuroscientific evidence has been introduced in civil law cases such as *Van Middlesworth v. Century Bank and Trust Co*, in which the results of a magnetic resonance imaging (MRI) scan were admitted as evidence of the defendant's mental incompetence.⁸⁵ Reliance upon neuroscientific evidence is more established in criminal law cases,⁸⁶ however, and significant cases in this context include *United States v. Semrau*,⁸⁷ *Florida v. Nelson*,⁸⁸ and *Graham v. Florida*,⁸⁹ pertaining to the admissibility of lie detection evidence, criminal responsibility and sentencing, and brain development in adolescents and the associated treatment of juvenile offenders, respectively.

Current debates and future policy and/or legal developments

As noted above, a key feature of the emerging interdisciplinary field of neuroscience and the law, often referred to by the portmanteau of "neurolaw",⁹⁰ is the growing use of and reliance upon neuroscientific evidence in courtrooms to, inter alia, (dis)prove injury in civil cases and establish mitigating circumstances for defendants in criminal cases.⁹¹ An additional aspect in the growth of neurolaw, as also noted above, is the reference made to neuroscience in a variety of legislative bills, particularly at the state level.⁹² It remains to be seen which of court-made neurolaw and legislature-enacted "Neurolegislation" is more likely to lead to significant legal developments in relation to the regulation of neurotechnologies in the U.S.⁹³

⁸² 21 U.S.C §360f.

⁸³ 21 U.S.C §360h(e).

⁸⁴ 21 U.S.C §333(f)(1)(A).

⁸⁵ *Van Middlesworth v. Century Bank and Trust Co.*, No.215512 (Mich. App., May 5, 2000).

⁸⁶ Farahany, N.A. (2016) 'Neuroscience and behavioural genetics in US criminal law: an empirical analysis', *Journal of Law and the Biosciences*, Vol.2:3, pp.485-509. DOI: <https://doi.org/10.1093/jlb/lsv059>

⁸⁷ *United States v. Semrau*, 693 F.3d 510 (6th Cir. 2012).

⁸⁸ *Florida v. Grady Nelson*, No.FO5-00846 (11th Fla. Cir. Ct., Dec 4, 2010).

⁸⁹ *Graham v. Florida*, 560 U.S. 48 (2010).

⁹⁰ Aggarwal, N.K., and Ford, E. (2013) 'The neuroethics and neurolaw of brain injury', *Behavioural Sciences & The Law*, Vol.31:6, pp.789-802. DOI: <https://doi.org/10.1002/bsl.2086>

⁹¹ See, e.g., Brown E. (2019) *Is "Neurolaw" Coming Soon to a Courtroom Near You?* / *Scientific American* [Online]. Available at: <https://www.scientificamerican.com/article/is-neurolaw-coming-soon-to-a-courtroom-near-you/>

⁹² Shen, F.X. (2016) 'Neurolegislation: How U.S. Legislators Are Using Brain Science', *Harvard Journal of Law & Technology*, Vol.29:2, pp.495-526. Available at: https://scholarship.law.umn.edu/faculty_articles/605

⁹³ Ibid.



3. Domain-specific legal issues

This section examines the legal implications of neurotechnologies in a U.S. context with respect to the following specific legal domains, namely human rights law, privacy and data protection law, use in legal systems (criminal, civil and evidence law), and liability for harms (tort, contract and criminal).

The following sections analyses some of the ways in which neurotechnologies may be governed by U.S. law and policy within the frameworks of human rights, privacy and data protection, use in legal systems and liability for harms. Each section begins with a brief introduction to the relevant legal issue(s) and associated legal framework(s). Specific legal issues within the identified legal frameworks are then analysed in greater depth, with each discussion including specific references to existing (and proposed) law and an explanation of how the law may regulate and apply to the use of neurotechnologies.

3.1 Human rights law

Advancements in neurotechnology and neuroscience more generally creates new opportunities for the enhancement of certain human rights through beneficial use cases, while also posing challenges to the adequate protection of others through misuse or misapplication. The purpose of this section is to firstly (see 3.1.1) outline the applicable human rights law frameworks under domestic and international law, focusing on three primary sources, namely: the U.S. Constitution, federal legislation and international human rights law. In the second part of this section (Section 3.1.2) the implications of neurotechnologies for the enjoyment of the right to non-discrimination, the right to a fair trial and the privilege against self-incrimination, the right to freedom from torture, the right to freedom of thought, and the right to life will be considered, with a focus on the key issues, gaps and challenges posed by this technology.

3.1.1 The human rights law framework

In accordance with the Supremacy Clause,⁹⁴ one of the primary sources of human rights law is the U.S. Constitution. While the original text contains certain inalienable human rights protections, for instance the right to trial by jury,⁹⁵ the most significant have been enumerated in subsequent constitutional amendments. This includes the following:

- **The Bill of Rights (1791),**⁹⁶ which consists of the first ten amendments to the U.S. Constitution and protects rights including the right to freedom of speech, press and peaceful assembly,⁹⁷ the right to be free from cruel and unusual punishment,⁹⁸ and the right of trial by jury in civil law cases.⁹⁹
- **The Thirteenth Amendment (1865),** which abolishes slavery.¹⁰⁰

⁹⁴ U.S. Const. Art. VI.

⁹⁵ U.S. Const. Art. III §2.

⁹⁶ U.S. Const. Amends. I – X.

⁹⁷ U.S. Const. Amend. I.

⁹⁸ U.S. Const. Amend. VIII.

⁹⁹ U.S. Const. Amend. VII.

¹⁰⁰ U.S. Const. Amend. XIII



- **The Fourteenth Amendment (1868)**, which provides that “All persons born or naturalized in the United States, and subject to the jurisdiction thereof, are citizens of the United States and of the State wherein they reside. No State shall make or enforce any law which shall abridge the privileges or immunities of citizens of the United States; nor shall any State deprive any person of life, liberty, or property, without due process of law; nor deny to any person within its jurisdiction the equal protection of the laws.”¹⁰¹
- **The Fifteenth Amendment (1870)**, which ensures that voting rights “shall not be denied or abridged by the United States or by any State on account of race, color, or previous condition of servitude”.¹⁰²
- **The Nineteenth Amendment (1920)**, which guarantees that voting rights “shall not be denied or abridged by the United States or by any State on account of sex.”¹⁰³

Whilst not a direct source of human rights, per se, the Ninth Amendment specifies that “[t]he enumeration in the Constitution, of certain rights, shall not be construed to deny or disparage other retained by the people.”¹⁰⁴ This provision has been interpreted, in the obiter dictum of one Supreme Court Justice, as evidencing “a belief of the Constitution’s authors that fundamental rights exist that are not expressly enumerated in the first eight amendments and an intent that the list of rights included there not be deemed exhaustive.”¹⁰⁵ The Ninth Amendment thus expresses the general principle that further human rights may emerge through judicial interpretation of the U.S. Constitution, with the U.S. Supreme Court variously relying upon this provision as well as the Due Process Clauses of the Fifth and Fourteenth Amendments,¹⁰⁶ together with the Equal Protection Clause of the Fourteenth Amendment,¹⁰⁷ as the basis for giving effect to certain unenumerated rights.¹⁰⁸ An example of this is the right to privacy, which is not expressly provided for in the U.S. Constitution, but has been recognised by the Supreme Court as being constitutionally protected in relation to,¹⁰⁹ inter alia, child rearing,¹¹⁰ marriage,¹¹¹ sexual activity,¹¹² and reproductive autonomy.¹¹³

An additional source of human rights law is federal legislation enacted by Congress, including:

- **The Civil Rights Act (1964)**, which prohibits discrimination on the basis of race, colour, religion, sex and national origin and applies to voting, public accommodation, and employment.¹¹⁴

¹⁰¹ U.S. Const. Amend. XIV §1.

¹⁰² U.S. Const. Amend. XV.

¹⁰³ U.S. Const. Amend. XIX.

¹⁰⁴ U.S. Const. Amend. IX.

¹⁰⁵ *Griswold v. Connecticut* 381 U.S. 479 (1965) at 488 (Goldberg, J. concurring).

¹⁰⁶ U.S. Const. Amend. V, XIV.

¹⁰⁷ U.S. Const. Amend. XIV.

¹⁰⁸ Congressional Research Service. (2022) *Privacy Rights Under the Constitution: Procreation, Child Rearing, Contraception, Marriage, and Sexual Activity*. LSB10820. Available at:

<https://crsreports.congress.gov/product/pdf/LSB/LSB10820>

¹⁰⁹ Ibid.

¹¹⁰ See, e.g., *Meyer v. Nebraska*, 262 U.S. 390 (1923).

¹¹¹ See, e.g., *Loving v. Virginia*, 388 U.S. 1 (1967); *Obergefell v. Hodges* 576 U.S. 644 (2015).

¹¹² See, e.g., *Lawrence v. Texas*, 539 U.S. 558 (2003).

¹¹³ See, e.g., *Griswold v. Connecticut*, 381 U.S. 479 (1965); Cf. *Dobbs v. Jackson Women’s Health Organisation*, 597 U.S. (2022).

¹¹⁴ 42 U.S.C §2000d et seq.



- **The Americans with Disabilities Act (ADA) (1990)**, which prohibits employment discrimination, harassment and retaliation against qualified individuals based on disability.¹¹⁵
- **The Genetic Information Nondiscrimination Act (GINA) (2008)**, which prohibits discrimination on the basis of genetic information in relation to health insurance and employment.¹¹⁶

Of the nine core international human rights law treaties, the U.S. has signed, ratified and therefore indicated its consent to be bound as a matter of international law to the following:

- **International Covenant on Civil and Political Rights (ICCPR)**¹¹⁷
- **International Convention on the Elimination of All Forms of Racial Discrimination (CERD)**¹¹⁸
- **Convention against Torture and Other Cruel, Inhuman and Degrading Treatment or Punishment (CAT)**¹¹⁹
- **Optional protocols to the Convention on the Rights of the Child (CRC)**¹²⁰ relating to the involvement of children in armed conflict¹²¹ and the sale of children, child prostitution and child pornography.¹²²

The U.S. has modified its obligations in relation to some of the international human rights treaties to which it is a State Party, however, by treating them as non-self-executing and exercising the reservation, understanding and declaration mechanism (RUDs), which informs the content, effect, interpretation and implementation of treaties so as not to interfere with comparable provisions of the U.S. Constitution.¹²³ In relation to the ICCPR, for instance, the U.S. ratification contained 5 reservations, 5 understandings, 4 declarations and 1 proviso.¹²⁴ The expressed reservations relate, inter alia, to Article 7 ('cruel, inhuman or degrading treatment'), which limits its obligation to prohibit cruel, unusual or inhuman treatment or punishment in accordance with the Fifth, Eighth, and/or Fourteenth Amendments to the U.S. Constitution,¹²⁵ and Article 20 ('incitement to discrimination, hostility or violence'), to the effect that it does not authorize or require the restriction of freedom of speech or freedom of association in a way that would contravene the First Amendment to the U.S. Constitution.¹²⁶

¹¹⁵ 42 U.S.C §12101-12213.

¹¹⁶ 42 U.S.C §2000ff.

¹¹⁷ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI).

¹¹⁸ International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX).

¹¹⁹ Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (entry into force 26 June 1987) G.A. Res. 39/46.

¹²⁰ Convention on the Rights of the Child (entry into force 2 September 1990) G.A. Res. 44/25.

¹²¹ Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict (entry into effect 12 February 2002) G.A. Res. A/RES/54/263.

¹²² Optional Protocol to the Convention on the Rights of Child on the sale of children, child prostitution, and child pornography (entry into effect 18 January 2002) G.A. Res. A/RES/54/263.

¹²³ Congressional Research Service. (2022) *Reservations, Understandings, Declarations, and Other Conditions to Treaties*. IF12208. Available at: <https://crsreports.congress.gov/product/pdf/IF/IF12208>

¹²⁴ Senate Comm. On Foreign Relations. (1992) *U.S. Senate Report on Ratification of The International Covenant on Civil and Political Rights*. U.S. Senate Executive Report 102-23 (102d Cong., 2d Sess).

¹²⁵ Ibid.

¹²⁶ Ibid.

Of the remaining core international human rights treaties, the Convention on the Rights of Persons with Disabilities (CRPD)¹²⁷ and the Convention on the Elimination of Discrimination against Women (CEDAW)¹²⁸ have both been signed by the President and submitted to the Senate for advice and consent but are yet to be ratified. The International Covenant on Economic, Social and Cultural Rights (ICESCR)¹²⁹ and the Convention on the Rights of the Child (CRC) have been signed by the President but have not been transferred to the U.S. Senate for ratification.¹³⁰ International human rights treaties to which the US is not a signatory party include the Convention for the Protection of All Persons from Enforced Disappearance (CED)¹³¹ and the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (ICRMW).¹³²

Finally, the U.S. is a member state of the regional multilateral intergovernmental body for the Americas named the Organisation of American States (OAS),¹³³ through the auspices of which has emerged the Inter-American human rights system, as constituted by the American Declaration of the Rights and Duties of Man,¹³⁴ in conjunction with the legally binding American Convention on Human Rights (ACHR).¹³⁵ The U.S. has signed but not ratified the ACHR, nor therefore accepted the jurisdiction of the judicial organ established by it,¹³⁶ namely the Inter-American Court of Human Rights (IACtHR). As a state party to the OAS Charter,¹³⁷ however, the U.S. is subject to the Inter-American Commission on Human Rights, which separately from but together with the IACtHR is required “to promote the observance and protection of human rights and to serve as a consultative organ of the Organisation in these matters.”¹³⁸

3.1.2 Human rights law implications of neurotechnologies

Neurotechnologies have the potential to impact human rights in various ways, both positively and negatively. In a healthcare context, for instance, neurotechnologies can be used to identify,¹³⁹ diagnose and treat a wide range of psychiatric and neurological disorders,¹⁴⁰ and to restore sensory, cognitive

¹²⁷ Convention on the Rights of Persons with Disabilities (entry into force 3 May 2008) G.A. Res. A/61/611.

¹²⁸ Convention on the Elimination of All Forms of Discrimination against Women (entry into force 3 September 1981) 1249 U.N.T.S. 13.

¹²⁹ International Covenant on Economic, Social and Cultural Rights (entry into force 3 January 1976) G.A. Res 2200A (XXI).

¹³⁰ United Nations General Assembly. (2020) *National report submitted in accordance with paragraph 5 of the annex to Human Rights Council resolution 16/21 A/HRC/WG.6/36/USA/1*, paras 7-9.

¹³¹ International Convention for the Protection of All Persons from Enforced Disappearance (entry into force 23 December 2010) G.A. Res. 47/133.

¹³² Convention for the Protection of the Rights of All Migrant Workers and Members of their Families (entry into force 1 July 2003) G.A. Res. 45/158.

¹³³ Charter of the Organization of American States (entry into force 13 December 1951) OAS, Treaty Series, Nos.1-C and 61.

¹³⁴ American Declaration of the Rights and Duties of Man (OAS) Ninth International Conference of American States, Bogotá, Colombia, 1948.

¹³⁵ American Convention on Human Rights (entry into force 18 July 1978) OAS, Treaty Series, No.36.

¹³⁶ Ibid Art.33.

¹³⁷ Charter of the Organization of American States (entry into force 13 December 1951) OAS, Treaty Series, Nos.1-C and 61.

¹³⁸ Ibid Art.106.

¹³⁹ See, e.g., Pillai, J., and Sperling M.R. (2006) ‘Interictal EEG and the Diagnosis of Epilepsy’, *Epilepsia*, Vol:47, pp.14-22. DOI: <https://doi.org/10.1111/j.1528-1167.2006.00654.x>

¹⁴⁰ See, e.g., Edwards, C.A. (2017) ‘Neurostimulation devices for the treatment of neurological disorders’, *Mayo Clinic Proceedings*, Vol.92:9, pp.1427-1444. DOI: <https://doi.org/10.1016/j.mayocp.2017.05.005>



and motor functions,¹⁴¹ the benefits of which are linked to the right to health. However, such applications could give rise to infringements in relation to the prohibition on torture, for instance, if used for the purposes of medical or scientific experimentation without obtaining the free and informed consent of the participant. This section analyses both domestic and international human rights law in relation to neurotechnologies, focusing on the right to non-discrimination, the right to a fair trial and the privilege against self-incrimination, the right to freedom from torture, the right to freedom of thought, and the right to life. Each subsection starts by outlining the relevant domestic and international law, before moving on to analyse and discuss the key issues, gaps and challenges posed by neurotechnologies. Where reference is made to obligations under international human rights law, it should be borne in mind that these rights may not be judicially enforceable domestically. In relation to the ICCPR, for instance, the U.S. RUDs state that “Articles 1 through 27 of the Covenant are not self-executing”, meaning implementing legislation is required in order to be applied by domestic courts.¹⁴²

The right to a fair trial and the privilege against self-incrimination

Access to justice is a foundational precept of law constituted by several overlapping rights. As guaranteed by the U.S. Constitution, these rights include due process of law,¹⁴³ “the right to a speedy and public trial, by an impartial jury” in all criminal prosecutions,¹⁴⁴ and “the right of trial by jury” in civil law proceedings,¹⁴⁵ as well as restrictions against punitive bail conditions, excessive fines and “cruel and unusual punishments”.¹⁴⁶ Broadly similar rights are guaranteed under international human rights law, including equal access to, protection of and treatment before the law,¹⁴⁷ the right to “a fair and public hearing by a competent, independent and impartial tribunal established by law”,¹⁴⁸ and the right to an “effective remedy”.¹⁴⁹ Also amongst these rights and of particular relevance to neurotechnology is the inclusion among the various “minimum guarantees”¹⁵⁰ under the ICCPR for those charged with a criminal offence of the right “[n]ot to be compelled to testify against himself [or herself] or to confess guilt.”¹⁵¹ It is similarly stipulated in the U.S. Constitution that “[n]o person...shall be compelled in any criminal case to be a witness against himself”,¹⁵² with this privilege against self-incrimination applicable in both federal and state legal proceedings.¹⁵³

In interpreting this provision, the US Supreme Court has observed that the “privilege against self-incrimination”, as “the essential mainstay of our adversary system”, entails that an individual has the “right to remain silent”.¹⁵⁴ This Fifth Amendment protection is not absolute, however, with the Supreme Court having narrowed its scope by identifying three necessary elements of an infringement, namely:

¹⁴¹ See, e.g., Grahn P.J. et al. (2014) ‘Restoration of motor function following spinal cord injury via optimal control of intraspinal microstimulation: toward a next generation closed-loop neural prosthesis’, *Frontiers in Neuroscience*, Vol.8. DOI: <https://doi.org/10.3389/fnins.2014.00296>

¹⁴² U.S. Reservations, Declarations, and Understandings, International Covenant on Civil and Political Rights, 138 Cong. Rec. S4781-01 (1992), §3(1).

¹⁴³ U.S. Const. Amend V, XIV.

¹⁴⁴ U.S. Const. Amend VI.

¹⁴⁵ U.S. Const. Amend VII.

¹⁴⁶ U.S. Const. Amend VIII.

¹⁴⁷ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI), Art.14(1).

¹⁴⁸ Ibid.

¹⁴⁹ Ibid Art.2(3)(a)-(c).

¹⁵⁰ Ibid Art.14(3)(a)-(g).

¹⁵¹ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI), Art.14(3)(g).

¹⁵² U.S. Const. Amend. V.

¹⁵³ U.S. Const. Amend. XIV.

¹⁵⁴ *Miranda v. Arizona*, 384 U.S. 460 (1966).

compulsion, testimony, and self-incrimination.¹⁵⁵ Through case law interpreting these different elements, and as codified by the Supreme Court in *Schmerber v. California*,¹⁵⁶ “[t]he distinction which has emerged, often expressed in different ways, is that the privilege is a bar against compelling “communications” or “testimony”, but that compulsion which makes a suspect or accused the source of “real or physical evidence” does not violate it.”¹⁵⁷ In other words, an individual is not protected against being compelled to provide incriminating “real or physical evidence”, but cannot be forced to provide through communication incriminating testimonial evidence.¹⁵⁸

Although intended as “a helpful framework for analysis”, it was also recognised that “[t]here will be many cases in which such a distinction is not readily drawn.”¹⁵⁹ By way of example, the Court in *Schmerber* pointed out that certain physiological tests, “for example, lie detector tests measuring changes in body function during interrogation, may actually be directed to eliciting responses which are essentially testimonial”, and therefore protected by the self-incrimination doctrine.¹⁶⁰ This appears to envisage as the paradigmatic example the contemporary use of the polygraph and is likely to be more even directly applicable to newer and potentially more accurate neurotechnologies, which may to an even greater extent blur the prevailing physical/testimonial distinction.¹⁶¹ Scholars and practitioners alike have already critiqued the practical difficulties associated with this distinction, and further advancements in neurotechnology may render this approach increasingly unworkable.¹⁶² Farahany, for instance, has suggested that there is a broader spectrum of evidence arising in new and emerging neurotechnological applications, including categories such as identifying, automatic, memorialised and uttered evidence, each of which “reveals a growing incoherence in determining Fifth Amendment privilege based on the *form* the contested evidence takes”, specifically by highlighting that “[i]n the era of neuroscience, self-incrimination may now occur silently just as aloud.”¹⁶³

A future-oriented challenge posed by neurotechnology, brought about by increased commercial availability of devices including brain computer interfaces (BCIs), is the possibility that State authorities will be able to sidestep Fifth Amendment protections and gain access to brain and other neural data collected in consumer-devices. It has been suggested, for example, that the voluntary agreement to the storing of data on third-party devices such as health apps may, in accordance with the third-party doctrine, render inapplicable certain Fourth Amendment protections of privacy, with the effect that any such data will be made available for search and access by the State.¹⁶⁴ Albeit indirectly, this may lead to further erosion of protection against self-incrimination.

¹⁵⁵ *Fisher v. United States*, 425 U.S. 391, 408 (1976).

¹⁵⁶ *Schmerber v. California*, 384 U.S. 757 (1966).

¹⁵⁷ *Ibid* at 764.

¹⁵⁸ Ienca, M. and Andorno, R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy*, Vol.13:5. DOI: <https://doi.org/10.1186/s40504-017-0050-1>

¹⁵⁹ *Schmerber v. California* 384 U.S. 757 (1966) at 764.

¹⁶⁰ *Ibid*.

¹⁶¹ Kraft, C.J. and Giordano, J. (2017) ‘Integrating Brain Science and Law: Neuroscientific Evidence and Legal Perspectives on Protecting Individual Liberties’, *Frontiers in Neuroscience*, Vol.11. DOI: <https://doi.org/10.3389/fnins.2017.00621>

¹⁶² For existing critiques of the practical difficulties associated with the physical/testimonial evidence distinction, see, e.g., Allen, R.J. and Kristin Mace, M. (2004) ‘The Self-Incrimination Clause Explained and Its Future Predicted’, *Journal of Criminal Law and Criminology*, Vol.94:2, pp.243-294. Available at: <https://scholarlycommons.law.northwestern.edu/jclc/vol94/iss2/1>

¹⁶³ Farahany, N.A. (2012) ‘Incriminating Thoughts’, *Stanford Law Review*, Vol.64, pp.351-408, p.395. Available at: https://scholarship.law.duke.edu/faculty_scholarship/2651 (emphasis added)

¹⁶⁴ Tournas, L.N. (2021) *If Police Have Devices That Can Read Your Mind, How Does The Fifth Amendment Fit In?* Future Tense [Online]. Available at: <https://slate.com/technology/2021/05/brain-computer-interface-mind-reading-fifth-amendment.html>

Non-discrimination

The principle of non-discrimination, in conjunction with equality before the law and equal protection of the law without discrimination (see above), constitutes a fundamental human rights norm protected by international human rights treaties to which the U.S. is a state party,¹⁶⁵ as well as constitutional,¹⁶⁶ and statutory law.¹⁶⁷ Neurotechnologies may present current and future challenges to the adequate protection of this right. One such future challenge relates to the effects of neurotechnology augmentation or enhancement, a trend as indicated by DARPA's N³ program (see above), with Yuste et al suggesting that "[t]he pressure to adopt enhancing neurotechnologies, such as those that allow people to radically expand their endurance or sensory or mental capacities, is likely to change societal norms, raise issues of equitable access and generate new forms of discrimination."¹⁶⁸ A more contemporary challenge, as potentially exacerbated by the growth in consumer-grade devices, is the risk that the processing of brain and other neural data in neurotechnologies may lead to differential treatment based on "a person's neural signatures (indicating, for example, a dementia predisposition), or mental health, personality traits, cognitive performance, intentions and emotional states."¹⁶⁹ Ienca terms this phenomenon "neurodiscrimination", and advocates "strict and broad prohibitions against neurodiscrimination in the context of health insurance, including employer-based health insurance".¹⁷⁰

Existing statutory disability law in the U.S. offers protection against similar and overlapping forms of discrimination but does not prohibit "neurodiscrimination" specifically. The Americans with Disabilities Act (1990), for instance, prohibits discrimination "on the basis of disability" in a variety of contexts, including employment,¹⁷¹ and defines disability broadly;¹⁷² indicatively including within its definition "a physical or mental impairment that substantially limits one or more major life activities", including neurological and brain functions.¹⁷³ While this may in principle prohibit employers from discriminating against individuals with neurological diseases and disorders, the scope of this protection is restricted to the employment context. Broader protection against discrimination is offered by the Genetic Information Nondiscrimination Act (2008), which prohibits discrimination in relation to both health insurance and employment on the basis of genetic information pertaining to personal genetic tests, the genetic tests of family members and disease or disorder in family members.¹⁷⁴ Whilst restricted to genetic information, this federal law could serve as a model for the establishment of comparable protections against the misuse of brain and other neural data to discriminate in healthcare insurance and employment contexts.¹⁷⁵

¹⁶⁵ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI), Art.26.

¹⁶⁶ U.S. Const. Amend XV, XIX.

¹⁶⁷ 29 U.S.C. §206(d).

¹⁶⁸ Yuste, R. et al. (2017) 'Four ethical priorities for neurotechnologies and AI', *Nature*, Vol.551, pp.159-163, pp.162. DOI: <https://doi.org/10.1038/551159a>

¹⁶⁹ Ienca, M. (2021) 'Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields', *Committee on Bioethics (DH-BIO) of the Council of Europe*, pp.32. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

¹⁷⁰ Ibid.

¹⁷¹ 42 U.S.C §12112(a).

¹⁷² 42 U.S.C §12102(4)(A).

¹⁷³ 42 U.S.C §12102(2)(B).

¹⁷⁴ 42 U.S.C. §2000ff(4)(A)(i)-(iii).

¹⁷⁵ Jwa, A.S. and Poldrack, R.A. (2022) 'Addressing privacy risk in neuroscience data: from data protection to harm prevention', *Journal of Law and the Biosciences*, Vol.9:2, pp.1-25. DOI: <https://doi.org/10.1093/jlb/ljac025>



Freedom of thought

It is stipulated in the ICCPR that “Everyone shall have the right to freedom of thought, conscience and religion.”¹⁷⁶ The equivalent provision of the U.S. Constitution, namely the First Amendment, provides that “Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof; or abridging the freedom of speech, or of the press; or the right of the people peaceably to assemble, and to petition the Government for a redress of grievances.”¹⁷⁷ Whilst substantively similar, a key difference between these provisions is the express inclusion of the “right to freedom of thought” in the ICCPR and the absence of explicit protections for this right in the U.S. Constitution; a potentially salient difference in the light of the declaration made by the U.S. that the former provision is “not self-executing” and cannot therefore be applied by domestic courts without implementing legislation.¹⁷⁸ In its case law, however, the U.S. Supreme Court has interpreted the First Amendment to include an unenumerated right to freedom of thought, although it has mostly failed to take “a clear position on whether thought must be intertwined with expression in order to be protected.”¹⁷⁹ In *Stanley v. Georgia*,¹⁸⁰ for instance, it was observed in dictum that “the right to control the moral content of a person’s thoughts...is wholly inconsistent with the philosophy of the First Amendment”,¹⁸¹ yet the facts of the case, which involved the defendant being charged with knowingly possessing obscene films, could equally point to protection of the right to freedom of expression.¹⁸²

The right to freedom of thought assumes distinctive importance in the context of neurotechnology, in relation to which both invasive and non-invasive techniques could be used to record brain activity and deduce thoughts for a variety of applications.¹⁸³ For example, “brain-based mind reading” may at present or in the future be applied in the context of forensic psychiatry to assess defendants, prisoners and prospective jurors,¹⁸⁴ while computer games involving brain mapping to spatialise user intentions are emerging as an alternative to gaming involving the use of traditional control methods.¹⁸⁵ Although such and similar use cases (e.g., neuroprosthetic technology)¹⁸⁶ are socially and economically beneficial, there is growing concern that neurotechnology may in the future be used to sanction inferred thoughts,¹⁸⁷ or to otherwise target individuals through “neuromarketing” in order to elicit certain specific consumer behaviours.¹⁸⁸ In such circumstances, the U.S. Supreme Court may be required to

¹⁷⁶ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI), Art.18.

¹⁷⁷ U.S. Const. Amend. I.

¹⁷⁸ U.S. Reservations, Declarations, and Understandings, International Covenant on Civil and Political Rights, 138 Cong. Rec. S4781-01 (1992), §3(1).

¹⁷⁹ Kolber, A.J. (2016) ‘Two Views of First Amendment Thought Privacy’, *Journal of Constitutional Law*, Vol.18:5, pp.1381-1423. Available at: <https://scholarship.law.upenn.edu/jcl/vol18/iss5/2>

¹⁸⁰ *Stanley v. Georgia*, 394 U.S. 557 (1969).

¹⁸¹ *Ibid* at 565-66.

¹⁸² Kolber, A.J. (2016) ‘Two Views of First Amendment Thought Privacy’, *Journal of Constitutional Law*, Vol.18:5, pp.1381-1423, pp.1394-95. Available at: <https://scholarship.law.upenn.edu/jcl/vol18/iss5/2>

¹⁸³ U.N. Special Rapporteur on freedom of religion or belief. (2021) *Interim report of the Special Rapporteur on freedom of religion or belief*, Ahmed Shaheed. A/76/380, para.76.

¹⁸⁴ Meynen, G. (2017) ‘Brain-based mind reading in forensic psychiatry: exploring possibilities and perils’, *Journal of Law and the Biosciences*, Vol.4:2, pp.311-329. DOI: <https://doi.org/10.1093/jlb/lbx006>

¹⁸⁵ Rosca, S-D. and Leba, M. (2019) ‘Design of a Brain-Controlled Video Game based on a BCI System’, *MATEC Web of Conferences*, Vol.290. DOI: <https://doi.org/10.1051/mateconf/201929001019>

¹⁸⁶ See, e.g., Collinger, J.L. et al. (2013) ‘Neuroprosthetic technology for individuals with spinal cord injury’, *The Journal of Spinal Cord Medicine*, Vol.36:4, pp.258-272. DOI: <https://doi.org/10.1179%2F2045772313Y.0000000128>

¹⁸⁷ U.N. Special Rapporteur on freedom of religion or belief. (2021) *Interim report of the Special Rapporteur on freedom of religion or belief*, Ahmed Shaheed. A/76/380, para.77.

¹⁸⁸ See, e.g., Vences, N.A., Diaz-Campo, J., and Garcia Rosales, D.F. (2020) ‘Neuromarketing as an Emotional Connection Tool Between Organisations and Audiences in Social Networks. A Theoretical Review’, *Frontiers in Psychology*, Vol.11. DOI: <https://doi.org/10.3389/fpsyg.2020.01787>



decide whether the First Amendment protects the privacy of thoughts independently of or only when intertwined with expression, the outcome of which is likely to determine the scope of constitutional protections for the unenumerated right to freedom of thought.¹⁸⁹

Freedom from torture

The prohibition against torture is a *jus cogens* norm of customary international law, reflected in both international treaties to which the U.S. is a state party and municipal law. The ICCPR, for instance, states that “No one shall be subjected to torture or to cruel, inhuman or degrading treatment or punishment. In particular, no one shall be subjected without his free consent to medical or scientific experimentation.”¹⁹⁰ Whilst not specified, it may be inferred from this that subjecting an individual to non-consensual medical or scientific experimentation involving the use of neurotechnologies would in principle constitute a prohibited act of torture, cruel, inhuman or degrading treatment. The CAT reiterates this prohibition on torture (and other forms of cruel, inhuman or degrading treatment or punishment), defined as “any act by which severe pain or suffering, whether physical *or mental*, is intentionally inflicted on a person”, thereby indicating *prima facie* application to acts involving neurotechnology, to be determined on the basis of the purpose for which it was committed.¹⁹¹ From this it can be inferred that, by way of example, the use of neural implants as an instrument of torture to produce various harmful effects, including memory and emotion manipulation and inducement of hallucinations,¹⁹² is likely to be prohibited. Furthermore, in accordance with its obligations under CAT,¹⁹³ the U.S. has codified the criminalisation of torture committed outside the United States by a U.S. national or by an offender who is present in its jurisdiction.¹⁹⁴ This reinforces the unconditional prohibition on torture, in relation to which relevant legal doctrine also includes various state and federal laws criminalising acts of violence against the person (e.g., battery and assault)¹⁹⁵ as well as the unenumerated constitutional protections provided by the Fourth,¹⁹⁶ Fifth,¹⁹⁷ Eighth (which is most directly applicable in referring to “cruel and unusual punishments”),¹⁹⁸ and Fourteenth Amendments.¹⁹⁹

Notwithstanding these various legal protections, the Special Rapporteur on torture and other cruel, inhuman or degrading treatment or punishment has warned that advances in neurotechnology and other emerging technologies may present new difficulties to the enforcement of the prohibition on torture.²⁰⁰ Such novel challenges include the potential for “neurotechnological devices” to be used as “an ‘enabler’ in the perpetration of both physical and psychological forms of torture”,²⁰¹ as well as the possibility that “rapid advances in medical, pharmaceutical and neurotechnological science”, particularly with the emergence of neurotechnology enhancement or augmentation (see above), may cause a

¹⁸⁹ Kolber, A.J. (2016) ‘Two Views of First Amendment Thought Privacy’, *Journal of Constitutional Law*, Vol.18:5, pp.1381-1423. Available at: <https://scholarship.law.upenn.edu/jcl/vol18/iss5/2>

¹⁹⁰ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI), Art.7.

¹⁹¹ Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (entry into force 26 June 1987) G.A. Res. 39/46, Art.1(1) (emphasis added).

¹⁹² Pérez-Sales, P. (2022) ‘The future is here: Mind control and torture in the digital era’, *Torture Journal*, Vol.32:1-2, pp.280-290. DOI: <https://doi.org/10.7146/torture.v32i1-2.132846>

¹⁹³ Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (entry into force 26 June 1987) G.A. Res. 39/46, Art.4, 5.

¹⁹⁴ 18 U.S.C §2340A.

¹⁹⁵ E.g., 18 U.S.C; Ala. Code 1975 §16-3-35.

¹⁹⁶ U.S Const. Amend IV.

¹⁹⁷ U.S. Const. Amend V.

¹⁹⁸ U.S. Const. Amend VIII.

¹⁹⁹ U.S. Const. Amend. XIV.

²⁰⁰ U.N. Special Rapporteur on torture and other cruel, inhuman or degrading treatment or punishment. (2020) *Report on psychological torture and ill-treatment*. A/HRC/43/49.

²⁰¹ *Ibid* para.73.

definitional lacuna by allowing “the subjective experience of pain and suffering to be circumvented, suppressed or otherwise manipulated while still achieving the purposes and the profoundly dehumanising, debilitating and incapacitating effects of torture.”²⁰² In order to ensure effective implementation of the prohibition on torture, the Special Rapporteur recommends that interpretation of this and other related obligations under international human rights law “should evolve in line with [the] new challenges and capabilities” that arise in relation to neurotechnology and other emerging technologies.²⁰³

Right to life

Although only implicit in the Bill of Rights amendment to the U.S. Constitution,²⁰⁴ the right to life is expressly guaranteed in the ICCPR, which provides that “Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life.”²⁰⁵ However, the emerging potential for neurotechnologies to be used for military applications may present a future challenge to the adequate protection of this right. For example, DARPA’s N³ program aims to develop bidirectional brain-machine interfaces (BMIs) for the purposes of controlling unmanned aerial vehicles (UAV),²⁰⁶ yet such technology could conceivably in the future be deployed in conjunction with Artificial Intelligence (AI) to control weapons systems. One such posited scenario is the use of electroencephalography (EEG) by the operator of an UAV to make missile targeting decisions.²⁰⁷ Such applications may give rise to issues with relevance to both international humanitarian law and international human rights law; the latter insofar as the control of weapons systems via algorithmic processing of brain signals may result in arbitrary deprivation of life.²⁰⁸ In addition to potential military applications, consumer-grade neurotechnological devices could also pose a threat to the right to life. The founder of Oculus, for instance, claims to have designed a virtual reality (VR) headset with built-in explosives designed to detonate and destroy an end-user’s brain simultaneous with the point at which ‘death’ occurs within virtual gameplay.²⁰⁹ The aporetic conflict between such a gaming experience and the legal protection for the right to life, however, means that it is unlikely any such or similar device with the same intended use for gaming purposes could be made commercially available, at least not without explicit recognition that the right to life also includes ‘the right to die’, including through available technological means.²¹⁰

²⁰² Ibid para.32.

²⁰³ Ibid para.76.

²⁰⁴ U.S. Const. Amend. V, XIV.

²⁰⁵ International Covenant on Civil and Political Rights (entry into force 23 March 1976) G.A. Res 2200A (XXI), Art.6.

²⁰⁶ Sarma, G. (no date) *Next-Generational Nonsurgical Neurotechnology* / DARPA [Online]. Available at: <https://www.darpa.mil/program/next-generation-nonsurgical-neurotechnology>

²⁰⁷ Noll, G. (2014) ‘Weaponizing neurotechnology: international humanitarian law and the loss of language’, *London Review of International Law*, Vol.2:2, pp.201-231. DOI: <https://doi.org/10.1093/lril/lru009>

²⁰⁸ Genser, J., Herrmann, S., and Yuste, R. (2022) *International Human Rights Protection Gaps in the Age of Neurotechnology*. *NeuroRights Foundation*, pp.29. Available at: <https://static1.squarespace.com/static/60e5c0c4c4f37276f4d458cf/t/6275130256dd5e2e11d4bd1b/1651839747023/Neurorights+Foundation+PUBLIC+Analysis+5.6.22.pdf>

²⁰⁹ Huet, N. (2022) *Oculus founder claims he made a VR headset that actually kills you if you die in a game* / *euronews.next* [Online]. Available at: <https://www.euronews.com/next/2022/11/09/oculus-founder-claims-he-made-a-vr-headset-that-actually-kills-you-if-you-die-in-a-game>

²¹⁰ See generally, Sunstein, C.R. (1996) ‘Right to Die, The’, *Yale Law Journal*, Vol.106, pp.1123-1163. Available at: https://chicagounbound.uchicago.edu/journal_articles/8539/



3.2 Privacy and data protection law

The interconnected issues of personal data protection and informational privacy have become increasingly important with the rise of new and emerging technologies capable of collecting and processing substantial volumes and various types of data, including information of protected value. In relation to neurotechnology, specifically, the potential for brain and other neural data to reveal sensitive characteristics through processing is significant.²¹¹ Against this background, this section will first explore whether and if so, how the U.S. Constitution protects informational privacy and personal data (Section 3.2.1). It will then go on to provide an overview of the data privacy statutes and regulations at the state and federal level, following which selected examples of the latter will be situated in relation to specific neurotechnology use cases, including healthcare, employment and education (Section 3.2.2).

3.2.1 The right to privacy and data protection

There is no explicit guarantee of the rights to privacy or data protection under the U.S. Constitution. In its case law, however, the U.S. Supreme Court has identified a number of unenumerated constitutional protections for privacy interests rooted in, inter alia, the First Amendment,²¹² the Third Amendment protection of the privacy of the home against compulsory quartering of soldiers,²¹³ and the Fourth Amendment “right of people to be secure in their persons, houses, papers, and effects, [and] against unreasonable searches and seizures”.²¹⁴ In relation to the latter, the U.S. Supreme Court initially took a narrowly textual approach to its interpretation of this provision, finding in *Olmstead v. United States* that governmental wiretapping did not amount to an interference with the Fourth (or Fifth) Amendment since it did not involve a physical or actual trespass.²¹⁵ The judgement is arguably most significant, however, for the dissent of Justice Brandeis who, building upon an argument made extrajudicially advocating the formal recognition and protection of the right to privacy by the courts in order to combat the threats posed by technological innovations,²¹⁶ stated

The makers of our Constitution...conferred, as against the Government, the right to be let alone – the most comprehensive of rights and the right most valued by civilized men. To protect that right, every unjustifiable interference by the Government upon the privacy of the individual, whatever the means employed, must be deemed a violation of the Fourth Amendment.²¹⁷

Justice Brandeis’ dissent informed the Supreme Court’s subsequent approach in *Katz v. United States*,²¹⁸ in which the Court overruled the precedent from *Olmstead* and “departed from the narrow view on which that decision rested.”²¹⁹ Specifically, the Court reasoned that the application of the Fourth Amendment “cannot turn upon the presence or absence of a physical intrusion” and that “reasonable expectations of privacy may be defeated by electronic as well as physical invasion.”²²⁰ *Katz* thus established the “reasonable expectation of privacy”²²¹ test as the prevailing test for determining

²¹¹ Rainey, S. et al. (2019) ‘Data as a Cross-Cutting Dimension of Ethical Importance in Direct-to-Consumer Neurotechnologies’, *AJOB Neuroscience*, Vol.10:4, pp.180-182. DOI: <https://doi.org/10.1080/21507740.2019.1665134>

²¹² U.S. Const. Amend. I; See, e.g., *NAACP v. Alabama*, 357 U.S. 449 (1958).

²¹³ U.S. Const. Amend. III; See, e.g., *Griswold v. Connecticut*, 381 U.S. 479 (1965).

²¹⁴ U.S. Const. Amend. IV.

²¹⁵ *Olmstead et al. v. United States*, 277 U.S. 438 (1928).

²¹⁶ Warren, S.D. and Brandeis, L.D. (1890) ‘The Right to Privacy’, *Harvard Law Review*, Vol.4:5, pp.193-220. DOI: <https://doi.org/10.2307/1321160>

²¹⁷ *Olmstead et al. v. United States*, 277 U.S. 438 (1928), 479.

²¹⁸ *Katz v. United States*, 389 U.S. 347 (1967).

²¹⁹ *Ibid* at 353.

²²⁰ *Ibid* at 362.

²²¹ *Ibid* at 361.

whether there has been an infringement with Fourth Amendment protections against unreasonable searches and seizures by law enforcement, as well as “the test that substantially all of the federal circuit of appeals use to determine whether a constitutional right to informational privacy attaches to an asserted liberty interest” in relation to the Fourteenth Amendment.²²²

However, it was also observed in the majority opinion of Justice Stewart that

the Fourth Amendment cannot be translated into a general constitutional “right to privacy.” That Amendment protects individual privacy against certain kinds of governmental intrusion, but its protections go further and often have nothing to do with privacy at all. Other provisions of the Constitution protect personal privacy from other forms of governmental invasion. But the protection of a person’s general right to privacy – his right to be let alone by other people – is, like the protection of his property and of his very life, left largely to the law of the individual States.²²³

Whilst in principle this has the effect of narrowing the Fourth Amendment protections for the right to privacy, it has been suggested that this statement should be treated as mere dicta on the basis that the petitioner was not seeking to assert such a right and instead relied on a specific interpretation of the Fourth Amendment to protect against the warrantless recording of private telephone conversations.²²⁴

In addition to the Fourth Amendment, the liberty guaranteed under the Due Process Clause of the Fourteenth Amendment²²⁵ has, as indicated above, also been interpreted as protecting privacy.²²⁶ In *Whalen v. Roe*,²²⁷ for instance, the Supreme Court implicitly recognised a constitutional right to privacy in relation to “two different kinds of interests. One is the individual interest in avoiding disclosure of personal matters, and another is the interest in independence in making certain kinds of important decisions.”²²⁸ This has been cited and re-affirmed in subsequent case law,²²⁹ and appears to be derived from the “right to be let alone” articulated by Justice Brandeis in *Olmstead*,²³⁰ to which the Court in *Whalen* referred to in its opinion.²³¹

The variety of constitutional safeguards for protecting against government interference with privacy interests,²³² notwithstanding, the focus of these protections upon limiting governmental overreach highlights the lack of similar constitutional protections in relation to privacy violations caused by private parties.²³³ Such rights are also unenumerated, meaning in exceptional circumstances the alteration of constitutional precedent could lead to privacy protections being rolled back. In *Dobbs v. Jackson Women’s Health Organisation*,²³⁴ for instance, U.S. the Supreme Court overruled its decisions in the

²²² Pittman, L.J. (2018) ‘The Elusive Constitutional Right to Informational Privacy’, *Nevada Law Journal*, Vol.19:1, pp.135-186, p.147. Available at: <https://scholars.law.unlv.edu/nlj/vol19/iss1/5>

²²³ *Katz v. United States*, 389 U.S. 347 (1967) 350-351.

²²⁴ Pittman, L.J. (2018) ‘The Elusive Constitutional Right to Informational Privacy’, *Nevada Law Journal*, Vol.19:1, pp.135-186, p.148. Available at: <https://scholars.law.unlv.edu/nlj/vol19/iss1/5>

²²⁵ U.S. Const. Amend XIV.

²²⁶ See, e.g., *Lawrence v. Texas*, 539 U.S. 558 (2003) 564-65.

²²⁷ *Whalen v. Roe*, 429 U.S. 589 (1977).

²²⁸ *Ibid* at 599-600.

²²⁹ See, e.g., *Nixon v. Administrator of General Services*, 433 U.S. 425 (1977).

²³⁰ *Olmstead et al. v. United States*, 277 U.S. 438 (1928), 479.

²³¹ *Whalen v. Roe*, 429 U.S. 589 (1977) at 599 n.25.

²³² Swire, P. and Kennedy-Mayo, D. (2017) ‘How Both the EU and the U.S. are “Stricter” Than Each Other for the Privacy of Government Requests for Information’, *Emory Law Journal*, Vol.66:3, pp.617-667. Available at: <https://scholarlycommons.law.emory.edu/elj/vol66/iss3/5>

²³³ Krishnamurthy, V. (2020) ‘A Tale of Two Privacy Laws: The GDPR and the International Right to Privacy’, *American Journal of International Law*, Vol.114, pp.26-30, p.29. DOI: <https://doi.org/10.1017/aju.2019.79>

²³⁴ *Dobbs v. Jackson Women’s Health Organisation*, 597 U.S. (2022).



*Roe*²³⁵ and *Casey*²³⁶ jurisprudence, accordingly finding that the Constitution does not confer a right to obtain an abortion, which had previously been found by the Court to be protected by the “right to privacy that springs from the First, Fourth, Fifth, Ninth and Fourteenth Amendments.”²³⁷ In accordance with the *Whalen* formulation the privacy interests at issue relate equally to the “independence in making certain kinds of important decisions” and the “individual interest in avoiding disclosure of personal matters”,²³⁸ thereby indicating that the constitutional protections for the different aspects of the right to privacy may be subject to further erosion.²³⁹

3.2.2 Data privacy law

In addition to the unenumerated constitutional protections for the right to informational privacy (see above), there exists a substantial and growing body of statutory and regulatory information or data privacy laws at both the federal and state level. In comparison to the predominant approach in European Union (EU) Member States, particular features of U.S. data privacy law include the protection of consumers, rather than fundamental rights-holders, a segmented, sector-specific approach instead of more widely applicable data privacy regulation, and the base presumption “that personal data may be collected, used or disclosed unless a specific legal rule forbids these activities.”²⁴⁰ This section will proceed by first outlining general features and examples of state and then federal data privacy law, before considering in greater detail selected examples of the latter in relation to specific neurotechnology use cases.

State law

According to the National Conference of State Legislatures, in 2022 alone approximately 200 consumer data privacy bills have been filed across 35 states and the District of Columbia.²⁴¹ Of this number, a significant proportion (almost 70 bills across 25 states and the District of Columbia) proposed introducing comprehensive consumer privacy legislation.²⁴² Furthermore, in addition to the forthcoming expansion of the California Consumer Privacy Act of 2018 (CCPA) to include protections for employees,²⁴³ the states of Colorado,²⁴⁴ Connecticut,²⁴⁵ Virginia,²⁴⁶ and Utah²⁴⁷ have each enacted comprehensive consumer privacy laws, all of which will become effective in 2023.²⁴⁸

²³⁵ *Roe v. Wade*, 410 U.S. 113 (1973).

²³⁶ *Planned Parenthood of Southeastern Pa. v Casey*, 505 U.S. 833 (1992).

²³⁷ *Dobbs v. Jackson Women’s Health Organisation*, 597 U.S. (2022).

²³⁸ *Whalen v. Roe*, 429 U.S. 589 (1977) 599-600.

²³⁹ See, e.g., Morse, J. (2022) *Your privacy is at risk now that Roe v. Wade has fallen, experts warn* / Mashable [Online]. Available at: <https://mashable.com/article/supreme-court-roe-wade-digital-privacy>

²⁴⁰ Chander, A., Kaminski, M.E., and McGeeveran, W. (2021) ‘Catalysing Privacy Law’, *Minnesota Law Review*, Vol.15, pp.1733-1802, pp.1747-56. Available at: <https://scholar.law.colorado.edu/faculty-articles/1336>

²⁴¹ National Conference of State Legislatures (2022). *2022 Consumer Privacy Legislation* / [Online]. Available at: <https://www.ncsl.org/research/telecommunications-and-information-technology/2022-consumer-privacy-legislation.aspx>.

²⁴² Ibid.

²⁴³ California Privacy Rights Act of 2020 (Proposition 24).

²⁴⁴ Colorado Privacy Act, 2021 S.B. 190 (Effective 1 July 2023).

²⁴⁵ Connecticut 2022 S.B. 6 (Personal Data Privacy and Online Monitoring) (Effective 1 July 2023).

²⁴⁶ Virginia Consumer Data Protection Act, 2021 H.B. 2307 | 2021 S.B. 1392 (Effective 1 January 2023).

²⁴⁷ Utah Consumer Privacy Act, 2022 S.B. 227 (Effective 31st December 2023).

²⁴⁸ National Conference of State Legislatures (2022). *2022 Consumer Privacy Legislation* / [Online]. Available at: <https://www.ncsl.org/research/telecommunications-and-information-technology/2022-consumer-privacy-legislation.aspx>.

Federal law

Unlike the emerging trend towards state legislatures enacting omnibus data privacy laws,²⁴⁹ there is no single, primary federal law which comprehensively regulates all aspects of the collection, storage and use of data in the public and private sector. Instead, federal data privacy law in the US follows a sector-specific approach focusing on certain types of data and specific regulatory contexts, with the Gramm-Leach-Bliley Act or Financial Services Modernisation Act (1999),²⁵⁰ for instance, restricting the use and disclosure of customers' "non-public personal information" by financial institutions.²⁵¹ Other federal data privacy laws apply to specific sectors including health,²⁵² education,²⁵³ and video rentals,²⁵⁴ with longstanding consumer protection laws offering extra protection against privacy intrusions perpetuated by unfair and deceptive commercial practices.²⁵⁵

The primary federal consumer protection statute, the Federal Trade Commission Act (1914), for example, establishes the U.S. Federal Trade Commission (FTC),²⁵⁶ which is authorised to initiate law enforcement action against individuals and organisations that breach the prohibition on unfair or deceptive acts or practices in or affecting commerce.²⁵⁷ The broad remit of this statutory power extends to bringing legal proceedings against companies that violate consumer data privacy rights, or that fail to maintain adequate security procedures for sensitive consumer information.²⁵⁸ In 2015, for example, the FTC brought enforcement action against and eventually settled with Carrot Neurotechnology, Inc., which it accused of making deceptive health-related claims relating to improvements in vision resulting from the use of a software application marketed by the accused.²⁵⁹ The FTC is also responsible for enforcing the various other federal laws relating to consumer data privacy and security,²⁶⁰ selected examples of which are outlined in relation to specific neurotechnology use cases below.

Healthcare

Neurotechnologies have a range of applications in clinical research, care and management contexts, including stage mapping of neurological diseases, such as Parkinson's.²⁶¹ Whilst beneficial to the overall provision of healthcare, such applications also raise potential data privacy issues relating to the collection, use and disclosure of brain and other neural data. The Health Insurance Portability and Accountability Act (HIPAA) (1996), as implemented by the Privacy Rule published by the Department of

²⁴⁹ Schwartz, P.M. and Nikolaus-Peifer, K. (2017) 'Transatlantic Data Privacy Law', *The Georgetown Law Journal*, Vol.106:1, pp.115-179. Available at: <https://www.law.georgetown.edu/georgetown-law-journal/in-print/volume-106/volume-106-issue-1-november-2017/transatlantic-data-privacy-law/>

²⁵⁰ Financial Services Modernisation Act of 1999, Pub. L. 106-102.

²⁵¹ 15 U.S.C §6801.

²⁵² Health Insurance Portability and Accountability Act of 1996, Pub. L. 104-19.

²⁵³ Family Education Rights and Privacy Act of 1974, Pub. L. 90-247.

²⁵⁴ Video Privacy Protection Act of 1988, Pub. L. 100-618.

²⁵⁵ Krishnamurthy, V. (2020) 'A Tale of Two Privacy Laws: The GDPR and the International Right to Privacy', *American Journal of International Law*, Vol.114, pp.26-30, p.29. DOI: <https://doi.org/10.1017/ajil.2019.79>

²⁵⁶ 15 U.S.C §41-58.

²⁵⁷ 15 U.S.C §45.

²⁵⁸ Federal Trade Commission. *Privacy and Security Enforcement* / [Online]. Available at: <https://www.ftc.gov/news-events/topics/protecting-consumer-privacy-security/privacy-security-enforcement>

²⁵⁹ Federal Trade Commission. (2015) *FTC Charges Marketers of 'Vision Improvement' App With Deceptive Claims* / Press Release [Online]. Available at: <https://www.ftc.gov/news-events/news/press-releases/2015/09/ftc-charges-marketers-vision-improvement-app-deceptive-claims>

²⁶⁰ Federal Trade Commission. (no date) *Privacy and Security Enforcement* / [Online]. Available at: <https://www.ftc.gov/news-events/topics/protecting-consumer-privacy-security/privacy-security-enforcement>

²⁶¹ Mitchell, T. et al. (2021) 'Emerging Neuroimaging Biomarkers Across Disease Stage in Parkinson Disease: A Review', *JAMA Neurology*, Vol.78:10, pp.1262-1272. DOI: <https://doi.org/10.1001/jamaneurol.2021.1312>



Health and Human Services (HHS),²⁶² restricts the use and disclosure,²⁶³ except in specified circumstances, of “protected health information” maintained or transmitted by a “covered entity”, whether in electronic or “any other form or medium”.²⁶⁴ The Privacy Rule protects “individually identifiable health information”, defined as “a subset of health information, including demographic information collected from an individual” that is created or received by a covered entity; relates to the past, present or future physical or mental health or condition of an individual, the provision of health care to an individual or the past, present or future payment for the provision of health care to an individual”; and that identifies the individual or there is “a reasonable basis to believe the information can be used to identify the individual.”²⁶⁵ Therefore, although not expressly included, the use and disclosure of brain and other neural data that constitutes “protected health information” according to this definition would be restricted.

The covered entities to which this regulation applies, however, is limited to health plans, health care clearinghouses, and health care providers that transmit health information in electronic form in connection with a transaction, such as health care claims, payment and benefits.²⁶⁶ As such, whilst the scope of application is slightly extended by the inclusion of “business associates” connected to covered entities,²⁶⁷ there remains a broad range of noncovered entities that are not subject to compliance with these regulations, such as employers and companies that market consumer wellness neurotechnology, including brain computer interfaces (BCIs),²⁶⁸ a type of neurotechnological device enabling direct and occasionally bidirectional communication between the brain and an external computer-based system.²⁶⁹ A related concern is the risk that emerging AI and machine learning techniques,²⁷⁰ such as automated face recognition algorithms,²⁷¹ may be used to reidentify brain and other neural data that has been subject to conventional methods of deidentification, and thereby circumnavigate the absence of restrictions to the use or disclosure of protected health information subject to the HIPAA standard for deidentification.²⁷² The possible privacy risks, notwithstanding, this report did not identify a particular policy or legislative development aimed at addressing this gap in the existing regulation.

Gaming and Entertainment

Although initially developed and still most widely used for clinical medicine and neuroscience research purposes, neurotechnology is also increasingly available to consumers for a wide variety of non-clinical applications, including gaming and other forms of entertainment.²⁷³ Typically retrofitted to existing

²⁶² 45 C.F.R §160.101-105; §164.102 et seq.

²⁶³ 45 C.F.R §164.502(a).

²⁶⁴ 45 C.F.R §160.103.

²⁶⁵ 45 C.F.R §160.103.

²⁶⁶ 45 C.F.R §§160.102-103.

²⁶⁷ 45 C.F.R §§160.102-160.103.

²⁶⁸ Greenberg, J. et al. (2021) ‘Privacy and the Connected Mind. Understanding the Data Flows and Privacy Risks of Brain-Computer Interfaces’, *Future of Privacy Forum*, pp.1-40, pp.12. Available at: <https://fpf.org/wp-content/uploads/2021/11/FPF-BCI-Report-Final.pdf>

²⁶⁹ Saha, S. et al. (2021) ‘Progress in Brain Computer Interface: Challenges and Opportunities’, *Frontiers in Systems Neuroscience*, Vol.15. DOI: <https://doi.org/10.3389/fnsys.2021.578875>

²⁷⁰ Jwa, A.S. and Poldrack, R.A. (2022) ‘Addressing privacy risk in neuroscience data: from data protection to harm prevention’, *Journal of Law and the Biosciences*, Vol.9:2, pp.1-25, p.8. DOI: <https://doi.org/10.1093/jlbb/lzac025>

²⁷¹ Schwartz, C.G. et al. (2021) ‘Changing the face of neuroimaging research: Comparing a new MRI de-facing technique with popular alternatives’, *NeuroImage*, Vol.231, pp.1-12. DOI: <https://doi.org/10.1016/j.neuroimage.2021.117845>

²⁷² 45 C.F.R. §§164.514.

²⁷³ Ienca, M. and Andorno, R. (2017) ‘Towards new human rights in the age of neuroscience and neurotechnology’, *Life Sciences, Society and Policy*, Vol.13:5, p.4 DOI: <https://doi.org/10.1186/s40504-017-0050-1>



devices via head mounted displays (HMDs) or other external device, such applications include non-invasive electroencephalographic (EEG)-based BCIs, which record, collect and interpret the user's electrical impulses and translate such brain and other neural data into outputs.²⁷⁴ The main privacy risks raised by such applications relate to the inferences that can be drawn from the collection of brain and other neural data, which might be of even greater sensitivity than other biological indicators, such as eye tracking.²⁷⁵ In particular, there is the risk that the direct recording of brain and other neural signals may lead to users revealing information involuntarily or without meaningful consent, that could be used by developers or other third parties in unanticipated or potentially harmful ways, such as to track and predict user behaviour.²⁷⁶ The practice of "neuromarketing", describing the process by which consumer behaviours can be analysed, profiled and predicted through neurotechnological applications, is of increasing commercial value for companies specialising in the area, such as MindLab International.²⁷⁷

An additional potential risk is that brain and other neural data could be used to target special categories of person, such as children.²⁷⁸ At the federal level, the main protection against such potential privacy invasions is granted to children via the Children's Online Privacy Protection Act (COPPA) (1998).²⁷⁹ COPPA regulates the collection of information from and about children under 13 years of age on the internet or an online service, specifically by stipulating that the collection, use or disclosure of such information is subject to the operator of a website or online service providing notice of what information is used, how it is used, and the relevant disclosure practices in operation, as well as being required to obtain verifiable parental consent.²⁸⁰ The statute applies to operators who collect or maintain "personal information" from users,²⁸¹ as defined as "individually identifiable information about an individual collected online",²⁸² such as physical or email address,²⁸³ as well as "any other identifier that the Commission determines permits the physical or online contacting of a specific individual; or information concerning the child or the parents of that child that the website collects online from the child and combines with an identifier".²⁸⁴ Whilst not expressly included, the use of a child's brain or other neural data could therefore be covered under the terms of the statute if considered a type of identifier permitting the child to be identified and contacted. Furthermore, as part of its ten-year review brought forward, the FTC has conducted a public consultation on the implementation of COPPA, in which it considered, amongst other things, whether to revise the definition of "personal information" to include "biometric data", such as genetic data, fingerprints and retinal scans.²⁸⁵ Although not explicitly identified, this definition could also conceivably include or be extended to brain and other neural data.

²⁷⁴ Greenberg, J. et al. (2021) 'Privacy and the Connected Mind. Understanding the Data Flows and Privacy Risks of Brain-Computer Interfaces', *Future of Privacy Forum*, pp.1-40, pp.15. Available at: <https://fpf.org/wp-content/uploads/2021/11/FPF-BCI-Report-Final.pdf>

²⁷⁵ Ibid 17.

²⁷⁶ Heller, B. (2021) 'Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law', *Vanderbilt Law Review*, Vol.23:1, pp.1-51. Available at: <https://scholarship.law.vanderbilt.edu/jetlaw/vol23/iss1/1>

²⁷⁷ Ienca, M. (2021) 'Common Human Rights Challenges Raised by Different Applications of Neurotechnologies in Biomedical Fields', *Committee on Bioethics (DH-BIO) of the Council of Europe*, pp.24. Available at: <https://rm.coe.int/report-final-en/1680a429f3>

²⁷⁸ Greenberg, J. et al. (2021) 'Privacy and the Connected Mind. Understanding the Data Flows and Privacy Risks of Brain-Computer Interfaces', *Future of Privacy Forum*, pp.1-40, pp.16. Available at: <https://fpf.org/wp-content/uploads/2021/11/FPF-BCI-Report-Final.pdf>

²⁷⁹ 15 U.S.C §6501-6506.

²⁸⁰ 15 U.S.C §6502(b)(1)(A)(i)-(ii).

²⁸¹ 15 U.S.C §6501 (2)(A).

²⁸² 15 U.S.C. §6501(8).

²⁸³ 15 U.S.C §6501(8)(B)-(C).

²⁸⁴ 15 U.S.C §6501(F)-(g)

²⁸⁵ Federal Trade Commission. (2019) *Request for Public Comment on the Federal Trade Commission's Implementation of the Children's Online Privacy Protection Rule*. 84 FR 35842. Available at:

Based on the type(s) of data being collected, particularly through non-invasive EEG-based BCIs used for gaming, also relevant in this context are the biometric privacy laws enacted at state level, which at the time of writing number at three (Illinois, Texas and Washington).²⁸⁶ Seven other states, including California, Missouri and New York, are at the time of writing considering similar legislative proposals, which are broadly based around the first and most robust of the biometric privacy laws,²⁸⁷ namely the Illinois Biometric Information Privacy Act (BIPA) (2008).²⁸⁸ BIPA establishes various procedures in relation to the retention, collection, disclosure and destruction of “biometric identifiers or biometric information” by private entities,²⁸⁹ while also empowering individuals with a right of action to seek relief for statutory violations.²⁹⁰ It defines “biometric identifiers” and “biometric information” separately, with the former meaning “a retina or iris scan, fingerprint, voiceprint, or scan of hand or face geometry.”²⁹¹ Indicatively, expressly excluded from this narrow definition are magnetic resonance imaging (MRI) scans and other techniques that create “image or film of the human anatomy used to diagnose, prognose or treat an illness or other medical condition or to further validate scientific testing or screening.”²⁹² Other state biometric privacy laws may offer greater interpretative flexibility for the inclusion of brain and other neural data used to or capable of identifying an individual, with the Washington state law, for instance, defining “biometric identifier” more broadly as “data generated by automatic measurements of an individual’s biological characteristics, such as a fingerprint, voiceprint, eye retinas, irises, or other unique biological patterns or characteristics that are used to identify a specific individual.”²⁹³ However, the framing of these laws in terms of biometric data for identification may give rise to regulatory gaps and challenges relating to novel data processing activities, such as the practice of inferring user preferences through a process conceptualised as “biometric psychography”.²⁹⁴

Employment

In an employment context, the use of neurotechnology may in the future permit employers to modify employee abilities and may enable screening of prospective employees for desirable traits.²⁹⁵ Such and similar applications involving brain scanning, biomonitoring, or cognitive modification may give rise to data privacy concerns in relation to the protection of brain and other neural data.²⁹⁶ In the existing patchwork of federal law, however, there exists limited protection for individuals against data privacy infringements arising in an employment context through the misuse of brain and other neural data. The U.S. Privacy Act (1974), as amended,²⁹⁷ protects employees’ personal information by establishing various requirements for federal agencies in maintaining relevant records systems, including a conditional prohibition on disclosure and the right of individual access to and amendment of any such

<https://www.federalregister.gov/documents/2019/07/25/2019-15754/request-for-public-comment-on-the-federal-trade-commissions-implementation-of-the-childrens-online>

²⁸⁶ DiRago, M.S. et al. (2022) *A Fresh “Face” of Privacy: 2022 Biometric Laws* / Troutman Pepper [Online]. Available at: <https://www.troutman.com/insights/a-fresh-face-of-privacy-2022-biometric-laws.html>

²⁸⁷ Ibid.

²⁸⁸ 740 ILCS 14.

²⁸⁹ 740 ILCS 14/15.

²⁹⁰ 740 ILCS 14/20.

²⁹¹ 740 ILCS 14/10.

²⁹² Ibid.

²⁹³ RCW 19.375.010.

²⁹⁴ Heller, B. (2021) ‘Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law’, *Vanderbilt Law Review*, Vol.23:1, pp.1-51. Available at: <https://scholarship.law.vanderbilt.edu/jetlaw/vol23/iss1/1>

²⁹⁵ Hopkins, P.D. and Fiser, H.L. (2017) “This Position Requires Some Alteration of Your Brain”: On the Moral and Legal Issues of Using Neurotechnology to Modify Employees’, *Journal of Business Ethics*, Vol.144, pp.783-797. DOI: <https://doi.org/10.1007/s10551-016-3182-y>

²⁹⁶ Ibid 789.

²⁹⁷ 5 U.S.C §552a.



records.²⁹⁸ However, the scope of this provision is limited in its application to the personal information maintained by federal employees.²⁹⁹

The Electronic Communications Privacy Act (1986),³⁰⁰ meanwhile, offers some protection for employees against monitoring of personal communications, but may allow employer monitoring of communications that take place via company-owned electronic devices.³⁰¹ Finally, the Employee Polygraph Protection Act (1988) prohibits employers from requiring or requesting, directly or indirectly, that any employee or prospective employee take a lie detector test.³⁰² Employers are also prohibited from using the results of such a test and taking discriminatory action against any employee or prospective employee who does not take such a test, or on the basis of the results of such a test.³⁰³ Whilst drafted with application to polygraph tests in mind, the definition of “lie detector” includes “psychological stress evaluator, or any other similar device”,³⁰⁴ thereby indicating that if existing neurotechnologies for lie-detection are to be used by employers,³⁰⁵ then it will follow that the privacy and right to non-discrimination (see Section 3.1) of private sector employees will be covered and protected.

Education

The education system is an emerging use case for neurotechnologies, in particular brain computer interfaces (BCIs).³⁰⁶ In this context, such technology may be used for a variety of purposes, including to diagnose and provide tailored interventions for students with learning disabilities,³⁰⁷ as well as to improve understanding of how the brain works during the learning process,³⁰⁸ the findings from which might be used to enhance the overall effectiveness of educational methods.³⁰⁹ However, such and similar applications involving the collection, processing and sharing of significant volumes of brain and other neural data may present a number of data privacy risks, such as making decisions about students’

²⁹⁸ 5 U.S.C §552a(b)-(d).

²⁹⁹ 5 U.S.C §552b(1).

³⁰⁰ 18 U.S.C. §§2701-2713.

³⁰¹ Greenberg, J. et al. (2021) ‘Privacy and the Connected Mind. Understanding the Data Flows and Privacy Risks of Brain-Computer Interfaces’, *Future of Privacy Forum*, pp.1-40, pp.19. Available at: <https://fpf.org/wp-content/uploads/2021/11/FPF-BCI-Report-Final.pdf>

³⁰² 29 U.S.C. §2002.

³⁰³ 29 U.S.C. §2002.

³⁰⁴ 29 U.S.C §2001.

³⁰⁵ See, e.g., Wolpe, P.R., Foster, K., Langleben, D.D. (2005) ‘Emerging neurotechnologies for lie-detection: promises and perils’, *American Journal of Bioethics*, Vol.5:2, pp.39-49. DOI: <http://dx.doi.org/10.1080/15265160590923367>

³⁰⁶ Wegemer, C. (2019) ‘Brain-computer interfaces and education: the state of technology and imperatives for the future’, *International Journal of Learning Technology*, Vol.14:2, pp.141-161. DOI: <https://dx.doi.org/10.1504/IJLT.2019.101848>

³⁰⁷ See, e.g., Prado, J. (2019) *Can neuroscience help predict learning difficulties in children / International Brain Research Organisation* [Online]. Available at: <https://solportal.ibre-unesco.org/articles/can-neuroscience-help-predict-learning-difficulties-in-children/>; See also, Coben et al. (2015) ‘The Impact of Coherence Neurofeedback on Reading Delays in Learning Disabled Children: A Randomized Controlled Study’, *NeuroRegulation*, 2(4). DOI: 10.15540/nr.2.4.168.

³⁰⁸ See, e.g., McCandliss B. and Toomarian, E. (2020) ‘Putting Neuroscience in the Classroom: How the Brain Changes As We Learn’, *Trend*. Available at: <https://www.pewtrusts.org/en/trend/archive/spring-2020/putting-neuroscience-in-the-classroom-how-the-brain-changes-as-we-learn>.

³⁰⁹ See, e.g., Lodge, J.M. and Harrison, W.H. (2019) ‘The Role of Attention in Learning in the Digital Age’, *Yale Journal of Biology and Medicine*, 92. Available at: <https://pubmed.ncbi.nlm.nih.gov/30923470/>.



cognitive abilities based on inaccurate or unreliable datasets.³¹⁰ Such and similar data privacy risks might also be particularly acute if the data relates to a student who is vulnerable due to age and/or disability.

Amongst the variety of federal privacy laws with application to the educational sector, most relevant is the Family Educational Rights and Privacy Act (FERPA) (1974)³¹¹ and the associated FERPA regulations.³¹² FERPA protects the privacy of students' "education records" by granting parents or eligible students rights of access, review and correction to such records, and prohibiting the release of the "personally identifiable information" contained therein without the written consent of an "eligible student" or that of their parents if the student is under eighteen years of age.³¹³ The statutory definition of "personally identifiable information" includes personal identifiers, "such as the student's social security number, student number or biometric record",³¹⁴ with the latter meaning "a record of one or more measurable biological or behavioural characteristics that can be used for automated recognition of an individual. Examples include fingerprints; retina and iris patterns; voiceprints; DNA sequence; facial characteristics; and handwriting."³¹⁵ Whilst not listed specifically, it is possible that with the growing use of neurotechnology in an educational context, there may be certain circumstances in which students' educational records containing brain and other neural data are protected under the terms of FERPA.³¹⁶

3.3 Use of neurotechnologies in the legal system

Neurotechnologies – and the brain and other neural data they produce – are increasingly relevant in both criminal and civil legal systems. Early forerunners (e.g., polygraph lie detection tests) to modern neurotechnological applications have been used in the courtroom since the early 20th century.³¹⁷ Yet, while not novel, the use of such technology (and discussion of its use) has grown considerably in the past two decades. For instance, the number of judicial opinions referencing neuroscience doubled from 2005 to 2012.³¹⁸

Theoretically, like any type of evidence, neuroscientific evidence could be introduced in court as evidence to prove or disprove a disputed fact. Neuroscientific evidence may be used for a variety of purposes and at various stages in both civil and criminal justice systems, including to assess competency to stand trial,³¹⁹ at the guilt phase to determine criminal culpability, including that of adolescents,³²⁰

³¹⁰ Greenberg, J. et al. (2021) 'Privacy and the Connected Mind. Understanding the Data Flows and Privacy Risks of Brain-Computer Interfaces', *Future of Privacy Forum*, pp.1-40, pp.20. Available at: <https://fpf.org/wp-content/uploads/2021/11/FPF-BCI-Report-Final.pdf>

³¹¹ 20 U.S.C §1232g.

³¹² 34 CFR §99.

³¹³ 20 U.S.C. §1232g(a)(2)-(b).

³¹⁴ 34 CFR §99.3.

³¹⁵ 34 CFR §99.3 (emphasis in original).

³¹⁶ Greenberg, J. et al. (2021) 'Privacy and the Connected Mind. Understanding the Data Flows and Privacy Risks of Brain-Computer Interfaces', *Future of Privacy Forum*, pp.1-40, p.20. Available at: <https://fpf.org/wp-content/uploads/2021/11/FPF-BCI-Report-Final.pdf>

³¹⁷ See, e.g., *LeFevre v. State*, 242 Wis. 416, 7 N.W.2d 288 (1943).

³¹⁸ Farahany, N.A. 'Neuroscience and behavioural genetics in US criminal law: an empirical analysis', *Journal of Law and the Biosciences*, Vol.2:3, pp.485-509. DOI: <https://doi.org/10.1093/jlb/lsv059>

³¹⁹ See, e.g., Perlin, M.L. and Lynch, A.J. (2018) "'My Brain is So Wired": Neuroimaging's role in competency cases involving persons with mental disabilities', *Boston University Public Interest Law Journal*, Vol.27:1, pp.73-98. Available at: https://digitalcommons.nyls.edu/fac_articles_chapters/1093/

³²⁰ See, e.g., Steinberg, L. (2013) 'The influence of neuroscience on US Supreme Court decisions about adolescents' criminal culpability', *Nature Review Neuroscience*, Vol.14, pp.513-518. DOI: <https://doi.org/10.1038/nrn3509>

and at the sentencing phase in mitigation,³²¹ particularly in death penalty trials.³²² Other potential current and future applications of neurotechnologies in the legal system include assessing jury (or judicial) bias,³²³ eliciting memories,³²⁴ and predicting recidivism, namely the risk of re-offending.³²⁵

This section will proceed by first outlining the different sources of criminal law (Section 3.3.1), tort law, and civil law (Section 3.3.2), as well as the associated evidential and procedural law (Section 3.3.3), at the federal and state level. Following this, the use of neurotechnologies for assessing the impartiality of the jury and the competence of defendants will be explored, wherein it will be shown that there are significant challenges to the accepted and widespread use of neurotechnology for such purposes (Section 3.3.4).

3.3.1 Criminal law

The criminal law is a system of rules governing how the government can punish individuals who commit crimes (an act or omission defined by law). Criminal procedure law is the set of rules stipulating how the criminal proceeding take place. The U.S. Constitution establishes the basic rights of criminal defendants, notably due process rights.³²⁶

In the United States, some crimes are defined in federal law and handled in federal courts. The definitions of these crimes, available defences and rules for proceedings are codified in Title 18 of the U.S. Code. The provisions on definitions and defences are informally known as the federal penal or criminal code. The provisions on procedure, i.e., the Federal Rules of Criminal Procedure, govern every step of the proceeding from issuing a warrant through a trial to post-conviction procedures.

Crimes defined under state law are handled in state courts and governed by state law. Each state has its own criminal and criminal procedure code, and there is “enormous diversity” amongst them.³²⁷ In an attempt to harmonize the different criminal justice systems, the American Law Institute published the Model Penal Code (MPC), which includes standardised definitions of criminal offenses. While not itself legally binding, many states have adopted portions of the MPC as part of state law, leading some legal scholars to characterise the MPC as “the closest thing to being an American criminal code.”³²⁸ Each state also has its own criminal procedure code, but many choose to replicate the Federal Rules of Criminal Procedure in state law.

³²¹ See, e.g., Du, Y. (2020) ‘The Application of Neuroscience Evidence on Court Sentencing Decisions: Suggesting a Guideline for Neuro-Evidence’, *Seattle Journal for Social Justice*, Vol.18:2, pp.493-524. Available at: <https://digitalcommons.law.seattleu.edu/sjsj/vol18/iss2/19>

³²² Denno, D.W. (2015) ‘The Myth of the Double-Edged Sword: An Empirical Study of Neuroscience Evidence in Criminal Cases’, *Boston College Law Review*, Vol.56:2, pp.493-551. Available at: https://ir.lawnet.fordham.edu/faculty_scholarship/548

³²³ See generally, Jolly, R.L. (2019) ‘The New Impartial Jury Mandate’, *Michigan Law Review*, Vol.117:4, pp.713-760. DOI: <https://doi.org/10.36644/mlr.117.4.new>

³²⁴ Roelfsema, P.R., Denys, D. and Klink, P.C. (2018) ‘Mind Reading and Writing: The Future of Neurotechnology’, *Trends in Cognitive Sciences*, Vol.22:7, pp.598-610. DOI: <https://doi.org/10.1016/j.tics.2018.04.001>

³²⁵ See, e.g., Lamparello, A. (2011) ‘Using Cognitive Neuroscience to Predict Future Dangerousness’, *Columbia Human Rights Law Review*, Vol.41:2, pp.481-539. Available at: <https://ssrn.com/abstract=1742940>

³²⁶ U.S. Const. Amend. V, XIV.

³²⁷ Robinson, P.H. (2007) ‘The American Model Penal Code A Brief Overview’, *New Criminal Law Review*, Vol.10:3, pp.319-341. Available at: https://scholarship.law.upenn.edu/faculty_scholarship/131

³²⁸ Ibid.



3.3.2 Tort law, civil law and civil procedure law

The U.S. Constitution establishes basic due process rights for civil cases.³²⁹ Civil law cases take place in civil courts, which are distinct from criminal courts and have their own set of rules and regulations, including rules on procedure. The substance of civil procedure laws significantly differs from the equivalent criminal procedure rules and applies throughout the legal process, from initial complaint to potential awarding of damages. Civil proceedings in federal courts are subject to the Federal Rules of Civil Procedure. Rules of civil procedure in state courts vary, but some states follow the Federal Rules of Civil Procedure.

3.3.3 Evidence and procedural law

Rules of evidence determine how items and information can be admitted to a court in the form of evidence. State laws relating to rules of evidence vary, but many states have adopted a version of the Uniform Rules of Evidence, which are closely aligned with the Federal Rules of Evidence (FRE) used by federal courts in both criminal and civil cases. Evidential law at the federal level is heavily informed by the trilogy of landmark U.S. Supreme Court cases handed down in the 1990s,³³⁰ the particular relevance of which is in the establishment of a general framework by which courts may determine the admissibility of expert testimony, including that which relates to neuroscientific evidence.³³¹ Indeed, it has been noted that neuroscientific evidence may not only appear in the form of “graphic images produced through methods such as fMRI, electroencephalography (EEG), quantitative electroencephalography (qEEG), and others”, but may also consist of “expert testimony about the brain, from researchers and clinicians”.³³² In the first of these cases, *Daubert v. Merrell Dow Pharmaceuticals, Inc.*,³³³ the U.S. Supreme Court determined that the previously established *Frye* test of “general acceptance”³³⁴ for the admission of expert testimony had been superseded by but still inform the application of the Federal Rules of Evidence, particularly Rule 402 on “relevant evidence”³³⁵ and the more specific Rule 702 on expert testimony.³³⁶ Further, when considering the admissibility of expert scientific testimony in accordance with Rule 702, federal trial judges “must ensure that any and all scientific testimony or evidence admitted is not only relevant, but reliable.”³³⁷ Finally, in exercising the “gatekeeping” function associated with admitting or excluding expert testimony, federal judges are directed to conduct a “flexible” inquiry to determine “whether a theory or technique is scientific knowledge that will assist the trier of fact” based on various factors, including whether the theory or technique can or has been

³²⁹ U.S. Const. Amend. VII.

³³⁰ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993); *General Electric Co. v. Joiner*, 552 U.S. 136 (1997); *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

³³¹ Kraft, C.J. and Giordano, J. (2017) ‘Integrating Brain Science and Law: Neuroscientific Evidence and Legal Perspectives on Protecting Individual Liberties’, *Frontiers in Neuroscience*, Vol.11. DOI: <https://doi.org/10.3389/fnins.2017.00621>

³³² Jones, O.D. and Shen, F.X. (2012) ‘Law and Neuroscience in the United States’, in Spranger, T.D. (ed) *International Neurolaw: A Comparative Analysis* (Berlin, Springer). DOI: <https://doi.org/10.1007/978-3-642-21541-4>

³³³ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993).

³³⁴ *Frye v. United States*, 293 F. 1013 (D.C. Cir. 1923) cited in *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993) at 585.

³³⁵ “The court may exclude relevant evidence if its probative value is substantially outweighed by a danger of one or more of the following: unfair prejudice, confusing the issues, misleading the jury, undue delay, wasting time, or needlessly presenting cumulative evidence.”

³³⁶ 28 U.S.C. 702: “A witness who is qualified as an expert by knowledge, skill, experience, training or education may testify in the form of an opinion or otherwise if: (a) the expert’s scientific, technical, or other specialised knowledge will help the trier of fact to understand the evidence or to determine a fact in issue; (b) the testimony is based on sufficient facts or data; (c) the testimony is the product of reliable principles and methods; and (d) the expert has reliably applied the principles and methods to the facts of the case.”

³³⁷ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), 589.

tested, whether it “has been subject to peer review and publication”, its “known or potential rate of error”, “the existence and maintenance of standards controlling the technique’s operation”, and whether it has garnered “[w]idespread acceptance” within the relevant scientific community.”³³⁸

In the follow-up case of *Kumho Tire Co. v. Carmichael*,³³⁹ the Supreme Court further established that the *Daubert* “gatekeeping obligation” is applicable to “all expert testimony”, but clarified that in exercising this function a trial judge “may”, consistent with the flexible nature of the inquiry, consider a range of factors since the *Daubert* “list of factors was meant to be helpful, not definitive. Indeed, those factors do not all necessarily apply even in every instance in which the reliability of scientific testimony is challenged.”³⁴⁰ Whilst not conclusive, an indication of how U.S. federal courts might apply the *Daubert* standard to neuroscientific evidence can be derived from the approach taken in *United States v. Semrau*.³⁴¹ Here, in the first case of its kind, the court considered the admissibility of fMRI lie-detection tests under FRE 702 in conjunction with the *Daubert* standard, as well as FRE Rule 402, and found that the technique was not generally accepted by the scientific community and therefore that the district court “did not abuse its discretion in excluding the fMRI evidence” relied upon by the defendant.³⁴²

Whilst illustrative, this may not necessarily be instructive as to the future admissibility of fMRI and other neuroscientific evidence in U.S. courts, particularly as the evidence was proffered at the liability/guilt stage, where the more stringent FRE and *Daubert* standard apply.³⁴³ Indeed, in comparison, the sentencing phase may be more conducive to the admissibility of neuroscientific evidence,³⁴⁴ since it is governed by a lower threshold of the court being able to consider “relevant information without regard to its admissibility under the rules of evidence applicable at trial, provided that the information has sufficient indicia of reliability to support its probable accuracy.”³⁴⁵ That the sentencing phase may be a more suited and accepted point at which to admit neuroscientific evidence is illustrated by the case of *Florida v. Grady Nelson*, in which the admission of qEEG brain mapping evidence at the sentencing phase as mitigation contributed to the verdict of life imprisonment instead of the state capital punishment.³⁴⁶

3.3.4 Issues relating to the use of neurotechnologies in the legal system

Impartiality of the jury

Jury trials are a constitutionally enshrined right in the United States for criminal and some civil defendants.³⁴⁷ The rules for jury trials are primarily set out in the Federal Rules of Criminal Procedure, Federal Rules of Civil Procedure, and case law. A jury is a group of people (usually 6-12) selected to hear evidence and issue a verdict in a case.³⁴⁸ A fundamental element of due process is that the jury must be impartial, which means the “jurors must lack specific bias against the parties.”³⁴⁹ The U.S. Supreme Court defines biases as any outside influence, such as conflicts of interests and previously held beliefs, that

³³⁸ *Daubert v. Merrell Dow Pharmaceuticals, Inc.*, 509 U.S. 579 (1993), 594-597.

³³⁹ *Kumho Tire Co. v. Carmichael*, 526 U.S. 137 (1999).

³⁴⁰ *Ibid* at 150-151 (emphasis added).

³⁴¹ *United States v. Semrau*, 693 F.3d 510 (6th Cir.) (2012).

³⁴² *Ibid* at 17.

³⁴³ Jones, O.D. and Shen, F.X. (2012) ‘Law and Neuroscience in the United States’, in Spranger, T.D. (ed) *International Neurolaw: A Comparative Analysis* (Berlin, Springer). DOI: <https://doi.org/10.1007/978-3-642-21541-4>

³⁴⁴ *Ibid*.

³⁴⁵ Federal Sentencing Guidelines, §6A1.3.

³⁴⁶ *Florida v. Grady Nelson*, No.FO5-00846 (11th Fla. Cir. Ct., 4 Dec 2010).

³⁴⁷ U.S. Const. Amend. VI, VII.

³⁴⁸ Fed. R. Crim. P. 23; Fed. R. Civ. P. 38-39.

³⁴⁹ Jolly, R.L. (2019) ‘The New Impartial Jury Mandate’, *Michigan Law Review* 117(4), p714. DOI: <https://doi.org/10.36644/mlr.117.4.new>



cannot be traced directly to the “evidence and arguments in open court.”³⁵⁰ The process of selecting jurors, which includes questions about potential bias, is called *voir dire*.³⁵¹ During *voir dire*, prospective jurors are asked about their ability to judge a case fairly, including whether they believe they have a relevant bias and the extent to which the bias will impact their decisions in the case.³⁵² This method of self-reporting was considered by the Supreme Court as the best and “only sure method of fathoming”³⁵³ whether a potential juror “has an unbiased mind.”³⁵⁴ Based on the answers provided during *voir dire* and observations of the jurors’ behaviour, the parties can make a request to the court that the prospective juror is disqualified for actual or impartial bias.³⁵⁵

Neurotechnologies could be used to help courts assess juror bias. Current ways of assessing bias – self-assessment and behavioural observation – are unreliable and “cannot detect bias with any precision at the individual level.”³⁵⁶ Therefore, some neuroscientists believe that brain imaging might better uncover “whether jurors are lying, even to themselves, about the influences that affect the way they think and the decisions they make,”³⁵⁷ an approach one legal scholar has termed “neuro-voir dire.”³⁵⁸ Some studies suggest it is possible³⁵⁹ and more reliable³⁶⁰ to identify bias through brain imaging techniques like fMRI. At present, there are no rules explicitly prohibiting the use of neurotechnologies for this purpose, though there are no examples of this happening in courtrooms yet.

Critiques of this proposal point to several concerns. Some concerns, like current high costs and logistical challenges, may be alleviated in the future as neurotechnologies become less expensive and easier to use – though they are serious considerations at present.³⁶¹ Like the use of neurotechnologies in general, concerns about accuracy are also pressing, but these may also be addressed as the technology develops. More fundamental are concerns about juror privacy. Jurors have a right to privacy and a “right against being forced to disclose certain personal information.”³⁶² Normally, a juror can refuse to answer a question in *voir dire* if it is not relevant,³⁶³ but there is a risk that “neuro-voir dire deprives her of that choice.”³⁶⁴ Furthermore, brain imaging related to potential bias, especially, “could reveal sensitive personal information... that a person would not wish to share or may not even yet know to be true.”³⁶⁵

³⁵⁰ *Skilling v. United States*, 130 S. Ct. 2896, 2913 (2010) (quoting *Patterson v. Colorado*, 205 U.S. 454, 462 (1907)).

³⁵¹ NB: French for “to speak the truth.”

³⁵² Fed. R. Crim. P. 24; Fed. R. Civ. P. 47.

³⁵³ *Aldridge v. United States*, 283 U.S. 308, 313-14 n.3 (1931) (quoting *State v. McAfee*, 64 N.C. 339, 340 (1870)).

³⁵⁴ *Smith v. Phillips*, 455 U.S. 209, 217 n.7 (1982) (quoting *Dennis v. United States*, 339 U.S. 162, 171 (1950)).

³⁵⁵ Fed. R. Crim. P. 24; Fed. R. Civ. P. 47.

³⁵⁶ Fox, D. (2014) ‘Neuro-Voir Dire and the Architecture of Bias’, *Hastings Law Journal*, Vol. 65:4, pp.1012-13. Available at: https://repository.uchastings.edu/hastings_law_journal/vol65/iss4/2

³⁵⁷ Ibid 1014.

³⁵⁸ Greely, H.T. (2009) ‘Law and the Revolution in Neuroscience: An Early Look at the Field’, *Akron Law Review* 42(3), p697.

³⁵⁹ See, e.g., Gilbert, S.J. Swencionis, J.K. and Amodio, D.M. (2012) ‘Evaluative vs. trait representation in intergroup social judgments: Distinct roles of anterior temporal lobe and prefrontal cortex’, *Neuropsychologia* 50.

³⁶⁰ See, e.g., Korn, H.A, Johnson, M.A. and Chun, M.M. (2012) ‘NeuroLaw: Differential brain activities for Black and White faces predicts damage awards in hypothetical employment discrimination case’, *Social Neuroscience* 7(4).

³⁶¹ Fox, D. (2014) ‘Neuro-Voir Dire and the Architecture of Bias’, *Hastings Law Journal*, Vol.65(4), p1017. Available at: https://repository.uchastings.edu/hastings_law_journal/vol65/iss4/2

³⁶² Ibid 1018.

³⁶³ *Brandborg v. Lucas*, 891 F. Supp. 352, 360 (E.D. Tex. 1995).

³⁶⁴ Fox, D. (2014) ‘Neuro-Voir Dire and the Architecture of Bias’, *Hastings Law Journal*, Vol.65(4), p1019. Available at: https://repository.uchastings.edu/hastings_law_journal/vol65/iss4/2

³⁶⁵ Ibid 1018.

Competency

In U.S. law, there are many types of specific competencies that have precise legal definitions, including competency to stand trial, testify, plead guilty, be sentenced and be executed. For the purpose of this analysis, the focus is on competency to stand for trial (CST or trial competency), which is the most frequent 'disability law' issue in criminal law.³⁶⁶

Trial competency refers specifically to the mental capacity or ability of the defendant to participate in legal proceedings. In the U.S., it is a constitutional due process requirement that the accused (known as the defendant) must be competent to stand for trial.³⁶⁷ The requirement for competency supports the legal values of dignity in the legal process, accuracy of the adjudication, and autonomy of the defendant to make decisions about the legal case.³⁶⁸ The rules for competency are primarily set out in the federal penal code, Federal Rules of Criminal Procedure, and case law. An incompetent defendant is someone with a mental illness that makes them unable "to understand the nature and consequences of the proceedings [and] assist in [the] defense" during the time of the trial.³⁶⁹ Competency can be assessed at any time pre-trial or during the legal proceedings. The government, the defense, or the court itself can request the assessment, but it must be ordered by the court.³⁷⁰ An expert witness (e.g., psychiatrist or psychologist) conducts the CST evaluation, which includes information on whether the defendant has a mental illness, a description of the signs and symptoms of the illness, and an assessment (based on the clinician's judgment) of any impairments to the mental capacities needed to participate in legal proceedings.³⁷¹ The CST evaluation is then presented to the judge for a legal decision on competency. The standard is preponderance of the evidence,³⁷² which means the judge must be convinced there is a greater than 50 percent chance that the defendant is incompetent.³⁷³ If the defendant is found incompetent, the proceedings are halted.³⁷⁴

Neurotechnologies can be used to help assess competency. While the Federal Rules on Criminal Procedure and Federal Rules on Evidence do not explicitly discuss neurotechnologies and competency assessments, judges have interpreted the rules to allow neuroscientific evidence in court for this purpose. In *United States v. Kasim* (2008),³⁷⁵ for instance, the admission of neuroimaging evidence contributed to a finding of incompetence. As part of the competency assessment, the defendant underwent a functional neuroimaging scan called SPECT (single photon emissions computerized tomography). This test measures metabolic activities and cerebral processes, including blood flow. The SPECT results indicated reduced blood flow to the defendants' front temporal lobes, which "control the cognitive, memory and speech functions." Based on the SPECT results, a medical expert (neurologist

³⁶⁶ Perlin, M.L. and Lynch, A.J. (2018) "'My Brain Is So Wired': Neuroimaging's Role in Competency Cases Involving Persons with Mental Disabilities', *Public Interest Law Journal*, 27, p75. Available at: https://digitalcommons.nyls.edu/fac_articles_chapters/1093/

³⁶⁷ "No person shall...be deprived of life, liberty, or property, without due process of law." U.S. Const. Amend. V. "The Conviction of a legally incompetent defendant violates due process." *Pate v. Robinson*, 383 U.S. 375, 378 (1966) (citing *Bishop v. United States*, 350 U.S. 961 (1956)).

³⁶⁸ Bonnie, R.J. (1990) 'The Competence of Criminal Defendants with Mental Retardation to Participate in Their Own Defense', *Journal of Criminal Law and Criminology*, 81(3).

³⁶⁹ 18 U.S.C. § 4241(a) (1948). The federal court standard was established in case law: "whether he has sufficient present ability to consult with his lawyer with reasonable degree of rational understanding – and whether he has a rational as well as factual understanding of the proceedings against him." *Dusky v. United States*, 362 U.S. 402 (1960).

³⁷⁰ 18 U.S.C. § 4241(a) (1948); Fed. R. Crim. P. 12.2(c).

³⁷¹ Wall, B. and Lee, R. (2020) 'Assessing Competency to Stand Trial', *Psychiatric Times*, 37(10).

³⁷² *Cooper v. Oklahoma*, 116 S.Ct. 1373 (1996).

³⁷³ NB: This is a lower threshold than *beyond a reasonable doubt or clear and convincing evidence*. See generally, https://www.law.cornell.edu/wex/preponderance_of_the_evidence

³⁷⁴ Proceedings may commence again if "the mental condition is so improved." 18 U.S.C. § 4241(d) (1948).

³⁷⁵ *United States v. Kasim*, No. 2:07 CR 56 (N.D. Ind. Nov. 3, 2008).



and neuropsychiatrist) diagnosed the defendant with dementia, a neurological condition which affects memory, judgment, and ability to concentrate. The court found that the SPECT evidence was admissible and credible, and that the preponderance of the evidence standard was satisfied to find the defendant incompetent for trial.³⁷⁶

However, the use and acceptance of neuroscientific evidence to assess competency as in *Kasim* is not typical. While the number of competency cases involving neuroscientific evidence is increasing, they still represent a “relatively small number” of competency cases overall.³⁷⁷ This is partly because courts have been and continue to show reluctance towards the admission of neuroscientific evidence. In a high-profile case in the late 1990s, for instance, a court rejected neuroscience evidence from a PET (positron emissions tomography) because it was “dubious, based on speculative scientific theories lacking full development, research and support.”³⁷⁸ This case illustrates multiple concerns with the use of neuroscientific evidence to prove incompetence.³⁷⁹ One concern is the accuracy and reliability of the technology. Many of the current neurotechnologies present an oversimplification of complex brain functions because there is “no one-to-one mapping of a particular function to a particular brain region,”³⁸⁰ meaning there isn’t one section of the brain that uniquely corresponds to competency. Additionally, mental illnesses that may inhibit competency do not have a ‘loci’ that can be “quantified, scanned or measured” in the same way as traumatic brain injuries, meaning that brain scans may not be useful for some defendants (and potentially harmful to an incompetency argument if a lack of abnormality is interpreted to mean a lack of mental illness).³⁸¹

Furthermore, neuroimaging scans, which only show areas of abnormality, are more limited than traditional neuropsychological exams “designed to measure aspects of mental function and to provide information about an individual’s ability to process, understand, and react appropriately.”³⁸² For all of these reasons, the expert witness must carefully present a clinical assessment of the neuroscientific evidence in a way that is relevant and clear to the court, bridging the “analytical gap” between the neurodata and the question of competence.³⁸³ This relates to a second major concern: the expert witness must have good knowledge of the legal standards and legal counsel must understand the neurotechnologies well-enough to ensure the specific evidence supports the facts and legal argument.

A third concern is more theoretical, namely: whether neuroscientific evidence supports the legal value and right of human dignity. If presented appropriately, voluntarily, and in a nuanced way, neuroscientific evidence can support human dignity and enhance an argument for incompetency. Part of human dignity is giving an individual a voice “to speak for himself or articulate something that he believes to be important.” The opportunity to present neuroscientific evidence might be seen as a way to bolster personal testimony of mental illness or help explain certain actions, particularly if the evidence in

³⁷⁶ “The objective SPECT scan support these symptoms and represent objective evidence of a medical disability.” *United States v. Kasim*, No. 2:07 CR 56, ¶ 38 (N.D. Ind. Nov. 3, 2008).

³⁷⁷ Gaudet, L.M. and Marchant, G.E. (2016) ‘Under the Radar: Neuroimaging Evidence in the Criminal Courtroom’, *Drake Law Review*, 64, pp. 647-48. Available at: <https://ssrn.com/abstract=2838996>; Perlin, M.L. and Lynch, A.J. (2018) “My Brain Is So Wired”: Neuroimaging’s Role in Competency Cases Involving Persons with Mental Disabilities’, *Public Interest Law Journal*, 27, p75. Available at: https://digitalcommons.nyls.edu/fac_articles_chapters/1093/

³⁷⁸ *United States v. Gigante*, 982 F. Supp. 140, 147 (E.D.N.Y. 1997).

³⁷⁹ For discussion, see Gaudet, L.M. and Marchant, G.E. (2016) ‘Under the Radar: Neuroimaging Evidence in the Criminal Courtroom’, *Drake Law Review*, 64, pp. 687-88. Available at: <https://ssrn.com/abstract=2838996>

³⁸⁰ Perlin, M.L. and Lynch, A.J. (2018) “My Brain Is So Wired”: Neuroimaging’s Role in Competency Cases Involving Persons with Mental Disabilities’, *Public Interest Law Journal*, 27, pp80-81. Available at: https://digitalcommons.nyls.edu/fac_articles_chapters/1093/

³⁸¹ *Ibid* 81-82.

³⁸² *Ibid* 81.

³⁸³ *Ibid* 80.

integrated in a way that it highlights the defendant as a person, rather than a caricature of a “mentally ill person.”³⁸⁴ However, it could equally undermine human dignity by forcing or allowing the neuroscientific evidence alone to speak in place of the defendant. Despite all the current concerns, courts will likely be confronted with more neuroscience evidence as “future defendants will seek to introduce neuroimaging evidence as early in a trial as possible, which would be the competency phase.”³⁸⁵ This increase will be made possible as technologies further develop, lawyers become more familiar and knowledgeable with the potential benefits, and the costs associated with the use of such technologies decrease.

3.4 Liability for harms

3.4.1 Liability for harms under tort law

At the federal level, there is no general statute on tort law as a whole. Addressing a specific aspect of tort law, the Federal Tort Claims Act (FTCA) (1946), for instance, enables private persons who have suffered a tortious infringement caused by an agent of the federal government to receive compensation.³⁸⁶ Specifically, it provides that “[t]he United States shall be liable...in the same manner and to the same extent as a private individual under like circumstances, but shall not be liable for interest prior to judgement or for punitive damages.”³⁸⁷ The majority of tort law, however, is state based. The essential components of tort liability are broadly similar – a tortious infringement with or without fault, damage suffered, chain of causation, relevant defences, and the awarding of damages – but there is much variation at the micro level of specific tort laws which differ in various aspects, including whether and in what circumstances liability is strict, the extent to which contributory negligence is relevant, and whether and the extent to which punitive damages may be granted.³⁸⁸

This variety, notwithstanding, some basic uniformity is derived from the primary source of U.S. tort law being the common law, with judges often having regard to relevant judgements handed down in other states and federal courts, as well as consulting the non-binding but strongly persuasive uniform tort rules set out in the Restatement of Torts published by the American Law Institute (ALI).³⁸⁹ Amongst its treatises, perhaps most relevant to the liabilities arising in relation to neurotechnologies is the Restatement (Third) of Torts: Products Liability (1998), which outlines the general rules of tort liability applicable to commercial sellers or distributors for harm caused by defective products.³⁹⁰ Also potentially relevant to neurotechnologies, particularly those devices used to enable XR applications that blur the public/private distinction, is the privacy tort of intrusion upon seclusion, for which the Restatement (Second) of Torts provides that “One who intentionally intrudes, physically or otherwise, upon the solitude or seclusion of another or his private affairs or concerns, is subject to liability to the other for invasion of his privacy, if the intrusion would be highly offensive to a reasonable person.”³⁹¹

³⁸⁴ Ibid 91.

³⁸⁵ Gaudet, L.M. and Marchant, G.E. (2016) ‘Under the Radar: Neuroimaging Evidence in the Criminal Courtroom’, *Drake Law Review*, 64, p. 651. Available at: <https://ssrn.com/abstract=2838996>

³⁸⁶ Federal Tort Claims Act, of 1946, Pub. L. 79-601.

³⁸⁷ U.S.C §2674.

³⁸⁸ Magnus, U. (2010) ‘Why is US Tort Law so Different?’, *Journal of European Tort Law*, Vol.1:1, pp.102-124, p.103. DOI: <https://doi.org/10.1515/jetl.2010.102>

³⁸⁹ Ibid p.103-104; See, e.g., Restatement (Second) of Torts (1965); Restatement (Third) of Torts: Products Liability (1998); Restatement (Third) of Torts: Apportionment of Liability (2000); Restatement (Third) of Torts: Liability for Physical and Emotional Harm (2010).

³⁹⁰ Restatement (Third) of Torts §1.

³⁹¹ Restatement (Second) of Torts §652B.



3.4.2 Liability for harms under contract law

Similar to tort law, most contract law in the U.S. is located at the state level, with each state having its own rules regulating contracts involving the sale of goods. The fundamental aspects of contract law are outlined in the Restatement (Second) of the Law of Contracts published by the ALI, which defines a contract as “a promise or a set of promises for the breach of which the law gives a remedy, or the performance of which the law in some way recognises as a duty.”³⁹² Furthermore, whilst not federal law, the Uniform Commercial Code (UCC) provides a comprehensive framework governing all commercial transactions in the US, including contractual arrangements relating to the sale of goods,³⁹³ which has been adopted uniformly across all states.³⁹⁴ This provides that the general “obligation of the seller is to transfer and deliver” the goods, while the general obligation “of the buyer is to accept and pay in accordance with the contract.”³⁹⁵ There is a suite of possible remedies available to both buyer and/or seller, depending on which party is found to be in breach of contract.³⁹⁶

3.4.3 Liability for harms under criminal law

At the national level, Congress has codified federal criminal law in Title 18 of the U.S. Code.³⁹⁷ There is scope for variation between the federal and state level since each state has a criminal code which determines the offences subject to criminalisation in that jurisdiction. There is no specific criminal liability for manufacturers of defective products, although a defendant could be found criminally liable under state law if found to have the requisite level of criminal intent for a similar offence.³⁹⁸ The overall trend towards the increased integration of neurotechnologies into daily life, as indicated by the growing availability of consumer-grade devices and applications, gives rise to various considerations in relation to the application of the criminal law, including whether and if so how neurotechnological interventions may affect existing understanding of essential ethical-legal concepts, such as criminal responsibility.³⁹⁹

³⁹² Restatement (Second) of Contracts §1.

³⁹³ U.C.C. §2.

³⁹⁴ National Conference of Commissioners on United State Laws. *Uniform Commercial Code* / Uniform Law Commission [Online]. Available at: <https://www.uniformlaws.org/acts/ucc>

³⁹⁵ U.C.C. §2-301.

³⁹⁶ U.C.C. §2-701-725.

³⁹⁷ 18 U.S.C.

³⁹⁸ Cofer, W.L. and Donahue, A.J. (2018) *Product Liability in the USA* / Shook Hardy & Bacon LLP [Online]. Available at: <https://www.lexology.com/library/detail.aspx?q=3714f105-6d2e-4e33-be4f-17289ae7e547>

³⁹⁹ See generally, Thompson, K. (2019) ‘Committing Crimes with BCIs: How Brain-Computer Interface Users can Satisfy Actus Reus and be Criminally Responsible’, *Neuroethics*, Vol.14, pp.311-322. DOI:

<https://doi.org/10.1007/s12152-019-09416-5>; Müller, O. and Rotter, S. (2017) ‘Neurotechnology: Current Developments and Ethical Issues’, *Frontiers in Systems Neuroscience*, Vol.11. DOI: <https://doi.org/10.3389%2Ffnsys.2017.00093>

4. Overview of gaps, challenges and future trends

This section highlights the main gaps and challenges identified in the previous sections and advances some recommendations for the amendment or enhancement of existing legal frameworks.

- The U.S. human rights law framework outlined in Section 3.1.1 protects various rights which may be both positively and/or negatively impacted by neurotechnologies. However, as explored in Section 3.1.2, a number of key challenges remain, including the blurring of the real/testimonial evidence distinction pursuant to the Fifth Amendment privilege against self-incrimination, the adequate protection of individuals against discriminatory treatment on the basis of their brain and other neural data, and the lack of clarity around the independence or interdependence of expression in the application of First Amendment protection to the right to freedom of thought.
- As discussed in relation to Section 3.1.2, the U.S. Congress has addressed some of the risks posed by genomic technologies to the adequate protection of genetic data through the enactment of the Genetic Information Non-discrimination Act (GINA) (2008).⁴⁰⁰ Within the legal academic literature two possible regulatory solutions to better protect individuals' rights to privacy and non-discrimination have been proposed, namely: the extension of the remit of GINA to include brain and other neural data, or the enactment by Congress of an equivalent federal regulatory framework addressing the various harmful risks associated with the misuse of such data.⁴⁰¹
- As identified in Section 3.2.1, notwithstanding the absence of explicit textual guarantees, there are various potential sources of protection for the unenumerated constitutional right to privacy. However, the continuance of these constitutional safeguards, as well as their direct applicability to the various privacy risks associated with neurotechnologies, may be subject to limitations.
- The patchwork of sector-specific federal data privacy laws outlined in Section 3.2.2 may protect against interference with brain and other neural data in certain specific contexts and in certain circumstances relating to the collection, use or processing of such data. Considering current and future neurotechnology use cases, federal data privacy laws with application to the healthcare, education, and entertainment sectors are all likely to be applicable.
- However, the premise of most federal (and state) data privacy laws is that any such data-related activity is in principle permitted unless expressly restricted, and as such the coverage of protection is narrowly demarcated. Following the nascent trend towards state legislatures enacting omnibus data privacy laws, a proposal for the enactment of comprehensive federal data privacy legislation may serve the dual purpose of offering more direct, robust and comprehensive protection of individuals' data privacy, while also reducing the burden of regulatory compliance for the private sector by pre-empting relevant state law and establishing uniformity in the application of federal standards across all states.

⁴⁰⁰ 42 U.S.C §1320d-9.

⁴⁰¹ Jwa, A.S. and Poldrack, R.A. (2022) 'Addressing privacy risk in neuroscience data: from data protection to harm prevention', *Journal of Law and the Biosciences*, Vol.9:2, pp.1-25. DOI: <https://doi.org/10.1093/jlb/lbac025>

- As described in Section 3.3, ongoing and significant improvements in the accuracy and reliability of neurotechnologies are increasing attempts to seek admission of neuroscientific evidence in legal proceedings, particularly criminal law proceedings. Factors that may affect more widespread use and acceptance of neuroscientific evidence in legal proceedings include the rules on admissibility of evidence (see Section 3.3.3), costs and other practical constraints (see generally Section 3.3.4), the legal system (i.e., whether civil or criminal), the stage at which the evidence is proffered (e.g., guilt/liability stage and/or sentencing), and the purpose behind its admission (e.g., in mitigation).
- The existing legal framework in relation to liability for harms is outlined in Section 3.4. For those neurotechnological devices used to enable XR applications that blur the public/private distinction, a tort of particular relevance is the privacy tort of intrusion upon seclusion, for which the Restatement (Second) of Torts provides that “One who intentionally intrudes, physically or otherwise, upon the solitude or seclusion of another or his private affairs or concerns, is subject to liability to the other for invasion of his privacy, if the intrusion would be highly offensive to a reasonable person.”⁴⁰² As regards liability for criminal harms, the overall trend towards the increased integration of neurotechnologies into daily life, as indicated by the growing availability of consumer-grade devices and applications, gives rise to various considerations in relation to the application of criminal law doctrine, including whether and if so how neurotechnological interventions may affect existing understanding of essential ethical-legal concepts, such as criminal responsibility.⁴⁰³

⁴⁰² Restatement (Second) of Torts §652B.

⁴⁰³ See generally, Thompson, K. (2019) ‘Committing Crimes with BCIs: How Brain-Computer Interface Users can Satisfy Actus Reus and be Criminally Responsible’, *Neuroethics*, Vol.14, pp.311-322. DOI: <https://doi.org/10.1007/s12152-019-09416-5> ; Müller, O. and Rotter, S. (2017) ‘Neurotechnology: Current Developments and Ethical Issues’, *Frontiers in Systems Neuroscience*, Vol.11. DOI: <https://doi.org/10.3389%2Ffnsys.2017.00093>

5. Conclusion

The U.S. national legal case study has set out some of the key legal issues and policy developments relating to the governance and regulation of neurotechnologies in the USA. As highlighted in Section 2, the centrepiece of U.S. policy in relation to neurotechnologies is the BRAIN initiative, the immediate priorities for which included to research and development (R&D) of innovative neurotechnologies to better understand the human brain and treat its disorders.⁴⁰⁴ Now in its second phase, the BRAIN initiative is seeking to achieve its long-term goals, which in terms of technology have shifted towards the application of these innovative tools for a wide range of clinical applications.⁴⁰⁵ Whilst the significant body of research generated is likely to inform future R&D, it remains to be seen whether this initiative will be renewed or whether a similar initiative will be devised in the event of its anticipated end in 2026. Importantly, these significant policy developments have not been paralleled by any dedicated legal regulation. Indeed, at the time of writing, this national legal case study did not identify any federal or state legislation (or ongoing proposals for such legislation) with direct and comprehensive application to neurotechnologies. Different existing laws in the domain-specific areas identified above are likely to apply to particular human rights, information privacy, criminal, civil, evidential and contractual law issues, but there remains the inherent risk that the pace of neurotechnological developments, particularly those enabling unforeseen and/or unregulated commercial and dual-use applications, outstrip existing legal protections. As outlined in Section 3.2.2., consumer neurotechnology is already available in the form of wearable EEG for gaming and entertainment purposes,⁴⁰⁶ while recent developments driven by the private sector (see Sections 1.2 and 2) indicates the future availability of more invasive BCIs that may be used for both clinical and, eventually, consumer purposes. Particular issues identified in this national legal case study that may affect future legal regulation of neurotechnologies and therefore warrant further research include the appropriate protection of brain and other neural data in both human rights and information privacy law, the extent to which a comprehensive information privacy legal framework at the federal level is both viable and normatively desirable, and the role and effect of neuroscientific evidence in both criminal and civil legal proceedings.

⁴⁰⁴ Brain Research Through Advancing Innovative Neurotechnologies (BRAIN) Working Group Report to the Advisory Committee to the Director, NIH. (2014) *Brain 2025 – A Scientific Vision*, p.6. Available at: https://braininitiative.nih.gov/sites/default/files/pdfs/brain2025_508c.pdf

⁴⁰⁵ Ibid 107.

⁴⁰⁶ Shen, F.X. (2016) 'Law and Neuroscience 2.0', *Arizona State Law Journal*, Vol.48, pp.1043-1086. Available at: https://scholarship.law.umn.edu/faculty_articles/604.



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Annex 9.7 National legal case study: Digital extended reality in France



D4.2 Comparative analysis of national legal case studies

December 2022



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D4.2 National legal case studies: Annex 9.7 Digital extended reality in France

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Partner name	CEA		
Lead Author(s)	Laurynas Adomaitis (CEA), Alexei Grinbaum (CEA)		
Other contributors	Julie Vinders (TRI), Ben Howkins (TRI)		
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Keywords

France, Legal framework, Extended reality, Natural language processing



The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have high socio-economic impact. The project involves ten scientific partners and six science engagement organisations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three technologies for users such as researchers, research ethics committees and policy makers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance and aspirations of academia, industry and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Digital Extended Reality	AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs, e.g., voice, gestures, language, movement, emotions, and other elements of human communication), allowing extended or mixed virtual scenarios (e.g., visual, audio, linguistic or haptic) to be tailor-made or “customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices).

Table 2: List of Main Abbreviations

Term	Explanation
CERNA	Commission de réflexion sur l'Éthique de la Recherche en sciences et technologies du Numérique d'Allistene
CNIL	Commission nationale de l’informatique et des libertés
DoA	Description of Action
GDPR	General Data Protection Regulation
PC	Project Coordinator
WP	Work Package
XR	Digital Extended Reality

Abstract

The objective of this study is to review the current state of the law and legal responses on digital extended reality (XR) in France, as evidenced in policy, legislation, case law and regulation. It focuses on those issues affecting and/or contributing fundamental human rights and freedoms, socio-economic inequalities, and stimulation of innovation. This study also looks at developments in XR that may influence constitutional or human rights, and proposals to create or adapt existing law in response to those XR developments.

A summary overview of the main findings and legal issues surrounding XR in France is provided in section 5.1.1 of the TechEthos D4.2 Comparative analysis of national legal case studies. This report is primarily aimed at informing the French government and French policy makers regarding the regulatory challenges of XR in France. Furthermore, it provides further background to readers to the specific French context of the main points and key regulatory challenges identified in the comparative analysis to which this report is annexed.



1. Introduction

Digital extended reality (XR) presents many significant legal issues that impact socio-economic equality and fundamental rights in France. This study provides an overview of those legal issues and challenges.

This study analyses relevant laws and policies from the French legal system in relation to XR. For the purpose of the TechEthos project and this national legal case study, we have used the following definition for XR:

- **Digital Extended Reality (XR)** refers to AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs, e.g., voice, gestures, language, movement, emotions, and other elements of human communication), allowing extended or mixed virtual scenarios (e.g., visual, audio, linguistic or haptic) to be tailor-made or “customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices)¹

For more information about the TechEthos technology families and their innovation ecosystems, visit: <https://www.techethos.eu/resources/>.

This **introduction** sets out the purpose of the French legal case study, and describes the scope and limitations of the study, before providing a high-level overview of the French legal system and current state of XR in France. **Section II** explores the existing and proposed laws and policies that specifically address XR. **Section III** explores the legal implications of XR in relation to specific legal domains, including human rights law, privacy and data protection, use in legal systems, and liability for harms. **Section IV** provides an overview of the gaps and challenges in relation to the regulation of XR. **Section V** concludes the case study followed by a reference list at the end.

1.1 Purpose of the French legal case study

The objective of this study is to review the current state of the law and legal responses on XR in France, as evidenced in policy, legislation, case law and regulation. We prepared this study through desk research, using legal research and academic databases such as Google Scholar and consultation with legal experts.

There are currently no XR-specific laws or policies in country France. However, existing law and regulations (e.g., privacy laws) may and should cover these technologies, including any harms resulting from them. Legal academic discourses in country have focused on digital sovereignty, consent, fraud, algorithmic bias, profiling, protection of vulnerable individuals, and the regulation of digital assets.

This study is part of a series of national legal case studies prepared in the TechEthos project covering three technology families: climate engineering, neurotechnologies, and XR. A complementary report

¹ Buchinger E., Kinegger M., Zahradnik G., Bernstein M.J., Porcari A., Gonzalez G., Pimponi D., Buceti G. (2022). In short: Digital Extended Reality. TechEthos Project Factsheet based on TechEthos technology portfolio: Assessment and final selection of economically and ethically high impact technologies, Deliverable 1.2 to the European Commission. Available at: www.techethos.eu.

covers the international and European Union law dimensions of the three technology families. The following table provides an overview of the nine country studies conducted as part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

Table 3: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Scope and Limitations

This study was prepared as part of the TechEthos project's work package on policy, legal and regulatory analysis. Therefore, the scope is demarcated by that project task's workplan. The legal issues related to XR are too vast to be covered comprehensively in a study of this size. Instead, this study focuses on a limited range of topics with significant human rights and socio-economic impacts that are of high policy relevance, particularly in the European context.

1.3 Overview of the French legal system

The French legal system is based on the civil law tradition. The French Constitution, which was established in 1958, is the supreme source of law.² The Constitution establishes the framework for the three branches of government: the executive, the legislative and the judicial.

The executive branch is headed by the President of the Republic, who is elected by universal suffrage for a five-year term. The President appoints the Prime Minister, who leads the government. The government is responsible for proposing and implementing laws.

The legislative branch is composed of the National Assembly and the Senate. The National Assembly is the lower house and is composed of 577 deputies, who are elected by universal suffrage for a five-year term. The Senate is the upper house and is composed of 348 senators, who are elected by indirect suffrage for a six-year term. The Senate's role is consultative.

The judicial branch is composed of the Constitutional Council, the Supreme Court, the Court of Cassation and the Council of State. The Constitutional Council is responsible for ensuring that laws are in line with the Constitution. The Supreme Court is the highest court for civil and criminal matters. The Court of Cassation is the highest court for matters of public law. The Council of State is the highest administrative court.

The Commission nationale de l'informatique et des libertés (CNIL) is a French data protection authority created in 1978 by the Data Protection Act (Loi Informatique et Libertés). It is responsible for ensuring

² Constitution Du 4 Octobre 1958, 4 October 1958.

that data processing complies with the French data protection law. The Data Protection Act was passed in 1978 in response to concerns about the potential for abuse of personal data.³ The law requires that personal data must be collected and processed fairly and transparently, and only for specified, explicit and legitimate purposes. Personal data must be accurate and up to date, and must be kept for no longer than is necessary for the purposes for which it is processed. Individuals have the right to access their personal data and to request that it be corrected if it is inaccurate.

The CNIL is responsible for enforcing the Data Protection Act as well as the General Data Protection Regulation (GDPR) and has a range of powers to do so, including the power to issue warnings, orders and fines. It also has the power to carry out investigations and audits, and to order the suspension or deletion of data processing operations that do not comply with the law.

The French Data Protection Act was one of the first data protection laws in the world, and the CNIL is one of the oldest data protection authorities. It has played a leading role in the development of data protection law and practice in France and internationally.

Within the DTI (Directorate of Technology and Innovation) of CNIL, LINC (CNIL's Digital Innovation Laboratory) participates in debates linking ethics, freedoms, data and digital uses.

One of the focus areas of the LINC laboratory is the concept of a metaverse. A member of LINC has published an article, outlining ethical and potential legal issues within virtual and augmented reality.⁴

Another area in which LINC has produced a research dossier is on vocal assistants.⁵ Although these efforts do not constitute any legal measure currently, they may influence future policy action.

1.4 Current state of XR in France

At the time of writing, “The Sandbox” is the dominating metaverse space in France. Several well-known companies and brands own land on the metaverse and operate there, including Groupe Carrefour, Groupe Casino, AXA Assurances, Ubisoft, and Groupe Havas.⁶ In 2022, Meta and Simphon have launched a coding academy dedicated to the Meta’s metaverse in France.⁷

³ Loi N° 78-17 Du 6 Janvier 1978 Relative à l’informatique, Aux Fichiers et Aux Libertés, 6 January 1978.

⁴ R. Chatellier, *Métavers : réalités virtuelles ou collectes augmentées ?*, 5 November 2021, available at <https://linc.cnil.fr/fr/metavers-realites-virtuelles-ou-collectes-augmentees> (last visited 28 October 2022); *Métavers : ce jeu dont qui sera le héros ?* / CNIL, 2022, available at <https://www.cnil.fr/fr/metavers-ce-jeu-dont-qui-sera-le-heros> (last visited 16 March 2022).

⁵ LINC, *[dossier] Assistants vocaux*, juin 2018, available at <https://linc.cnil.fr/fr/dossier-assistants-vocaux> (last visited 28 October 2022).

⁶ F. David, *Metaverse français : les principaux metaverses en France*, 24 May 2022, BeinCrypto France, available at <https://fr.beincrypto.com/apprendre/metaverse-francais-les-principaux-metaverses-en-france/> (last visited 24 October 2022).

⁷ C. Simon, *Meta lance une ‘académie du métavers’ en France à la rentrée 2022*, 12 June 2022, L’Express.fr, available at https://www.lexpress.fr/actualites/1/societe/meta-lance-une-academie-du-metavers-en-france-a-la-rentree-2022_2175065.html (last visited 24 October 2022).



2. XR-specific legal developments

This section presents an overview of the legal developments pertaining to XR technologies in France. It examines relevant policies and laws in relation to XR and identifies the national authorities involved in the implementation and enforcement of such laws and policies.

Current debates and future policy and/or legal developments

France's Digital Republic Act has been adopted in 7 October 2016 and mentions the creation of a Commission for Digital Sovereignty.⁸ Its aim was supposed to be to investigate how national sovereignty can be understood in the globalized digital arena and create tools that enhance France's digital sovereignty, like developing an independent operating system. A French Senate report on the issue was published in 2019.⁹ However, this proposal has not transitioned into concrete legislation and this idea was eventually abandoned.

Ethical and legal research efforts have also been dedicated to exploring the idea of digital sovereignty. Commission de réflexion sur l'Éthique de la Recherche en sciences et technologies du Numérique d'Allistene (CERNA) – an ethics and policy research consortium - has published a report that addresses how sovereignty, as a pivotal and defining notion of the relationship of legitimate authority between human beings under the rule of law, is affected by the rapid and global technological change. To enhance the digital sovereignty of France, the CERNA report recommends enhancing access to data for scientific purposes, providing ethical and privacy-oriented training, and strongly supporting open access research.¹⁰

France currently supports European Commission's initiatives to increase protection for journalists and freedom of expression online (the European Democracy Action Plan) and to require greater accountability from digital service providers (the Digital Services Act).¹¹

The biggest foundational legal debate in France concerns the identity associated with an avatar. In a mission letter dated February 14, 2022, the Minister of Economy, the Minister of Culture and the Secretary of State for Digital Transition and Electronic Communications requested the establishment of an exploratory mission on the development of a metaverse. Camille François, researcher at Columbia University, Adrien Basdevant, lawyer at the Paris Bar, and Rémi Ronfard, researcher at Inria have published a report in October 2022, which focuses on the issue of identity, among others.¹²

Currently, the users of the metaverse can use a pseudonym and an avatar, which raises questions of identity verification and traceability of actions. How to trace the identity of people in the Metaverse in case of illicit activity? How to verify that a person is who they claim to be? How to avoid fraud and

⁸ LOI N° 2016-1321 Du 7 Octobre 2016 Pour Une République Numérique (1), 2016-1321, 7 October 2016.

⁹ G. Longuet, *Le Devoir de Souveraineté Numérique*, n° 7 tome (2019).

¹⁰ 'Cerna (Commission de réflexion sur l'Éthique de la Recherche en sciences et technologies du Numérique d'Allistene', in 2018. *Research Ethics in Machine Learning*.

¹¹ European Commission, Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on a Single Market For Digital Services (Digital Services Act) and Amending Directive 2000/31/EC, 2020.

¹² A. Basdevant, C. François and R. Ronfard, *Mission Exploratoire Sur Les Métavers* (2022).



identity theft with the use of avatars in a metaverse? Will an identity necessarily have to be associated with an avatar? How will we move from one metaverse to another? Will it be possible to explore a metaverse anonymously? How can we reconcile the desire for anonymity with the accountability of actions in a metaverse?

These questions can further be enhanced by the discussion of artificial or digital subjects that may produce actions and language autonomously, without a human-machine distinction. Thus, in addition to human anonymity, there is a question of avatar humanity in the first place – is there anyone behind an avatar? There are proposals to solve this issue by introducing watermarking or other techniques to enforce the human-machine distinction.¹³

In the report, some initial suggestions are made regarding the usage of identifying techniques to identify avatars and ensure the link between digital and material identity. For example, there are suggestions to use European Digital Identity Wallet and to apply eIDAS regulation.¹⁴

¹³ A. Grinbaum and L. Adomaitis, The Ethical Need for Watermarks in Machine-Generated Language, arXiv:2209.03118, 7 September 2022.

¹⁴ Regulation (EU) No 910/2014 of the European Parliament and of the Council of 23 July 2014 on Electronic Identification and Trust Services for Electronic Transactions in the Internal Market and Repealing Directive 1999/93/EC, OJ L, vol. 257, 23 July 2014.

3. Domain-specific legal issues

This section examines the legal implications of XR in a France context with respect to specific legal domains with a high socio-economic impact. The legal domains covered include human rights law, privacy and data protection law, use in legal systems (criminal, civil and evidence law), and liability for harms (tort, contract and criminal).

3.1 Human rights law

3.1.1 Dignity

Article 52 (3) of the proposed AI Act claims that the manufacturer of an AI system “that generates or manipulates image, audio or video content that appreciably resembles existing persons, objects, places or other entities or events and would falsely appear to a person to be authentic or truthful (‘deep fake’), shall disclose that the content has been artificially generated or manipulated.”¹⁵ Failure to do so would be punishable by fine (Article 71).

XR avatars can usually be distinguished into two categories. One is a picture, aggregated from a database of images by using Generative Adversarial Networks (GANs)¹⁶, but not resembling any subject in particular. The other category is an imitation of a single individual by using multiple images of them, like “the digital Einstein”¹⁷ or Meta’s avatars that are designed based on visual appearance. The latter could be subject to the regulation; however the acceptable degree of resemblance needs to be established.

3.1.2 Bias and Fairness

In 2017, the Defender of Rights and CNIL focused on the risks of discrimination that can result from algorithmic biases.¹⁸ A debate is also underway at the European level with a goal to adapt a regulatory framework to mitigate such risks.¹⁹ In 2020, the Council of Europe recommended that developers, manufacturers, and service providers should avoid any potential bias, including unintentional or hidden bias, as well as the risks of discrimination in the new Convention 108 guidelines.²⁰ In the resolution of February 2021, the European Parliament claimed that “outputs should be reviewed in order to avoid all forms of stereotypes, discrimination and biases, and where appropriate, make use of AI to identify and

¹⁵ European Commission, Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS, 2021.

¹⁶ Creswell et al., ‘Generative Adversarial Networks: An Overview’, 35 *IEEE Signal Processing Magazine* (2018) 53.

¹⁷ <https://digitalhumans.com/digital-einstein/>

¹⁸ Demiaux and Si Abdallah, ‘How Can Humans Keep the Upper Hand’, *Report on the Ethical Matters Raised by Algorithms and Artificial Intelligence. Paris: Commission Nationale Informatique et Libertés* (2017).

¹⁹ European Commission, *supra* note 15.

²⁰ Council of Europe, Convention 108 + Convention for the Protection of Individuals with Regard to the Processing of Personal Data.



correct human biases where they might exist.”²¹ The proposed European Artificial Intelligence Regulation (proposed AI Act), published by the European Commission on April 21, 2021, names measures to limit discriminatory biases and employs the notion of human oversight as the key to fighting them.²²

Chatbots are used by human resources managers for recruitment as well as for career follow-up and employee training. Legal regulations are starting to be applied to implementations in human resources. Article 6 of the proposed AI Act and its Annex III consider recruitment systems to be high-risk by claiming “AI systems used in employment, workers management and access to self-employment, notably for the recruitment and selection of persons, for making decisions on promotion and termination and for task allocation, monitoring or evaluation of persons in work-related contractual relationships, should also be classified as high-risk.”²³ Therefore, legal compliance is mandatory *ex ante*, including risk management processes, monitoring, bias detection and correction, technical documentation, event logs, user consent, human oversight, robustness, security, accuracy, and proportionality.

3.1.3 Protection of vulnerable Persons

Article 5 of the proposed AI Act prohibits the use of any artificial intelligence system that exploits the vulnerability of a group of individuals to influence the behaviour of any of these individuals and cause harm to them. In June 2021, CNIL has published recommendations for the protection of minors online.²⁴ These recommendations related to the “online” life of minors can pave the way for consultation with the stakeholders, in order to make them technically operational and propose practical advice and adapted educational resources. France’s civil law limits the type of consent that minors under the age of 18 can give. For example, this precludes them from owning or buying digital assets.²⁵

3.1.4 Autonomy

The European Union law is moving to include measures to regulate manipulation by digital systems. Article 5 of the proposed AI Act prohibits the placing on the market, putting into service or use of an AI system that implements subliminal techniques beyond a person’s consciousness in order to materially distort a person’s behaviour in a manner that causes or is likely to cause that person or another person physical or psychological harm. The same section prohibits artificial intelligence systems that exploit any of the vulnerabilities of a specific group of persons in order to influence their behaviour and cause harm to them. Article 71 of the text defines the penalties for disregarding these prohibitions. In addition, a person who has suffered harm may seek financial compensation. Moreover, the Council of Europe has called for “open-ended, informed and inclusive public debates with a view to providing guidance on where to draw the line between forms of permissible persuasion and unacceptable manipulation.”²⁶

²¹ European Parliament Resolution of 19 May 2021 on Artificial Intelligence in Education, Culture and the Audiovisual Sector (2020/2017(INI)), 2021.

²² European Commission, *supra* note 15.

²³ *Ibid.*

²⁴ <https://www.cnil.fr/fr/la-cnil-publie-8-recommandations-pour-renforcer-la-protection-des-mineurs-en-ligne>

²⁵ LOI N° 2019-486 Du 22 Mai 2019 Relative à La Croissance et La Transformation Des Entreprises (1), 2019-486, mai 2019.

²⁶ Council of Europe, Draft Declaration of the Committee of Ministers on the Manipulative Capabilities of Algorithmic Processes, 13 February 2019.



3.2 Privacy and data protection law

3.2.1 Consent

The issue of personal data protection has become crucial with the development of digital technology, the explosion of data processing, and the offering of free services in return for the use of data. The protection from the collection of personal data was considered to be part of privacy as early as the law of January 6, 1978, known as the Data Protection Act in France.²⁷ The European Union has begun regulating it in 2002 with regard to communication technologies.²⁸ It is now governed by the European regulation of April 27, 2016, known as the GDPR, especially its chapters II and III, that constitute a set of protective rights for the individual.²⁹

The control of personal data protection falls under a national regulator, the CNIL in France, which monitors compliance with the GDPR and the French Data Protection Act, mostly by issuing opinions and formal notices and by applying sanctions under the oversight of the Council of State.³⁰ Although the national judge and the Court of Justice of the European Union are progressively developing case law on data protection, like the case of *Google v. Cnil*,³¹ there are questions on the quality of consent, its meaning, and the conditions under which it is collected (legibility, clarity, and precision of clauses).³² These tensions between the law and the actual collection of data, which stimulates the current reflections in this area.

3.2.2 Profiling

Article 4 of the GDPR defines profiling as any form of automated processing of personal data that consists of using that data to evaluate certain aspects of an individual, including analysing or predicting issues related to work performance, economic situation, behaviour, etc. Decisions resulting from profiling are governed by Article 47 of the French Data Protection Act³³ and Article 22 of the GDPR, as long as they are likely to have an effect on the individual. According to Article 22 of the GDPR, “the data

²⁷ Loi N° 78-17 Du 6 Janvier 1978 Relative à l’informatique, Aux Fichiers et Aux Libertés, 6 January 1978, *supra* note 3.

²⁸ Directive 2002/58/EC of the European Parliament and of the Council of 12 July 2002 Concerning the Processing of Personal Data and the Protection of Privacy in the Electronic Communications Sector (Directive on Privacy and Electronic Communications), OJ L, vol. 201, 12 July 2002.

²⁹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA Relevance), OJ L, vol. 119, 27 April 2016.

³⁰ *Ibid.*

³¹ Bougiakiotis, 'One Law to Rule Them All? The Reach of EU Data Protection Law after the Google v CNIL Case', 42 *Computer Law & Security Review* (2021) 105580; Zalnieriute, 'Google LLC v. Commission Nationale de l’informatique et Des Libertés (CNIL)', 114 *American Journal of International Law* (2020) 261; ECJ, *Google LLC, Successor in Law to Google Inc v Commission Nationale de l’informatique et Des Libertés (CNIL)*, Case C-507/17, 24 September 2019, available at <https://eur-lex.europa.eu/legal-content/en/TXT/?uri=CELEX:62017CJ0507> (last visited 25 October 2022).

³² Gray et al., 'Dark Patterns and the Legal Requirements of Consent Banners: An Interaction Criticism Perspective', in *Proceedings of the 2021 CHI Conference on Human Factors in Computing Systems* (2021) 1; Papadogiannakis et al., 'User Tracking in the Post-Cookie Era: How Websites Bypass GDPR Consent to Track Users', in *Proceedings of the Web Conference 2021* (2021) 2130.

³³ Loi N° 78-17 Du 6 Janvier 1978 Relative à l’informatique, Aux Fichiers et Aux Libertés, 6 January 1978, *supra* note 3.

subject shall have the right not to be subject to a decision based solely on automated processing, including profiling, which produces legal effects concerning him or her or similarly significantly affects him or her.”³⁴ Furthermore, under Articles 13– 2 f) and 14– 2 g) of the GDPR, individuals who are subject to a fully automated decision must be informed, at the time of collection of their data and at any other time about “the existence of automated decision-making [and] meaningful information about the logic involved” (Article 15).³⁵

3.2.3 Mental data

In their report to the French ministries and secretaries of state of Economy and Culture, Basdevant, François, and Ronfard note that immersive technologies are extremely invasive in terms of acquiring personal data.³⁶ The tracking of eye-movement, facial expressions, inflections, voice textures, etc. can all be used in the analysis and prediction of behaviour and emotions. The report states that building a metaverse presents the challenge of preserving our mental space and data that until now has been less prominent, but which will undoubtedly be highly coveted and valued.

The researchers claim that existing French and European regulation “do not address the issues of mental integrity, mental self-determination and cognitive freedom. The debate is therefore not only about the protection of personal data, but more globally about defending fundamental rights.”³⁷ like the right to “physical and mental integrity”, as expressed in the Charter of Fundamental Rights of the European Union.³⁸

3.3 Consumer rights law

3.3.1 Virtual assets

Much of the economic trade in metaverse is facilitated by Non-Fungible Tokens (NFTs), which is only a digital token giving access to the file saved in the blockchain. The NFT is therefore not the work itself. Basdevant, François, and Ronfard emphasize that the question of the regulation of virtual markets has mainly to do with the question of the taxation – how can digital assets on a blockchain be taxed and enforced.³⁹ Currently, the Article 150 VH bis of the French General Tax Code provides that the transfer exchange of digital assets for other digital assets by individuals is not taxable.⁴⁰ Whether or not NFTs will be included in the definition of digital assets will have major consequences for the economy of a metaverse, particularly in terms of taxation. The debates at the European level in reviewing MiCA (Markets in Crypto-assets) will have impact on how the taxation of NFTs is understood in France.⁴¹

³⁴ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the Protection of Natural Persons with Regard to the Processing of Personal Data and on the Free Movement of Such Data, and Repealing Directive 95/46/EC (General Data Protection Regulation) (Text with EEA Relevance), OJ L, vol. 119, 27 April 2016, *supra* note 29.

³⁵ *Ibid.*

³⁶ Basdevant, François and Ronfard, *supra* note 12.

³⁷ *Ibid.*

³⁸ Charter of Fundamental Rights of the European Union, OJ C, vol. 326, 26 October 2012.

³⁹ Basdevant, François and Ronfard, *supra* note 12.

⁴⁰ Article 150 VH Bis - Code Général Des Impôts, 24 May 2019.

⁴¹ Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on Markets in Crypto-Assets, and Amending Directive (EU) 2019/1937, 2020.



3.4 Liability for harms

3.4.1 Liability for harms under tort law

The legal problem of Artificial Intelligence (AI) spreading lies and misinformation concerns the responsibility of the manufacturer of a conversational agent, and not the conversational agent itself, since AI does not constitute a legal person. The legal texts on this subject are quite limited because they essentially relate to the formation of the contract. Article 1104 of the Civil Code imposes a requirement of good faith in contractual relations.⁴² Article 1112 (1) provides an obligation to disclose information to the party who knows information which is decisive for the consent of the other party, when the latter is unaware of this information or trusts his co-contractor.⁴³ Moreover, for consent to be informed, it must not be obtained by fraud, on pain of rendering the contract void. Article 1137 provides that fraud (dol) "is the fact that a contracting party obtains the consent of the other party through manœuvres or lies. Fraud (dol) also results from an intentional concealment of information by one of the contracting parties which it knows is decisive for the other party."⁴⁴ Moreover, unfair commercial practices aiming at deceiving the consumer are prohibited by the Consumer Code.⁴⁵ The abuse of weakness is sanctioned by the criminal code.⁴⁶

3.4.2 Liability for harms criminal law

Some illegal acts, such as prostitution, incest, torture, pedophilia or murder are sensitive themes in virtual worlds. Thus, the question of law and the digital body cannot be ignored by public authorities. Knowledge exchange among institutions will be necessary to tackle them. Some researchers in France suggest that the National Agency for Information Systems Security (ANSSI) could be the first point of contact in ensuring safety in a metaverse.⁴⁷ They also suggest that "France must invest in a major [forensic toolkit]. We therefore recommend creating a "French Chainalysis" to limit our technological and economic dependencies."⁴⁸

A competing image of justice in a metaverse is described in a novel "Snow Crash", where justice is served by "burbclaves" that Neal Stephenson describes as "Franchise-Organized Quasi-National Entities". Each of these "burbclaves" makes its own rules, acting as a "city-state with its own constitution, a border, laws, cops, everything."⁴⁹ Meta has created a similar entity in November 2018 after Mark Zuckerberg met with Harvard Law School professor Noah Feldman, who had proposed the creation of a quasi-

⁴² Article 1104 - Code Civil, 1 October 2016.

⁴³ Article 1112-1 - Code Civil, 1 October 2016.

⁴⁴ Article 1137 - Code Civil, 1 October 2018.

⁴⁵ Article L120-1 - Code de La Consommation, L120-1, 2008.

⁴⁶ Article 223-15-2 - Code Pénal, 14 May 2009.

⁴⁷ Basdevant, François and Ronfard, *supra* note 12.

⁴⁸ *Ibid.*

⁴⁹ N. Stephenson, *Snow Crash* (2003).



judiciary on Facebook.⁵⁰ The board officially began its work on October 22, 2020.⁵¹ As these platforms operate in France, French users will be subjected to decisions by such “burbclaves.”

4. Overview of gaps and challenges

Digital sovereignty debates might have to extend to more general themes of how territorial land relates to digital law. For example, if fraud or other crimes are committed in the metaverse, which law enforcement agency should investigate it? Does it depend on where the cloud information is kept, what citizenship the subject holds, or does a metaverse merit its own law enforcement agency? These questions might be imbedded in the further discussions about digital sovereignty. Normally, if a crime is committed in France, French law applies. The IP address of the perpetrator may determine ‘where’ the crime was committed. However, there needs to be a decision made on how to treat crimes in the metaverse and when national LEAs should get involved.

The proposed regulation in the AI Act stresses that training, validation, and test datasets must be subject to appropriate data governance and management practices to mitigate possible biases.⁵² It is not specified how systems will be tested for such biases. Should they be benchmarked against the equality of opportunities, equality of outcomes, or other criteria? These biases will be important in understanding how biometric data and mental data collected in a metaverse can be used fairly and unfairly.

A big ethical challenge, that has relevancy for legal liability, is how damage and responsibility in the metaverse are conceptualized. On one hand, virtual actions do not directly translate into physical damage, and despite immersion, users are aware of their stats in the digital space;⁵³ on the other hand, lasting psychological effects can be created by experiences in a metaverse. Thus, legal liability can be understood in terms of actions and their virtual analogues, the psychological effects they produce, or both. The model of responsibility and liability is still to be clearly conceptualized.

⁵⁰ Klonick, 'Inside the Making of Facebook's Supreme Court', *The New Yorker* (2021), available at <https://www.newyorker.com/tech/annals-of-technology/inside-the-making-of-facebooks-supreme-court> (last visited 25 October 2022).

⁵¹ B. Fung, *Facebook's Oversight Board Is Finally Hearing Cases, Two Years after It Was First Announced* | *CNN Business*, 22 October 2020, CNN, available at <https://www.cnn.com/2020/10/22/tech/facebook-oversight-board/index.html> (last visited 25 October 2022).

⁵² European Commission, *supra* note 15.

⁵³ L. Adomaitis, A. Grinbaum and D. Lenzi, *TechEthos D2.2: Identification and Specification of Potential Ethical Issues and Impacts and Analysis of Ethical Issues of Digital Extended Reality, Neurotechnologies, and Climate Engineering* (2022), available at <https://hal-cea.archives-ouvertes.fr/cea-03710862> (last visited 25 October 2022).

5. Conclusion

Although France possesses one of the longest histories of data protection in the digital age, there are no existent national legislation that would consider extended reality and the concept of a metaverse specifically and entirely. Different existent laws provide avenues to tackle particular issues in the metaverse, like data protection, manipulation, lying, or regulating and taxing digital assets. However, XR specific phenomena, like illicit activities in a virtual space, damage produced by autonomous chatbots and avatars, the double identity of avatar-human, anonymity of an avatar, are not entirely covered. Ongoing specific debates single out the question of identity as the main one for a legal framework. Should we identify avatars and how? Other specific concerns also stand out regarding posthumous data, impersonation, unfair biases, the privacy of biometric and mental data, consent practices and law enforcement in a metaverse. The ongoing discussions in France will likely carry over to the European level and vice versa, anything that is decided on the European level will be implemented in France.



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Annex 9.8 National legal case study: Digital Extended Reality in Italy

D4.2 Comparative analysis of national legal case studies



December 2022



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D4.2 National legal case studies: Digital Extended Reality in Italy

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Work Package lead	Trilateral Research (TRI)		
Partner name	Italian Association for Industrial Research (AIRI)		
Lead Author(s)	Domenico Piero Muscillo, Gustavo Gonzalez, Marco Liut, Sara Morisani, Andrea Porcari (AIRI)		
Other contributors	Julie Vinders, Ben Howkins (TRI)		
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Virtual technologies; extended reality technologies; Italian legislation; Italian Constitution; human rights; privacy and data protection; consumer protection; digital service governance; artificial intelligence governance; use in legal systems; liability for harms; dark patterns; digital nudging; digital advertising

The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have a high socio-economic impact. The project involves ten scientific partners and six science engagement organizations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three to four technologies for users such as researchers, research ethics committees, and policymakers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance, and aspirations of academia, industry, and the general public alike and reflect them in the guidelines.

TechEthos receives funding from the EU H2020 research and innovation program under Grant Agreement No 101006249. This deliverable and its contents reflect only the authors' view. The Research Executive Agency and the European Commission are not responsible for any use that may be made of the information contained herein.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Digital Extended Reality technologies (XR)	Refers to AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs, and allowing extended or mixed virtual scenarios to be tailor-made or “customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices)

Table 2: List of Abbreviations

Term	Explanation
AGID	Agenzia per l’Italia Digitale (Agency for Digital Italy)
CIE	Carta di Identità Elettronica (Electronic identity Card)
CNS	Carta Nazionale dei Servizi (National Services Card)
DMA	Digital Market Act
DoA	Description of Action
DSA	Digital Service Act
SPID	Sistema Pubblico di Identità Digitale (Public Digital Identity System)
WP	Work Package

Executive Summary

This report provides a review of the current state of the law and legal responses to Digital Extended Reality in Italy, as evidenced in legislation, regulation, and case law. It focuses on those issues affecting and/or contributing to fundamental human rights and freedoms, socio-economic inequalities, and stimulation of innovation. Most relevant legal domains and regulatory bodies, and their views on the application of existing and proposed regulatory provisions relevant for XR, and significant legal cases are discussed in the report. The on-going discussions on gaps and challenges of these provisions is also provided, to feed into the TechEthos ethical, legal and social analysis and the design of ethics-by design guidelines for extended digital reality technologies.

A summary overview of the main findings and legal issues surrounding XR in Italy is provided in section 5.1.2 of the TechEthos D4.2 Comparative analysis of national legal case studies. This report is primarily aimed at informing the Italian government and Italian policy makers regarding the regulatory challenges of XR in Italy. Furthermore, it provides further background to readers to the specific Italian context of the main points and key regulatory challenges identified in the comparative analysis to which this report is annexed.

This report looked at legal data bases, scientific articles and formal documents– approved and in discussion – produced by the Chamber of Deputies and Senate of the Republic websites, and the Parliamentary Legislative Committees.

Whilst there are no specific laws and policies on digital extended reality technologies in Italy, many existing laws and policies address aspects related to these technologies. These include:

- Human rights law;
- Privacy and Data Protection law;
- Consumer Protection;
- AI Governance;
- Digital Service Data Governance;
- Liability for harms.

In most of the analysed domains, it has been possible to identify specific legal cases that, although not directly related to XR, might be applied to XR technologies.

XR have the potential to impact existing regulatory obligations in many ways, both positive and negative. These technologies have the potential to enhance the enjoyment of human rights, such as when XR are adopted and used for health services. In other situations, however, the use of these technologies may interfere with protected human rights such as issues of freedom of expression and vulnerable population (e.g., children) rights in the use of online platforms.

Regarding human rights, the on-going discussion on the Metaverse concept, highlights several issues related to the regulation of privacy regarding users and their right to anonymity (which might lead to inappropriate uses), the protection of intellectual property rights of real-life physical goods (both public and private), the application of national and international law, and users' security, since verbal and physical sexual harassment, and even rapes, might occur in the Metaverse.

In the privacy and data protection domain, a legal case shows the challenges in classifying and thus regulate biometric data used by XR applications. Other two cases, the Spid (*Public Digital Identity System*) and App IO (*the app of public services*), shows how digital technologies might enable broader and easier access to public services, also for vulnerable parts of the population, with a strict respect of data rights.

In the consumer protection domain, human rights are at the core of the discussion on the new Digital Market Act and Digital Service Act. Issues of right to information and transparency and protection of

minors are under scrutiny. Digital and XR technologies allows new approaches, such as nudging, sludge, dark patterns and sophisticated methods for advertisement on online platforms that are challenging consumer rights and will need further discussions at policy and regulatory level. Moreover, health issues have arisen regarding the use of XR devices which might affect minors such as impaired visual development, as well as psychological issues concerning the non-distinguishing between “reality” and “play”.

In the A.I. Governance domain, although no specific legal case has been provided, however A.I. represents the bedrock to the development of XR technologies, based on the fact that these technologies are powered by A.I.. The Italian Government and Parliament are focused on the development of A.I. technologies, by stressing its importance and discussing the effects on the national legislation of the EU Artificial Intelligence Act.

In the Digital Service Governance domain the issue regarding the protection of human rights is of the utmost importance, due the importance of the Right to information as a mean to foster transparency of public authorities and to guarantee integrity, efficiency, effectiveness, and accountability of public authorities. In the near future, public authorities might adopt XR in order to ensure the principle of acknowledgement concerning administrative and decision-making processes, and to favour democratic participation.

In the Liability of harms domain, the protection of human rights, such as the right to human dignity and the right to self-determination, represents an issue which shall be discussed by policymakers especially when inappropriate conducts are carried out in virtual reality platforms.

A key advantage of rights-based legal frameworks, as the ones discussed in this report, is the *built-in flexibility* to adapt to the challenges posed by new and emerging technologies, including XR, to better protect the rights of individuals against interference. A key question is about the chosen definition will have the effect of determining which will be the applicable basis for future legal regulation.

To conclude, although XR technologies are still object of development, the national legislator, as well as policymakers (at national and EU level) are commencing to understand the legal implications regarding the adoption and exploitation of the several uses of these technologies. At this stage, it is the jurisprudence, more than the legislator, that might provide legal reactions to any extreme (and rare) uses of these technologies (such as issues of crimes in the virtual world). It is clearly an evolving field, and a lot of work has yet to be done.

1. Introduction

Digital Extended Reality (XR) technologies present significant legal issues that might impact socio-economic equality and fundamental rights in Italy. This study provides an overview of those legal issues and challenges.

This report analyses relevant laws and policies from the Italian legal system concerning digital extended reality (XR) technologies. For the purpose of the TechEthos project and this national legal case study, we have used the following definition for XR technologies¹:

Digital Extended Reality technologies refers to AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs, e.g., voice, gestures, language, movement, emotions, and other elements of human communication, allowing extended or mixed virtual scenarios (e.g., visual, audio, linguistic or haptic) to be tailor-made or “customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices).²

Although there is no comprehensive or dedicated legislation in Italy governing this technology family, many elements of existing laws and policies in Italy would apply to the use of such technologies. This report provides an overview of such aspects.

1.1 Purpose and structure of the case study

The objective of this case study is to review the current state of the law on and legal responses to digital extended reality technologies in Italy, as evidenced in policy, legislation, case law, and regulation.

Whilst there are no specific laws and policies on digital extended reality technologies in Italy, many existing laws and policies address aspects related to these technologies. These include human rights law, privacy and data protection law, consumer protection, A.I. governance, digital service governance, and liability for harms.

This study provides an analysis of these norms and of the relevant legal academic discourse, and it is enriched by “*legal cases*”, which do represent the implementation of the abovesaid laws, regulations, and guidelines

This report is part of a series of national legal case studies prepared in the TechEthos project covering three technology families: climate engineering, digital extended reality, and neurotechnologies. A complementary report covers the international and European Union law dimensions of the three technology families. The following table provides an overview of the nine national legal case studies conducted as part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

¹ For more information about the TechEthos technology families and their innovation ecosystems, visit <https://www.techethos.eu/resources/>.

² Buchinger E., Kinegger M., Zahradnik G., Bernstein M.J., Porcari A., Gonzalez G., Pimponi D., Buceti G. (2022). In short: Digital Extended Reality. TechEthos Project Factsheet based on TechEthos technology portfolio: Assessment and final selection of economically and ethically high impact technologies, Deliverable 1.2 to the European Commission. Available at: www.techethos.eu.

Table 3: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Overview of the Italian legal system

The Italian form of state and form of government:

Italy is a representative democracy in the form of a parliamentary republic. The Republic, as provided by Article 5 of the Italian Constitution, is "*one and indivisible*", meaning that even though decentralization of powers to local authorities is allowed, the sovereignty powers lie with the State.³

The Italian Constitution outlines the system of governance that concerns several bodies. The most important are outlined below:

- The President of the Republic ("*Presidente della Repubblica*"), is the head of State. Its activities directly impact the political climate of the country and therefore, it is not a purely ceremonial position. The President of the Republic is elected by the Parliament in a joint session of its members and represents national unity.⁴
- The Parliament ("*Parlamento*")⁵, vested with the legislative power, represents the legislative body of the State. It is based on a model of "equal bicameralism", meaning that the Parliament is comprised of the Chamber of Deputies (*Camera dei Deputati*) and the Senate of the Republic (*Senato della Repubblica*), which due to the adopted model by the Constituent Fathers, are both independent and entitled the same rights and powers.
- The Government of the Republic ("*Governo della Repubblica*"), which consists of the President of the Council of Ministers ("*Presidente del Consiglio dei Ministri*") and the Ministers ("*Ministri*") which do form the Council of Ministers ("*Consiglio dei Ministri*").⁶ The Ministers are divided into two categories – Ministers ("*Ministri*") and Ministers without portfolio ("*Ministri senza portafoglio*").⁷ This body represents the executive power.

Italy has adopted a civil law system, meaning that it has comprehensive, continuously updated legal codes (such as civil code, criminal code, civil procedure code, criminal procedure code, navigation code,

³ Gubitosi, M. Tortora della Corte, A. Colombero, S. Schiaffino, C. (2021) *Legal systems in Italy: overview* (Online). Available at uk.practicallaw.thomsonreuters.com/ (Accessed: 16 August 2022)

⁴ Constitution of the Italian Republic, Art. 87

governo.it/it/costituzione-italiana/parte-seconda-ordinamento-della-repubblica/

⁵ Constitution of the Italian Republic, Art. 55

governo.it/it/costituzione-italiana/parte-seconda-ordinamento-della-repubblica/titolo-i-il-parlamento/

⁶ Constitution of the Italian Republic, Art. 92

governo.it/it/costituzione-italiana/parte-seconda-ordinamento-della-repubblica/titolo-iii-il-governo/

⁷ Governo Italiano - Presidenza del Consiglio dei Ministri – Ministri e Sottosegretari (Online) Available at: governo.it/it/ministri-e-sottosegretari (Accessed: 16 August 2022)

industrial property code, etc.) which specify all matters capable of being brought before a court, the applicable procedure, and the appropriate punishment for each offense.⁸

Sources of Italian law, based on their importance according to the hierarchy of legal sources, are: the Constitution, Constitutional Law, EU legislation, international treaties, Legal Acts, Ordinary Laws, Decrees with the force of law, Legislative Decree, Regional Legislation, Governmental Regulations, Local Government Agency Regulations, Custom.⁹

It must be stressed that the hierarchy of sources is also composed of the sources deriving from the accession of Italy to the European Union as well as the ratification of international treaties to which Italy is a party, which are incorporated into domestic law through Acts of the Italian Parliament.

As previously mentioned, the Italian legal system is comprised of various laws and statutes. The Constitution represents the bedrock of the Italian legal system since it provides several principles, which inform all the laws approved by the institutional bodies.

Legal acts which bear relevance regarding the Digital Extended Reality Technologies include the Legislative Decree n. 101/2018 of adaption of the EU Reg. 679/2016 – GDPR¹⁰, which enacts the European GDPR of 2016¹¹.

The Italian Constitution:

The Italian Constitution (*Costituzione Italiana*), which was approved in December 1947 and entered into force in January 1948, provides all the fundamental principles which do inform the legislative, executive, and judiciary activities. The Italian Constitution sets out the principles according to which laws shall be written (in compliance with the fundamental rights comprised in the Constitution) as well as the procedure of approval and entry into force.

Therefore, the Constitution supplies several fundamental rights which are distributed throughout the text of the Constitution¹², including but not limited to the right to life to human dignity; self-determination; right to development; moral and legal equality; freedom of expression (including the freedom of the press – freedom of association – freedom of assembly – freedom of religion); right to health; right to justice.

International and European Union law:

Italy is a party to several international treaties as well as being one of the founding members of the European Economic Community¹³ (1957) and is an EU Member State since 1958¹⁴. Indeed, the Treaty of

⁸ Reuben, C. (2017) *Common Law and Civil Law Traditions* (Online). Available at law.berkeley.edu/wp-content/uploads/2017/11/CommonLawCivilLawTraditions.pdf (Accessed: 16 August 2022)

⁹ Busani, A. *Le fonti del diritto italiano* (Online). Available at notaio-busani.it/it-IT/diritto-fonti-dirittaitaliano.aspx (Accessed: 16 August 2022)

¹⁰ Decreto legislativo 10 agosto 2018, n. 101 "Disposizioni per l'adeguamento della normativa nazionale alle disposizioni del regolamento (UE) 2016/679 del Parlamento europeo e del Consiglio, del 27 aprile 2016, relativo alla protezione delle persone fisiche con riguardo al trattamento dei dati personali, nonché alla libera circolazione di tali dati e che abroga la direttiva 95/46/CE (Regolamento generale sulla protezione dei dati)" (18G00129) normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2018-08-10;101

¹¹ Privacy Control. *GDPR 679/16 and Legislative Decree of adaptation n. 101/2018* (Online). Available at privacycontrol.it/en/gdpr-679-16-and-legislative-decree-of-adaptation-n-101-2018/ (Accessed: 16 August 2022)

¹² The most important of these articles are n° 2, 3, 13, 14, 15, 17, 18, 19, 29, 30, 32, 33, 34, 35, 36, 37, 38, 48, and 49.

¹³ European Union. *History of the European Union 1945-59* (Online). Available at european-union.europa.eu/principles-countries-history/history-eu/1945-59_en (Accessed: 16 August 2022)

¹⁴ European Union. *Italy* (Online). Available at european-union.europa.eu/principles-countries-history/country-profiles/italy_en (Accessed: 16 August 2022)

Rome (1957) (effective 1 January 1958) gave effect to Italy's membership of the European Economic Community, an organization that was subsequently incorporated into the EU upon its formation through the Maastricht Treaty (effective 1 November 1993).

Therefore, it is subject to European Union laws, including Regulations, Directives, and Decisions¹⁵.

The Italian Constitution provides, via articles 10 and 11, the recognition and consequently the enactment of both international treaties as well as principles, and European Union treaties and legislation. The Constitution states, on one hand via Article 10, the following principle, "*The Italian legal system conforms to the generally recognized principles of international law.*"¹⁶ On the other hand, Article 11 provides the following principle "*Italy agrees on conditions of equality with other States, to the limitations of sovereignty that may be necessary to a world order ensuring peace and justice among the Nations. Italy promotes and encourages international organizations furthering such end.*"¹⁷ This has been interpreted as the recognition, by Italy, of the United Nations (due to the proximity between the founding of the institution of the United Nations in 1946 and the entry into force of the Italian Constitution in 1948) and the European institutions (European Economic Community and more recently of the European Union).¹⁸

Due to the importance of the abovementioned principle set out in Article 10 of the Constitution, some of the main United Nations treaties to which Italy is a signatory, and which are relevant to this national legal case study, include the International Covenant on Civil and Political Rights (**ICCPR**), the Convention on the Elimination of All Forms of Discrimination against Women (**CEDAW**), the International Convention on the Elimination of All Forms of Racial Discrimination (**ICERD**), the International Covenant on Economic, Social and Cultural Rights (**ICESCR**), the Convention on the Rights of the Child (**CRC**), and the Convention on the Rights of Persons with Disabilities (**CRPD**).¹⁹ In addition to these international treaties, Italy is a Member State of the Council of Europe since 1949 and ratified the European Convention on Human Rights in 1955.²⁰

¹⁵ Consolidated Version of the Treaty on the Functioning of the European Union (OJ C 326/47, 26.10.2012), article 288.

jus.unitn.it/cocoa/papers/PAPERS%20nd%20PDF/Interaction/Italy-interaction.pdf;

¹⁶ Senato della Repubblica. *Constitution of the Italian Republic* (Online). Available at senato.it/documenti/repository/istituzione/costituzione_inglese.pdf (Accessed: 16 August 2022)

¹⁷ Senato della Repubblica. *Constitution of the Italian Republic* (Online). Available at senato.it/documenti/repository/istituzione/costituzione_inglese.pdf (Accessed: 16 August 2022)

¹⁸ Antonio Mazza. *Art. 11 Costituzione* (Online). Available at legalars.net/homepage-new/fonti-normative/costituzione-della-repubblica-italiana/art-11-costituzione-spiegazione-del-testo/ (Accessed: 16 August 2022)

¹⁹ International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

²⁰ Convention for the Protection of Human Rights and Fundamental Freedoms (as amended by Protocol No. 11) - Rome, 04.11.1950

echr.coe.int/Documents/Facts_Figures_Italy_ENG.pdf



Italian court system ^{21 22}

As previously mentioned, Italy has adopted a civil law system, on which the Italian judicial system is founded. The Italian Constitution provides provisions regarding the judiciary system at Art. 101 – Art. 113.²³

The function of a judge ("*Giudice*"), as well as that of a public prosecutor ("*pubblico ministero*"), is exercised by members of the judiciary system. The judicial system is based on two functions identified as "*funzione giudicante*", which is the role conferred to the judges, and "*funzione requirente*" (investigators) which is conferred to the magistrates of the public prosecutor's office. Bear in mind that both these functions are exercised by member of the judiciary. The administrative function is carried out by the Ministry of Justice ("*Ministero della Giustizia*"). The judicial function is composed of the following areas:

- *Ordinary civil and criminal*: the jurisdiction is exercised by magistrates belonging to the judicial order (judges and magistrates of the public prosecutor's office).
- *Administrative*: the jurisdiction is exercised by regional administrative courts ("*Tribunali Amministrativi Regionali*" or TAR) and by the Council of State ("*Consiglio di Stato*").
- *Accounting*: the jurisdiction is exercised by the State Auditors' court ("*Corte dei Conti*") and the office of the public prosecutor ("*Procuratore Generale presso la Corte Dei Conti*") is based in the same court.
- *Military*: the jurisdiction is exercised by several courts, such as the military courts ("*tribunali militari*"), the military appeals court ("*corte militare d'appello*"), the surveillance military court ("*tribunale militare di sorveglianza*"). Concerning the military prosecutor, its offices are based at the abovementioned courts, as well as at the Court of Cassation.
- *Taxation*: the jurisdiction is exercised by the Provincial Taxation Commissions ("*Commissioni Tributarie Provinciali*") and the District Taxation Commissions ("*Commissioni Tributarie Regionali*").

A particular mention must be made to the Supreme Court of Cassation which represents the supreme judicial body of the Italian jurisdiction and is the judge of last resort. It must ensure the correct application of the law and its uniform interpretation, together with the unity of the national objective law and the respect for the limits between the different jurisdictions.²⁴

In Italy, the Supreme Court is at the top of the ordinary jurisdiction. Among the main functions that are conferred by article 65 of the Fundamental Law on the Judicial System of 30 January 1941 no. 12²⁵, certainly there is to ensure "*the exact observance and uniform interpretation of the law, the unity of the national objective law, compliance with the limits of the various jurisdictions.*" One of the key features of its mission is represented by the fact that the Court of Cassation shall not know the facts of a lawsuit unless proved by deeds already obtained in proceedings during the pre-trial stages, and only to the

²¹ European Justice. *Organisation of justice – judicial systems* (Online). Available at [e-justice.europa.eu/content_judicial_systems_in_member_states](https://justice.europa.eu/content_judicial_systems_in_member_states) (Accessed: 16 August 2022)

²² CSM – Consiglio Superiore della Magistratura. *Italy's judicial system* (Online). Available at csm.it/en/web/csm-international-corner/high-council-for-the-judiciary/italy-s-judicial-system (Accessed: 26 October 2022)

²³ Constitution of the Italian Republic, Art. 101 to Art. 113. governo.it/it/costituzione-italiana/parte-seconda-ordinamento-della-repubblica/titolo-iv-la-magistratura/2855

²⁴ ELI – European Law Institute. *Corte Suprema di Cassazione* (Online). Available at europeanlawinstitute.eu/membership/institutional-members/supreme-court-of-italy/ (Accessed: 26 October 2022)

²⁵ Fundamental Law on the Judicial System - Article 65 normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1941-01-30;12



extent which is necessary in order to assess the remedies that the law allows to be adopted in order to motivate the file of a petition to the Court.

No special permission is required to file an appeal before the Supreme Court. According to article 111 of the Italian Constitution²⁶, every citizen may appeal to the Supreme Court for violation of the law regarding any decision issued by the judicial authority (without issuing any civil or criminal appeal), or against any adopted measure restricting personal freedom. In the event the Court encounters one of the following defects (i.e. the violation of the law or of procedural law, the defects of motivation, the grounds for jurisdiction) it shall be entitled both the power and duty not only to annul the decision issued by the unified court of first instance or by the court of appeals but also to enunciate the principle of law that must be observed by the impugned decision. In general, the lower courts are not to be considered bound by the principles laid down by the Supreme Court, in deciding a different lawsuit. However, they may be considered an influential precedent for the judge. In most cases, the judges operating in the lower courts do comply with decisions issued by the Supreme Court.

To the Court of Cassation are also assigned other tasks, such as, establishing jurisdiction and competence and to perform non-judicial functions relating to elections and referendums for the repeal of laws.

The **Constitutional jurisdiction** is attributed to the Constitutional Court ("*Corte Costituzionale*"). This judicial body according to Article 125 of the Constitution²⁷, is composed of fifteen judges, with one-third being nominated by the President of the Republic, one-third by Parliament in a joint sitting, and one-third by the ordinary and administrative supreme courts. Based on Article 134 of the Constitution²⁸, adjudicates on the following matters:

- on controversies relating to the constitutional legitimacy of laws and enactments having the force of law, of the State and the Regions;
- on jurisdictional disputes between the powers of the State and those between the State and the Regions and between the Regions;
- on the accusations made against the President of the Republic, by Article 90 of the Constitution.²⁹

²⁶ Constitution of the Italian Republic – Article 111

senato.it/documenti/repository/istituzione/costituzione_inglese.pdf

²⁷ Senato della Repubblica. Constitution of the Italian Republic (Online). Available at senato.it/documenti/repository/istituzione/costituzione_inglese.pdf (Accessed: 16 August 2022)

²⁸ Senato della Repubblica. Constitution of the Italian Republic (Online). Available at senato.it/documenti/repository/istituzione/costituzione_inglese.pdf (Accessed: 16 August 2022)

²⁹ Senato della Repubblica. Constitution of the Italian Republic (Online). Available at senato.it/documenti/repository/istituzione/costituzione_inglese.pdf (Accessed: 16 August 2022)

2. XR-specific legal developments

It must be stressed that among the Italian legislative bodies there are no current proposals for dedicated legislation on XR in Italy. Therefore, the report analyses and identifies the legislative requirements regarding the most relevant laws and regulations that could be applied to XR. The subject matter of the report though has not been yet object of national statutes, it is the object of hearings of experts organized by Parliamentary Committees (as shown in the report).

In most of domains analysed it has been possible to identify specific legal cases that, although not directly related to XR, might be applied to XR technologies (or XR technologies might be used to improve and extent the service, such as in the case of SPID, and App IO).

An overview of the most relevant legal domains for XR, and some specific legal cases is provided in the mind map (figure 1). Each legal domain is enriched by significant legal cases and by indication of the most relevant laws and regulation. The arrows show that almost every legal domain, as well as significant legal cases are interconnected. For instance, Artificial Intelligence can be connected to the legal case “Metaverse”. Moreover, Digital Service Data Governance as well as Artificial Intelligence can be related to Privacy and Data Protection.

There are several regulatory bodies dealing with these legal domains, and thus (potentially) concerned with the application of XR technologies. With regard to Privacy and Data Protection, the Regulatory body is the Data Protection Authority. Regarding products safety, the Regulatory bodies are represented by several Ministries such as Ministry for the Economic Development, Ministry of Health, Ministry of Labour, Ministry of Social Policies, Ministry of Internal Affairs, Ministry of Economy and Finance and Ministry of Transports.

A detailed analysis of the legal domains and cases shown in the mind map are provided in the next sections of the report.

LEGEND:

LEGAL DOMAIN SIGNIFICANT LEGAL CASES MOST RELEVANT LAWS – REGULATIONS FOR XR

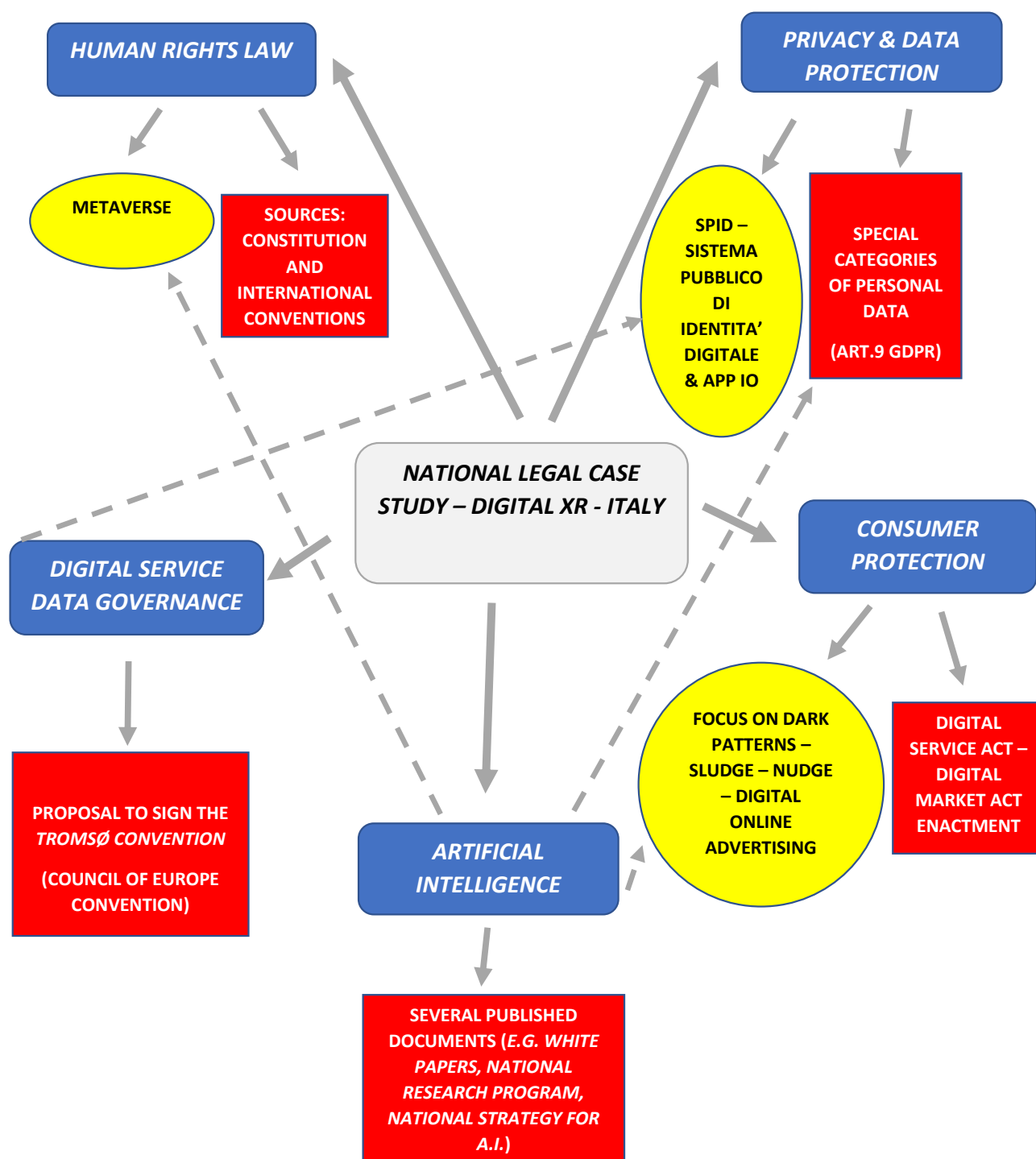


Figure 1: mind map of the legal domains (blue), most relevant laws and regulations (red) and legal cases (yellow) analysed in the report

3. Domain-specific legal issues

This section examines the legal implications of digital extended reality technologies in the Italian context with respect to specific legal domains. The legal domains covered include human rights law, privacy and data protection law, consumer protection, A.I. governance, digital service governance, and liability for harms.

The following sections discuss some of the ways that digital extended reality technologies are or may be governed by Italian law and policy within the frameworks of human rights, privacy and data protection, consumer protection, A.I. governance, and digital service governance. Each section begins with a brief introduction to the relevant legal issues and a summary of the Italian legal framework. Specific legal issues within the legal framework are then presented in more detail; each discussion includes specific references to existing (and proposed) law and an explanation of how the law may apply to digital extended reality technologies in Italy. It must be stressed that although no Italian law directly addresses or explicitly mentions digital extended reality technologies, many aspects are subject to the following domains of the Italian legal system.

3.1 Human rights law

Digital extended reality technologies have the potential to impact human rights in many ways, both positive and negative. Regarding some rights in particular contexts, these technologies have the potential to enhance the enjoyment of rights, such as when extended digital reality technologies are adopted and used for health services. In other situations, however, the use of these technologies may interfere with protected human rights such as the freedom of expression (e.g. whenever the user of a certain platform – based on XR – might be prevented the exercise of the freedom of expression by other users or as per certain policies adopted by the platform). This section explores what impact digital extended reality technologies may have on various human rights protected in Italian law.

3.1.1 Overview of the law and key elements of XR

The Italian Constitution provides several human rights (HRs). In particular, **Article 2 of the Italian Constitution refers to inviolable rights of the person, both as an individual and in the social groups, where human personality is expressed.**³⁰ The following HRs are granted in the Constitution (entered into force on January 1st, 1948):

- **"The right to life;**³¹
- **The right to human dignity;**³²
- **The right to self-determination;**³³
- **The right to development;**³⁴
- **The right to moral and legal equality;**³⁵
- **The right to freedom of expression** (included the freedom of the press – freedom of association – freedom of assembly – freedom of religion);³⁶

³⁰ Constitution of the Italian Republic, Article 2.
senato.it/documenti/repository/istituzione/costituzione_inglese.pdf

³¹ Constitution of the Italian Republic, Article 2.

³² Constitution of the Italian Republic, Article 3.

³³ Constitution of the Italian Republic, Article 2

³⁴ Constitution of the Italian Republic, Article 3 and 9.

³⁵ Constitution of the Italian Republic, Article 3

³⁶ Constitution of the Italian Republic, Article 21.



- The right of participation to decisions which affect everybody and everyone;³⁷
- The right to education;³⁸
- The right to health;³⁹
- The right to justice;⁴⁰
- The right to safeguard of laborers and the recognition of the value of every work;⁴¹
- The recognition of the essential function performed by in the institution of the family;⁴²
- The right to prohibition on torture/cruel inhuman and degrading treatment and slavery;⁴³
- The right to rest and leisure;⁴⁴
- Women's rights;⁴⁵
- Children's rights;⁴⁶
- Disability rights".⁴⁷

The articles of the Italian Constitution providing the above-mentioned rights and freedoms, and others (such as the right to justice, right to vote, right to set up political parties, etc.) are **articles 2, 3, 4, 9, 13, 14, 15, 17, 18, 19, 21, 29, 30, 32, 33, 34, 35, 36, 37, 38, 48, 49**. The above-mentioned rights and freedoms represent the bedrock on which the Italian society is founded⁴⁸.

In addition, many human rights are introduced in the legal and judiciary Italian system by international treaties that are not directly applicable in the domestic legal system and must first be transposed into the national system.

The transposition is based on the provision provided by **article 10 and by article 11 of the Constitution**.⁴⁹

- Article 10: "*The Italian legal system conforms to the generally recognized principles of international law. The legal status of foreigners is regulated by law in conformity with international provisions and treaties. A foreigner who, in his home country, is denied the actual exercise of the democratic freedoms guaranteed by the Italian constitution shall be entitled to the right of asylum under the conditions established by law. A foreigner may not be extradited for a political offense.*"
- Article 11: "*Italy rejects war as an instrument of aggression against the freedom of other peoples and as a means for the settlement of international disputes. Italy agrees on conditions of equality with other States, to the limitations of sovereignty that may be necessary to a world order ensuring peace and justice among the Nations. Italy promotes and encourages international organizations having such ends.*"

Therefore, every human rights provision which applies to Italy shall be enacted by Italian authorities such as by the Parliament, judges, and public administration. The Human Rights laws which are enforceable in Italy are the following:

³⁷ Constitution of the Italian Republic, Articles 17 and 18.

³⁸ Constitution of the Italian Republic, Articles 33 and 34.

³⁹ Constitution of the Italian Republic, Article 32.

⁴⁰ Constitution of the Italian Republic, Article 24.

⁴¹ Constitution of the Italian Republic, Articles 1- 35 – 36 - 38.

⁴² Constitution of the Italian Republic, Articles 29 and 30.

⁴³ Constitution of the Italian Republic, Article 13.

⁴⁴ Constitution of the Italian Republic, Article 36.

⁴⁵ Constitution of the Italian Republic, Articles 3 and 37.

⁴⁶ Constitution of the Italian Republic, Articles 2 – 3 -30 – 31 – 32 – 33 – 34 - 37.

⁴⁷ Constitution of the Italian Republic, Article 2 – 3 – 4 – 24 – 32- 34 - 38.

⁴⁸ Andrea Marzorati. *I DIRITTI FONDAMENTALI PREVISTI DALLA COSTITUZIONE* (Online). Available at marzorati.org/i-diritti-fondamentali-previsti-dalla-costituzione/ (Accessed: 18 August 2022)

⁴⁹ Constitution of the Italian Republic, Articles 10 and 11.

senato.it/documenti/repository/istituzione/costituzione_inglese.pdf



- United Nations Charter (1945)⁵⁰ signed by Italy in 1955.
- Universal Declaration of Human Rights (1948)^{51 52}
- European Convention on Human Rights⁵³ (1950)⁵⁴ signed by Italy in 1950 and ratified in 1955.⁵⁵
- Charter of Fundamental Rights of the European Union (2000) which entered into force in December 2009 along with the Treaty of Lisbon.⁵⁶

It shall be noticed that the Italian Parliament has enacted several other international conventions throughout the years, including but not limited to⁵⁷:

- International Convention on the Elimination of All Forms of Racial Discrimination (1966) signed by Italy in 1968 and ratified in 1976.
- International Covenant on Economic, Social and Cultural Rights (1966) signed by Italy in 1967 and ratified in 1978.
- International Covenant on Civil and Political Rights (1966) signed by Italy in 1967 and ratified in 1978.
- Convention on the Elimination of All Forms of Discrimination against Women (1979) signed by Italy in 1980 and ratified in 1985.
- Convention on the Rights of the Child (1989) signed by Italy in 1990 and ratified in 1991.
- Convention on the Rights of Persons with Disabilities (2006) signed by Italy in 2007 and ratified in 2009.

The abovementioned rights - reported in each international act - are enforceable in relation to all kinds of digital extended realities technologies, notwithstanding the fact that these technologies are not explicitly referred to.

The **International Convention on the Elimination of All Forms of Racial Discrimination**, for instance, provides various rights, such as Article 4 in which propaganda and organizations based on ideas or theories of superiority of one race or group of persons of one colour or ethnic origin, or promoting racial

⁵⁰ Filippone-Thaulero, S. Aza Mustafa Duran, S. (2006) *MANUALE DEI DIRITTI UMANI Trattati, Convenzioni, Dichiarazioni, Statuti, Protocolli aggiornati al 2004*. 1st edn. Roma: Senato della Repubblica. senato.it/documenti/repository/commissioni/dirittiumani/manuale.pdf (Accessed: 16 August 2022)

⁵¹ Italy was not a UN member until 1955 (December 14th).

⁵² Ufficio comunicazione istituzionale e dell'Ufficio delle informazioni parlamentari, dell'archivio e delle pubblicazioni del Senato (2018) *DICHIARAZIONE UNIVERSALE DEI DIRITTI UMANI*. 1st edn. Roma: Senato della Repubblica. (Online). Available at senato.it/application/xmanager/projects/leg18/file/DICHIARAZIONE_diritti_umani_4lingue.pdf (Accessed: 18 August 2022)

⁵³ The Convention for the Protection of Human Rights and Fundamental Freedoms.

⁵⁴ Italy joined the Council of Europe on 5 May 1949. It is a founder member of the Organization. Council of Europe. *Italy // 46 States, one Europe* (Online). Available at coe.int/en/web/portal/italy (Accessed: 18 August 2022)

⁵⁵ Centro studi per la pace. *CEDU e Protocolli Addizionali* (Online). Available at studiperlapace.it/view_news (Accessed: 18 August 2022)

⁵⁶ Citizens Information. (2021) *Charter of Fundamental Rights* (Online). Available at citizensinformation.ie (Accessed: 18 August 2022)

⁵⁷ International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

hatred and discrimination are condemned and deemed punishable by law;⁵⁸ and Article 5 according to which the right to freedom of thought, conscience, and religion, opinion and expression shall be enjoyed by everyone and safeguarded without distinction as to race, color, or national or ethnic origin, to equality before the law.⁵⁹

Under Article 15 of the **International Covenant on Economic, Social, and Cultural Rights** everyone is granted the right to enjoy scientific progress, its benefits, and its applications,⁶⁰ including in relation to XR.

The Italian Parliament has ratified and given execution to the abovementioned Convention, by approving the Law n. 881 – 25.10.1977.⁶¹

The **International Covenant on Civil and Political Rights** provides principles as reported in Article 19, in which it is declared the right for everyone to hold opinions without any kind of interference, have the right to freedom of expression, which shall concern the freedom to seek, receive and impart information and ideas of all kinds...via any chosen media; and Article 20 where it is stressed the prohibition of any kind of advocacy that represents a form of incitement to discrimination, hostility or violence based on hate regarding national, racial or religious justification.⁶²

The Italian Parliament has ratified and given execution to the abovementioned Convention, by approving the Law n. 881 – 25.10.1977.⁶³

Potential freedom of expression challenges in relation to XR include for instance the adoption – made by platforms implementing XR - of any kind of policy which do prevent users' exercise of freedom of expression (related to lawful content) or provides the non-intervention or adoption of measures to contrast unlawful acts which do limit the freedom of expression.

The **Convention on the Elimination of All Forms of Discrimination against Women** as well as the previous mentioned international legal acts, provides - according to Article 3 - the protection of human rights and fundamental freedoms, based on the assumption of equality between men and women, to ensure the full development and advancement of the latter.⁶⁴

⁵⁸ International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX), Art.4(a).

[ohchr.org/en/instruments-mechanisms/instruments/international-convention-elimination-all-forms-racial](https://www.ohchr.org/en/instruments-mechanisms/instruments/international-convention-elimination-all-forms-racial)

⁵⁹ International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX), Art.4(a).

[ohchr.org/en/instruments-mechanisms/instruments/international-convention-elimination-all-forms-racial](https://www.ohchr.org/en/instruments-mechanisms/instruments/international-convention-elimination-all-forms-racial)

⁶⁰ International Covenant on Economic, Social and Cultural Rights (entry into force 3 January 1976) G.A. Res. 2200A (XXI)

[ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights](https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-economic-social-and-cultural-rights)

⁶¹ LEGGE 25 ottobre 1977, n. 881 "Ratifica ed esecuzione del patto internazionale relativo ai diritti economici, sociali e culturali, nonché del patto internazionale relativo ai diritti civili e politici, con protocollo facoltativo, adottati e aperti alla firma a New York rispettivamente il 16 e il 19 dicembre 1966" (GU n.333 del 07-12-1977 - Suppl. Ordinario)

normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:1977-10-25:881

⁶² International Covenant on Civil and Political Rights (23 March 1976) G.A. Res. 2200A (XXI)

[ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights](https://www.ohchr.org/en/instruments-mechanisms/instruments/international-covenant-civil-and-political-rights)

⁶³ LEGGE 25 ottobre 1977, n. 881 "Ratifica ed esecuzione del patto internazionale relativo ai diritti economici, sociali e culturali, nonché del patto internazionale relativo ai diritti civili e politici, con protocollo facoltativo, adottati e aperti alla firma a New York rispettivamente il 16 e il 19 dicembre 1966" (GU n.333 del 07-12-1977 - Suppl. Ordinario)

normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:1977-10-25:881

⁶⁴ Convention on the Elimination of All Forms of Discrimination against Women New York, 18 December 1979 (3 September 1981)

The Italian Parliament has ratified and given execution to the abovementioned Convention, by approving the Law n. 135 - 14.3.1985.⁶⁵

In relation to XR, the provision provided by the abovementioned Article 3 shall be enacted by platforms in order to safeguard women's rights to equality. Thus, on one hand platforms shall adopt policies according to which no kind of gender - discriminatory related act will be tolerated, and on the other, sanctions shall be issued to users.

Concerning the **Convention on the Rights of the Child**, the Articles to be taken into consideration are:

- Article 6 where it is declared that every child is granted the right to life;
- Article 12 in which it shall be assured to the child – capable of forming his or her own views – to freely express them regarding all matters affecting the child;
- Article 13 where the child shall be granted the right to freedom of expression which shall concern the freedom to seek, receive and impart information and ideas of all kinds...via any chosen media by the child;
- The right of the child as per Article 14 to freedom of thought, conscience and religion shall be observed;
- Article 16 according to which no child shall be the subject to neither any unlawful interference concerning privacy, correspondence, nor unlawful attacks regarding honor and reputation. Therefore, the child shall be protected against any of these interferences or attacks.
- Article 17 stresses the importance of mass media and ensures that the child has access to information and material provided which shall promote social, spiritual, moral well-being, physical and mental health;
- Finally, Article 24 establishes the right of the child to enjoy and to be guaranteed the highest attainable standard of health and to facilities for the treatment of illness and rehabilitation of health.⁶⁶

The Italian Parliament has ratified and given execution to the abovementioned Convention, by approving the Law n. 176 - 12.6.1991.⁶⁷

In relation to XR, children's rights shall be granted and safeguarded by XR platforms due to the delicacy of the subject and to their right to information and to protection against interferences concerning privacy, honor, and reputation. Children shall be granted access to XR technologies since they can intelligently entertain, educate, or unleash creative forces in healthy moderation and with the right choice of VR apps and XR platforms.

The **Convention on the Rights of Persons with Disabilities** (CRPD) provides principles contained in several articles. These articles are also relevant to XR due to the fact that technologies shall be meant accessible to everybody – notwithstanding physical or mental disabilities. Therefore, XR platforms shall guarantee access to those subjects – without any kind of discrimination based on gender and on disability – throughout the adoption and implementation of suitable measures, and XR apps shall be designed in order to be used by person with disabilities.

ohchr.org/en/instruments-mechanisms/instruments/convention-elimination-all-forms-discrimination-against-women

⁶⁵ LEGGE 14 marzo 1985, n. 132 "Ratifica ed esecuzione della convenzione sull'eliminazione di ogni forma di discriminazione nei confronti della donna, adottata a New York il 18 dicembre 1979" (GU n.89 del 15-04-1985 - Suppl. Ordinario) normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:1985-03-14;132!vig=2022-10-13.

⁶⁶ Convention on the Rights of the Child (entry into force 2 September 1990) G.A. Res. 44/25 of 20 November 1989.

unicef.org/child-rights-convention/convention-text#

⁶⁷ LEGGE 27 maggio 1991, n. 176 "Ratifica ed esecuzione della convenzione sui diritti del fanciullo, fatta a New York il 20 novembre 1989" (GU n.135 del 11-06-1991 - Suppl. Ordinario n. 35) normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:1991-05-27;176!vig=2022-10-13



This principle is declined in general in Article 5 entitled “Equality and non-discrimination”. According to this article, it is recognized that all persons are equal before and under the law and are entitled without any discrimination to equal protection and equal benefit of the law.⁶⁸ Any kind of discrimination, based on disability, shall be prohibited.⁶⁹ It shall be granted to persons with disabilities equal and effective legal protection against discrimination on all grounds.

The principle is further recognised and specified in Article 6 that states that both women and girls affected by disabilities shall be granted the right to enjoy all human rights and fundamental freedoms.⁷⁰ Appropriate measures shall be taken to ensure the full development, advancement, and empowerment of women, in order to guarantee the exercise and enjoyment of human rights and fundamental freedoms.⁷¹ The rights of children with disabilities are specifically addressed in Article 7, which provides that they shall have the right to express their views freely about matters regarding them.⁷²

In relation to accessibility, the CRPD provides that persons with disabilities shall be guaranteed the right to live independently and participate fully in all aspects of life.⁷³ This means that no one shall be discriminated against by not being able to access the physical environment, transportation, information, and communications (such as information and communications technologies and systems).⁷⁴ Therefore, barriers representing obstacles to accessibility, in particular to the Internet and other means of communication (e.g. internet platforms) shall be removed. Related to the previous article, Article 21 requires that State Parties “take all appropriate measures to ensure that persons with disabilities can exercise the right to freedom of expression and opinion, including the freedom to seek, receive and impart information and ideas on an equal basis with others and through all forms of communication of their choice” (e.g., technologies which are classified as appropriate to different kinds of disabilities in a promptly without additional cost).⁷⁵ This extends to encouraging private entities that provide services to the public, including through the Internet, to provide information and services in accessible and usable formats for persons with disabilities.⁷⁶ Finally, Article 22 guarantees the right of respect for privacy, as protected by the law.⁷⁷ As with any other person, this right shall not be jeopardized or harmed.⁷⁸

The Italian Parliament has ratified and given execution to the abovementioned Convention, by approving the Law n. 18 - 23.3.2009.⁷⁹

According to the analysis of this domain (i.e safeguarding of human rights in general and in particular on online platforms), the Italian Parliament, in particular the Senate, established, on one hand, the

⁶⁸ Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106, Art.5(1).

un.org/en/development/desa/population/migration/generalassembly/docs/globalcompact/A_RES_61_106.pdf

⁶⁹ Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106, Art.5(2).

⁷⁰ Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106, Art.6(1).

⁷¹ Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106, Art.6(2).

⁷² Convention on the Rights of Persons with Disabilities, GA Res. A/61/106, Art.7(3).

⁷³ Convention on the Rights of Persons with Disabilities, GA Res. A/61/106, Art.9.

⁷⁴ Convention on the Rights of Persons with Disabilities, GA Res. A/61/106, Art.9(1)(a)-(b).

⁷⁵ Convention on the Rights of Persons with Disabilities, GA Res. A/61/106, Art.21(a)-(e).

⁷⁶ Convention on the Rights of Persons with Disabilities, GA Res. A/61/106, Art.21(c).

⁷⁷ Convention on the Rights of Persons with Disabilities, GA Res. A/61/106, Art.22(1).

⁷⁸ Convention on the Rights of Persons with Disabilities, GA Res. A/61/106, Art.22(1).

⁷⁹ LEGGE 3 marzo 2009, n. 18 “Ratifica ed esecuzione della Convenzione delle Nazioni Unite sui diritti delle persone con disabilità, con Protocollo opzionale, fatta a New York il 13 dicembre 2006 e istituzione dell'Osservatorio nazionale sulla condizione delle persone con disabilità” (GU n.61 del 14-03-2009) normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2009-03-03;18



“Extraordinary Committee regarding intolerance, racism, antisemitism, incitement to hate and violence” as a Supervisory Body entitled to verify the enforcement and the safeguarding of principles and values provided by the Constitution and the international laws regarding human rights. On the other, it established the Permanent Committees named Constitutional Affairs Committee. It would be advantageous if sooner than later the activity performed by both bodies will shape online platforms’ policies dealing with human rights and how these shall be safeguarded and enforced.

Consequently, by the fact that human rights shall be enforced, it is envisaged to approve and enforce regulations also providing some sort of “fines” (such as disabling accounts whom authors resorts systematically to hate speech, racism, violence, gender-based violence, etc.) in the event of violation attributable to digital extended reality technologies.

Regarding hate speech, the “Extraordinary Committee regarding intolerance, racism, antisemitism, incitement to hate and violence”, has published a report concerning the phenomenon of online hate incitement.⁸⁰ Moreover, the above-mentioned Extraordinary Committee gathered the views from the Vice President of the Italian Data Protection Authority regarding the phenomenon of online hate incitement in February 2022. One of the discussed topics concerned the role of platforms in contrasting online hate speech.^{81 82} It must be stressed that the Vice President of the Italian Data Protection Authority has not provided any solution to the phenomenon of online hate speech but has moved a critic to the DSA Proposal since in the entire Proposal, the EU legislator has not provided any definition to the word “hate”, but only references to the “European Commission Conduct Code on countering illegal hate speech online”(recalled at page 4 and 6 of the Report regarding the DSA Proposal)⁸³ and to the Whereas of the DSA Proposal (n° 12, 57 and 69)⁸⁴.

The main “focal points” expressed in this domain are the following:

- human rights are recognized and safeguarded both by the Constitution and by national laws (ratification and execution of the abovementioned international conventions);
- the international acts, as well as Conventions, regulating human rights, state that these rights shall be enforceable. Although there is not reported any kind of referral to digital extended reality technologies, it is plausible to think that these rights are enforceable also in this context.

⁸⁰ Commissione straordinaria per il contrasto dei fenomeni di intolleranza, razzismo, antisemitismo e istigazione all'odio e alla violenza (2022). *ANALISI COMPARATIVA SUL FENOMENO DELL'ISTIGAZIONE ALL'ODIO ONLINE* (Online). Available at

senato.it/documenti/repository/commissioni/antidiscriminazioni18/22020614 - RIE - Analisi comparativa sul fenomeno dell'istigazione all'odio online.pdf

⁸¹ Garante Protezione dei Dati Personali (2022). *Senato della Repubblica - Commissione straordinaria intolleranza, razzismo, antisemitismo, istigazione all'odio e alla violenza Audizione del Vice Presidente del Garante per la protezione dei dati personali, prof.ssa Ginevra Cerrina Feroni, sul fenomeno dei discorsi d'odio* (Online). Available at garanteprivacy.it/home/docweb/-/docweb-display/docweb/9746273 (Accessed: 24 August 2022)

⁸² Commissione intolleranza, razzismo, antisemitismo e istigazione all'odio e alla violenza. Ultima seduta. (Online). Available at: senato.it/26301?seduta=296589 (Accessed: 16 August 2022)

⁸³ European Commission (2020). *Commission publishes EU Code of Conduct on countering illegal hate speech online continues to deliver results* (Online). Available at ec.europa.eu/commission/presscorner/detail/en/ip_20_1134 (Accessed: 16 August 2022)

⁸⁴ Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on a Single Market For Digital Services (Digital Services Act) and amending Directive 2000/31/EC eur-lex.europa.eu/legal-content/en/TXT/?uri=COM%3A2020%3A825%3AFIN



3.1.2 Significant implications and legal cases

The Italian Parliament – the Constitutional Affairs Committee - is discussing the topic of human rights protected by the Italian Constitution and law in relation to the Metaverse.⁸⁵ The Committee has only – up to today – proceeded in collecting information via experts' auditions. Among the interviewed several were university professors, as well as researchers, involved in the study of Artificial Intelligence, and/or experts on Constitutional Law. as well as founders, CEOs and Security Officers, of tech and communication companies.

Five main legal issues emerged from the hearings:

- The first issue deals with privacy regulation, as physical devices (e.g. helmets and visors) gather a huge amount of data such as sounds, expressions and emotions of the users. Moreover, it is noted by experts that the right to anonymity given to avatars in the metaverse could lead to inappropriate uses.
- The second issue is about the nature of avatars and how they are controlled by users. Experts agree that avatars shall be unique and recognizable as users' alter ego (so-called interoperability).
- The third issue concerns protection of real-life physical goods reproduced in the Metaverse. Illegal copies can affect public goods (such as the Coliseum) or private assets (such as a bag in copyright lawsuit *Hermès v Mason Rothschild*⁸⁶).
- The fourth issue concerns governance on the application of national and international law in the metaverse. In order to effectively enforce legal provisions, States shall cooperate to govern the metaverse. For instance, international courts can rule over violations. Two other important aspects concerning the role of the State in the metaverse are tax rules and the possibility for users to be considered citizens, enjoying the same constitutional rights as in real life.
- The fifth issue concerns users' security, since verbal and physical sexual harassment, and even rapes, might occur in the Metaverse. The impact on victims of such incidents can be equivalent to the effects of such events happening in real life⁸⁷. It is worth considering that no one shall feel at risk or not safe for the purpose of large-scale use of the metaverse.

3.2 Privacy and data protection law

3.2.1 Overview of the law and key elements of XR

Following the adoption of the GDPR in 2016,⁸⁸ the EU Member States were granted two years to harmonize their national legislation in accordance with the principles provided by the GDPR. Because the GDPR is a Regulation and not a Directive, its provisions became binding upon all EU Member States

⁸⁵ To hear the full audition – in italian – please visit the following website. Available at: radiatoradiale.it/scheda/666823/commissione-affari-costituzionali-del-senato-della-repubblica (Accessed: 18 August 2022)

⁸⁶ UNITED STATES DISTRICT COURT SOUTHERN DISTRICT OF NEW YORK - HERMÈS INTERNATIONAL and HERMÈS OF PARIS, INC., vs MARTIN ROTHSCHILD (Online). Available at: law.justia.com/cases/federal/district-courts/new-york/nysdcce/1:2022cv00384/573363/61/ (Accessed: 18 August 2022)

⁸⁷ Sum of us. (2022) *Metaverse: another cesspool of toxic content* (Online) Available at: sumofus.org/images/Metaverse_report_May_2022.pdf (Accessed: 18 August 2022)

⁸⁸ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119. eur-lex.europa.eu/eli/req/2016/679/oj

following entry into effect on 25th May 2018. The Italian Government – as per the Law n. 163/2017⁸⁹ - enacted those principles by approving the Legislative Decree n. 101/2018⁹⁰ and amending the previously adopted Privacy Code⁹¹ (Legislative Decree n. 196/2003 which enacted the principles provided by Directive 95/46/CE⁹², repealed by the GDPR).

For the sake of clarity, it must be stressed that the Italian Parliament “suggested” a “soft” entry into force of the GDPR in the national legal system.⁹³ This, however, would have been in contrast with the provision provided by article 99 (“*This Regulation shall be binding in its entirety and directly applicable in all Member States.*”)⁹⁴.

The authorities which are engaged in Data Protection, the enforcement of the right to privacy, the right to consent, and the protection of minors (regarding personal data) include the Italian Data Protection Authority, as well as the Italian Parliament (based on its activity of address and supervision of the Government’s activity)⁹⁵ and Government, which oversees the enforcement of the provisions provided by both European and National Legislation in the legal system. The abovementioned role played both by the Italian Parliament and by the Government are of the utmost importance since the European Legislation, regulating the right to Privacy and Data Protection, shall be enforced in each EU Member State through the national legislation which enacts its provisions (*however in and on itself directly applicable in all Member States*). In Italy, as seen above, the GDPR has been enacted through the Legislative Decree n. 101/18 approved by the Government as per the Law n. 163/2017.

The Italian Parliament by approving the Legislative Decree no. 101/18 (which enacts the GDPR provisions), has introduced in the Personal Data Protection Code (Legislative Decree no. 196/2003) the provisions provided by the said EU Regulation and enacted by the Legislative Decree no. 101/18.

At the same time, it has decided to not introduce in the Personal Data Protection Code any provision regarding the data subject’s consent and the privacy policy (*with some exceptions regarding provisions regulating minors, students, the processing of genetic data, biometric data, and data concerning health*).

Concerning the previous version of the Personal Data Protection Code (ante GDPR), the Legislative Decree n. 101/18 affected its provisions, particularly with regard to sanctions, data subject’s rights, the use of data collected in violation of the provisions provided by the GDPR, the process by which the

⁸⁹ Delega al Governo per il recepimento delle direttive europee e l’attuazione di altri atti dell’Unione europea - Legge di delegazione europea 2016-2017 (17G00177) normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2017-10-25;163

⁹⁰ Privacy Control. GDPR 679/16 and Legislative Decree of adaptation n. 101/2018 (Online). Available at: privacycontrol.it/en/gdpr-679-16-and-legislative-decree-of-adaptation-n-101-2018/ (Accessed: 25 August 2022)

⁹¹ PERSONAL DATA PROTECTION CODE Containing provisions to adapt the national legislation to Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC gdpd.it/documents/10160/0/PERSONAL+DATA+PROTECTION+CODE.pdf

⁹² Directive 95/46/EC of the European Parliament and of the Council of 24 October 1995 on the protection of individuals with regard to the processing of personal data and on the free movement of such data eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31995L0046

⁹³ Costa, P. (2018) *GDPR: con il decreto legislativo 101/2018 la privacy italiana si adegua* (Online). Available at spindox.it/it/blog/gdpr-decreto-legislativo-101-2018-privacy/#gref (Accessed: 25 August 2022)

⁹⁴ Costa, P. (2018) *GDPR: con il decreto legislativo 101/2018 la privacy italiana si adegua* (Online). Available at spindox.it/it/blog/gdpr-decreto-legislativo-101-2018-privacy/#gref (Accessed: 25 August 2022)

⁹⁵ Camera dei Deputati. *L’attività di indirizzo e di controllo* (Online). Available at legislature.camera.it/cost_req_funz/671/673/documentotesto.asp (Accessed : 25 August 2022)



provisions provided by the GDPR concerning the information society service and minors are implemented, etc.^{96 97}

Data subjects' consent, as well as the privacy policy, shall abide by the specific provisions regarding minors as provided by article 8 of the GDPR. In this case, the Italian legislator has reduced the minimum age, for the allowance of the release of the consent concerning the offer of information society services, from 16 (GDPR) to 14. The provision provided in article 2 (5) of the Personal Data Protection Code. It must be stressed that the European Legislator decided to leave to Member States which minimum age shall apply (however, it shall not be under 13).^{98 99}

Regarding the processing of genetic data, biometric data, and data concerning health, these data are classified as "special", and the processing activity is regulated under article 9 of the GDPR "Processing of special categories of personal data". Based on this provision, the processing shall be prohibited in the event the collected personal data reveal "racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership" and/or the type of data being processed is "genetic data, biometric data to uniquely identify a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation".¹⁰⁰ Indeed, the basic human rights and fundamental freedoms granted to people are safeguarded.

The Legislator has, however, provided due exceptions to article 9 of the GDPR,¹⁰¹ including that "*the data subject has given explicit consent to the processing of those personal data for one or more specified purposes; the processing relates to personal data which are manifestly made public by the data subject; the processing is necessary for preventive or occupational medicine, for the assessment of the working capacity of the employee, medical diagnosis, the provision of health or social care or treatment or the management of health or social care systems and services; the processing is necessary for reasons of public interest in the area of public health, such as protecting against serious cross-border threats to health or ensuring high standards of quality and safety of health care and medicinal products or medical devices; and processing is*

⁹⁶ Bolognesi, M. (2018) *Le principali novità introdotte dal Decreto n. 101 del 10 Agosto del 2018 rispetto agli obblighi previsti dal GDPR 2016/679 e Dlgs 196/03* (Online). Available at: ictsecuritymagazine.com/articoli/le-principali-novita-introdotte-dal-decreto-n-101-del-10-agosto-del-2018- (Accessed: 25 August 2022)

⁹⁷ Giampaolino, C.F. et al. (2018) *L'ITALIA SI ADEGUA AL GDPR* (Online). Available at: cliffordchance.com/content/dam/cliffordchance/briefings/2018/09/litalia-si-adequa-al-gdpr.pdf (Accessed: 25 August 2022)

⁹⁸ Bolognesi, M. (2018) *Le principali novità introdotte dal Decreto n. 101 del 10 Agosto del 2018 rispetto agli obblighi previsti dal GDPR 2016/679 e Dlgs 196/03* (Online). Available at: ictsecuritymagazine.com/articoli/le-principali-novita-introdotte-dal-decreto-n-101-del-10-agosto-del-2018 (Accessed: 25 August 2022)

⁹⁹ Giampaolino, C.F. et al. (2018) *L'ITALIA SI ADEGUA AL GDPR* (Online). Available at: cliffordchance.com/content/dam/cliffordchance/briefings/2018/09/litalia-si-adequa-al-gdpr.pdf (Accessed: 25 August 2022)

¹⁰⁰ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.9(1). eur-lex.europa.eu/eli/reg/2016/679/oj

¹⁰¹ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regards to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119, Art.9(2). eur-lex.europa.eu/eli/reg/2016/679/oj

necessary for archiving purposes in the public interest, scientific or historical research purposes or statistical purposes.”^{102 103}

The European legislator, due to the nature of these data, has provided that in the event Member States may decide to introduce or to maintain further conditions, including limitations, concerning the processing of genetic data, biometric data, or data concerning health (as per Article 9, paragraph 4).¹⁰⁴
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Therefore, the Italian legislator, based on the above-mentioned paragraph 4 of article 9 GDPR, has provided in the Legislative Decree n. 101/18 the approval by the Italian Data Protection Authority of safety measures to process these data. These safety measures shall be updated every two years.¹⁰⁶ The measures provide simplified processes regarding the release of the consent, whenever requested. The legislator has prohibited the dissemination of the concerned personal data.¹⁰⁷ The effect produced by this provision is that it is not allowed, for whoever collects the data, to acknowledge undetermined subjects about such data, or for making them available or for consultation. The Legislative Decree n. 101/18 allows the use of biometric data to implement procedures within technical and organizational measures - regarding restricted access to personal data – for the protection of personal data, which controllers shall implement as provided by article 32 of the GDPR (“Security of processing”).^{108 109}

Therefore, the release of consent, as well as the privacy policy are regulated by the principles of the GDPR. Moreover, the collection and storage of personal data are regulated by the principles provided by the GDPR.¹¹⁰

Due to the importance of the personal data collected and stored by Digital Extended Reality devices (such as genetic and biometric data related to the user), the abovementioned articles provided by the GDPR, and enacted by the Italian Legislation, represent the “gatekeeper” to the use of those data. Specifically, the use of XR technology, implies several activities during the immersive experience, which

¹⁰² Bolognesi, M. (2018) Le principali novità introdotte dal Decreto n. 101 del 10 Agosto del 2018 rispetto agli obblighi previsti dal GDPR 2016/679 e Dlgs 196/03 (Online). Available at: ictsecuritymagazine.com/articoli/le-principali-novita-introdotte-dal-decreto-n-101-del-10-agosto-del-2018 (Accessed: 25 August 2022)

¹⁰³ Giampaolino, C.F. et al. (2018) *L'ITALIA SI ADEGUA AL GDPR* (Online). Available at: cliffordchance.com/content/dam/cliffordchance/briefings/2018/09/litalia-si-adequa-al-gdpr.pdf (Accessed: 25 August 2022)

¹⁰⁴ Bolognesi, M. (2018) Le principali novità introdotte dal Decreto n. 101 del 10 Agosto del 2018 rispetto agli obblighi previsti dal GDPR 2016/679 e Dlgs 196/03 (Online). Available at: ictsecuritymagazine.com/articoli/le-principali-novita-introdotte-dal-decreto-n-101-del-10-agosto-del-2018 (Accessed: 25 August 2022)

¹⁰⁵ Giampaolino, C.F. et al. (2018) *L'ITALIA SI ADEGUA AL GDPR* (Online). Available at: cliffordchance.com/content/dam/cliffordchance/briefings/2018/09/litalia-si-adequa-al-gdpr.pdf (Accessed: 25 August 2022)

¹⁰⁶ Decreto Legislativo n. 101/18, Art. 2 (2).
normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2018-08-10;101

¹⁰⁷ Legislative Decree n. 101/18, Art. 2(7), paragraph 8.
normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2018-08-10;101

¹⁰⁸ Bolognesi, M. (2018) Le principali novità introdotte dal Decreto n. 101 del 10 Agosto del 2018 rispetto agli obblighi previsti dal GDPR 2016/679 e Dlgs 196/03 (Online). Available at: ictsecuritymagazine.com/articoli/le-principali-novita-introdotte-dal-decreto-n-101-del-10-agosto-del-2018 (Accessed: 25 August 2022)

¹⁰⁹ Giampaolino, C.F. et al. (2018) *L'ITALIA SI ADEGUA AL GDPR* (Online). Available at: cliffordchance.com/content/dam/cliffordchance/briefings/2018/09/litalia-si-adequa-al-gdpr.pdf (Accessed: 25 August 2022)

¹¹⁰ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)
eur-lex.europa.eu/eli/req/2016/679/oj



all rely on the body and behavioral reactions of users. These activities regard the analyses of user's heart rate, eye movements, body gestures, etc. Therefore, the collected data concern special "data", such as biometric and health related.¹¹¹

In conclusion, it is important to highlight the "*focal points*" reported in the domain, which are:

- the enactment of the principles expressed by the GDPR in the Italian legislation and the role of the authorities in the enforcement of the provisions (both European and national);
- the importance conferred to special categories of personal data which shall be safeguarded due to their particular nature.

3.2.2 Significant implications and legal cases

Clearview A.I. case (decision adopted by the Italian Data Protection Authority)

Concerning the collecting and storing of personal data, the Italian Data Protection Authority, in February 2022, issued an injunction against Clearview AI. The reason for the issue of the injunction is the unlawful collection and processing of personal data by Clearview AI through facial recognition software (used by police authorities). The collected personal data were further treated as "*biometric data*", which as provided by paragraph 9 of the GDPR, are strictly protected.¹¹²

This abovementioned case, although not directly related to XR technologies, might be adopted in the future as an example on how not to use "*special*" categories of data (such as biometric data), which are adopted in XR Technologies (as reported above regarding immersive technologies). In the near future, XR technologies will continue to develop, therefore it is mandatory that platforms, adopting such technologies, abide to the provisions provided by law.

SPID and App IO

Recently, the Italian public has been using applications to access and benefit from services provided by the public administrations, such as accessing personal records, paying taxes, receiving notice of payment, registering for a public competition, accessing health services, etc. The introduction of these electronic instruments, and their compulsory use, have represented some sort of innovative ground-breaking case of the Italian Government and Public Administration.

The promotion and use of such instruments by public institutions shall be contextualized in pursuit of enhancing accessibility to public administration services as well as to implement the digital ID system.

The three best-known applications are "Spid"¹¹³, "PagoPA"¹¹⁴ and "App IO"¹¹⁵.

The acronym Spid stands for "Sistema Pubblico di Identità Digitale" (*Public Digital Identity System*) which allows citizens to access the online services of Public Administrations and participating private institutes with a single Digital Identity.¹¹⁶

¹¹¹ Paule, L. (2021) *Data in the XR industry: why do we need it?* (Online). Available at: blog.laval-virtual.com/en/data-in-the-xr-industry-why-do-we-need-it/ (Accessed: 25 August 2022)

¹¹² Ordinanza ingiunzione nei confronti di Clearview AI - 10 febbraio 2022 [9751362] (Online) Available at: garanteprivacy.it/web/quest/home/docweb/-/docweb-display/docweb/9751362 (Accessed: 25 August 2022)

¹¹³ Spid – Public Digital Identity System spid.gov.it/en/

¹¹⁴ PagoPA pagopa.gov.it/

¹¹⁵ Dipartimento per la Trasformazione Digitale - Cittadinanza digitale - App IO innovazione.gov.it/progetti/app-io-cittadinanza-digitale/

¹¹⁶ AGID - Spid – Public Digital Identity System agid.gov.it/en/platforms/spid



It is free of charge and citizens can get SPID through a series of private companies under agreements (known as *Identity Providers*). Once the verification procedure is completed, which certifies the identity of the applicant, the system releases a set of credentials that can be used on all the websites (called *Service Providers*).

Since October 1st, 2021^{117 118} all Italian citizens (as well as foreigners residing in Italy – only using SPID) must access Public Administration and participating private institutes services via SPID, CNS (National Services Card – Carta Nazionale dei Servizi)^{119 120 121}, CIE (Carta d'Identità Elettronica – Electronic Identity Card)^{122 123}.

PagoPA represents the national platform that allows the user to choose how to pay taxes, or fees towards Public Administrations and other participating private institutes and providers of services. The service is provided by App IO.

App IO represents an important step toward the implementation of the national innovation strategy (*Italia Digitale 2026*) set by the Government (the Ministry of Digital Transition), to fulfill the obligations provided by the National Recovery and Resilience Plan (PNRR).^{124 125} It is used to submit petitions, declarations, and self-declarations to Public Administrations.¹²⁶

Through this application, the user will receive messages, notices, and communications from any public administration. To receive notifications via push on the smartphone, to receive updates via e-mail or directly through the app, to be updated about due dates, and to pay tributes.¹²⁷

¹¹⁷ Cherchi, A. (2021) *Spid, Cie o Cns: obbligo dal 1° ottobre per i servizi della Pa* (Online). Available at: ilsole24ore.com/art/spid-cie-o-cns-obbligo-1-ottobre-i-servizi-pa-AEIPcCl?refresh_ce=1 (Accessed: 25 August 2022)

¹¹⁸ Namirial S.p.A. (2022) *Come attivare lo SPID per anziani e per persone con disabilità* (Online). Available at: focus.namirial.it/spid-per-anziani/ (Accessed: 25 August 2022)

¹¹⁹ CNS – Carta Nazionale dei Servizi (National Service Charter) is an instrument whose purpose is to identify with certainty the citizen operating online (since it contains data to authenticate the user). It consists of a USB key or a smart card, bearing a microchip and contactless technology, which allows access and benefits from the online services provided by public administrations (such as INAIL, INPS, Agenzia delle Entrate, etc.). It is used to obtain documents and information or to access funding. With the CNS, unlike SPID, it is possible to digitally sign documents.

¹²⁰ Pisanu, N. (2021) *CNS: cos'è e come utilizzare la Carta nazionale dei servizi* (Online). Available at: agendadigitale.eu/documenti/cns-cos-e-come-utilizzare-la-carta-nazionale-dei-servizi-guida-completa-2019/ (Accessed: 25 August 2022)

¹²¹ Ministero dell'Interno – Prefettura di Firenze (2021) *NATIONAL SERVICE CARD (CNS) AND DIGITAL SIGNATURE - CARTA NAZIONALE DEI SERVIZI* (Online). Available at: immigrazione.regione.toscana.it/?q=schedemultilingue-CNS-EN-6227 (Accessed: 25 August 2022)

¹²² CIE- Carta d'Identità Elettronica - is the identity document of Italian citizens issued by the Ministry of the Interior. Thanks to highly advanced security and anti-counterfeiting elements, it grants the holder's identity verification and the access to online services of Public Administration, during administrative procedures at public offices or in any situation that requires identity verification, both in Italy and in many EU countries.

¹²³ Ministero dell'Interno *Electronic Identity Card (CIE)* (Online). Available at: cartaidentita.interno.gov.it/en/cie/electronic-identity-card (Accessed: 25 August 2022)

¹²⁴ Dipartimento per la trasformazione digitale (2022) *Digitalizzazione della PA* (Online). Available at: innovazione.gov.it/italia-digitale-2026/il-piano/digitalizzazione-della-pa/ (Accessed: 25 August 2022)

¹²⁵ Governo Italiano – Presidenza del Consiglio dei Ministri (2021) *PNRR: digitalizzazione, innovazione, competitività, cultura e turismo* (Online). Available at: governo.it/it/approfondimento/digitalizzazione-innovazione-competitivita-e-cultura/16701 (Accessed: 25 August 2022)

¹²⁶ Maggioli – La PA digitale *Guida alle lettura del decreto semplificazioni* (Online). Available at: lapadigitale.it/decreto-semplificazioni/ (Accessed: 25 August 2022)

¹²⁷ Longo, A. Ruggiero G. (2022) *L'app IO dei servizi pubblici in Italia: come si usa e il suo senso strategico* (Online). Available at: agendadigitale.eu/cittadinanza-digitale/lapp-io-pronta-al-lancio-cosi-i-servizi-pubblici-saranno-a-portata-di-smartphone/ (Accessed: 25 August 2022)

The theme of accessibility to mobile apps and websites has been regulated by the EU Directive 2102/2016 “Directive on accessibility of the websites and mobile applications of public sector bodies”¹²⁸, enacted by the Legislative Decree 106/2018¹²⁹. The Italian legal system features several laws in which it is ensured the right to access to the services provided by Public Administrations, such as Decree n. 76/2020 “Simplification and Digital Innovation Decree”. This Decree provides that Public Administrations shall, through the App IO, make their webservices accessible (except for technical issues certified by PagoPA S.p.A.).

With regard to accessibility to mobile applications, AGID – Agency for Digital Italy has published new guidelines concerning the accessibility to IT instruments (such as App IO, and PagoPa).^{130 131} These guidelines shall be complied with by platforms to allow people with disabilities to access IT instruments (especially mobile apps) provided by Public Administrations and other participating private institutes, and providers of services. In particular, the guidelines shall provide the *“technical requirements for accessibility to IT instruments; the adoption of technical methodologies to verify the accessibility to IT instruments; the model for the declaration of accessibility; the adoption of evaluation and monitoring methodology with regard to the compliance to the provisions regulating accessibility by IT instruments (such as websites and mobile apps); the circumstances by which the providers might reasonably (as per EU Directive 2102/2016 article 5)¹³² limit the accessibility to websites or mobile apps.”*¹³³

The guidelines, which entered into force on January 10th, 2020, enact the technical features provided by article 11 (*“Requisiti tecnici”*), Law n. 4/2004¹³⁴ as well as the EU Directive n. 2102/2016¹³⁵.

The abovementioned Article 11, recall the principle provided by the Law n. 4/2004 in Art. 3 (2) “General principles for accessibility” (*“Principi generali per l’accessibilità”*)¹³⁶.

Ensuring accessibility through the above-mentioned apps has however presented an issue. As per **SPID**, since all the information provided to the Public Digital Identity System are strictly personal, it has become an issue on how to allow elderly people (which represents a large proportion of the Italian population), to access apps in order to benefit from the services provided by the Public Administration (as seen before). Therefore, regarding those unable to use autonomously online services (such as elderly

¹²⁸ DIRECTIVE (EU) 2016/2102 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies

eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016L2102&from=IT

¹²⁹ DECRETO LEGISLATIVO 10 agosto 2018, n. 106 (Attuazione della direttiva (UE) 2016/2102 relativa all’accessibilità dei siti web e delle applicazioni mobili degli enti pubblici). (18G00133) (GU n.211 del 11-09-2018)

normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2018-08-10;106!vig=2021-11-04

¹³⁰ AGID - Docs Italia *Linee guida sull’accessibilità degli strumenti informatici* (Online). Available at: docs.italia.it/AgID/documenti-in-consultazione/lq-accessibilita-docs/it/stabile/index.html (Accessed: 25 August 2022)

¹³¹ AGID (2021) *Linee guida accessibilità – PA* (Online). Available at: agid.gov.it/it/design-servizi/accessibilita/linee-guida-accessibilita-pa (Accessed: 25 August 2022)

¹³² DIRECTIVE (EU) 2016/2102 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies

eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016L2102&from=IT

¹³³ AGID (2021) *Linee guida accessibilità – PA* (Online). Available at: agid.gov.it/it/design-servizi/accessibilita/linee-guida-accessibilita-pa (Accessed: 25 August 2022)

¹³⁴ LEGGE 9 gennaio 2004, n. 4 (Disposizioni per favorire e semplificare l’accesso degli utenti e, in particolare, delle persone con disabilità agli strumenti informatici). (GU n.13 del 17-01-2004)

normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2004-01-09;4!vig=

¹³⁵ DIRECTIVE (EU) 2016/2102 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 26 October 2016 on the accessibility of the websites and mobile applications of public sector bodies

eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32016L2102&from=IT

¹³⁶ Legge 9 gennaio 2004, n. 4 - *Disposizioni per favorire e semplificare l’accesso degli utenti e, in particolare, delle persone con disabilità agli strumenti informatici.*

normattiva.it/uri-res/N2Ls?urn:nir:stato:legge:2004-01-09;4!vig=2022-10-19



and disabled people), since August 16th, 2021, it is possible to designate a trusted person to exercise their rights towards INPS (National Social Security Institute). To safeguard the citizens' and foreigners' rights to access, article 64 (3) of the Digital Administrative Code¹³⁷ provides the regulation of the Proxy Management System ("*Sistema di Gestione delle Deleghe*" - SGD) for which the Minister of the Council of Ministers in charge of the technological innovation and the digital transition is responsible. The above-mentioned proxy can be requested by legal guardians, curators, and court-appointed guardians.¹³⁸

Concerning the protection of disclosed personal data to identity providers, these won't be used for commercial purposes. Identity Providers cannot use the user's personal data or transfer them to third parties without the user's authorization. The system provides a distinction, at the time of registration, between the necessary data to obtain the SPID digital identity and the information - not mandatory - that the identity provider may possibly request. Compliance with data protection rules is supervised by AgID and by the Italian Data Protection Authority¹³⁹.

As per **App IO** (the app of public services), the main goal, which developers intend to achieve, is to guarantee citizens full accessibility to the services provided by Public Administrations. To ensure the right to access to citizens affected by disabilities, the user interface has been designed to comply with specific requirements demanded by partially sighted citizens. Furthermore, developers are planning to adopt supporting tools, such as TalkBack or VoiceOver provided by operating systems.¹⁴⁰

For what it concerns Privacy issues, the app has been developed in compliance with the security guidelines provided by the ICT three-year Plan. Moreover, the design and development of the app have been based on the principles and provisions provided by the GDPR and the Italian Data Protection Code. The Public Administrations are responsible for the collection and storage of all the disclosed personal data which are deemed necessary for the pursuit of their institutional purpose.¹⁴¹

It is important to stress that currently these two apps do not adopt XR technologies. However, since XR are being developed, it is possible that the two abovementioned apps might adopt the technology, especially regarding the collecting and processing of biometric data (which are already specified in ID cards – both electronic and analogic).

3.3 Consumer Protection

3.3.1 Overview of the law and key elements of XR

It is important to remember that the Italian Parliament has approved the Legislative Decree n. 206, dated 6 September 2005 which came into force on 23 October 2005.¹⁴² The Legislative Decree provides a consolidated Act called "Codice del Consumo" (Consumer Code) which collects all EU consumer protection legislation. The purpose of the approval of this Code, is to bring together and coordinate all existing consumer protection provisions.¹⁴³

¹³⁷ DECRETO LEGISLATIVO 7 marzo 2005, n. 82 Codice dell'amministrazione digitale (GU n.112 del 16-05-2005 - Suppl. Ordinario n. 93)

normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2005-03-07;82

¹³⁸ Namirial S.p.A. (2022) *Come attivare lo SPID per anziani e per persone con disabilità* (Online). Available at focus.namirial.it/spid-per-anziani/ (Accessed: 25 August 2022)

¹³⁹ Spid – Public Digital Identity System FAQ – *Frequently Asked Questions?* (Online). Available at: spid.gov.it/en/frequently-asked-questions/ (Accessed: 25 August 2022)

¹⁴⁰ App IO – FAQ *Accessibilità* (Online). Available at: io.italia.it/fag/#n5_1 (Accessed: 25 August 2022)

¹⁴¹ App IO – FAQ *Sicurezza e Privacy* (Online). Available at: io.italia.it/fag/#n7_2 (Accessed: 25 August 2022)

¹⁴² D.lgs 206/2005 - Codice del Consumo
normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2005-09-06;206

¹⁴³ Unione Nazionale dei Consumatori. *Codice del Consumo – Conosci i tuoi diritti* (Online). Available at: codicedelconsumo.it/english-version/ (Accessed: 27 October 2022)



Therefore, it represents the single Act which covers and consolidates all the different stages in the consumer dealings, from advertising to correct information, from consumer contracts in general to product safety, access to justice and consumer organizations.¹⁴⁴

Recently, it has been subject to important legislative amendments made to the sale of goods Directive (*Articles 128 to 135-septies of the Consumer Code*)¹⁴⁵ and to the supply of digital content and digital services Directive (*Articles 135-octies to 135-vicies of the Consumer Code*)¹⁴⁶. These amendments are aimed at transposing European rules envisaging stricter consumer protection, with particular attention being made to those concerning the supply of digital content and those in Directive (EU) 2019/771 (*Sale of goods Directive*)¹⁴⁷ and Directive (EU) 2019/770 (*Digital content and digital services Directive*)¹⁴⁸.

With regard to the latter, the Regulation of the supply of digital content and services has been reformed by Legislative Decree no. 173/2021¹⁴⁹ implementing Directive (EU) 2019/770¹⁵⁰ in Italy, whose provisions apply to the supply of digital content or digital services occurring from 1 January 2022. The right of redress and the rules on the modification of the digital content or service, which only apply to contracts concluded as from that date, are exempted from the application of the Directive. The new amendments highlight that if the contract concerns a continuous supply service or in accordance with the expectations that the consumer may have built up (in line with the customs of the sector and the goods received), the updates to the provided digital contents or services, must be provided throughout the entire duration of the contract.¹⁵¹

With regard to the Digital Market Act and the Digital Service Act, the IX Committee - "Transport, Post and Telecommunications" – of the **Chamber of Deputies**, has examined the Proposal for a *REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON CONTESTABLE AND FAIR MARKETS IN THE DIGITAL SECTOR* (Digital Markets Act)¹⁵², as well as the Proposal for a *REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL ON A SINGLE MARKET FOR DIGITAL SERVICES* (Digital Services Act) amending the Directive 2000/31/EC¹⁵³. In addition, the 14th "European Union" (*Politiche dell'Unione*

¹⁴⁴ Unione Nazionale dei Consumatori. *Codice del Consumo – Conosci I tuoi diritti* (Online). Available at: codicedelconsumo.it/english-version/ (Accessed: 27 October 2022)

¹⁴⁵ D.lgs 206/2005 - Codice del Consumo – Articles 128 to 135 (7) normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2005-09-06;206

¹⁴⁶ D.lgs 206/2005 - Codice del Consumo – Articles 135 (8) to 135 (20) normattiva.it/uri-res/N2Ls?urn:nir:stato:decreto.legislativo:2005-09-06;206

¹⁴⁷ Directive (EU) 2019/771 - *Sale of goods Directive* eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32019L0770

¹⁴⁸ Directive (EU) 2019/770 - *Digital content and digital services Directive* eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32019L0771

¹⁴⁹ Decreto Legislativo n. 173/2021 - Attuazione della direttiva (UE) 2019/770 del Parlamento europeo e del Consiglio, del 20 maggio 2019, relativa a determinati aspetti dei contratti di fornitura di contenuto digitale e di servizi digitali.

gazzettaufficiale.it/atto/stampa/serie_generale/originario

¹⁵⁰ Directive (EU) 2019/770 - *Digital content and digital services Directive* eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32019L0771

¹⁵¹ Ferrari, M. (2021) *Codice del Consumo: le modifiche alla disciplina sulla vendita di beni* (Online). Available at: altalex.com/documents/news/2021/12/03/codice-del-consumo-le-modifiche-alla-disciplina-sulla-vendita-di-beni (Accessed: 27 October 2022)

¹⁵² Camera dei Deputati - Atto numero: COM (2020) 842 "Proposta di REGOLAMENTO DEL PARLAMENTO EUROPEO E DEL CONSIGLIO relativo a mercati equi e contendibili nel settore digitale (legge sui mercati digitali)" (Online). Available at: camera.it/leg18/1227?sezione=documenti&tipoDoc=lavori_attive&t=3&file=leg.18.COM.2020.842 (Accessed: 29 August 2022)

¹⁵³ Camera dei Deputati - Atto numero: COM (2020) 825 "Proposta di REGOLAMENTO DEL PARLAMENTO EUROPEO E DEL CONSIGLIO relativo a un mercato unico dei servizi digitali (legge sui servizi digitali) e che modifica la direttiva 2000/31/CE" (Online). Available at: camera.it/leg18/1227?sezione=documenti&tipoDoc=lavori_attive&t=3&file=leg.18.COM.2020.825 (Accessed: 29 August 2022)



Europea) has requested an opinion regarding the compliance of the Proposal with the EU principle of subsidiarity.¹⁵⁴ All assignments were decided in February 2021. Both Proposals have been published together by the EU Commission.

In order to allow the MPs to understand the scope of the Proposal, two reports, one summarizing the DSA Proposal and the other one the DMA Proposal, have been published by the Chamber of Deputies. On one hand the report regarding the Digital Services Act – DSA – is the Dossier n. 51, published on May 12th, 2021 (Camera dei Deputati, 2021c)¹⁵⁵, and the other the report regarding the Digital Market Act – DMA – is the Dossier n. 52, published on May 18th, 2021 (Camera dei Deputati, 2021a)¹⁵⁶. Moreover, each of these reports contains a section entitled “Government evaluations”, in which the Government’s opinion about the DMA and the DSA are reported.

Concerning the **DSA report**, the Italian Government agrees with the scope of the proposal, especially about the role of platforms to provide a safer environment for users. Therefore, the DSA shall adopt a mechanism, until now not provided, for the safeguarding of citizens’ fundamental rights and democratic principles. Furthermore, it is paramount the adoption of fines to ensure the protection of the abovementioned rights as well as principles.

It is the Government’s opinion that it is important to stress the reference to the rights provided in the Charter of Fundamental Rights of the European Union (especially regarding the protection of Intellectual property Rights – article 17)¹⁵⁷, as well as the urgency to clarify the relationship between the principles provided by the DSA and the principles provided by sector-based regulations. At last, the Government expresses its preliminary favour for the Proposal. It is paramount to stress that both these legislative acts focus on creating a safer online place for users by safeguarding the Right to transparency (Right to information) and the Protection of minors.

Concerning the first issue (*Right to information – transparency*), the EU legislator provided new transparency obligations for platforms, which will allow users to be better informed about how content is recommended to them (recommender systems) and to choose at least one option not based on profiling. The latter issue (*Protection of minors*) regards the obligation for platforms to be accessible to minors by adopting specific measures to protect them, including by fully banning targeted advertising. Since the two legislative acts have not yet entered into force (DMA will enter into force in 2023 and the DSA will apply fifteen months or from January 1st, 2024) neither the Italian Government nor the Parliament has yet assigned to any authority the task to supervise the enforcement of the provisions provided by both acts.

¹⁵⁴ Camera dei Deputati - Atto numero: COM (2020) 825 "Proposta di REGOLAMENTO DEL PARLAMENTO EUROPEO E DEL CONSIGLIO relativo a un mercato unico dei servizi digitali (legge sui servizi digitali) e che modifica la direttiva 2000/31/CE" (Online). Available at:

camera.it/leg18/1227?sezione=documenti&tipoDoc=lavori_attiue&t=1&file=leg.18.COM.2020.825 (Accessed: 29 August 2022)

¹⁵⁵ Camera dei Deputati – Ufficio rapporti con l’Unione Europea XVIII Legislatura (2021) Legge sui servizi digitali (Digital services act) Dossier n° 51 - 12 maggio 2021 (Online). Available at: documenti.camera.it/leg18/dossier/pdf/ES051.pdf?_1663826017878 (Accessed: 29 August 2022)

¹⁵⁶ Camera dei Deputati – Ufficio rapporti con l’Unione Europea XVIII Legislatura (2021) Legge sui mercati digitali (Digital markets act) Dossier n° 52- 12 maggio 2021 (Online). Available at: documenti.camera.it/Leg18/Dossier/Pdf/ES052.Pdf (Accessed: 29 August 2022)

¹⁵⁷ CHARTER OF FUNDAMENTAL RIGHTS OF THE EUROPEAN UNION (2000/C 364/01) europarl.europa.eu/charter/pdf/text_en.pdf



The procedure of examination of both proposals was eventually finished, and the IX Committee of the Chamber of Deputies approved the final document proposed by the supervisor (*Allegato 4¹⁵⁸*)¹⁵⁹ about the DSA Proposal. The final document reports the scope of the DSA, which is to strengthen the common digital service market and provide, to all types of enterprises, more legal clarity as well as fair competition conditions (*level playing field*). The Committee expressed its own opinion, stating that there is suitable coordination between the EU legislation (*horizontal regime*) and the specific legislations (*lex specialis*). Specifically, it reports the following observations:

- It is deemed necessary to clarify the mechanism of harmonization with the “Copyright Directive” (2019/790/CE) as well as with the “SMAV” (*Audiovisual and Media Services* - 2018/1808/CE) especially in consideration of platforms’ obligations towards minors and to guarantee consumers’ rights as well as the protection of Intellectual Property in accordance with the EU principle “*know your business customer*”
- It is necessary to modernize and update the three categories (*mere conduit, caching and hosting*), to which the providers’ conduct can be attributed, as well as more flexibility toward *cloud services providers*; update the definition of “illegal content” by EU Member States (with this regard it is proposed a EU common legal framework concerning both the definitions of “notice” and “take down” and the provision of standard procedures based on given time and guarantees
- There is a need to take into consideration the possibility of introducing for major platforms proactive obligations balanced by the respect of the freedom of speech and information which are safeguarded by the Charter of Fundamental Rights of the European Union. Therefore, it might be appropriate considering the introduction of an obligation for platforms to inform users about the unlawfulness and dangerousness of content.
- The provisions provided by the codes of conduct shall be deemed as the starting point for the approval of best practices concerning the phenomenon of disinformation. The said provisions might be completed by the directions indicated by the EU Commission.
- The EU Commission shall adopt measures to attenuate systemic risks and support the adoption of good conduct codes regarding online advertisement, especially sensationalist and viral content advertisement; the importance of the traceability of providers as well as the adoption of a mechanism to control the effective removal of illegal content.
- It shall be taken into consideration the adoption of procedures to extra-EU based providers to abide with the procedures provided by law which do apply to EU based providers, due to the lack of effective enforcement in the event of a breach of the law.
- It is important to clarify and to distinguish the roles and to guarantee coordination between national authorities, Digital services coordinator, and the European Commission, especially about the supervision regime and the enforcement activity towards major platforms. It is fundamental which national body shall be chosen to exercise the functions of Digital Services Coordinator to supervise the effective application of the regulation at a national level.¹⁶⁰

Regarding the **DMA report**, it is important to highlight the Government’s opinion and specifically its concerns about:

- The role of National Authorities which would be reduced to advisory and non-binding.
- The designation of the gatekeeper.

¹⁵⁸ The final document is reported in the BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) ALLEGATO published on June 23, 2021 n. 611.

¹⁵⁹ Camera dei Deputati XVIII Legislatura (2021) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) (Online). Available at: camera.it/leg18/824?tipo=A&anno=2021&mese=06&giorno=23&view=&commissione=09# (Accessed: 29 August 2022)

¹⁶⁰ Camera dei Deputati XVIII Legislatura (2021) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) (Online). Available at: camera.it/leg18/824?tipo=A&anno=2021&mese=06&giorno=23&view=&commissione=09# (Accessed: 29 August 2022)

- The definition of the obligations provided by the regulation which do apply to all kinds of gatekeepers.
- Too much power granted to the Commission regarding the issue of delegated acts.
- The proposed DMA provides a concentration of power, regarding the regulation power concerning discretionary scopes, in the hands of the Commission in despite of national governments.
- The excessive discretion granted to the Commission regarding the designation of gatekeepers in the event these do not fulfil the minimum quantitative threshold provided by the regulation, as well as cases in which gatekeepers are exempted from fulfilling certain types of obligations and prohibitions referred to certain events as provided by the Regulation.

As per the DSA, the Committee approved on June 23, 2021, the final document proposed by the supervisor (*Allegato 5*)¹⁶¹ regarding the DMA Proposal. This final document highlights the purpose of the DMA Proposal, which is to guarantee fair competition conditions and the contestability of the digital market as well as about services provided by the platforms, bearing in mind that the digital economy is expanding and that the digital platforms have assumed the role of “gatekeepers” of the said market. It also highlights the difference, in terms of *governance*, between the two Proposals. Indeed, the DSA proposes a model of governance based on the advisory role attributed to a body composed of the representatives of competent national authorities. The Advisory Committee for digital markets has been provided by the EU Regulation n. 182/2011¹⁶².

On the other hand, the DMA proposes a “centralized” governance model, based on the role attributed to the Commission to enforce the Proposal via the approval of delegated acts as well as execution acts.

The IX Committee of the Chamber of Deputies has however expressed the necessity to define a more complex model of governance based on reinforcement of the cooperation between the Commission and the Member States (represented by the national authorities). The above-mentioned IX Committee has expressed the following observations reported in the final document of approval of the DMA Proposal:

- It is deemed necessary to strengthen the cooperation between the Commission and the Member States and consequently the involvement of the national authorities, in order to guarantee a more congruent and effective application of the instruments provided by the Proposal;
- The EU Commission shall adopt specific criteria concerning the selection process of *gatekeepers*; provide the definition of “*final recipient of the service*” and “*active business recipients*”;
- It shall be evaluated whether it is deemed necessary to make explicit the coordination between the new regime and the European and national competition law;
- It is deemed appropriate to make explicit the coordination between the new regime and data protection law (in consideration of the fact that some provisions of the Proposal complete the applicable data protection legislation);
- It should be taken into consideration the opportunity given by more cooperation between the Commission and the Member States in order to be aware of the different subjects involved as well as the development of the digital market (the purpose is to adopt the appropriate measures to enforce the provisions provided);
- It should be evaluated the opportunity to determine the criteria regarding the adoption of the delegated acts to update gatekeepers’ obligations;

¹⁶¹ Camera dei Deputati XVIII Legislatura (2021) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) (Online). Available at: camera.it/leg18/824?tipo=A&anno=2021&mese=06&giorno=23&view=&commissione=09 (Accessed: 29 August 2022)

¹⁶² REGULATION (EU) No 182/2011 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 16 February 2011 laying down the rules and general principles concerning mechanisms for control by Member States of the Commission’s exercise of implementing powers.
eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:32011R0182&from=IT

- It is suggested to adopt measures to amend or repeal the adopted provisions.¹⁶³

During the examination of the two Proposals conducted by the IX Committee, several experts were engaged with, such as Facebook (Meta) Italy and Google (Alphabet) Italian representatives; the President of the Italian Authority for Communications Guarantees (AGCOM)¹⁶⁴; the President of the Italian Competition Authority (AGCM)¹⁶⁵, as well as the Italian Data Protection Authority, represented by its President¹⁶⁶.

As for the **Senate of the Republic** the Research Service (*Servizio Studi*) of the Chamber of deputy has provided, regarding the two abovementioned Proposals, a dossier (DMA – Dossier n. 22¹⁶⁷ and DSA – Dossier n. 21^{168 169}). In both dossiers, the Research Service has summarized the content of the two Proposals (structured in two sections: “*Legislative Background*” and “*Summary of the proposed measures*”).

The processing of analysing the Digital Service Act¹⁷⁰, as well as the Digital Market Act¹⁷¹, has been assigned also to other several Permanent Committees, such as the 3rd “Foreign Affairs and Immigration” (*Affari esteri e emigrazione*), the 10th “Industry, Trade and Tourism” (*Industria, Commercio, Turismo*), the 14th “European Union” (*Politiche dell’Unione Europea*) and the 8th “Public work and Communications” (*Lavori pubblici, comunicazioni*). All assignments have been decided in February 2021. These Committees have to give their observations and proposals to the IX Committees.

¹⁶³ Camera dei Deputati XVIII Legislatura (2021) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) (Online). Available at: camera.it/leg18/824?tipo=A&anno=2021&mese=06&giorno=23&view=&commissione=09# (Accessed: 29 August 2022)

¹⁶⁴ Camera dei Deputati XVIII Legislatura (2021) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) (Online). Available at: camera.it/leg18/824?tipo=C&anno=2021&mese=06&giorno=16&view=&commissione=09&pagina=# (Accessed: 29 August 2022)

¹⁶⁵ Camera dei Deputati XVIII Legislatura (2021) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) (Online). Available at: camera.it/leg18/824?tipo=C&anno=2021&mese=06&giorno=16&view=&commissione=09&pagina=# (Accessed: 29 August 2022)

¹⁶⁶ Camera dei Deputati XVIII Legislatura (2021) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Trasporti, poste e telecomunicazioni (IX) (Online). Available at: camera.it/leg18/824?tipo=C&anno=2021&mese=06&giorno=23&view=&commissione=09&pagina=# (Accessed: 29 August 2022)

¹⁶⁷ Senato della Repubblica XVIII Legislatura Dossier n. 22 Elementi di valutazione sui progetti di atti legislativi dell’UE *Proposta di regolamento del Parlamento europeo e del Consiglio relativo ai mercati equi e contendibili nel settore digitale (legge sui mercati digitali)* COM(2020)842 (Online). Available at: senato.it/japp/bgt/showdoc/18/DOSSIER/0/1208870/index.html (Accessed: 29 August 2022)

¹⁶⁸ Senato della Repubblica XVIII Legislatura Dossier n. 22 Elementi di valutazione sui progetti di atti legislativi dell’UE *Proposta di regolamento del Parlamento europeo e del Consiglio relativo ai mercati equi e contendibili nel settore digitale (legge sui mercati digitali)* COM(2020)842 (Online). Available at: senato.it/japp/bgt/showdoc/18/DOSSIER/0/1208868 (Accessed: 29 August 2022)

¹⁶⁹ Servizi Studi del Senato (2021) Elementi di valutazione sui progetti di atti legislativi dell’UE N. 21 *ELEMENTI PER LA VALUTAZIONE DEL RISPETTO DEL PRINCIPIO DI SUSSIDIARIETÀ E DI PROPORZIONALITÀ* (Online). Available at: senato.it/service/PDF/PDFServer/BGT/01208868.pdf (Accessed: 29 August 2022)

¹⁷⁰ Senato della Repubblica XVIII Legislatura Atto dell’Unione europea n. COM(2020) 825 definitivo (Online). Available at: senato.it/leg/18/BGT/Schede/docnonleg/41925.htm (Accessed: 29 August 2022)

¹⁷¹ Senato della Repubblica XVIII Legislatura Atto dell’Unione europea n. COM(2020) 825 definitivo (Online). Available at: senato.it/leg/18/BGT/Schede/docnonleg/41926.htm (Accessed: 29 August 2022)



Also, at the Senate of the republic regarding to the DSA, in the Dossier n. 89¹⁷² provided by the Research Service the Government has expressed its position. It agrees with the purpose to provide specific obligations which shall be abided by digital platforms. Besides, it agrees with the innovative approach set by the DSA, shaped by the recognition of the supranational feature of the platforms and the adoption of a Regulation in lieu of a Directive. The first is deemed more suitable to facilitate the harmonization of the obligations set for the platforms, notwithstanding the establishment country.

The Government has not expressed any opinion regarding the DMA.

In conclusion, the “*focal points*” highlighted in this domain are the following:

Concerning the DSA Proposal:

- The observations published by the Italian Government, especially concerning the rights provided in the Charter of Fundamental Rights of the European Union as well as the urgency to clarify the relationship between the principles provided by the DSA and the principles provided by the sector-based regulations;
- To clarify the mechanism of harmonization with the “Copyright Directive” (2019/790/CE) as well as with the “SMAV” (Audiovisual and Media Services - 2018/1808/CE).

Concerning the DMA Proposal:

- The Government’s opinion, and specifically its concerns about the Proposal such as the role of National Authorities which would be reduced to advisory and non-binding, the designation of the gatekeeper, the definition of the obligations provided by the regulation which do apply to all kinds of gatekeeper, the excessive power granted to the Commission regarding the issue of delegated acts.
- It is deemed necessary to strengthen the cooperation between the Commission and the Member States and consequently the involvement of the national authorities;
- The EU Commission shall adopt specific criteria concerning the selection process of gatekeepers; define “final recipient of the service” and “active business recipients”;
- It should be evaluated the opportunity to determine the criteria regarding the adoption of the delegated acts to update gatekeepers’ obligations.

3.3.2 Significant implications and legal cases

The adoption of new technologies and innovation is challenging the implementation and update of national legislation. We briefly analyse in this section the significant implications on consumer regulations of innovative approaches such dark patterns, nudging, dark nudges, sludge, and digital online advertising.

The use of “*dark patterns*”, consists of the adoption of manipulative design choices that significantly distort the behavior of the average user.¹⁷³ These techniques can be divided into two categories; the first one concerns patterns which are practices designed in good faith without the intention to undermine consumers, nor are justified in specific circumstances.¹⁷⁴ The second one, on the other hand, consists of psychological tricks, deceit, and manipulation which are deceptive design practices that should be prohibited.

¹⁷² Servizio Studi del Senato della Repubblica XVIII Legislatura Dossier n. 89 Nota su atti dell'Unione europea. *La proposta di legge sui servizi digitali (Digital Services Act - DSA)* (Online). Available at: senato.it/japp/bqt/showdoc/18/DOSSIER/0/1315079/ (Accessed: 29 August 2022)

¹⁷³ De Posson, V. (2022) *Dark Patterns: Four Key Principles the EU Must Get Right* (Online). Available at: project-disco.org/european-union/052522-dark-patterns-four-key-principles-the-eu-must-get-right/ (Accessed: 29 August 2022)

¹⁷⁴ For instance, requests for location access that allow users to update their preferences or awareness tools aimed at improving safety and privacy.



Policymakers, such as the Italian legislator, shall distinguish between the two abovementioned patterns, and ban “dark patterns” (which do not have a legitimate purpose under any circumstances). Currently underway there no legislative/ policy proposals with regard to dark patterns. It shall be borne in mind that in the event the legislator adopts a vague definition, as well as concept, of “pattern”, this would simply end up creating a lot of confusion and legal uncertainty. The EU Commission as well as data protection regulators, have/are expected to issued/issue three separate guidelines on dark patterns (specifically the European Commission guidelines on consumer protection rules¹⁷⁵, new comprehensive guidelines on the General Data Protection Regulation from the European Data Protection Board (EDPB)¹⁷⁶ adopted on March 14th, 2022¹⁷⁷ and the Commission guidelines on the Digital Services Act).¹⁷⁸

However, the EU legislator has proposed that platforms shall abide to the obligation to ban dark patterns.¹⁷⁹ The main target to achieve is represented by the following statement “*With the DSA, cancelling a subscription for a service should become easy as subscribing to it*”.^{180 181} Indeed, one of the members of the Italian Data Protection Authority¹⁸², has declared that dark patterns represent “*one of the most dangerous menaces for privacy*”¹⁸³. Therefore, it is reasonable to expect a major supervision by the Authority concerning the use of dark patterns by platforms, thanks also to the approval of the abovementioned guidelines on the General Data Protection Regulation from the European Data Protection Board (EDPB).

The protection of minors and women online through the adoption of “*nudging*”¹⁸⁴ techniques by platforms, seems to be a promising alternative intervention to make internet users more privacy

¹⁷⁵ Commission Notice – Guidance on the interpretation and application of Directive 2005/29/EC of the European Parliament and of the Council concerning unfair business-to-consumer commercial practices in the internal market. (Online). Available at : eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021XC1229%2805%29&qid=1640961745514 (Accessed: 29 August 2022)

¹⁷⁶ EDPB – European Data Protection Board (2022) Guidelines 3/2022 on Dark patterns in social media platform interfaces : How to recognise and avoid them (Online). Available at : edpb.europa.eu/our-work-tools/documents/public-consultations/2022/guidelines-32022-dark-patterns-social-media_en (Accessed: 29 August 2022)

¹⁷⁷ EDPB – European Data Protection Board (2022) *Guidelines 3/2022 on Dark patterns in social media platform interfaces: How to recognise and avoid them* (Online). Available at : edpb.europa.eu/system/files/2022-03/edpb_03_2022_guidelines_on_dark_patterns_in_social_media_platform_interfaces_en.pdf (Accessed: 29 August 2022)

¹⁷⁸ De Posson, V. (2022) *Dark Patterns: Four Key Principles the EU Must Get Right* (Online). Available at: project-disco.org/european-union/052522-dark-patterns-four-key-principles-the-eu-must-get-right (Accessed: 29 August 2022)

¹⁷⁹ European Commission (2022) *Questions and Answers: Digital Services Act* (Online). Available at: ec.europa.eu/commission/presscorner/detail/en/QANDA_20_2348 (Accessed: 29 August 2022)

¹⁸⁰ Vosloo, S. (2022) *EU Digital Services Act: How it will make the internet safer for children* (Online). Available at: weforum.org/agenda/2022/06/eu-digital-service-act-how-it-will-secure-children-online/ (Accessed: 29 August 2022)

¹⁸¹ European Parliament (2022) *Digital Services Act: agreement for a transparent and safe online environment* (Online). Available at: europarl.europa.eu/news/en/press-room/20220412IPR27111/digital-services-act-agreement-for-a-transparent-and-safe-online-environment (Accessed: 29 August 2022)

¹⁸² Garante della Privacy - Guido Scorza - Componente del Garante per la protezione dei dati personali (Online). Available at: garanteprivacy.it/home/trasparenza/organizzazione/organi-di-indirizzo-politico-amministrativo/il-collegio/guido-scorza (Accessed: 29 August 2022)

¹⁸³ Scorza, G. (2022) *Dark Pattern, Scorza: “Una delle minacce più pericolose per la privacy”* (Online). Available at: agendadigitale.eu/sicurezza/privacy/dark-pattern-scorza-una-delle-minacce-piu-pericolose-per-la-privacy/ (Accessed: 29 August 2022)

¹⁸⁴ Term coined by Richard Thaler - professor of Behavioral Science and Economics at the University of Chicago. behavioraleconomics.com/resources/mini-encyclopedia-of-be/nudge/



sensitive. At the same time, nudging faces sharp criticism, suggesting it violates various ethical values (such as personal autonomy, human dignity, sustainable well-being, and privacy).¹⁸⁵

Users as well as the legislator shall be aware of the adoption of “dark nudges” and “sludge”¹⁸⁶. The two techniques both aim to change consumer behavior against their best interests, but “sludge” uses cognitive biases to make behavior change more difficult.¹⁸⁷

The regulation of “digital advertising”, which is regulated in the DSA, as well in the DMA, through the introduction of two new restrictions concerning targeted advertising on online platforms. The first one bans targeted advertising of minors based on profiling techniques.¹⁸⁸ Indeed, platforms accessible to minors will have to take specific measures to protect them, including by fully banning targeted advertising.¹⁸⁹

The second one bans targeted advertising based on profiling by analyzing special categories of personal data, such as sexual orientation, religious beliefs, or ethnicity.¹⁹⁰ Indeed, users will have better control over how their personal data are used, specifically with regard to targeted advertising based on the process of sensitive data.¹⁹¹

Why might they be particularly harmful in XR? Nowadays, XR are being adopted by platforms which among users are minors (i.e. learning platforms) as well as platforms providing online games. Minors do interact with such platforms and therefore, there is a risk of implementation in the development and design of these patterns.

Minors interact with said platforms by wearing VR goggles. It must be stressed that this device is not designed for minors but primarily for adults and their use by minors is prohibited by manufacturers.¹⁹² Indeed, Meta cites a minimum age of 13 for the use of its VR technology and services, in compliance with global child protection regulations and the U.S. COPPA privacy law, which protects the online privacy of children under the age of 13.¹⁹³ However, this age restriction is unlikely to stop any child from dabbling in virtual reality is well known to anyone who visits popular VR social apps like Rec Room and VRChat or plays online games from time to time. Here, minors are often in the majority and easily

¹⁸⁵ Veretilnykova, M. Dogruel, L. (2021) *Nudging Children and Adolescents toward Online Privacy: An Ethical Perspective* Journal of Media Ethics 36(2):1-13 (Online). Available at: researchgate.net/publication/352404995_Nudging_Children_and_Adolescents_toward_Online_Privacy_An_Ethical_Perspective DOI:10.1080/23736992.2021.1939031 (Accessed: 30 September 2022)

¹⁸⁶ Term coined by Richard Thaler - professor of Behavioral Science and Economics at the University of Chicago. turtl.co/blog/sludge-cognitive-barrier/

¹⁸⁷ Pettigrew, M. Maani, N. Pettigrew, L. et al. (2020) *Dark Nudges and Sludge in Big Alcohol: Behavioral Economics, Cognitive Biases, and Alcohol Industry Corporate Social Responsibility* the Milbank Quarterly (Online). Available at: pubmed.ncbi.nlm.nih.gov/32930429/ DOI: 10.1111/1468-0009.12475 (Accessed: 30 September 2022)

¹⁸⁸ European Commission (2022) Questions and Answers: Digital Services Act (Online). Available at: ec.europa.eu/commission/presscorner/detail/en/QANDA_20_2348 (Accessed : 29 August 2022)

¹⁸⁹ European Parliament (2022) Digital Services Act: agreement for a transparent and safe online environment (Online). Available at: europarl.europa.eu/news/en/press-room/20220412IPR27111/digital-services-act-agreement-for-a-transparent-and-safe-online-environment (Accessed: 29 August 2022)

¹⁹⁰ European Commission (2022) Questions and Answers: Digital Services Act (Online). Available at: ec.europa.eu/commission/presscorner/detail/en/QANDA_20_2348 (Accessed: 29 August 2022)

¹⁹¹ European Parliament (2022) Digital Services Act: agreement for a transparent and safe online environment (Online). Available at europarl.europa.eu/news/en/press-room/20220412IPR27111/digital-services-act-agreement-for-a-transparent-and-safe-online-environment (Accessed: 29 August 2022)

¹⁹² Bezmalinovic, T, (2022) *Children and Virtual Reality: Do they need more protection?* (Online). Available at: mixed-news.com/en/children-and-virtual-reality-do-they-need-more-protection/ (Accessed: 30 September 2022)

¹⁹³ Federal Trade Commission - Children's Online Privacy Protection Rule ("COPPA") 16 CFR Part 312 ftc.gov/leqal-library/browse/rules/childrens-online-privacy-protection-rule-coppa



recognized by their voice. Not so many medical studies have been conducted with regard to whether and how virtual reality affects children. The lack of medical studies and hence, the uncertainty in the research, does not mean that VR does not involve risks for children. Indeed, there are two kind of risks that might affect children. One regards the question whether excessive and prolonged VR consumption could impair visual development.¹⁹⁴ ¹⁹⁵The other regards the psychological effects, where the question that arises is if the child spending a lot of time in VR, could be more likely to have trouble distinguishing between reality and play.¹⁹⁶

It must be stressed that virtual reality is more effective at mimicking human perception and faking "reality." If this were the case, then unsuitable content would possibly be even more disturbing for children than it would be on a monitor or smartphone.

Up to today none of these issues/gaps/challenges have been discussed in detail by the legislator, neither as a bill nor as in a declaration or report.

3.4 A.I. Governance

3.4.1 Overview of the law and key elements of XR

The Committees of the **Chamber of Deputies** (Camera dei Deputati, 2021a)¹⁹⁷ – n. IX "Transport, Postal Services and Telecommunications" (*Trasporti, Poste e Telecomunicazioni*) and n. X "Productive Activities, Trade and Tourism" (*Attività Produttive, Commercio e Turismo*), as well as n. XIV "European Union" (*Politiche dell'Unione Europea*) - has examined the Proposal for a "REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS"¹⁹⁸. The examination began in November 2021 and ended in March (about the reunited Committees n. IX and X) and in April (about the Committees n. XIV) 2022.¹⁹⁹

The 14th Committee "European Union" (*Politiche dell'Unione Europea*) has requested an opinion regarding the compliance of the Proposal with the EU principle of subsidiarity. For the MPs to

¹⁹⁴ Miehlbradt, J, Cuturi, L.F. Zanchi, S. *et al.* (2021) *Immersive virtual reality interferes with default head-trunk coordination strategies in young children* Article number: 17959 Scientific Reports (Online) Available at: [nature.com/articles/s41598-021-96866-8](https://www.nature.com/articles/s41598-021-96866-8) (Accessed: 30 September 2022)

¹⁹⁵ Tychsen, L. Foeller, P. (2020) *Effects of Immersive Virtual Reality Headset Viewing on Young Children: Visuomotor Function, Postural Stability, and Motion Sickness*, Am J Ophthalmol, January, Available at: pubmed.ncbi.nlm.nih.gov/31377280/ DOI: 10.1016/j.ajo.2019.07.020 (Accessed: 30 September 2022)

¹⁹⁶ Bezmalinovic, T, (2022) *Children and Virtual Reality: Do they need more protection?* (Online). Available at: mixed-news.com/en/children-and-virtual-reality-do-they-need-more-protection/ (Accessed: 30 September 2022)

¹⁹⁷ Camera dei Deputati XVIII Legislatura (2021) *Proposta di REGOLAMENTO DEL PARLAMENTO EUROPEO E DEL CONSIGLIO CHE STABILISCE REGOLE ARMONIZZATE SULL'INTELLIGENZA ARTIFICIALE (LEGGE SULL'INTELLIGENZA ARTIFICIALE) E MODIFICA ALCUNI ATTI LEGISLATIVI DELL'UNIONE* (Online). Available at: documenti.camera.it/apps/CommonServices/getDocumento.ashx (Accessed: 30 September 2022)

¹⁹⁸ REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL LAYING DOWN HARMONISED RULES ON ARTIFICIAL INTELLIGENCE (ARTIFICIAL INTELLIGENCE ACT) AND AMENDING CERTAIN UNION LEGISLATIVE ACTS

eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=CELEX:52021PC0206&from=IT

¹⁹⁹ Camera dei Deputati XVIII Legislatura (2021) *Proposta di REGOLAMENTO DEL PARLAMENTO EUROPEO E DEL CONSIGLIO CHE STABILISCE REGOLE ARMONIZZATE SULL'INTELLIGENZA ARTIFICIALE (LEGGE SULL'INTELLIGENZA ARTIFICIALE) E MODIFICA ALCUNI ATTI LEGISLATIVI DELL'UNIONE* (Online) Available at: documenti.camera.it/apps/CommonServices/getDocumento.ashx (Accessed: 31 August 2022)



understand the scope of the Proposal, a report (Camera dei Deputati, 2021d)²⁰⁰ has been published. It, on one hand, summarizes the principles provided in the EU Proposal, and on the other remarks on the fact that Italy has been actively engaged with this topic. Starting in 2018, various papers and documents have been produced, including a White Paper entitled “The A.I. at the service of citizens” (*Agenzia per l'Italia Digitale*)²⁰¹, published by AGID – Agency for Digital Italy; the document “A.I. for future Italy”²⁰², written and published in May 2020 and published by Consorzio CINI (*Consorzio Interuniversitario Nazionale per Informatica*) – Interuniversity Consortium on Computer Science; the National Research Program 2021 – 2027²⁰³, published by the Ministry of University and Research; the document entitled “National Strategy for Artificial Intelligence”²⁰⁴, published on September 2020 by the Italian Ministry of Economic Development. In this last document, the Government identifies 6 priorities:

- A.I. for competitive enterprises
- A.I. for a more modern Public Administration
- A.I. for more informed citizens
- The creation of professionals who are competent in different fields
- Regulate the use of data
- Propose a program regarding the investment of resources and governance.

The Authorities assigned the task to supervise the correct implementation of the A.I. Regulation in Italy is the AGID - Agency for Digital Italy - which has previously published the White Paper entitled “The A.I. at the service of citizens”, as reported above. During the examination of the Proposal, the reunited Committees n. IX and X, have interviewed the representatives of Anitec – Assinform (*Italian Association for Information and Communication Technology – ICT*)²⁰⁵, the MEP - draftsman of the Proposal of Regulation²⁰⁶; several experts^{207 208}; the Minister for Technological Innovation and Digital Transition²⁰⁹;

²⁰⁰ Camera dei Deputati – Ufficio rapporti con l’Unione Europea XVIII Legislatura (2021) Legge sull’Intelligenza Artificiale Dossier n° 57- 12 novembre 2021 (Online). Available at : documenti.camera.it/leg18/dossier/pdf/ES057.pdf?_1647278357058 (Accessed: 31 August 2022)

²⁰¹ AGID (2018) *L’Intelligenza Artificiale al servizio del cittadino: sfide e opportunità* (Online). Available at: agid.gov.it/it/agenzia/stampa-e-comunicazione/notizie/2018/03/21/l'intelligenza-artificiale-al-servizio-del-cittadino-sfide-opportunita (Accessed: 31 August 2022)

²⁰² CINI – Consorzio Interuniversitario nazionale per l’informatica - Laboratorio Nazionale di Artificial Intelligence and Intelligent Systems “AI for FUTURE ITALY” (Online). Available at: consorzio-cini.it/index.php/it/labaiis-home/labaiis-bandi/1659-ai-for-future-italy (Accessed: 31 August 2022)

²⁰³ MUR – Ministero dell’Università e della Ricerca (2020) Programma nazionale per la ricerca 2021-2027 (Online) Available at : mur.gov.it/sites/default/files/2021-01/Pnr2021-27.pdf (Accessed: 31 August 2022)

²⁰⁴ MISE – Ministero dello Sviluppo Economico (2020) Strategia Nazionale per l’Intelligenza Artificiale (Online) Available at: mise.gov.it/images/stories/documenti/Strategia_Nazionale_AI_2020.pdf (Accessed: 31 August 2022)

²⁰⁵ Annitec – Assinform anitec-assinform.it/

²⁰⁶ Camera dei Deputati XVIII Legislatura (2022) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Commissioni Riunite (IX e X) – Audizioni (Online). Available at: documenti.camera.it/leg18/resoconti/commissioni/bollettini/html/2022/01/13/0910/comunic.htm# (Accessed: 31 August 2022)

²⁰⁷ Camera dei Deputati XVIII Legislatura (2022) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Commissioni Riunite (IX e X) – Audizioni (Online). Available at: documenti.camera.it/leg18/resoconti/commissioni/bollettini/html/2022/02/08/0910/comunic.htm# (Accessed: 31 August 2022)

²⁰⁸ Camera dei Deputati XVIII Legislatura (2022) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Commissioni Riunite (IX e X) – Audizioni (Online). Available at: documenti.camera.it/leg18/resoconti/commissioni/bollettini/html/2022/03/02/0910/comunic.htm# (Accessed: 31 August 2022)

²⁰⁹ Camera dei Deputati XVIII Legislatura (2022) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Commissioni Riunite (IX e X) – Audizioni (Online). Available at: documenti.camera.it/leg18/resoconti/commissioni/bollettini/html/2022/03/09/0910/comunic.htm# (Accessed: 31 August 2022)



labour union representatives²¹⁰. On April 13th, 2022, the reunited Committees n. IX and X approved the final version of the document.²¹¹ The XIV Committees – European Union has approved the proposal reporting the supervisor’s favourable opinion to the approval of the Proposal²¹² on March 29th, 2022.

Also at the **Senate of the Republic**, the examination of the Proposal was assigned, on June 8th, 2021, to the following permanent committees: the XIV “European Union” (*Politiche dell’Unione Europea*) and the n. X “Industry, Trade and Tourism” (*Industria, commercio e turismo*)²¹³. The XIV Committee proceeded to examine the Proposal in two working sessions on July 6th, 2021,²¹⁴ and on July 28th, 2021²¹⁵, where it received favourable approval concerning compliance with the EU principle of subsidiarity and proportionality.

In conclusion, the “*focal points*” highlighted in this domain are the following:

- the Italian Government, National Authorities, and as well as other public/private subjects have published documents, and reports concerning A.I. in which it can be inferred the importance of this topic;
- both the Chamber of Deputies as well as the Senate of the Republic (their Committees) are discussing and examining the Proposal.

3.5 Digital Service Governance

3.5.1 Overview of the law and key elements of XR

On November 25th, 2020, the EU Commission has approved the Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on European data governance (*Data Governance*

²¹⁰ Camera dei Deputati XVIII Legislatura (2022) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Commissioni Riunite (IX e X) – Audizioni (Online). Available at: documenti.camera.it/leg18/resoconti/commissioni/bollettini/html/2022/03/16/0910/comunic.htm# (Accessed: 31 August 2022)

²¹¹ Camera dei Deputati XVIII Legislatura (2022) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Commissioni Riunite (IX e X) – Audizioni (Online). Available at: documenti.camera.it/leg18/resoconti/commissioni/bollettini/html/2022/04/13/0910/comunic.htm# (Accessed: 31 August 2022)

²¹² Camera dei Deputati XVIII Legislatura (2022) BOLLETTINO DELLE GIUNTE E DELLE COMMISSIONI PARLAMENTARI Commissioni Riunite (IX e X) – Audizioni (Online). Available at: documenti.camera.it/leg18/resoconti/commissioni/bollettini/html/2022/03/29/14/comunic.htm# (Accessed: 31 August 2022)

²¹³ Senato della Repubblica XVIII Legislatura Atto dell’Unione europea n. COM(2021) 206 definitivo (Online). Available at: senato.it/leg/18/BGT/Schede/docnonleg/42623.htm (Accessed: 31 August 2022)

²¹⁴ Senato della Repubblica – XVIII Legislatura - 14^a Commissione permanente (2021) ESAME DI PROGETTI DI ATTI LEGISLATIVI DELL’UNIONE EUROPEA Proposta di decisione del Parlamento europeo e del Consiglio relativa alla partecipazione dell’Unione al partenariato europeo sulla metrologia avviato congiuntamente da più Stati membri (n. COM(2021) 89 definitivo) (Online). Available at: senato.it/japp/bgt/showdoc/frame.jsp?tipodoc=SommComm&leg=18&id=1300906&part=doc (Accessed: 31 August 2022)

²¹⁵ Senato della Repubblica – XVIII Legislatura - 14^a Commissione permanente (2021) ESAME DI PROGETTI DI ATTI LEGISLATIVI DELL’UNIONE EUROPEA Proposta di Regolamento del Parlamento europeo e del Consiglio sui prodotti macchina (n. COM(2021) 202 definitivo) (Online). Available at: senato.it/japp/bgt/showdoc/frame.jsp?tipodoc=SommComm&leg=18&id=1306123&part=doc (Accessed: 31 August 2022)

Act)²¹⁶. At the time of writing, the Italian Parliament - in particular its Committees – has not yet begun the examination of the proposal. The provisions provided in the Proposal shall **enter into force 15 months after its approval**.

Though the examination of the proposal has not yet begun, the abovementioned “*Extraordinary Committee regarding intolerance, racism, antisemitism, incitement to hate and violence*”, has approved – unanimously – a resolution regarding the Council of Europe Convention on Access to Official Documents - CETS No. 205 – June 18th, 2009, and entry into force on December 1st, 2020 (*Tromsø Convention*).²¹⁷²¹⁸ This resolution commits the Government to promote, evaluate the opportunity, adhere to the **Tromsø Convention**,²¹⁹ and further implement its ratification to adopt the provided high standard. This Convention has not yet been signed by Italy.

The above-mentioned resolution is part of the more general theme of the Right to transparency (*Right to information*) which is paramount concerning the relationship between citizens and public institutions, as well as the role played by online platforms in promoting equality, the fight against discrimination, etc.

The Convention provides a series of provisions that, based on national legislations regarding the field of access to official documents, lays on three main principles:

- Transparency of public authorities;²²⁰
- Helps the public to form an opinion on the state of society and on public authorities;²²¹
- Fosters the integrity, efficiency, effectiveness, and accountability of public authorities, so helping affirm their legitimacy.²²²

Since the Convention has not been yet signed by Italy, there is no national authority which has been assigned the task of supervising the implementation of the provisions.

However, Italy has ratified in 2009 the UN Convention against Corruption (signed in 2003)^{223 224} known as the *Merida Convention*, by which it is restated the necessity to provide along criminal sanctions

²¹⁶ Proposal for a REGULATION OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL on European data governance (Data Governance Act)

eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52020PC0767

²¹⁷ Senato della Repubblica XVIII Legislatura - Procedura : Affari Assegnati - Affare concernente il tema del diritto alla conoscenza (n. 1181) (Online) Available at:

senato.it/leg/18/BGT/Schede/ProcANL/ProcANLScheda48041.htm (Accessed: 31 August 2022)

²¹⁸ Deemed as the first international legal instrument, which binds the recognition of the general right to access public authorities’ documents. It provides the development of principles and measures in order to guarantee its effective implementation in a democratic and pluralist society.

²¹⁹ Council of Europe Convention on Access to Official Documents Tromsø, 18.VI.2009

rm.coe.int/1680084826

²²⁰ Council of Europe Convention on Access to Official Documents Tromsø, 18.VI.2009 - Preamble

rm.coe.int/1680084826

²²¹ Council of Europe Convention on Access to Official Documents Tromsø, 18.VI.2009 - Preamble

rm.coe.int/1680084826

²²² Council of Europe Convention on Access to Official Documents Tromsø, 18.VI.2009 - Preamble

rm.coe.int/1680084826

²²³ UNITED NATIONS CONVENTION AGAINST CORRUPTION G.A. Res. 58/4 (entry into force 14 December 2005)

unodc.org/documents/treaties/UNCAC/Publications/Convention/08-50026_E.pdf

²²⁴ UNITED NATIONS CONVENTION AGAINST CORRUPTION G.A. Res. 58/4 (entry into force 14 December 2005)

unodc.org/unodc/en/corruption/ratification-status.html (Accessed: 31 August 2022)



against corruption events, also administrative preventive policies based on the principle of transparency.²²⁵

As per the national legislation the Italian Parliament has approved the legislation on the access to official documents (Law n° 241/1990, Legislative Decree n° 33/2013 – civic access - and Legislative Decree n° 97/2016 – “Freedom of Information Act” known as FOIA). The national authority supervising the compliance of Public Administrations to the provisions provided by these laws, is the Committee for the access to administrative documents (*“Commissione per l’accesso ai documenti amministrativi”*)²²⁶.

The resolution approved by the above-mentioned Extraordinary Committee regarding intolerance, racism, antisemitism, incitement to hate, and violence, commits the Government to the following targets²²⁷:

- *“to guarantee the dissemination of the “culture of transparency and participation”, by the implementation of the provisions fostering – first of all – a parliamentary and public discussion, capable of representing an instrument that contributes to an effective acknowledgment and democratic supervision”;*²²⁸
- *“to adopt as a guiding principle, concerning its mission, the “principle of acknowledgment” as a right to which citizens are entitled, regarding the acknowledgment of administrative and decision-making processes, to fulfil the more suitable democratic participation, according to the state of law and the most important international human rights law”;*²²⁹
- *“to foster the publicity of information regarding sectors of the utmost importance for a public interest, such as compliance with human rights, the promotion of equals, and the contrast of every kind of discrimination based on ethnic and national origin, religion, age, sex, gender, sexual orientation, gender identity, and disability, to contrast corruption, safeguard of the environment, social accountability, management of employee, equal opportunities concerning the board of directors with regard to age, gender, level of education and professional experience, as provided by the Directive 2014/95/UE of the European Parliament and the Council, on October 22nd, 2014”;*²³⁰
- *“to foster the fulfilment of an observatory to control the information of the major television channels and radio stations and their interaction with the most used social network platforms”;*²³¹
- *“to publish the structure of the ownership and the funding of media, to enact the recommendations of the Council of Europe, and to request full transparency in the stipulation and execution of the*

²²⁵ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²²⁶ Presidenza del Consiglio dei Ministri – Commissione per l’accesso ai documenti amministrativi – Il diritto di accesso ai documenti amministrativi (Online). Available at: commissioneaccesso.it/it/ (Accessed: 31 August 2022)

²²⁷ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²²⁸ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²²⁹ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²³⁰ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²³¹ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)



*exchange of information agreements, which such media reach with counterparts and with third parties”;*²³²

- *“to foster a regulation concerning the transparency of the lobby activities, according to the recommendation CM/Rec (2017) Committee of Ministers of the Council of Europe²³³ concerning the regulation of the activities performed by lobbies during the public decision-making process”;*²³⁴
- *“to promote, evaluate the opportunity, the participation in and the ratification of Italy to the Tromsø Convention, adopting the highest standards as described”;*²³⁵
- *“to foster, together with other Countries representative of all geopolitical and regional areas, initiatives within the UN which conduct the Organization and the Member States to commence the activity of codification – at a universal level - of the human rights to acknowledgment”.*²³⁶

It would represent an important decision made by the Italian Parliament if the Tromsø Convention will be signed. The signature of this Convention will represent a step forward for Italy to adopt policies and promote the principles provided therein in order to be part of a process of harmonization at a worldwide level. It shall be stressed, however, as reported above, in the Italian legal system several laws do provide policies guarding fundamental rights and the transparency of public authorities.

With regard to its application to XR technologies, the provided provisions might find application in the event that XR will be adopted to ensure the principle of acknowledgement concerning administrative and decision-making processes, and to fulfil the more suitable democratic participation, according to the state of law and the most important international human rights law.

In conclusion, the “*focal points*” highlighted in this domain are the following:

- it is highlighted the importance to adhere to the Tromsø Convention, and further implementing of its ratification to adopt the provided high standard.
- the Extraordinary Committee regarding intolerance, racism, antisemitism, incitement to hate, and violence, commits the Government to achieve several targets, such as guaranteeing the dissemination of the “*culture of transparency and participation*”, the adoption of the “*principle of acknowledgment*” as a right to which citizens are entitled, regarding the acknowledgment of administrative and decision-making processes.
- to foster the publicity of information regarding sectors of the utmost importance for a public interest, such as compliance with human rights, the promotion of equals, and the contrast of every kind of discrimination.

²³² Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²³³ Council of Europe – Committee of Ministers (2017) Recommendation CM/Rec(2017)4 of the Committee of Ministers to member States on youth work (Online). Available at: rm.coe.int/1680717e78 (Accessed: 31 August 2022)

²³⁴ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²³⁵ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)

²³⁶ Senato della Repubblica XVIII Legislatura (2022) RISOLUZIONE DELLA COMMISSIONE STRAORDINARIA PER LA TUTELA E LA PROMOZIONE DEI DIRITTI UMANI (Online). Available at: senato.it/service/PDF/PDFServer/BGT/1355459.pdf (Accessed: 31 August 2022)



3.6 Liability for harms

3.6.1 Overview of the law and key elements of XR

As per the topic regarding liability for harms under contract law, tort and criminal, the following articles are to be considered: in the Italian civil code, articles 1218²³⁷ and 2043²³⁸ rule contract and tort liability respectively. Contract liability concerns the violation of a legal constraint, while tort liability concerns harms to others. Criminal liability is mentioned at the art. 27 of the Italian Constitution²³⁹, stating that criminal liability is personal. Article 42²⁴⁰ of the criminal code describes the subjective elements of the crime, to assess the guilt of a person.

A case of sexual assault can be useful to understand how to deal with criminal liability in the digital XR context. The fact occurred on Horizon Worlds, the digital platform belonging to the Meta company. The Italian website *StudioCataldi.it*²⁴¹ explains that the lack of a real physical contact prevents bringing the case back into the context of sexual violence disciplined and punished by art. 609-bis of the criminal code²⁴². Furthermore, the Italian legal system does not provide an autonomous crime of sexual harassment. Nevertheless, art. 660²⁴³ of the criminal code punishes the crime of harassment of the person, understood as the behaviour with which, in a place open to the public, harassment or disturbance is caused to others for reasons worthy of reproach. Jurisprudence, Court of Cassation, has tried to elaborate the specific figure of sexual harassment, which, even in the absence of the material act of physical contact typical of sexual violence, is substantiated in vulgar expressions of a sexual nature or in acts of invasive and insistent courtship. This figure should be sufficient to punish those behaviours carried out by means of electronic devices in the context of virtual environments.

In conclusion, the “*focal point*” highlighted in this domain is the following:

- The Italian legislation provides several provisions with regard to civil, tort and criminal liability respectively in the civil cod and in the criminal code;
- Currently, as seen, it is the jurisprudence, more than the legislator, involved in the attempt to provide legal reactions to crimes committed in the virtual world (e.g. Metaverse).

²³⁷ Italian Civil Code, Artiche 1218 “Responsabilità del debitore”
normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1942-03-16;262

²³⁸ Italian Civil Code, Article 2043 “Risarcimento per fatto illecito”
normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1942-03-16;262

²³⁹ Constitution of the Italian Republic, Article 27
senato.it/documenti/repository/istituzione/costituzione_inglese.pdf

²⁴⁰ Italian Criminal Code, Article 42 “Responsabilità per dolo o per colpa o per delitto preterintenzionale. Responsabilità obiettiva”
normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1930-10-19;1398

²⁴¹ Sicolo, M. (2022) *Molestie sessuali nel Metaverso: sono reato?* (Online). Available at:
studiocataldi.it/articoli/44610-molestie-sessuali-nel-metaverso-sono-reato.asp (Accessed: 30 September 2022)

²⁴² Italian Criminal Code, Article 609 (2) “Violenza sessuale”
normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1930-10-19;1398

²⁴³ Italian Criminal Code, Article 660 “Molestia o disturbo alle persone”
normattiva.it/uri-res/N2Ls?urn:nir:stato:regio.decreto:1930-10-19;1398



4. Overview of gaps and challenges

In this section is included a recap of all the “*focal points*” reported at the end of each domain specific legal issues relevant at national level.

- Human rights are recognized and safeguarded both by the Constitution and by national laws.
- The international acts, as well as Conventions, regulating human rights, state that these rights shall be enforceable. Although there is not reported any kind of referral to digital extended reality technologies, it is plausible to think that these rights are enforceable also in the extended digital reality.
- The enactment of the principles expressed by the GDPR in the Italian legislation and the role of the authorities in the enforcement of the provisions (both European and national).
- The importance conferred to special categories of personal data which shall be safeguarded due to their particular nature.
- The observations published by the Italian Government, especially concerning the rights provided in the Charter of Fundamental Rights of the European Union as well as the urgency to clarify the relationship between the principles provided by the DSA and the principles provided by the sector-based regulations.
- The demands to clarify the mechanism of harmonization with the “Copyright Directive” (2019/790/CE) as well as with the “SMAV” (Audiovisual and Media Services - 2018/1808/CE).
- The Government’s opinion, and specifically its concerns about the Proposal such as the role of National Authorities which would be reduced to advisory and non-binding, the designation of the gatekeeper, the definition of the obligations provided by the regulation which do apply to all kinds of gatekeeper, the excessive power granted to the Commission regarding the issue of delegated acts.
- It is deemed necessary to strengthen the cooperation between the Commission and the Member States and consequently the involvement of the national authorities.
- The EU Commission shall adopt specific criteria concerning the selection process of gatekeepers; define “final recipient of the service” and “active business recipients”.
- It should be evaluated the opportunity to determine the criteria regarding the adoption of the delegated acts to update gatekeepers’ obligations.
- The Italian Government, National Authorities, and as well as other public/private subjects have published documents, and reports concerning A.I. in which it can be inferred the importance of this topic.

- It is highlighted the importance to adhere to the Tromsø Convention, and further implementation by way of its ratification to adopt the provided high standard.
- The Extraordinary Committee regarding intolerance, racism, antisemitism, incitement to hate, and violence, commits the Government to achieve several targets, such as guaranteeing the dissemination of the “*culture of transparency and participation*”, the adoption of the “*principle of acknowledgment*” as a right to which citizens are entitled, regarding the acknowledgment of administrative and decision-making processes.
- To foster the publicity of information regarding sectors of the utmost importance for a public interest, such as compliance with human rights, the promotion of equals, and the contrast of every kind of discrimination.
- The Italian legislation provides several provisions with regard to civil, tort and criminal liability respectively in the civil cod and in the criminal code;
- Currently, as seen, it is the jurisprudence, more than the legislator, involved in the attempt to provide legal reactions to crimes committed in the virtual world (e.g. Metaverse).

The report features *significant legal cases* which are the object of in-depth analyses by the legislator and policymakers (such as Spid App and AppIO, dark patterns, nudging, etc.) and others which are the focus of current debates and are likely to be the focus of future discussions (such as the Metaverse and its implications).

5. Conclusion

XR technologies present multiple and complex legal issues and challenges with wide-ranging socio-economic and human rights implications.

As with the international and EU law landscape, in the Italian legal system there is no dedicated legislation with direct application to XR. As reported throughout the report, the Italian constitutional bodies are discussing the implications of XR technologies, although no law has yet been approved by the Parliament.

XR technologies, although not explicitly regulated at a national level, nor at an international or European level, are nonetheless subject to various domain-specific legal frameworks, including human rights law (see Section 3.1) privacy and data protection law (see Section 3.2), and consumer rights law (see Section 3.3). Further legislative measures at the EU level are also expected, with each of the e-Privacy Regulation, the AI Act, the Digital Services Act, the Data Act, and the Data Governance Act at varying stages of the legislative schedule and all likely to impact upon the regulation of XR technologies. All these upcoming legislative measures will directly apply to the Italian Legislation (such as EU Regulations), or adapted to the national legal system (in the case of Directives). Nonetheless, these legislative measures are objects of discussions by Parliamentary Committees, as reported in Sections 3.3 (Consumer Protection), 3.4 (A.I. Governance), and 3.5 (Digital Service Governance).

Even in the absence of additional regulatory measures, a key advantage of rights-based legal frameworks is the *built-in flexibility* to adapt to the challenges posed by new and emerging technologies, including XR, to better protect the rights of individuals against interference.

It must be stressed that certain human rights frameworks, for instance, are treated as “*living instruments*”, in accordance with which they are constantly evolving to address new challenges, whether it be through expanded judicial interpretations of existing rights, or the introduction of new rights to supplement existing protections.²⁴⁴ Such a feature assumes certain importance for XR technologies, due to the fact of representing an *emerging technology*.

The main question that shall be asked is how to define XR technologies. The chosen definition will have the effect of determining which will be the applicable basis for future legal regulation, with regard to privacy and data protection (not only limited to collection and storage of personal data but the process of “special” category personal data – biometric and genetic), human rights (such as the right to freedom of thought and freedom from discrimination), consumer protection (concerning, for instance, the role of major platforms in assuring the right to information, the protection of minors and women as well as the right to safety), and digital service governance (concerning the relationship established between Public Administration and citizens with regard to the Right to transparency, the role of lobbying during the public decision-making process, and above all the public’s confidence in public authorities).

²⁴⁴ The doctrine which refers to “*living instrument*” is derived from the jurisprudence of the European Court of Human Rights (ECtHR) and applies specifically to the European Convention on Human Rights (ECHR), which Italy signed (1950) and ratified (1955) as one of the founding members of the Council of Europe (1949).

Overall, this analysis of the Italian law and policy in relation to XR has highlighted how the discussion is in progress, though in its early stages, and it is based on the question of how to regulate such technologies, obviously bearing in mind primarily the EU legislation as well as international acts.

In conclusion of this report, at present, there is no proposal to comprehensively regulate XR at the Italian national level, although initial discussions are in progress, especially in the light of specific cases - object of debate from a legal point of view – which do represent opportunities and challenges, such as the Metaverse.

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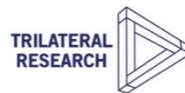
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Annex 9.9 National legal case study: Digital Extended Reality in the UK

D4.2 Comparative analysis of national legal case studies



December 2022



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D4.2 National legal case studies: Digital Extended Reality in the UK

Work Package	WP4 Policy, legal and regulatory analysis		
Work Package lead	Trilateral Research (TRI)		
Partner name	DeMontfort University (DMU)		
Lead Author(s)	Kathleen Richardson, Nitika Bhalla (DMU)		
Other contributors	Julie Vinders, Ben Howkins (TRI)		
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1.0	23/12/2022	Final version

Keywords

Digital Extended Reality (XR); law of UK; human rights; privacy and data protection; use in legal systems; liability for harms, online harms, free speech, hate speech, Online Safety Bill, Data Protection and Digital Information Bill, Higher Education (Freedom of Speech) Bill, GDPR

The TechEthos Project

TechEthos is an EU-funded project that deals with the ethics of the new and emerging technologies anticipated to have a high socio-economic impact. The project involves ten scientific partners and six science engagement organizations and runs from January 2021 to the end of 2023.

TechEthos aims to facilitate “ethics by design”, namely, to bring ethical and societal values into the design and development of new and emerging technologies from the very beginning of the process. The project will produce operational ethics guidelines for three to four technologies for users such as researchers, research ethics committees, and policymakers. To reconcile the needs of research and innovation and the concerns of society, the project will explore the awareness, acceptance, and aspirations of academia, industry, and the general public alike and reflect them in the guidelines.

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Definitions and abbreviations

Table 1: List of Definitions

Term	Explanation
Digital Extended Reality technologies (XR)	Refers to AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs, and allowing extended or mixed virtual scenarios to be tailor-made or “customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices)

Table 2: List of Abbreviations

Term	Explanation
AIA	Artificial Intelligence Act (AIA)
APPG	All Party Parliamentary Group
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CERD	International Convention on the Elimination of All Forms of Racial Discrimination
CPRMW	Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families
CPS	Criminal prosecution service
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
DoA	Description of Action



DSA	Digital Services Act (EU)
ECHR	European Convention on Human Rights
ECHR	European Convention on Human Rights
ECtHR	European Court of Human Rights
EU	European Union
GDPR	(UK or EU) General Data Protection Regulation
ICCPR	International Covenant on Civil and Political Rights
ICESCR	International Covenant on Economic, Social and Cultural Rights
MP	Member of Parliament
MR	Mixed Reality
NLP	Natural language processing
VLOP	Very large online platforms
VR	Virtual reality
WP	Work package
XR	Digital extended reality

Abstract

This report provides a review of the current state of the law and legal responses to Digital Extended Reality in the UK, as evidenced in legislation, regulation, and case law. It focuses on those issues affecting and/or contributing to fundamental human rights and freedoms, socio-economic inequalities, and stimulation of innovation. Most relevant legal domains and regulatory bodies, and their views on the application of existing and proposed regulatory provisions relevant for XR, and significant legal cases are discussed in the report. The on-going discussions on gaps and challenges of these provisions is also provided, to feed into the TechEthos ethical, legal and social analysis and the design of ethics-by design guidelines for extended digital reality technologies.

A summary overview of the main findings and legal issues surrounding XR in the UK is provided in section 5.1.3 of the TechEthos D4.2 Comparative analysis of national legal case studies. This report is primarily aimed at informing the UK government and UK policy makers regarding the regulatory challenges of XR in the UK. Furthermore, it provides further background to readers to the specific UK context of the main points and key regulatory challenges identified in the comparative analysis to which this report is annexed.

1. Introduction

Digital Extended Reality (XR) is a cluster of different technologies (virtual reality, augmented reality, mixed reality, and natural language processing (NLP)) that mediate users' experience with digital technologies. These technologies pose significant legal issues that will impact on human rights, privacy, and social engagement with others. This study provides an overview of those legal issues and challenges.

This report analyses relevant laws and policies from the UK legal system concerning XR technologies. For the purpose of the TechEthos project and this national legal case study, we have used the following definition for XR technologies¹:

Digital Extended Reality technologies refers to AI-powered digital technologies (hardware and software) capable of perceiving and processing human sensorial outputs, e.g., voice, gestures, language, movement, emotions, and other elements of human communication, allowing extended or mixed virtual scenarios (e.g., visual, audio, linguistic or haptic) to be tailor-made or “customized” based on the user interest and behaviour (and thus profile, model, predict, discriminate, and influence the user’s behaviour or nudge their choices).²

1.1 Purpose of the UK case study

The objective of this case study is to review the current state of the law and legal responses on XR in UK, as evidenced in policy, legislation, case law and regulation. We prepared this study through desk research.

Whilst there are no specific laws and policies on XR in the UK, many existing laws and policies (including human rights law, privacy and data protection law, use in criminal, civil and evidence law) are relevant and are likely to apply to the use of such technologies, including any harms resulting from them (covering tort, contract and criminal law in relation to liability for harms).

This report is part of a series of national legal case studies prepared in the TechEthos project covering three technology families: climate engineering, digital extended reality (XR), and neurotechnologies. A complementary report covers the international and European Union law dimensions of the three technology families. The following table provides an overview of the nine national legal case studies conducted as part of the *Comparative analysis of national legal case studies* (D4.2 of the TechEthos project):

¹ For more information about the TechEthos technology families and their innovation ecosystems, visit <https://www.techethos.eu/resources/>.

² Buchinger E., Kinegger M., Zahradnik G., Bernstein M.J., Porcari A., Gonzalez G., Pimponi D., Buceti G. (2022). In short: Digital Extended Reality. TechEthos Project Factsheet based on TechEthos technology portfolio: Assessment and final selection of economically and ethically high impact technologies, Deliverable 1.2 to the European Commission. Available at: www.techethos.eu.

Table 3: Overview of nine national legal case studies (TechEthos WP4)

Climate Engineering	Neurotechnologies	Digital Extended Reality
Australia	Germany	France
Austria	Ireland	Italy
United Kingdom	United States	United Kingdom

1.2 Structure of the study

Section II explores the existing and proposed laws and policies that specifically address XR. **Section III** explores the legal implications of XR in relation to specific domains, including human rights law, privacy and data protection, use in legal systems, and liability for harms. **Section IV** provides an overview of the gaps and challenges in relation to the regulation of XR. **Section V** concludes the case study.

1.3 Scope and limitations

This national legal case study of the UK was prepared as part of the TechEthos project's work package 4 on policy, legal and regulatory analysis. Therefore, the scope is demarcated by the project task's workplan. Like the technology itself, the potential legal issues in relation to XR are still emerging. Therefore, the purpose of this national legal case study is to provide a high-level overview of the legal implications of XR in the UK, focusing on a pre-defined range of topics and legal frameworks with significant human rights and socio-economic impacts that are of high policy relevance.

1.4 Introduction to the UK legal system

UK devolution

The United Kingdom (UK) is made up of four distinct territories: England, Wales, Scotland and Northern Ireland. Scotland and Northern Ireland have independent legislative assemblies where they can make their own laws. Scotland, Northern Ireland and Wales are devolved administrations, with only certain, differing powers passed on to them through UK Acts of Parliament. Those powers not devolved to them, are called 'reserved powers' and still sit with the UK Parliament. Devolved administrations do not have the legal competence to legislate in these areas, only the UK Parliament. Relevant Acts of Parliament are: the Scotland Act 1998, the Northern Ireland Act 1998, and the Government of Wales Act 1998, the Government of Wales Act 2006, and the Wales Act 2017. The Sewel Convention provides that the UK Parliament can legislate on devolved matters, but will not normally do so without consent of the devolved administrations.

UK Parliament

There are 650 members of parliament (MPs), each representing a constituency from the four countries: England, Wales, Scotland and Northern Ireland. Scotland has a devolved Scottish Parliament (*Pàrlamaid na h-Alba*), as does Northern Ireland through the Northern Irish Assembly (Stormont). Finally, Wales has the Welsh parliament (Senedd Cymru).

The UK parliament is bicameral, meaning it is comprised of an upper and a lower house. The lower house is called the House of Commons and has democratically elected representatives for each constituency known as Members of Parliament (MPs). The House of Commons dates from the second half of the 13th

century to represent the interests of property owners.³ The House of Lords is the upper House of Parliament, a non-elected body where members' role is to scrutinise bills. Appointed or hereditary members of the House of Lords have a range of titles (e.g., Lords, Ladies, Baroness, Countess, Duke, Marquess) and are often collectively referred to as peers.

The UK is described as a constitutional monarchy, a status which denotes that whilst acting as the head of state, the role of the monarch is limited, and its powers are mostly exercisable on the basis of advice from ministers.⁴

UK legislative process

In the UK laws are called Bills while in the legislative stages, and only become Acts if they are approved by the two Houses of Parliament and receive Royal Assent. Legislative proposals can be initiated in either of the Houses and go through various stages: first reading, second reading, committee stage, report stage, and third reading, where upon a bill is transferred to the other House for its first reading or consideration of any amendments, depending on where it started. Before a bill can be enacted as an Act of Parliament, each of the Houses considers any amendments proposed by the other. In the event of disagreement, proposed amendments and counter-amendments will be exchanged in a process of 'ping pong' unless and until both Houses consent to the bill.⁵ The final stage of the legislative process involves the grant of Royal Assent by the monarch in exercise of a prerogative power determined by constitutional convention to be a mere formality.⁶ During the legislative process there is normally a consultation phase, with experts invited to participate. This can take place prior to the development of bills, or during the readings. Members of the public participate in these consultations either by attending specific APPG (All Party Parliamentary Group – normally invitation only), or via online consultations.

Sources of law

The UK has no codified constitution. Instead of a single written constitution, sovereignty is the most important principle of UK constitutional law, the UK constitution comprises various statutes, conventions, judicial decisions and treaties. Parliamentary sovereignty is the most important principle of UK constitutional law, which provides that the UK Parliament is the ultimate legal authority to create or revoke laws.⁷ The UK has a well-established legal framework of Common law (reliance on court precedence). Main sources of law:

- Common law / case law
- UK legislation (Acts of Parliament or the Parliaments of devolved administrations)
- Retained EU law
- International law

Retained EU law

The UK is no longer a member of the European Union following the passing of the European Union (Withdrawal) Act 2018. Despite the UK leaving the European Union, the UK (all four territories) are still

³ Britannica, n.d. House of Commons: British Government [Online] Retrieved 28.10.22
<https://www.britannica.com/topic/House-of-Commons-British-government>

⁴ Le Seur, A., Sunkin, M., and Murkens, J.E.K. (2016) *Public Law* (3rd edn. Oxford University Press, Oxford, UK) pp.261-263.

⁵ Le Seur, A., Sunkin, M., and Murkens, J.E.K. (2016) *Public Law* (3rd edn. Oxford University Press, Oxford, UK) pp.451.

⁶ Le Seur, A., Sunkin, M., and Murkens, J.E.K. (2016) *Public Law* (3rd edn. Oxford University Press, Oxford, UK) pp.451.

⁷ *Parliament's authority / UK Parliament*, [Online]. Retrieved 28.10.22. Available at:
<https://www.parliament.uk/about/how/role/sovereignty/>.

bound by some retained EU-derived domestic legislation, such as the Data Protection Act 2018, which implements the EU General Data Protection Regulation (GDPR). Furthermore, the UK is still a member of the Council of Europe and accepts the jurisdiction of the European Court of Human Rights. The European Convention on Human Rights (ECHR)⁸ is implemented into UK domestic law through the Human Rights Act 1998.

1.5 Current state of digital extended reality (XR) in UK

There are no UK laws specifically developed or being developed to deal with XR. However, the UK government is in the process of debating the Online Safety Bill (hailed as the 'world-first online safety law'). Moreover, the UK will not sign up to the EU AI Act⁹, but instead is developing a Data Protection and Digital Information Bill that covers some of the concerns embedded in the AI Act.

⁸ ECHR (1953)

⁹ EU AI Act. Retrieved 28.10.22 <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A52021PC0206>



2. XR-specific legal developments

This section provides an overview of the legal and policy developments pertaining to XR in the UK. It examines relevant policies and laws in relation to XR and identifies the national authorities involved in the implementation and enforcement of such laws and policies.

Existence of dedicated laws on XR

At present there are no UK laws that explicitly mention the regulation of XR. However, the Online Safety Bill¹⁰ is still under discussion (with activists aiming to stop it for fears it will harm free speech) and is considered in greater detail in section IV.

Proposals for dedicated law on XR

The Online Safety Bill (hailed as the 'world-first online safety' bill) is legislative proposal currently under discussion. This bill introduces a 'duty of care' for big technology companies who will have to follow its regulations to ensure a safe environment for their users. This includes the responsibility to amend their Terms and Conditions to be in line with the new directives, while removing all the harmful content posted on their platforms. Furthermore, it will give governments the right to fine (up to ten per cent of revenues) for illegal material, material relating to terrorism, and child sexual exploitation and abuse. Provisions will be made to address named categories of legal but harmful material accessed by adults.¹¹

The bill will distinguish between adult and child users and ensure content is appropriately accessed by different age categories. Adults will be given rights to restrict their personal access to harmful (but legal) data (e.g., eating disorders, self-harm). Platforms will be required to report any child sexual exploitation and abuse content to the National Crime Agency and assist with law enforcement.¹²

The other significant legislation under discussion is the Data Protection and Information Bill¹³ which is seen as a replacement to the European law of GDPR.

Responsibility for enforcement

The Office for Communications (Ofcom) is the regulator for the communications services that the UK would use as a safety regulator for enforcement of the law. Fines of up to ten percent of income for companies will be made payable if the law is broken.

Significant legal cases

A recent case in the UK where a child (Archie Battersbee¹⁴) imitated a game on Tik Tok and injured himself and then died.

¹⁰ Online Safety Bill. Retrieved 28.10.22. Available at/<https://bills.parliament.uk/bills/3137>

¹¹ The Draft Online Safety Bill and the legal but harmful debate: Government response to the Committee's Eight Report. Fifth Special Report of Session 2021-22. House of Commons, Digital, Culture, Media and Sport Committee. Retrieved 28.10.2022 Available at/

<https://committees.parliament.uk/publications/9408/documents/161169/default/>

¹² Online Safety Bill: factsheet. 19th April 2022. Retrieved 28.10.2022 Available at/

<https://www.gov.uk/government/publications/online-safety-bill-supporting-documents/online-safety-bill-factsheet>

¹³ Data Protection and Information Bill. Retrieved 28.10.2022. Available at/<https://bills.parliament.uk/bills/3322>

¹⁴ BBC (2022). Archie Battersbee: How did life support battle end up in court? 6th August 2022. [Online] Retrieved 28.10.22 Available at/ <https://www.bbc.co.uk/news/uk-england-essex-61829522>



A court case is underway by the parents of Molly Russell¹⁵ (14 years old) who accessed self-harm images and material around depression and suicide on Instagram and Pinterest.

Current debates and future policy and/or legal developments

The current debate and key message from child rights campaigners is to restrict harmful material to and of children. A counterargument put forward by activists is that the bill will harm legitimate freedom of speech by imposing restrictions on certain types of content. There is a range of debates where there is no social agreement and social media has been regulated in light of this, for example, during the covid-19 pandemic there was regulation of medical voices that did not adhere to governmental public health messaging on the topic.¹⁶

Links to other laws

The European Parliament is currently considering the proposed Digital Services Act (DSA)¹⁷ to address content moderation in the EU. Similar to the Online Safety Bill in the UK, the DSA is aimed at protecting the human rights of its European citizens. The DSA requires very large online platforms (VLOPs) to perform assessments of their systemic risks, including systemic design features that threaten the exercise of fundamental rights.¹⁸ Therefore, regarding legal but harmful content, the DSA is concerned only with systemic design features of user-to-user services.

Furthermore, countries such as Brazil and India have both considered much stricter regulation of content monitoring online. The Brazilian executive issued a Provisional Measure 1068 to restrict content removal by social media platforms, limiting removal only to cases of nudity, violence, narcotics, and incitement to crime, thereby preventing social media platforms from removing disinformation (such as President Jair Bolsonaro's COVID-19 disinformation removed by Facebook, Twitter, and YouTube)¹⁹. The Indian government has similarly issued several regulations, including the Information Technology Act and Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules of 2021²⁰, which direct user-to-user services to remove a wide range of content, including material that threatens the sovereignty of the Indian state. This uses algorithmic systems to monitor and remove harmful content, and to trace encrypted messages to limit online anonymity. Activist groups have claimed that these measures are aimed at curbing dissent against the government, resulting in what they call "digital authoritarianism."²¹

¹⁵ BBC (2022). Molly Russell inquest: Father makes social media plea. 30th September 2022. [Online] Retrieved 28.10.22. Available at/ <https://www.bbc.co.uk/news/uk-england-london-63073489>

¹⁶ The Draft Online Safety Bill and the legal but harmful debate: Government response to the Committee's Eight Report. Fifth Special Report of Session 2021-22. House of Commons, Digital, Culture, Media and Sport Committee. Retrieved 28.10.2022 Available at/

<https://committees.parliament.uk/publications/9408/documents/161169/default/>

¹⁷ Digital Services Act package. Retrieved 28.10.2022 Available at/ <https://digital-strategy.ec.europa.eu/en/policies/digital-services-act-package>

¹⁸ Albert, J. 2022. "The Digital Services Act: EU sets a new standard for platform accountability". [Online] Algorithm Watch. 25th April 2022. Retrieved 28.10.22 Available at/ <https://algorithmwatch.org/en/dsa-deal-plattform-accountability/>

¹⁹ Satariano. A. (2021). Youtube Pulls Videos by Bolsonaro for Spreading Misinformation on the virus. New York Times.

²⁰ Ministry Electronics and Information Technology. (2021). The Information Technology (Intermediary Guidelines and Digital Media Ethics Code) Rules, 2021. Feb 25. 2021. Retrieved 28.10.22. Available at/ <https://prsindia.org/billtrack/the-information-technology-intermediary-guidelines-and-digital-media-ethics-code-rules-2021>

²¹ Shahbaz, A. (n.d). "The Rise of Digital Authoritarianism" Freedom on the net 2018. Retrieved 28.10.22. Available at/ <https://freedomhouse.org/report/freedom-net/2018/rise-digital-authoritarianism>



3. Domain-specific legal issues

This section examines the legal implications of digital extended reality in the UK context with respect to specific legal domains with a high socio-economic impact. The legal domains covered include human rights law, privacy and data protection law, use in legal systems (criminal, civil and evidence law), and liability for harms (tort, contract and criminal).

The following sections discuss some of the ways that digital extended reality (XR) technologies are or may be governed by UK law and policy within the frameworks of human rights, privacy and data protection, use in legal systems, and liability for harms. This is a general overview of legal issues supported by discussion to existing (and proposed) law and an explanation of how the law may apply to XR in the UK. While no UK law directly addresses or explicitly mentions XR technologies, many aspects are subject to the following domains of the UK legal system.

3.1 Human rights law

XR technologies have the potential to impact human rights in many ways, both positive and negative. In relation to some rights in particular contexts, XR have the potential to enhance flexibility to engage with others in work and leisure. In other situations, however, such as the use of XR in courtrooms, incorrect use may interfere with the right to a fair trial or the prohibition on self-incrimination. XR technologies may also interfere with protected human rights such as freedom of speech, or the right to privacy. This section explores what impact XR may have on various human rights protected in UK law.

3.1.1 Sources of UK Human Rights Law

The human rights law framework in UK includes a variety of national and international legal sources. First of all, the UK is party to a number of United Nations human rights law treaties, such as the International Covenant on Civil and Political Rights (ICCPR) (ratified 1966), the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) (ratified in 2016), the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD) (ratified March 1969), the International Covenant on Economic, Social and Cultural Rights (ICESCR) (ratified in 1976), the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (CMW), the Convention on the Rights of the Child (CRC), and the Convention on the Rights of Persons with Disabilities (CRPD).²²

- ECHR and the European Convention on Human Rights Act (UK implementation of ECHR). the UK is a Member State of the Council of Europe and subject to the jurisdiction of the European Court of Human Rights. The UK has implemented the European Convention of Human Rights through the Human Rights Act 1998.
- Charter of Fundamental Rights of the European Rights (CFREU) (The CFREU applied to the UK up until Brexit and now is no longer a law in the UK)

²² International Covenant on Civil and Political Rights (entered into force 23 March 1976), G.A. Res 2200A (XXI); Convention on the Elimination of All Forms of Discrimination against Women (entered into force 3 September 1981), 1249 U.N.T.S. 13; International Convention on the Elimination of All Forms of Racial Discrimination (entry into force 4 January 1969) G.A. Res. 2106 (XX) (ICERD); International Covenant on Economic, Social and Cultural Rights (entered into force 3 January 1976), G.A. Res 2200A (XXI), 993 U.N.T.S. 3; International Convention on the Protection of All Migrant Workers and Members of Their Families (entered into force 18 December 1990), G.A. Res 45/158; Convention on the Rights of the Child (entered into force 2 September 1990) GA Res. 44/25, 1577 U.N.T.S. 3; Convention on the Rights of Persons with Disabilities (entered into force 3 May 2008), GA Res. A/61/106.

- International human rights law
- Human Rights Act 1998.²³ This act sets out the fundamental rights and freedoms that everyone in the UK is entitled to. It incorporates the rights set out in the European Convention on Human Rights (ECHR) into domestic British law. The Human Rights Act came into force in the UK in October 2000.
- Equality Act 2010²⁴ brought together several distinct forms of anti-discrimination legislation including of sex, disability and race.

3.1.2 Human rights law implications

As XR is speech, language and communication mediated in technological platforms, laws of free speech and free expression are likely to be significantly important in XR. Therefore, the human rights of citizens and their legitimate expression within the confines of 'legal expression'. Freedom of speech is protected under Article 10 of the Human Rights Act 1998, which provides that 'everyone has the right to freedom of expression'.²⁵ However, exercising this right "carries with it duties and responsibilities", and may as such be 'subject to such formalities, conditions, restrictions or penalties as are prescribed by law and are necessary in a democratic society'.²⁶ Thus, the right to 'freedom of expression' is not an absolute right. The UK has several laws against hate speech built into various other laws (rather than a standalone law). For example, section 4 of the Public Order Act 1986 makes it offence to use 'threatening, abusive or insulting words or behaviours that causes, or is likely to cause, another person harassment, alarm or distress'. Such distress can be caused by racial, religious hatred, sexual orientation, or language that encourages 'terrorism'.²⁷

Other issues of human rights concerns regards data use, manipulation and surveillance of citizens. The AI ACT has values enshrined in it (e.g. opacity, complexity, dependency on data, autonomous behaviour).

Following Brexit, the UK Government has indicated it intends to update and reform the UK's data protection laws.²⁸ This led to the introduction of the Data Protection and Digital Information Bill to the House of Commons in July 2022. At the time of writing, the Bill had entered its second reading stage in Parliament, although it appears to be facing some delays.²⁹ This bill covers similar topics to the GDPR (data protection, subjects' rights, obligations of controllers and processors). It relates to customer data and business data (part 3)³⁰.

Freedom of Expression

As XR is mediated through expression: speech, image, audio, text – debates around freedom of expression, free speech, hate speech and child rights, safeguarding and protections are relevant.

²³ Human Rights Act 1998.

²⁴ Equality Act 2010.

²⁵ Human Rights Act 1998, schedule 1, article 10 (1).

²⁶ Human Rights Act 1998, schedule 1, article 10 (2).

²⁷ CARE. (n.d.) Free Speech in the UK: what does the law actually say? Retrieved 28.10.22. Available at/ <https://care.org.uk/cause/religious-liberty/free-speech-law>

²⁸ See, *Consultation outcome: Data: A new direction – government response to consultation / Gov.uk Department for Digital, Culture, Media & Sport*, [Online]. Available at/ <https://www.gov.uk/government/consultations/data-a-new-direction/outcome/data-a-new-direction-government-response-to-consultation#:~:text=response%2Dto%2Dconsultation-Introduction,the%20UK's%20National%20Data%20Strategy>.

²⁹ See, for example, Kirsop J. (2022) *UK Data Protection and Digital Information Bill faces delay / Pinsent Masons*, [Online]. Available at: <https://www.pinsentmasons.com/out-law/news/data-protection-digital-information-bill-delay>; Woollacott, E. (2022) *UK Reconsiders Data Protection Rules (Again) / Forbes*, [Online]. Available at: <https://www.forbes.com/sites/emmawoollacott/2022/10/04/uk-reconsiders-data-protection-rules-again/?sh=27767b87207f>.

³⁰ GDPR, Section 3.



There is currently a discussion underway to develop a Bill of Rights to strengthen free of speech. This bill was introduced into parliament on Wednesday 22nd June 2022. The Bill of Rights is intended to repeal and replace the Human Rights Act 1998.

Bill passage



Figure 1: Process of a bill's passage in the UK parliament

The bill is currently paused.³¹

The law aims to reduce the power of the courts (in Europe and the UK) to intervene in government policy 'the courts must give that courts must give the greatest possible weight to the principle that, in a Parliamentary democracy, decisions about the balance between different policy aims, different Convention rights and Convention rights of different persons are properly made by Parliament' (2.c).³²

In the UK, due to the Crime and Disorder Act 1998³³ and section 66 of the Sentencing Act 2020³⁴ both allow for an uplift in sentence if 'hate' against the categories listed above are identified.

Another law of significance is the Equality Act 2010. It protects people from discrimination in the workplace and wider society, particularly in respect of the following protected characteristics: age, disability, gender reassignment, pregnancy and maternity, race, religion or belief, sex and sexual orientation.³⁵ The Public Sector Equality Duty requires public authorities to "have due regard to the need to–

- eliminate unlawful discrimination, harassment, victimisation and any other conduct prohibited by the Act;
- advance equality of opportunity between people who share a protected characteristic and people who do not share it; and

³¹ Elgot, J. 2022. "Liz Truss halts Dominic Raab's bill of rights plan. [Online] The Guardian. 7 September 2022. Retrieved 28.10.22. Available at/ <https://www.theguardian.com/law/2022/sep/07/liz-truss-halts-dominic-raab-bill-of-rights-plan>

³² Bill of Rights Bill. Retrieved 28.10.22 Available at/ <https://publications.parliament.uk/pa/bills/cbill/58-03/0117/220117.pdf>

³³ Crime and Disorder Act 1998.

³⁴ Sentencing Act 2020.

³⁵ Equality Act 2010, s. 4.

- foster good relations between people who share a protected characteristic and people who do not share it.”³⁶

The UK until recently also faced controversy for recording non-crime hate incidents. A total of 120,000³⁷ incidents were recorded in the last five years. A non-crime hate incident is when no crime has been committed but a specific individual feels offended by speech. Some critics such as campaign group Fair Cop compare this to a pre crime scenario, a term coined by science fiction writer Philip K. Dick. Similarly, comparisons with George Orwell’s 1984 ‘thought crimes’ are invoked in leading campaigns for free speech in the UK.

Harry Miller³⁸ took the College of Policing to court and won at the Court of Appeal against his record of non-crime hate speech (he put a limerick about sex and gender on twitter). The UK Home Office with the support of the College of Policing published new guidelines in mid 2022 about recording and retaining personal data related to non-crime hate incidents.³⁹

The guidance states that:

- “non-crime hate incidents should not be recorded where they are trivial, irrational, or if there is no basis to conclude that an incident was motivated by hostility.
- individuals who are commenting in a legitimate debate – for example, on political or social issues – should not be stigmatised because someone is offended.
- if a record is made, it must be done in the least intrusive way possible – for example, it may not be necessary to record the name of an individual or the location of an incident”.⁴⁰

There is also a Higher Education (Freedom of Speech) Bill under discussion in Parliament and is at committee stage in the House of Lords. The Bill makes it law for higher education institutions to protect freedom of speech and will make provision for ‘academic freedom’ 2.(6):⁴¹

(6) In this Part, “academic freedom”, in relation to academic staff at a registered higher education provider, means their freedom within the law— (a) to question and test received wisdom, and (b) to put forward new ideas and controversial or unpopular opinions, without placing themselves at risk of being adversely affected in any of the ways described in subsection (7).”

3.2 Privacy and data protection law

This section considers how personal and secondary data collected through the use of XR technologies is protected in UK law.

³⁶ Equality Act 2010, s. 149.

³⁷ Tettenborn, A. (2022). Wil the police finally see sense on ‘non-crime hate incidents’? The Spectator. Retrieved 28.10.22. Available at/ <https://www.spectator.co.uk/article/will-the-police-finally-see-sense-on-non-crime-hate-incidents->

³⁸ Harry Miller. Fair Cop. <https://www.faircop.org.uk/case-studies/harry-miller/>

³⁹ Fair Cop. 2022. Non Crime Hate Incidents – Updated Guidance. Thursday 21st July 2022. Retrieved 28.10.22 Available at/ <https://www.faircop.org.uk/non-crime-hate-incidents-updated-guidance/>

⁴⁰ College of Policing. 2022. “Protecting Freedom of Expression – updated guidance’. 21 July 2022. Retrieved 28.10.22 Available at/ <https://www.college.police.uk/article/protecting-freedom-expression-updated-guidance>

⁴¹ Higher Education (Freedom of Speech) Bill Retrieved 28.10.22 Available at/ <https://bills.parliament.uk/publications/46799/documents/1952>



UK General Data Protection Regulation 2018 (GDPR)

The UK GDPR is the domestic version of the EU GDPR retained in accordance with the European Union (Withdrawal) Act,⁴² and as amended by the Data Protection, Privacy and Electronic Communications (Amendments etc) (EU Exit) Regulations (2019).⁴³ It applies to the processing of personal data⁴⁴ by organisations operating within the UK,⁴⁵ as well as organisations outside the UK that offer goods or services to individuals in the UK, or that monitor the behaviour of data subjects based in the UK.⁴⁶ The GDPR was developed based upon seven principles of data processing: 1) lawfulness, fairness and transparency; 2) purpose limitation; 3) data⁴⁷ minimization; 4) accuracy; 5) storage limitation; 6) integrity and confidentiality (security); and 7) accountability.⁴⁸ See also

Data Protection Act 2018⁴⁹

The Data Protection Act 2018, as amended by the Data Protection, Privacy and Electronic Communications (Amendments etc) (EU Exit) Regulations 2019, is the domestic implementation of the EU GDPR. It prevents people or organisations from holding and using inaccurate information on individuals. This applies to information regarding both private lives and business. This given sensitive information such as race, health, sex life or orientation.

Privacy and data protection challenges

Issues related to the protection of privacy and data protection in relation to XR include; right to privacy, autonomy (i.e., individual control over how data is collected, stored and how it is used); anonymity; right to restrict access/use; right to erasure; transparency; informed consent; data ownership and control; surveillance; data security; misuse and malicious use of data. The Online Safety Bill aims to serve as a duty of care to all users who use online platforms to ensure protection of their personal data.

3.3 Consumer Protection law

The Consumer Rights Act 2015 is the UK's primary piece of legislation in relation to consumer protection.⁵⁰ The Act offers consumer protection in relation to goods as well as digital content.⁵¹ The

⁴² European Union (Withdrawal) Act 2018, Art.3.

⁴³ The Data Protection, Privacy and Electronic Communications (Amendments etc) (EU Exit) Regulations 2019, Schedules 1 and 2.

⁴⁴ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (United Kingdom General Data Protection Regulation), Art.2.

⁴⁵ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (United Kingdom General Data Protection Regulation), Art.3(1).

⁴⁶ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (United Kingdom General Data Protection Regulation), Art.3(2).

⁴⁷ ICO. (n.d.) Key definitions. Who does the UK GDPR apply to? Retrieved 28.10.22. Available at/ <https://ico.org.uk/for-organisations/guide-to-data-protection/guide-to-the-general-data-protection-regulation-gdpr/key-definitions/>

⁴⁸ Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data (United Kingdom General Data Protection Regulation), Art.5(1)(a)-(f).

⁴⁹ Data Protection Act 2018

⁵⁰ Consumer Rights Act 2015, c. 15.

⁵¹ Consumer Rights Act 2015, c. 15, chapter 2 and 3.



Act provides that consumers have a right to remedies, such as repair, replacement, a price reduction or a refund, if their consumer rights under a goods or digital content contract are not met.⁵²

Following Brexit, UK consumer protection law remained largely unchanged due to the retained EU law. However, ongoing legal developments at the EU level, such as the Digital Services Act and the Digital Markets Act, will not apply in the UK.⁵³ In the long run, it is thought that UK and EU consumer rights law will diverge further, which will likely have various implications on producers and sellers of XR technologies in the UK and EU.⁵⁴

3.4 Use in legal systems

Criminal law

The UK criminal law sets out the definitions of criminal offences and the rules and procedures that apply when: the police investigate an offence they allege you have committed then the prosecuting authorities charge you, and you must appear in a criminal court. If you admit the offence or are found guilty, the court will impose a punishment on you, ranging from fines, community orders and imprisonment. Sentencing guidelines are set by the Criminal Prosecution Service (CPS).

Civil law

This is part of the legal system that deals with people's relationships, property, and business agreements, rather than with criminal activity.

Examples can include the use of XR material such as image, texts, audio recordings which can be investigated in civil law disputes

Evidence law

The law of evidence encompasses the rules and legal principles that govern the proof of factual matters in both criminal and civil proceedings. It is the evidence that helps the parties prove or disprove their case and, in turn, assist the court in fairly determining the outcome of those proceedings.

Issues to consider include evidence and expert witness standards, could the use of digital systems be used to help in providing evidence to the case. Juvenile defendants are being tried over evidence provided by social media footage of the crime. In this way the use of XR can remove some of the challenges faced over jury competency or judicial bias. Furthermore, the issues around eliciting memories and impeaching witnesses to determine guilt is helped through the evidence provided by XR.

⁵² Consumer Rights Act 2015, c. 15, Chapter 3, s. 42-45.

⁵³ Proposal for a Regulation of the European Parliament and of the Council on a Single Market For Digital Services (Digital Services Act) and amending Directive 2000/31/EC (15.12.2020, COM(2020) 825 final), [Online]. Available at: <https://eur-lex.europa.eu/legal-content/en/ALL/?uri=COM:2020:825:FIN>; Regulation (EU) 2022/1925 of the European Parliament and of the Council of 14 September 2022 on contestable and fair markets in the digital sector and amending Directives (EU) 2019/1937 and (EU) 2020/1828 (Digital Markets Act).

⁵⁴ Conway, L. (2021) *Brexit: UK consumer protection law* / UK Parliament: House of Commons Library [Online]. Available at: <https://commonslibrary.parliament.uk/research-briefings/cbp-9126/#:~:text=In%20effect%2C%20consumer%20protection%20law,as%20they%20did%20before%20Brexit.>

3.5 Liability for harms

3.5.1 Sources of law

Tort law:

- Products Liability in the UK⁵⁵
- Liability for Consumer Protection Act 1987, implementing the Product Liability Directive (85/374/EEC);
- Issues can include big tech companies who will need to take responsibility of their products/system algorithms and ensure that harmful material is removed

Contract law:

- Sale of Goods Act 1893 and the Sale of Goods and Supply of Services Act 1980;
- European Communities (Certain Aspects of the Sale of Consumer Goods and Associated Guarantees) Regulations 2003

Criminal:

- General Product Safety Regulations 2005
- Consumer Rights Act 2015⁵
- The Children Act 1989
- Domestic Abuse Act 2021⁵⁶
- Animal Welfare Act 2006⁵⁷ (images in XR that involve animal harm could potentially be used).

3.5.2 Implications for XR technologies

The Consumer Protection Act 1987 is the primary piece of legislation relating to product liability in England and Wales, and implements the EU Directive on liability for defective products.⁵⁸ Furthermore, as a common law jurisdiction, the tort of negligence is a recognised doctrine in the UK. A breach of contract may also give rise to liability.⁵⁹ Finally, alleged product safety issues may also result in criminal

⁵⁵ Product Safety advice for business. Retrieved 28.10.22 Available at/<https://www.gov.uk/guidance/product-safety-advice-for-businesses>

⁵⁶ Domestic Abuse Bill Factsheet. Retrieved 28.10.22/ Available at/<https://www.gov.uk/government/publications/domestic-abuse-bill-2020-factsheets/domestic-abuse-bill-2020-overarching-factsheet>

⁵⁷ Animal Welfare Act. Retrieved 28.10.22. Available at/<https://www.legislation.gov.uk/ukpga/2006/45/section/4>

⁵⁸ Council Directive of 25 July 1985 on the approximation of the laws, regulations and administrative provisions of the Member States concerning liability for defective products (7.8.1985, OJ L210/29).

⁵⁹ Sale of Goods Act 1979, c. 54; Supply of Goods and Services Act 1982, c. 29; Directive 1999/44/EC of the European Parliament and of the Council of 25 May 1999 on certain aspects of the sale of consumer goods and associated guarantees (7.7.1999 OJ L171/12); *Product liability and safety in the UK (England and Wales): overview* /Thomson Reuters Practical Law [Online]. Available at:

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investigation and prosecution.⁶⁰ UK law provides for the offence of corporate manslaughter in the case of a gross breach of duty of care for which an organisation can be held responsible.⁶¹

Two recent UK incidents illustrate the impact of online platforms on vulnerable groups of people, such as children.⁶² Whilst these incidents did not concern liability for harm caused by the online platforms, they will likely be informative for the ongoing debate of regulating harmful online content and responsibilities of operators and providers.

Online Safety Bill and XR

Online Safety Bill⁶³ aims to tackle many of the challenges presented by digital technologies such as social media especially for its users. For example, for children these new potential laws will mean that all companies must assess risks and take action to handle illegal activity that threatens the safety of children. In addition, platforms likely to be accessed by children will need to; prevent access to material that is harmful for children, such as pornography. Ensure there are strong protections from activity, which is harmful to children, which we expect will include harms such as bullying.

Furthermore, for adults the Online Safety Bill will ensure that platforms tackle the presence of illegal material on their sites. Major service providers will also need to make clear in their terms of service what legal content is acceptable on their sites and provide user-friendly ways to complain when things go wrong. The categories of content that companies' terms of service will need to address will be set out in secondary legislation and approved by Parliament. On the largest sites, adults will have more control over who they interact with online, and the types of harmful content that they can see. This could, for example, mean that on a platform which allows self-harm content, individuals who feel that this content would be damaging to their mental health could choose not to be presented with it. Adults will be able to make informed decisions about the online services they use and be able to trust the platforms will keep the promises they make.

⁶⁰ *Product liability and safety in the UK (England and Wales): overview* / Thomson Reuters Practical Law [Online]. Available at: [https://uk.practicallaw.thomsonreuters.com/w-013-0564?transitionType=Default&contextData=\(sc.Default\)&firstPage=true](https://uk.practicallaw.thomsonreuters.com/w-013-0564?transitionType=Default&contextData=(sc.Default)&firstPage=true).

⁶¹ Corporate Manslaughter and Corporate Homicide Act 2007, c. 19.

⁶² BBC (2022). Archie Battersbee: How did life support battle end up in court? 6th August 2022. [Online] Retrieved 28.10.22 Available at/ <https://www.bbc.co.uk/news/uk-england-essex-61829522>; BBC (2022). Molly Russell inquest: Father makes social media plea. 30th September 2022. [Online] Retrieved 28.10.22. Available at/ <https://www.bbc.co.uk/news/uk-england-london-63073489>.

⁶³ Online Safety Bill: factsheet. 19th April 2022. Retrieved 28.10.2022 Available at/ <https://www.gov.uk/government/publications/online-safety-bill-supporting-documents/online-safety-bill-factsheet>

4. Overview of gaps and challenges

This document provides an overview of potential and existing legal issues related to XR in the UK. The main areas of freedom of speech, human rights and liability for harms are explored with several relevant pieces of legislation currently under discussion. Data protection online securing personal data remains the most developed laws related to XR in the UK. The following provides an overview of the main gaps and challenges identified relating to the regulation of XR in the UK.

Digital Extended Reality (XR) and the law

- Impact of XR on legal development: might XR fundamentally change concepts of legal responsibility if the Online Safety Bill is passed. Sites such as forums and messaging apps, some online games, cloud storage and the most popular pornography sites play a significant role in enabling users to access harmful content. Sites which publish pornographic content will also be required under the legislation to ensure that children cannot access age-inappropriate material.

Human Rights Law

- There is conflict between protected characteristics in the Equality Act 2010 and Hate Crime provision. Several high profile debates around 'transgender identity' have led to discussions in the UK about legitimate speech online. With the provision 'no one has the right to not be offended' ruled by the Judge of the case of Harry Miller.
- There is also a conflict between 'legal but harmful speech' and whether this can be legitimately decided in law. If speech is legal but harmful, how can it be regulated?
- Protection categories of adults and children is a source of conflict. The Online Safety Bill aims to protect children from harmful imagery/speech/incitements but what are the provisions for adults and how will adult legal speech be protected?

Tort Law

- There is some conflict between protected characteristics in the Equality Act 2010 and Hate Crime provision.
- The Education (Freedom of Speech) Bill will create a statutory law to sue individuals for compensation for losses suffered from an academic's institutions failure to protect freedom of speech.

Criminal law

- Sociological evidence and criminal law – admissibility of expert evidence in criminal proceedings
- Concerns about overlap of material for adults and children and ways to restrict access to children while allowing access for adults to legal but harmful material.

5. Conclusion

Regulating XR technologies in the context of harmful online content appears to be an important regulatory challenge in the UK. A balance must be struck between protecting the right to freedom of expression on the one hand, and protecting against harmful online content and hate speech on the other, particularly in the context of groups with protected characteristics. XR technologies pose a unique challenge in this regard, given their immersive nature which may exacerbate possible negative impacts.

Brexit is a further area which may pose future challenges with regard to the regulation of XR technologies in the UK, versus the EU. Whilst many laws that originated in the EU are currently retained in UK domestic law, it is possible that these will diverge in the long-term. This may have wide-ranging implications on developers and providers, as well as end-users, although the exact implications remain to be seen.

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