



Policy Brief

Key messages for the ethical governance of neurotechnologies

TECHETHOS

FUTURE ◦ TECHNOLOGY ◦ ETHICS

Highlights



To ensure responsible, just and sustainable development of neurotechnology, the Horizon 2020-funded [TechEthos](#) project encourages the European Union (EU) policymakers to champion principles of autonomy and dignity, privacy, justice, interoperability, and environmental regard in legal, regulatory, and guidance reforms.

Who is this for?

This brief seeks to inform EU policymakers and officials involved in the preparation of legislative or policy initiatives related to **neurotechnologies, medical devices, dual use items, privacy and data protection, and systematic algorithmic learning and machine inference systems.**

Background

Neurotechnology encompasses research, development and use of devices with the potential to directly access, monitor, investigate, assess, manipulate, and/or emulate the structure and function of the neural systems of natural persons. Neurotechnologies hold the potential to enhance healthcare and quality of life in relation to a range of conditions, including Parkinson's and Alzheimer's diseases, mental health, stroke and trauma recovery, and

prosthetics. Such medical applications, as well as speculated applications for human enhancement, labour management, and legal determinations, present a range of social, ethical, and legal challenges and questions.

Ethical issues accompanying neurotechnologies raise questions of use, notably medical treatments versus human enhancement (e.g., neurogaming, neuroeducation, neuromarketing). In either case, issues may arise of discrimination based on neurological ability or inequality of access to beneficial medical interventions or enhancements. Questions of data privacy and data security also tie to neurotechnology applications, as do concerns regarding testing of prototypes in animal and human subjects, device material sourcing and energy consumption. Issues of responsibility of companies and governments to people dependent on neurotechnological devices must be clarified. At a more abstract level, questions of non-manipulation, cognitive privacy, questions and stigmatization about what it means to have a brain function in "the right way," and definitions of the human-self arise.

The ethical values and principles identified below, drawing on the range of social, ethical, and legal analyses carried out in the TechEthos project, intend to inform regulatory developments and European investments in neurotechnology and ensure better alignment of the technology with societal concerns.





Key Messages



Safeguard the autonomy and dignity of individuals and groups

A first key message to guide neurotechnology governance pertains to ensuring **the rights of individuals and groups to “be their own persons.”** This refers not only to the freedom to make decisions about what may affect them, but also freedom from non-consensual (i.e., without consent) manipulation associated with using neurotechnology. Legal definition and recognition of neurorights within EU fundamental rights frameworks as well as guiding questions used to obtain consent, as well as clarifications on conditions in which consent can be deemed valid, should be extended to protect against instances of unethical or unlawful neurotechnology-enabled interference with and/or manipulation of neural activity, including biased decision-making or judgement.

Ensure robust commitments to privacy

A second key message for neurotechnology pertains to **brain data definition and appropriate protections.** The potential for collection and extraction of highly sensitive personal data increases drastically with neurotechnology deployment. The current political economy of data makes it especially important to ensure protection from present or future exploitation through brain data. Reform of European legal and regulatory frameworks, like the GDPR and the proposed AI Act, as well as involvement of ethics committees, will be needed to explore and circumscribe legitimate collection, accessibility, use, reuse, storage and ownership of data, and recourse to robust privacy.

Commit to justice, in all forms

Concerns with justice regarding neurotechnology arise on multiple fronts. Questions of equitable access come into play for potentially cost-prohibitive medical treatments, or enhancements. Safeguards against discrimination are vital when considering how brain data might be used to profile people in environments ranging from schools or workplaces to healthcare or the military. Use of devices in legal proceedings in cases questioning human agency are also concerning. **Reforms to EU law to protect against misuse and discrimination based on brain data,** as well as guidance in legal proceedings for protection of fundamental rights should be guided by a commitment to justice.

Promote interoperability across devices, platforms and data

Neurotechnology devices, invasive or otherwise, in medical use-cases may give rise to the dependence of people on devices for a range of functions. Proprietary systems regularly inhibit people from porting data across platforms or repairing devices. Where medical treatments rely on brain data, or bespoke technologies from private actors, blocking data transfer or the bankruptcy and discontinuation of technical support for maintenance or replacement quickly transitions from an inconvenience to a life-threatening situation. **Principles of interoperability of software, hardware, platforms and data ought to be elevated in legal and regulatory frameworks** and guidance in consumer, medical device, and various other areas. Innovation in intellectual property, liability, and consideration of rights to repair all might contribute to advancing interoperable neurotechnological advances. **Safeguarding long-term device maintenance and continuity of service** from predatory commercial exploitation of dependent users is also essential to consider from legal and regulatory perspectives.





Integrate environmental regard across system lifecycles

Concerns arise related to neurotechnologies' energy consumption, associated CO2 emissions, material footprint of production, and end-of-life.

Although not unique to neurotechnologies, data storage implicates energy, water, and carbon-intensive practices; and device parts may consist of a variety of materials and environmental footprints. In concert with eco-design efforts in Europe, consideration of environmental impacts of neurotechnology, whether connected to extraction of rare earth elements, metals and other elements, recyclability of components, or of energy intensity of data processing, require addressing.

Final thoughts



The principles advanced above – **autonomy and dignity, privacy, justice, interoperability, and environmental regard** – are necessarily **interdependent**. Legal grounding of brain data and privacy advances autonomy and dignity. When technologies fail, effective interoperability ensures just and equitable access to maintenance and continuity of service. Privacy and innovative brain data use and ownership regimes promote autonomy and dignity. Environmental design benefits from interoperability requirements (e.g., recyclability of standardized components). If and as the EU invests in neurotechnology development, championing these principles together can ensure a more just, responsible, and sustainable deployment in line with European values.

Further reading



- TechEthos (2023) Policy Brief Enhancing EU legal frameworks for Neurotechnologies https://www.techethos.eu/wp-content/uploads/2023/03/TECHETHOS-POLICY-BRIEF_Neurotechnologies_for-web.pdf ;
- 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; and <https://doi.org/10.5281/zenodo.7619852>;
- Bernstein M.J. and Mehnert E.W. (2022) Policy note: Analysis of expert scenarios addressing ethical implications of the selected technologies. TechEthos Project Deliverable to the European Commission. Available at www.techethos.eu; and <https://doi.org/10.5281/zenodo.7615250>;
- Buchinger E, Mehnert W, Csabi A, Nishi M, Bernstein MJ, Gonzales G, Porcari A, Grinbaum A, Adomaitis L, Lenzi D, Rainey S, Umbrello S, Vermaas P, Paca C, Alliaj G, Whittington-Davis A (2023). D3.1 Evolution of advanced TechEthos scenarios. TechEthos Project Deliverable to the European Commission;
- Ministry of Higher Education and Research (2022) French charter for the responsible development of neurotechnologies. Ministère de l'Enseignement supérieur et de la Recherche. Available at: <https://www.enseignementsup-recherche.gouv.fr/sites/default/files/2023-04/french-charter-for-the-responsible-development-of-neurotechnologies-27500.pdf>;





- Santiago, N., et al. (2022). TechEthos D4.1: Analysis of international and EU law and policy. TechEthos Project Deliverable. Available at: www.techethos.eu; and <https://doi.org/10.5281/zenodo.7650731>;
- Vinders, J., et al. (2022). TechEthos D4.2: Comparative analysis of national legal case studies. TechEthos Project Deliverable. Available at: <https://www.techethos.eu/national-legal-cases-on-emerging-technologies/>.

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This policy brief is based on the results of the social, ethical, and legal analyses of the TechEthos project. Policy briefs on other project results are provided at www.techethos.eu.

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