



Technology Factsheet

Digital Extended Reality



Focus	Interaction with the digital world
Description	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)
Key functions and capabilities	Partial or full extension of the user’s real-world environment with a digital one through visual, audio, linguistic or haptic human-machine interaction
Key Industrial sectors	Aerospace; automotive; machinery and equipment; defence and security; ICT and digital; medical healthcare; space; transport; tourism, arts and cultural heritage; entertainment and recreation; education
Examples of technologies	<ul style="list-style-type: none"> • Data analysis and software: virtual, augmented, and mixed reality systems; human digital twins (avatars); nudge and affective computing; applied behavioural analysis and engineering; people profiling; Natural Language Processing (NLP) • Hardware and data processing: headsets, contact lenses and glasses; projection mapping; motion sensors; distributed cloud; edge and exa-scale computing;
Example of applications	Autonomous data processing; AI-powered chatbots and NLP applications, such as smart and virtual assistants; cognitive and medical training; patient treatment (e.g., anxiety, stress disorder, and phobias); virtual manufacturing, design, and training
Time horizon to mass market	Short to medium for small- and regional-scale deployment; medium- to long-term for large-scale and global deployment and the most advanced application

Key ethical issues



Human Rights ○ Integrity ○ Autonomy ○ Privacy and Data Protection ○ Security ○ Inclusivity ○ Human Supervision/Control ○ Equal Access/Digital Divide ○ Surveillance ○ Disempowerment ○ Dual Use/Misuse ○ Bias ○ Discrimination



Selection rationale



Its potential to change the way individuals perceive, live, and interact with their real-world environment, in terms of people's daily habits, the organisation of work, jobs, industrial and business models, and cultural, policy and political behaviour.

Expected policy impact

- Priority for several national, EU and global policy organizations

Expected legal impact

- Requires adaptations in existing legal frameworks (e.g., transparency)
- Requires limited adaptations in existing frameworks in specific applications or digital infrastructures (e.g., distributed cloud)

At a glance

TechEthos (Ethics for Technologies with High Socio-Economic Impact)

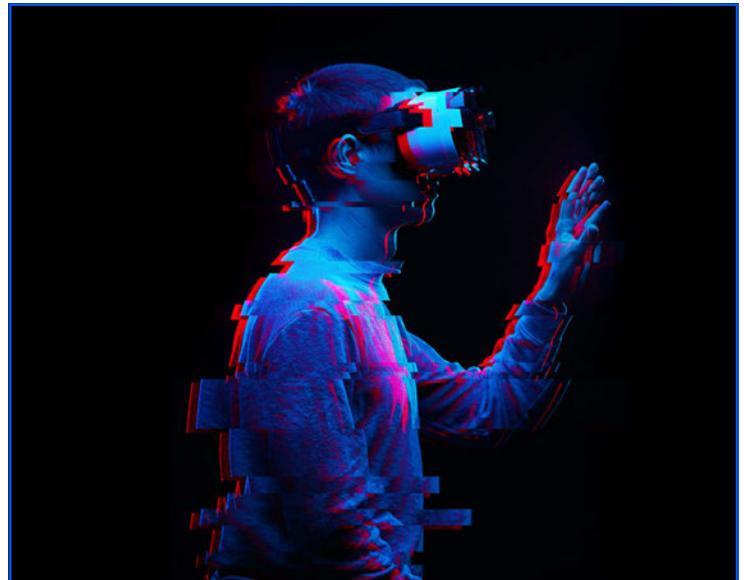
- **Funding** Horizon 2020 Research and Innovation Programme's Science and for Society (SwafS)
- **Duration** 2021 – 2023 (3 years)
- **EU grant** €3.99 million
- **Coordinator** AIT - Austrian Institute of Technology
- **Consortium** 16 organisations from 13 countries
- **Website** www.techethos.eu

Expected industrial and economic impact

- Includes both radical and incremental innovations and is considered enabling across many sectors;
- Priority by most industrial players in relevant industrial sectors;
- Impact on both local and national economies, with the costs of storing and processing data likely to be a major issue.

Expected public impact

- High impact on people's life in terms of choices and monitoring, safety, and jobs.
- Key areas of potential impact include good health and well-being, responsible consumption and production, the inclusion of people with disabilities, decent work and economic growth, industry, innovation, and infrastructure, education, training, and life-long learning. healthy, safe, and well-adapted work environments and data protection, and access to essential services.



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