XR4 HUMAN

Code of Conduct for the Human-Centered and Ethical Development of Immersive Technologies

Presenter: *Rosemarie Bernabe, PhD*

Professor of Research Ethics and Research Integrity

University of Oslo/University of South-Eastern Norway

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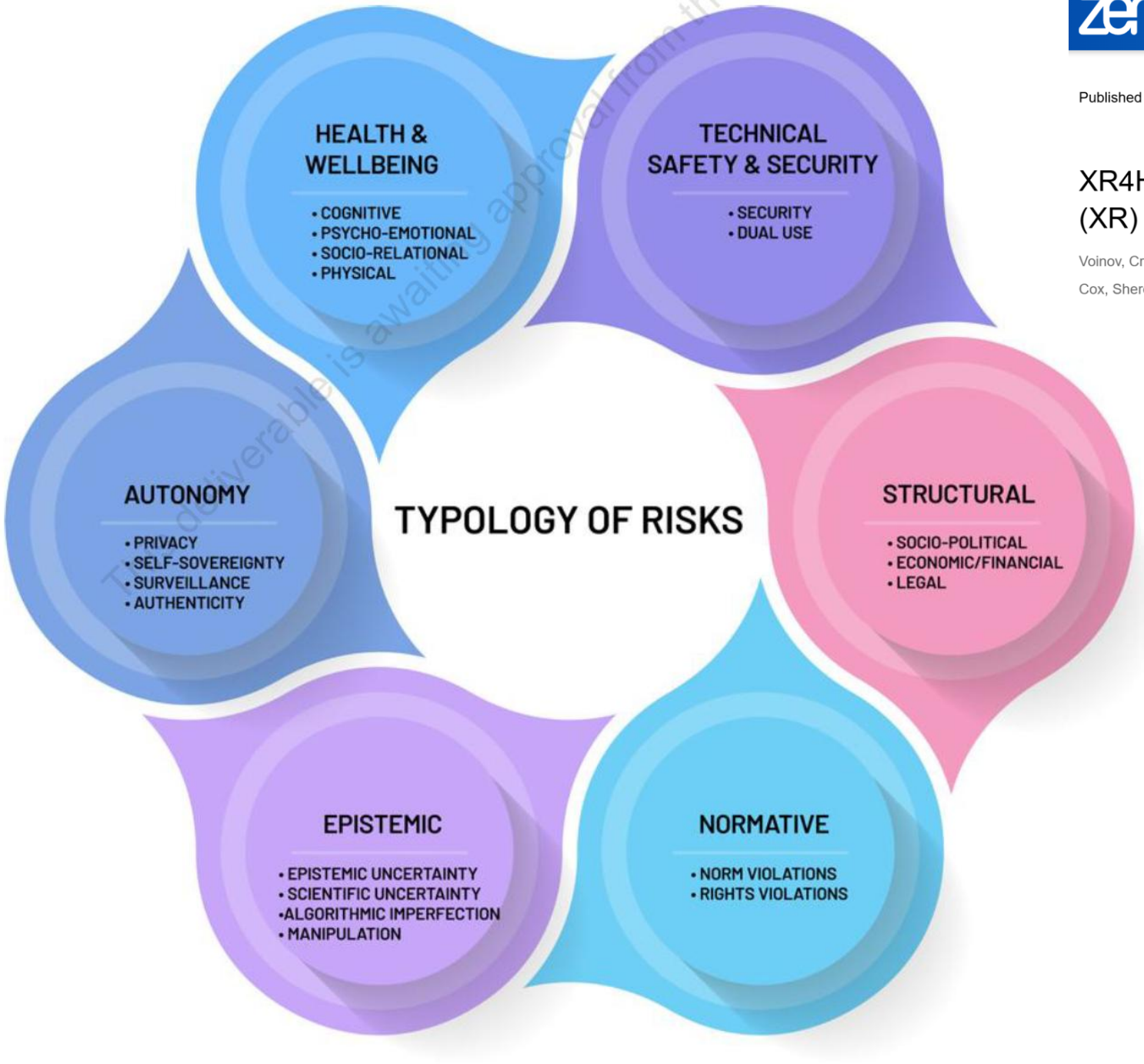

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Project deliverable
Open

XR4Human D2.2: Mapping of risks and harms of eXtended reality (XR) technologies

Voinov, Cristiana[1]; Baraas, Rigmor C[1, 2]; Bernabe, Rosemarie (Work package leader)[3, 2, 1]; Cox, Shereen[4, 3]; Hagen, Lene A.[1]
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Code of Conduct for the Human-Centered and Ethical Development of Immersive Technologies

Annex A

XR4Human

Ethical Impact Assessment for Immersive Technologies

Annex B

XR4HUMAN
Human-Centered and Ethical Development of Immersive Technologies Checklist

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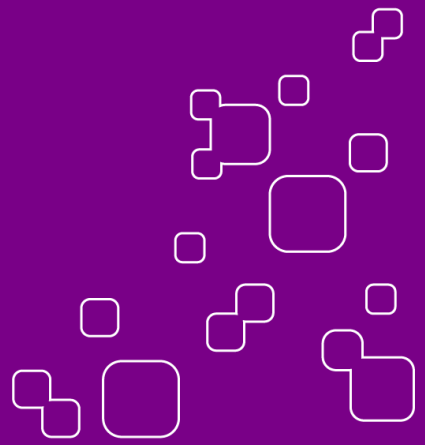

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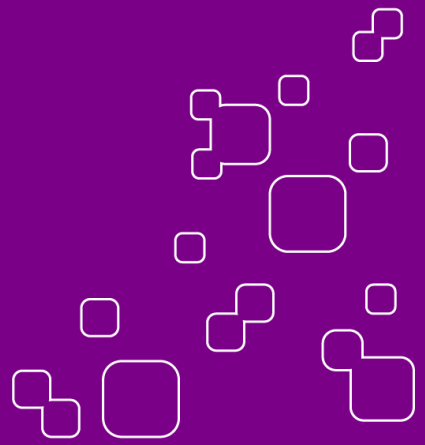

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Preamble

This Code of Conduct (henceforth, Code) sets forth the **ethical obligations** for **everyone involved in technological innovation and governance** of immersive or extended reality (XR) technologies, including Virtual Reality (VR), Augmented Reality (AR), Mixed Reality (MR), as well as all current and other emerging and future technologies.

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Guiding Principles

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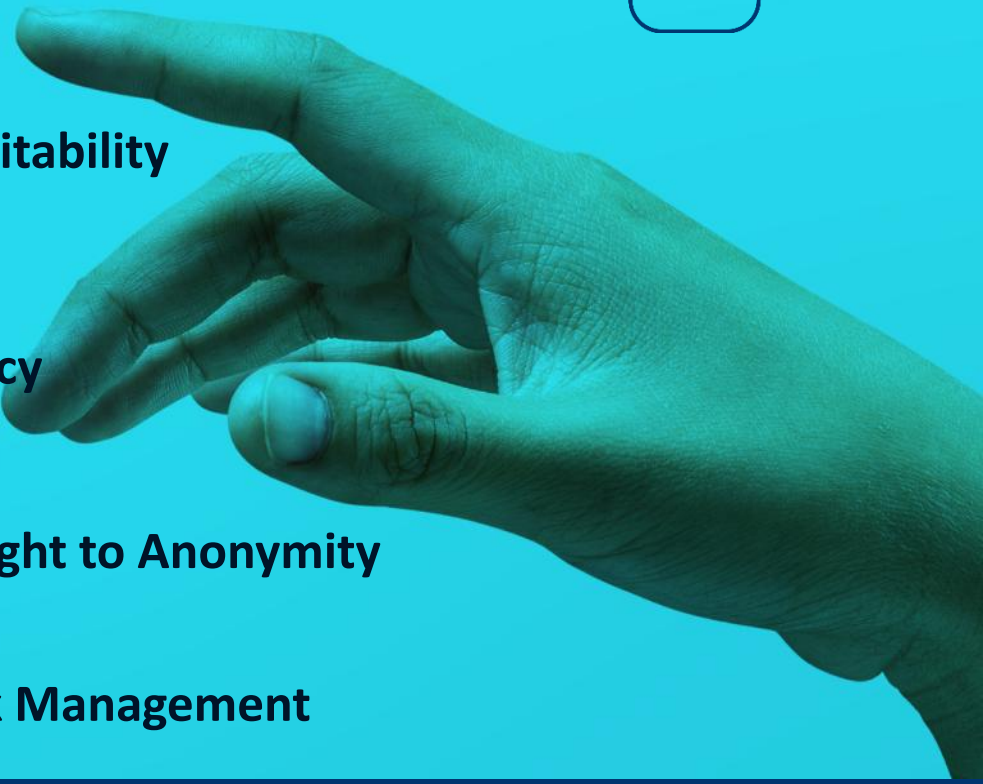
Human-Centered Design

Sustainability

Safe Experience



Diversity, Inclusivity, Accessibility and Equitability

Privacy and Data Governance

Trustworthiness and Transparency

Identity and Right to Anonymity

Technical Security and Interoperability

Moral Dilemma Resolution and Risk Management

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Case example: headset behavioural tracking without explicit user transparency

VR ecosystem collects:

- *eye-tracking,*
- *body posture,*
- *micro-gestures,*
- *emotional inference patterns,*
- *attention metrics*

yet these were not clearly disclosed to users beyond vague statements about improving services. Users were never explicitly informed of how much behavioural and biometric data was being collected or how it could be used for profiling and monetisation.

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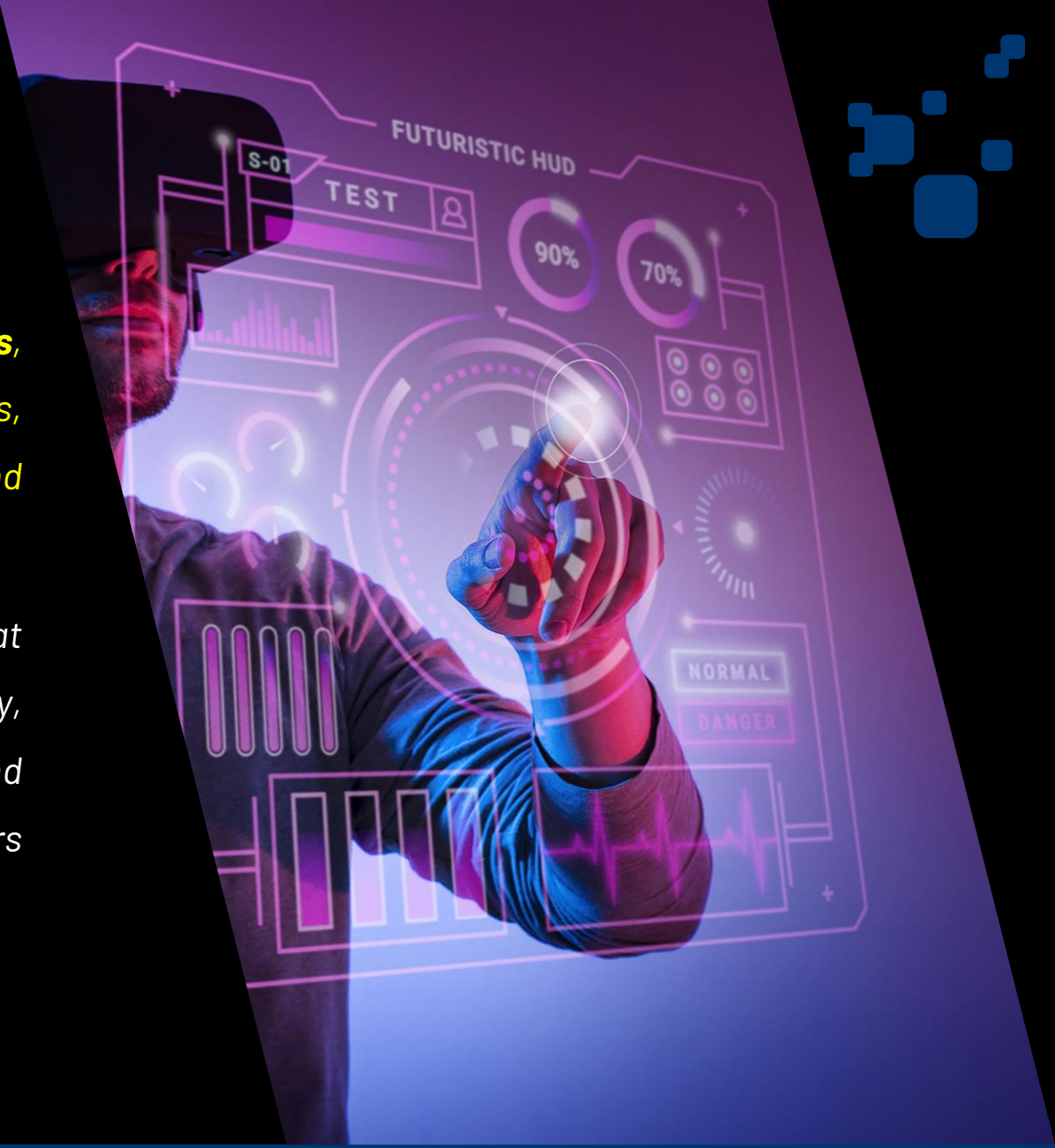
Article 1: User transparency by design

*3. Risk Information: Developers should **clearly communicate risks**, uncertainties, or limitations associated with the technologies, especially regarding privacy, data usage, safety, or the robustness and reliability of features.*

5. User Data Transparency: Developers should be explicit about what the application does with user data. Inform users clearly and frequently, if possible, at predefined intervals, about the collection, usage and sharing of their data, especially in cases involving third-party providers (cf. Article 2).



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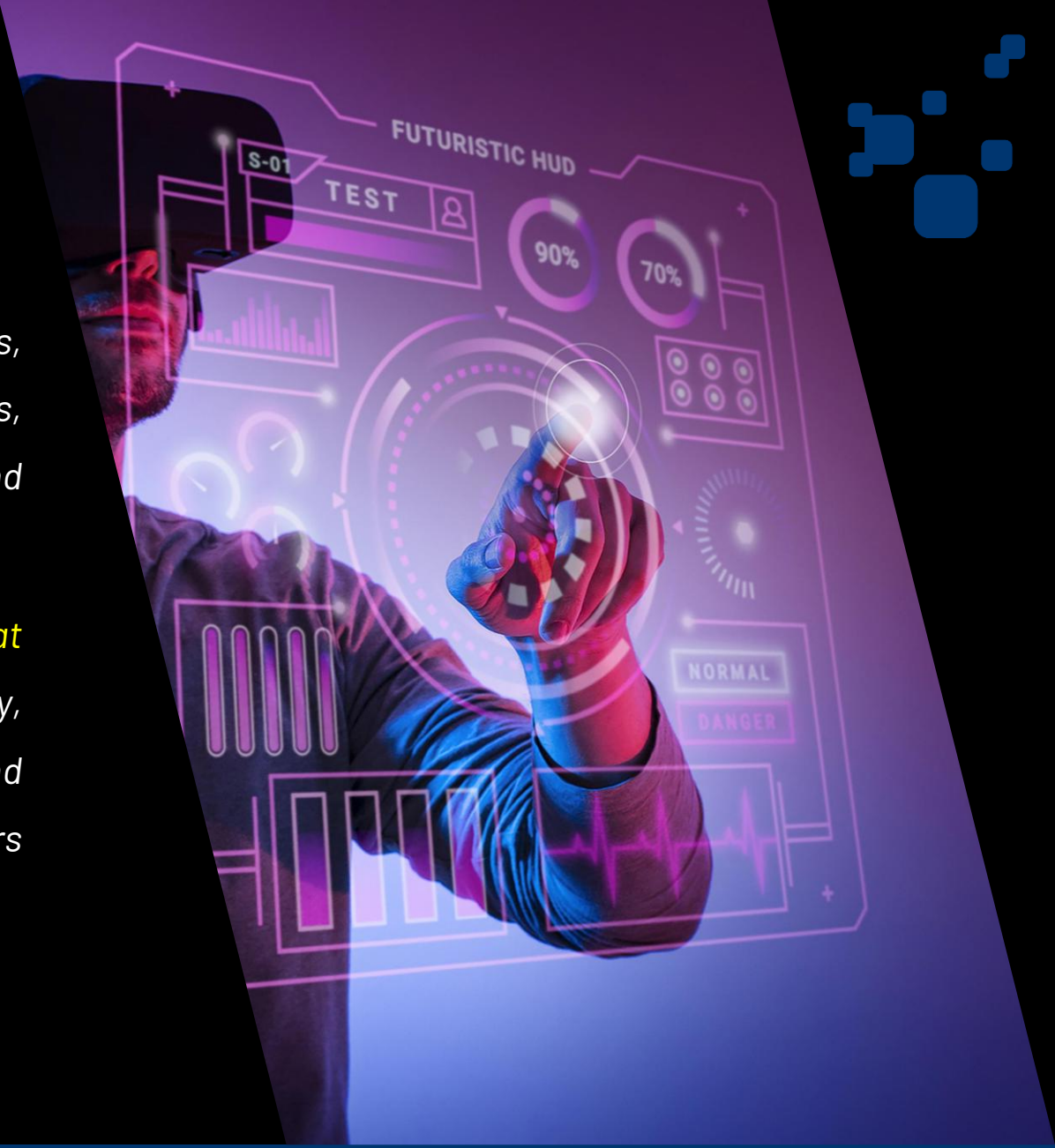

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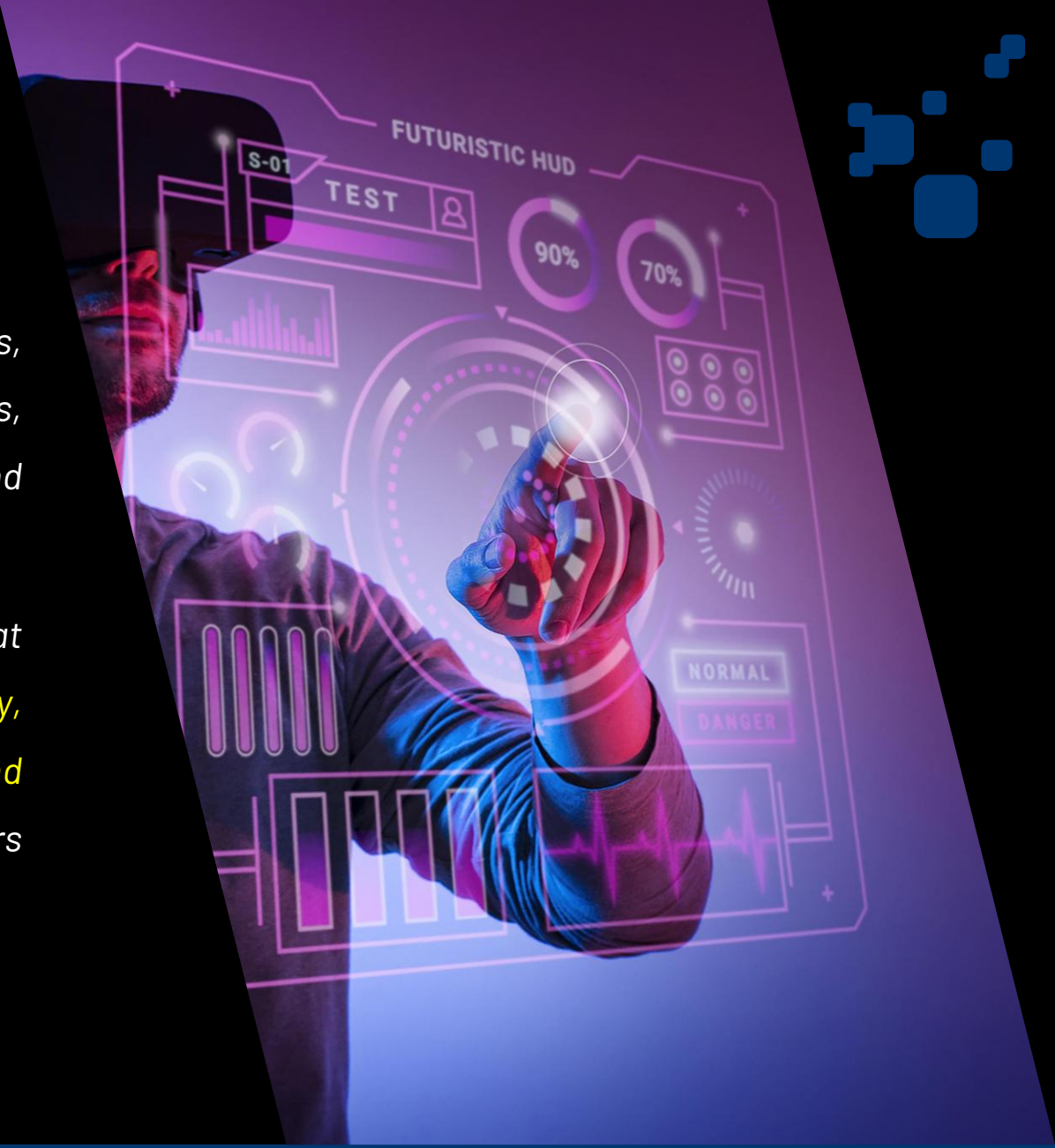

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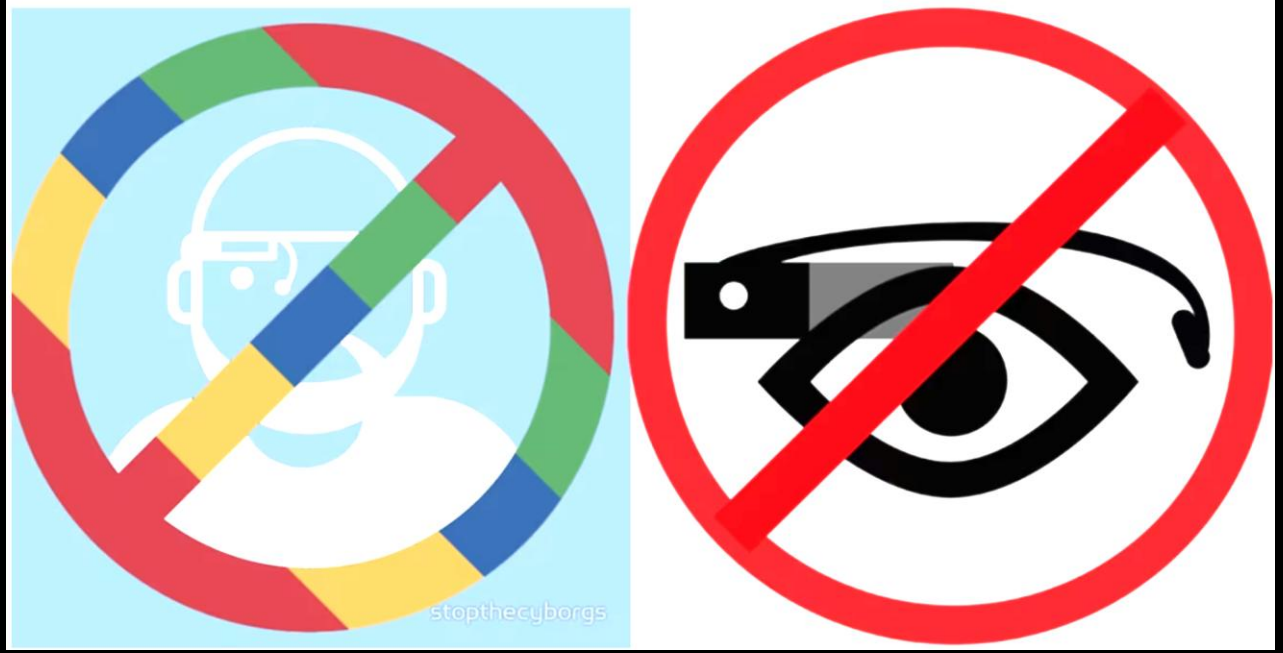
CNN Business Markets Tech Media Calculators Videos Wat

Google Glass users fight privacy fears

Heather Kelly, CNN

6 min read · Updated 2:48 PM EST, Thu December 12, 2013



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Article 2: Data protection and privacy by design

1 Designing Privacy-Sensitive Experiences: Privacy as a core consideration should be integrated into every phase of design of immersive technologies. Wherever feasible, data should be processed on device to reduce dependence on cloud-based solutions and minimise exposure to security risks.

2. Respect for Bystanders: Developers should account for the rights to privacy and lawful personal data processing of bystanders who may be inadvertently captured or involved in the immersive experiences of others. Developers should take measures to protect bystanders' privacy and make all reasonable efforts to inform them of any relevant impacts.

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Tech

Hackers Hijacked VR Chatrooms to Manipulate Users' Reality

By Lorenzo Franceschi-Bicchierai July 3, 2019, 8:00am

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Article 3: Risk management by design

1. Risk Management and Communication: Developers should continuously and sufficiently assess and transparently mitigate risks related to data security, privacy breaches, and critical vulnerabilities in the immersive technology experience. Developers or Data Controllers should make users aware of whether and how their personal data and other data captured could be or has been misused or compromised.

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News and Opinion

Is Virtual Reality Bad for Our Health? Studies Point to Physical and Mental Impacts of VR Usage

During the early iterations of virtual reality headsets, there were cases of users reporting headaches, eye strain, and dizziness. Can VR have a long-term health impact?

Published in Social Sciences

Jul 13, 2023

Dmytro Spilka and **Dmytro Spilka**
2 contributors

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The Hidden Psychological Costs of Virtual Work: Examining the Psychosocial Adverse Effects of Metaverse in the Workplace

Simone Grassini, Department of Psychosocial Science, University of Bergen, Norway and Cognitive and Behavioral Neuroscience Laboratory, University of Stavanger, Norway, simone.grassini@uib.no

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Article 4: Well-being by design

1. Promote & Support Well-being: Developers should design immersive experiences that uphold the mental and physical well-being of users. Customisable (personalised) ergonomic design features should be built into the experience. This is to encourage users to engage in healthier behaviours and time management, such as taking breaks, limiting screen time, avoiding prolonged and/or uncomfortable physical actions, and maintaining awareness of their physical surroundings.

2. Safety Features: Developers should implement features that support user safety. This includes taking reasonable steps to mitigate potential risks associated with overuse, addiction, physical strain (e.g., visual discomfort, muscle or joint strain), or disembodiment. This could be supported by time and usage monitoring, combined with adaptive suggestions based on age, gender, or other characteristics.

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Article 5 protects users' **identity, persona, and avatar integrity**, because in XR the avatar *is* the self, and misuse, cloning, or theft can cause psychological and dignity-related harm.

Article 6 ensures **safe and respectful shared spaces**, where harassment, non-consensual contact, and invisible observation are mitigated through clear rules, boundaries, and transparency of who can see or moderate actions.

Article 7 requires **disclosure and traceability of AI-driven or digitally generated entities and augmented spaces**, so users know when they are interacting with humans versus AI, and to prevent cultural, social, or contextual misuse of digital

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INDIVIDUAL RIGHTS, but also and through which…

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- ✓ **Autonomy:** Prevents hidden manipulation and behavioural steering by requiring transparency of data practices and mediation (Articles 1 & 7).
- ✓ **Informed Consent:** Users must know who/what influences them in immersive spaces, enabling informed participation instead of passive conditioning (Articles 1, 6, 7).
- ✓ **Inclusion & Equal Access:** Accessibility, protection of vulnerable groups, and non-discrimination ensure that participation is open to all, not only the technologically privileged (Articles 4 & 6).
- ✓ **Accountability of Power:** The Code requires traceability, disclosure of who moderates/controls spaces, and breach notification, preventing unaccountable corporate authority (Articles 3, 6, 7).

Ensure XR does not become a space of digital control, but a space where citizens remain empowered, informed, and free.

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