COMMITTEE ON CULTURE, SCIENCE, EDUCATION AND MEDIA

Risks and opportunities of the metaverse

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Expert memorandum

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1.   Introduction

1.   The 'metaverse' represents a new frontier for digital technology. A step-change in the way that citizens can interact with information, with one other, and with civil society. As immersive tools such as virtual and augmented reality become more commonplace, a picture is starting to form of this next phase in our collective future. This report looks at key ways in which the metaverse is likely to impact democracy, human rights and the rule of law. It seeks to offer insight into the many fantastic opportunities offered by these emerging technologies. It also examines some of the existing and future risks of the metaverse, and offers a series of recommendations intended to support positive decision making whilst mitigating risk.

2.   There is yet to form one coherent definition of the term 'metaverse' and there remains much debate about what is inferred by the term and how it is applied. In this report we are utilising the XRSI (Extended Reality Safety Initiative) definition of the metaverse as:

> *"A network of interconnected virtual worlds with the following key characteristics: Presence, Persistence, Immersion and Interoperability"*

Closely related terms include 'extended reality', 'XR', 'Web3', 'Web 3.0' and 'spatial computing'.

3.   This report focuses primarily on the experience of current and potential users accessing the metaverse using immersive technologies such as wearable virtual and augmented reality devices.

Contents

This report provides an expert insight into key areas of risk and opportunity related to immersive technologies and the 'metaverse'. Each segment includes recommendations for constructive steps that could be taken now to support positive socio-technical futures. Core areas explored:

- Community and connectivity
- Digital Democracy
- Harassment and abuse
- Health and wellbeing
- Childhood and education
- Creativity
- Climate and sustainability

- Commerce
- Data and privacy
- Convergence with artificial intelligence (AI)
- Social and political manipulation
- Criminality and justice

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1 Declassified by the Committee on Culture, Science, Education and Media during its meeting on Thursday 21 March 2024, in Paris.
2 All opinions expressed in this text are those of the author and do not necessarily reflect the views of the Council of Europe.

2. Community and connectivity

Being together whilst physically apart

4. Immersive media and the metaverse offer meaningful potential for enhancing human communication and connecting communities. Emerging technologies such as virtual and augmented reality reimagine human interaction by incorporating a sense of 'presence' into online communication. Users of virtual reality frequently report a strong sense of "being there" and describe their experiences in VR in terms usually reserved for direct, physical contact.[3] In comparison with video calls, virtual environments can offer more intuitive, and often more engaging social experiences involving body language, gesture, movement and sometimes even expression and eye contact. A recent study in Greece concluded that virtual reality "has the capacity to be *as* rich and *as* intricate as an interpersonal interaction during FtF [face to face communication]".[4]

Enhancing Communication

5. Unlike traditional digital communication, which is primarily text and image-based, immersive media offers an environment in which people can meet with one another as embodied avatars. They can form communities of interest and engage in group activities and conversations in a more naturalistic, spatial, 3D environment, no matter where they are in the world. For families separated by distance and by circumstance, the enhanced intimacy and interpersonal nature of these tools can create digital tunnels of connection and care.

6. Such social tools can support the extension of freedoms of association and assembly into digital realms. Freedom of expression, and the opportunity to engage in collective action may also translate well into metaverse spaces. The availability of such freedoms is largely dependent on the approaches taken by companies and governments in the coming years.

7. In the working world, metaverse tools open up new possibilities for remote working, potentially democratising citizen's access to global employment opportunities and creating new pathways for international collaboration and entrepreneurship.

8. It is important to note that creating a sense of community in XR is not something that happens automatically; it requires both purpose and context. As observers of 'metaverse ghost towns' will attest, the 'if you build it, they will come' approach to community building has been shown to be as successful in virtual spheres as it is in physical spaces. Although immersive tools enable individuals to meaningfully connect with communities around the world, the barriers to entry remain significant[5] and users must perceive a clear benefit to justify the added effort.

RECOMMENDATIONS

Support strategic investment in immersive platforms and environments that model positive social and community structures.

Champion the benefits of specifically designed, and hosted virtual space over open ended spaces. Legislative approaches could mirror public sector approaches to town planning and social democracy as contrasted with urban sprawl and libertarianism.

Publicly funded XR projects could be expected to conform to a code of ethics including provision for diverse community participation and systems to ensure that users can reasonably expect civil liberties and the rule of law to be upheld. Adherence to such a code could be mandatory, or made desirable through kite marking and commercial (dis)incentives.

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[3] Bailenson, J. (2018). *Experience on demand: what virtual reality is, how it works, and what it can do* (First edit). W.W. Norton & Company.

[4] Dzardanova, E., Kasapakis, V., Gavalas, D., & Sylaiou, S. (2022). Virtual reality as a communication medium: a comparative study of forced compliance in virtual reality versus physical world. *Virtual Reality*, *26*(2), 737–757. https://doi.org/10.1007/s10055-021-00564-9.

[5] Bennett, J., Dalton, P., Goriunova, O., Preece, C., Whittaker, L., Verhulst, I., & Woods, A. (2021). *Audience Insight Report: The story of immersive users*. StoryFutures.

Consider extending legislature regarding freedoms of expression, association and assembly to explicitly include metaverse contexts.

3. Digital democracy

9.   Like the internet revolution before it, the 3D, embodied 'metaverse' offers great opportunities to expand citizen's access to information. It creates exciting new platforms for expression, and new opportunities to meet like and unlike-minded people from around the world. With the enhanced interpersonal and collaborative qualities of these spatial tools, the metaverse has the potential to involve citizens in the democratic process as never before.

Empowering young citizens

10.   Many young people are currently growing up with 'proto-metaverse' gaming environments such as Fortnite, Roblox and Minecraft. They are cultivating high levels of literacy and skill when navigating massively multi-player, social, persistent, creative and collaborative environments. These games share many of the presumed affordances of the 'metaverse', and host millions of daily users from around the world. This generation are likely to find spatial, immersive environments more familiar and intuitive than their parent's generation, and are more likely to seek out and create new forms of engagement in these spaces.

11.   In this context, the metaverse offers a new (semi-) public forum for active, democratic citizenship. Forward thinking governments and civic institutions may wish to encourage participation by integrating metaverse contexts into engagement activity and social development initiatives. Meeting the young people where they are, and empowering them by mobilising the tools of their generation. As so-called 'legacy media' declines, such planning could enable younger generations to participate more fully in informing policy and taking part in the democratic process.

Inequity of access

12.   Much of the democratic potential of metaverse technologies; to connect across communities and continents, depends heavily on citizens' ability to access to emerging technologies. And their access to reliable, high-capacity internet connectivity. At present, access and opportunity to engage with immersive tech is heavily concentrated in the Global North and around existing centres of privilege. If these tools are to deliver on their potential as a democratising communications technology, structural work is needed to close the 'digital divide' between those with, and those without a voice in the sector.[6] [7]

RECOMMENDATIONS

Plan to site public engagement and active citizenship initiatives in metaverse contexts to broaden access to, and involvement in the democratic process

Co-design metaverse activity with young people, particularly when they are the target group to in order to remain in sync with the rapid pace of techno-cultural change, and to encourage empowered civic engagement.

Consider creating or reserving opportunity for initiatives that prioritise inclusion in enterprise and user engagement with the metaverse, actively enabling the contribution of otherwise minoritised persons and groups.

Prioritise investments that connect those isolated by geography, mobility, health or lack of economic opportunity.

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[6] Kopp, I. (2017) Who Is VR For? *Immerse News* (online). https://immerse.news/who-is-vr-for-20b3f077a912.
[7] Sinclair, K., Clark, J. (2020) Making New Reality: A toolkit for inclusive media futures (online)
https://makinganewreality.org/.

4. Harassment and Abuse

13. The existence of harassment and abuse within metaverse platforms represents a significant, and well-evidenced risk, particularly in open, multi-person environments where users interact with strangers. This hazard has been apparent for several years, and appears still to be growing. Evidence suggests that instances of harassment tend to increase in virtual environments devoid of managed hosting or a clear purpose, with female users and minoritized people most likely to be targeted.[8]

14. In 2018 U.S-based XR researcher, Jessica Outlaw found that 49% of regular female VR users reported experiences of sexual harassment or abuse in virtual social spaces. Since then, with the rise in public adoption of VR headsets, the issue has escalated and attracted a significant amount of media attention. In the last few years, numerous reports of sexual harassment or abuse within the metaverse have been reported.[9] [10] [11]

15. Although the nature of harassment and abuse in VR differs from real-world instances, the impact is still significant. Dr Daria Kuss from the UK's Cyberpsychology Research Group explains "Just because these events happen online rather than offline doesn't mean they are not being experienced as real. The emotions produced are as real as they could be."[12]

16. The immersive and embodied nature of the VR metaverse intensifies the impact of physical threats or simulated violence. Unwanted touching or invasion of personal space can result in severe psychological distress. Future developments like haptic technology clothing may further heighten this distress by adding a physical sensation to the virtual abuse in the future.

17. Even without the use of specific haptic technology, many people using only a headset and controllers currently report uncanny physical sensations upon being touched in virtual environments. Experts hypothesis that the transfer of self into an avatar can lead to a mental mapping onto the virtual self, akin to the Rubber Hand Illusion, a much-repeated psychology experiment in which participants gradually associate a rubber hand with their own, and consequently report feeling pronounced physical sensations when they observe the rubber hand being touched or harmed, even though their physical body remains untouched.

18. A comparable phenomenon, 'phantom touch', is frequently discussed by users of social VR. Although largely under-researched in a formal setting, this sensation appears to involve users perceiving a touch sensation on their bodies that directly corresponds to a simulated act of touch in VR. This could point to a form of sensory substitution, in which convincing visual and audio experiences encourage the brain to 'fill in sensory gaps' such as touch and smell. This 'phantom touch' can increase the traumatic impact felt by victims of VR harassment and abuse, differentiating it from traditional cyberbullying.[13]

19. One often-posed question in regard to VR abuse, from those not familiar with the technology is, "why didn't you just take the headset off?". Preliminary research suggests that rapid disengagement from VR, particularly under stress or anxiety, can provoke panic or dissociative episodes. Therefore, the solution may not be as simple as disconnecting.[14] Psychologists and neuroscientists warn that

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[8] Limina Immersive. (2018). *Immersive Content Formats for Future Audiences*. www.digicatapult.org.uk.

[9] Eccles, L. (2022, January 22). My journey into the metaverse — already a home to sex predators. *The Sunday Times*.

[10] Patel, N. J. (2021, December 21). *Reality or Fiction?* Medium. https://medium.com/kabuni/fiction-vs-non-fiction-98aa0098f3b0.

[11] Rifkind, H. (2022, February 21). The metaverse will be an abuser's paradise. *The Sunday Times*.

[12] Askham, G. (2022, April 26). Metaverse: New Documentary Exposes Racial & Sexual Abuse. *Glamour*. https://www.glamourmagazine.co.uk/article/metaverse-misogyny.

[13] McIntosh, V., & Allen, C. (2023). *Child Safeguarding and Immersive Technologies: Key Concepts*. https://learning.nspcc.org.uk/research-resources/2023/child-safeguarding-immersive-technologies.

[14] Allen, C., & McIntosh, V. (2022). *Safeguarding the metaverse*. https://www.theiet.org/media/9836/safeguarding-the-metaverse.pdf.

experiences in virtual reality can form original sites of trauma, and are likely to have lasting effects for affected individuals.[15]

20. To realise the potential of immersive technologies, it will be necessary for all users to feel safe and comfortable engaging with these platforms. Current instances of harassment and abuse are deterring a significant proportion of a potential user base. This can skew the technology's early adopters and, as a knock-on effect, future workforce demographics. Places with high levels of bullying and harassment are something that, as a society, we do not accept in real life, so it follows that they should not be considered acceptable in metaverse spaces.

RECOMMENDATIONS

Recognise that metaverse space is public space, and that citizens have a right to expect that their legal rights, freedoms and protections extend into virtual and augmented territories, including freedom from abuse and harassment.

Regulatory measures could be introduced to ensure that third party platform developers strictly adhere to the terms and conditions set by VR app stores. Most VR app stores' terms and conditions for developers do include the requirement for procedures designed to reduce instances of harassment and abuse. There is evidence from the authors' fieldwork to suggest that these standards are not being upheld, indicating a need for more consistent oversight and accountability for breaches of trust.

Policy makers may also consider creating stronger links between activity in the metaverse and national law enforcement agencies. This would ensure that serious crimes committed in the virtual world don't remain under the exclusive jurisdiction of the platform's internal justice system, which is arguably more suited for technology-related issues rather than serious criminal offences.

Revisit existing laws on sexual assault to ascertain whether they adequately address instances of assault occurring within the metaverse. Reviews of existing statute would consider, for instance, the legal definition of 'touch', and if touch within metaverse spaces are currently in the existing scope of certain laws. Loopholes and gaps could be identified for amendments or clarification.

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5. Health and Wellbeing

21. Virtual and augmented reality are currently in use in numerous clinical and therapeutic contexts, and in support of patients' physical and mental wellbeing. VR in particular has been found to be effective in the management of both acute and chronic pain,[16] providing a distraction from painful symptoms and treatments. The simulative qualities of VR have been leveraged to treat various phobias through exposure therapy.[17] They have also been used to support people with autism in rehearsing social scenarios,[18] and in the treatment of PTSD, allowing patients to revisit traumatic events in a managed and professional setting.[19] [20]

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[15] Madary, M., & Metzinger, T. K. (2016). Recommendations for Good Scientific Practice and the Consumers of VR-Technology. *Frontiers in Robotics and AI*, *3*. https://doi.org/10.3389/frobt.2016.00003.

[16] Pourmand, A., Davis, S., Marchak, A., Whiteside, T., & Sikka, N. (2018). Virtual Reality as a Clinical Tool for Pain Management. *Current Pain and Headache Reports*, *22*(8), 53. https://doi.org/10.1007/s11916-018-0708-2.

[17] Carl, E., Stein, A. T., Levihn-Coon, A., Pogue, J. R., Rothbaum, B., Emmelkamp, P., Asmundson, G. J. G., Carlbring, P., & Powers, M. B. (2019). Virtual reality exposure therapy for anxiety and related disorders: A meta-analysis of randomized controlled trials. *Journal of Anxiety Disorders*, *61*, 27–36. https://doi.org/10.1016/j.janxdis.2018.08.003.

[18] Bradley, R., & Newbutt, N. (2018). Autism and virtual reality head-mounted displays: a state of the art systematic review. *Journal of Enabling Technologies*, *12*(3), 101–113. https://doi.org/10.1108/JET-01-2018-0004.

[19] Rizzo, A., Parsons, T. D., Lange, B., Kenny, P., Buckwalter, J. G., Rothbaum, B., Difede, J., Frazier, J., Newman, B., Williams, J., & Reger, G. (2011). Virtual Reality Goes to War: A Brief Review of the Future of Military Behavioral Healthcare. *Journal of Clinical Psychology in Medical Settings*, *18*(2), 176–187. https://doi.org/10.1007/s10880-011-9247-2.

[20] Rizzo, S. A., Hartholt, A., & Mozgai, S. (2021). COVID-19-Managing the Impact of Trauma Using Virtual Reality. *Journal of Technology in Human Services*, *39*(3), 314–347. https://doi.org/10.1080/15228835.2021.1915931.

22.   Wearable augmented reality devices are being used in surgeries, providing doctors with 'hands free' access to historical and live patient data during procedures, and to support the teaching of complex patient care with a reduced need for live subjects, models and cadavers.[21] [22]

23.   The use of immersive technology has also been shown to be effective for outpatient care, including physical therapy and stroke rehabilitation due to the embodied and immersive nature of the tools. Studies have shown that outpatients using VR exhibit higher levels of motivation and adherence to medical advice, as well as faster recovery times than those with more traditional treatment plans. Further research and investment into therapeutic uses of immersive technologies could improve patient independence and begin to address issues of overcrowding in hospitals.

24.   Some virtual reality experiences have been shown to have profound mood inducting qualities and can significantly affect the emotional state of the user.[23] Multiple immersive apps and experiences have been developed with the intention of supporting mental health and wellbeing. Meditation and mindfulness apps continue to rank among the most popular applications for virtual reality headset users.

25.   As 'metaverse' spaces open up, there will be more opportunity for health and wellbeing experiences to become social and collective. Therapists will become more able to host consultations with patients in virtual spaces, and group sessions using immersive tech may become more available to those who are not able to leave their homes, or do not have access to nearby community resources.

26.   Whilst a great deal of research has been undertaken in hospitals and clinical settings around the world, insights and innovation rarely survive the 'pilot' project. Experts suggest that this is due to a lack of capacity and confidence for healthcare providers to make it work at scale 'in the field' and legitimate concerns persist around sanitation and data privacy. Multiple providers are having to invent their own sets of standards, checks, and balances, and progress is slow.

RECOMMENDATION

Encourage knowledge sharing across healthcare providers to share learning and best practice.

Consider the development of a series of internationally relevant professional standards that will support clinicians wishing to engage with emerging technologies. Core areas to be considered:

- sterility and hygiene
- patient privacy and data security
- accessibility and inclusivity of tools in terms of the design and configurability of hardware and software
- training required for clinical staff and management to responsibly engage with new tools
- patient support for engaging with novel technology and guidance regarding safe use

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6.   Childhood and Education

Virtual learning environments

27.   Immersive tools potentially offer rich new opportunities to educators and students. Virtual reality has already begun to be used in classrooms around the world in a number of ways. These include taking students on virtual reality 'field trips', using headsets to travel through space and time to places the class are unlikely to have the opportunity to visit in person. On more traditional field trips,

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[21] Barsom, E. Z., Graafland, M., & Schijven, M. P. (2016). Systematic review on the effectiveness of augmented reality applications in medical training. *Surgical Endoscopy*, *30*(10), 4174–4183. https://doi.org/10.1007/s00464-016-4800-6.

[22] Palumbo, A. (2022). Microsoft HoloLens 2 in Medical and Healthcare Context: State of the Art and Future Prospects. *Sensors*, *22*(20), 7709. https://doi.org/10.3390/s22207709.

[23] Diniz Bernardo, P., Bains, A., Westwood, S., & Mograbi, D. C. (2021). Mood Induction Using Virtual Reality: a Systematic Review of Recent Findings. *Journal of Technology in Behavioral Science*, *6*(1), 3–24. https://doi.org/10.1007/S41347-020-00152-9/PUBLISHED.

augmented reality technologies are allowing students to access hidden histories, bringing the curriculum to life by recreating ruined buildings, and introducing colourful characters through the lens of a phone or tablet.

28.   The spatial, embodied and interactive qualities of virtual learning environments (VLEs) have been shown to be effective in myriad educational contexts including design, architecture, engineering and science.[24] Research suggests that training delivered using a virtual reality headset "can improve both knowledge and skill development, and maintain the learning over time".[25]

Play

29.   Immersive platforms offer children a diverse range of opportunities to play, explore and to get creative. The social element of the 'metaverse' provides greater opportunities for children to play together and to develop their interpersonal skills. Many of the online games most popular with children today (e.g. Roblox, Fortnite, Minecraft) exhibit features used to define the 'metaverse' e.g. massively multi-player, persistent. 3D worlds that encourage creative, co-operative and competitive play. Roblox has recently released a VR version of its platform on Meta's popular Quest app store, with others expected to follow suit.

Age guidance

30.   There is significant difference of opinion regarding appropriate age thresholds for children engaging with immersive technologies. Each hardware manufacturer issues its own guidance, with lower age limits tending to range between 10 and 13 years old. In the educational marketplace, numerous companies now offer 'off the shelf' immersive learning packages purporting to be appropriate for children as young as four. Many do not recommend a lower age range, referring instead to products as 'for all ages'.

31.   Similar to films and games, VR content is often assigned an age rating such as 13+ or 18+ which can help parents and educators to make informed choices. Some apps, however, are harder than others to classify. Multi-person, metaverse-style social apps involve large groups of real people, talking and interacting with one another in real time via avatars. User behaviour in these environments can be volatile and unpredictable and therefore difficult to pre-classify. As a result, the Pan European Game Information (PEGI) has chosen to designate such apps as 'Parental Guidance Recommended'. Some have expressed concern that this approach gives caregivers a false expectation that such spaces are benign and appropriate for children. Recent reports suggest that unmoderated social VR spaces in fact are over-populated by users who (through voice and behavioural cues) appear to be significantly under the recommended age thresholds for devices. There is concern and a growing evidence base (see below) that young, unaccompanied users in metaverse-style spaces are vulnerable to exploitation and abuse.[26]

Neuro-plasticity

32.   There are additional concerns about the psychological impact of virtual reality on young children who are in the process of forming their optical, vestibular and neurological systems. Research suggests that children may be particularly susceptible to a 'blurring of the lines' between imagination and reality, making it difficult to distinguish between physical and virtual experiences over time. One study conducted at Stanford suggests that virtual reality can generate false memories in pre-school-

[24] Hamilton, D., McKechnie, J., Edgerton, E., & Wilson, C. (2021). Immersive virtual reality as a pedagogical tool in education: a systematic literature review of quantitative learning outcomes and experimental design. *Journal of Computers in Education*, *8*(1), 1–32. https://doi.org/10.1007/s40692-020-00169-2.

[25] Wu, B., Yu, X., & Gu, X. (2020). Effectiveness of immersive virtual reality using head-mounted displays on learning performance: A meta-analysis. *British Journal of Educational Technology*, *51*(6). https://doi.org/10.1111/bjet.13023.

[26] Allen, C., & McIntosh, V. (2023). *Child Safeguarding and Immersive Technologies: An Outline of the Risks*. https://learning.nspcc.org.uk/research-resources/2023/child-safeguarding-immersive-technologies.

aged children,[27] whilst another demonstrates that messages delivered by media figures in VR have an outsized influence on children relative to 2D media such as TV and tablets.[28]

Harms and abuse

> Content warning: the following passage briefly discusses issues of child sexual abuse and exploitation.

33.   Recent research by this paper's authors, commissioned by the UK children's charity, NSPCC reveals evidence of offenders using immersive technologies to meet with, groom, abuse and exploit children, as well as to produce deep fake avatars of real children in order to simulate child sexual abuse scenarios with other offenders.[29] Findings suggest that offenders are also using virtual reality spaces to form communities, swap tools and techniques for committing abuses, and tips on how to evade scrutiny. Intelligence from law enforcement suggests that such offender communities regard immersive technologies and metaverse spaces favourably as they present ample opportunity for the perpetration of abuses, with low expectation of discovery or prosecution due to minimal levels of oversight and technology literacy of law enforcement.

Industry-led activity

34.   Most device manufacturers provide parental controls allowing caregivers a degree of oversight of their children's activity in virtual reality. Controls often involve gated permissions for children to download apps above certain age thresholds, and may include information about which apps children are accessing and for how long. They are unlikely to contain information about who children meet in multi-person spaces, or what they experienced, as this information is not generally monitored, recorded or stored.

35.   Some companies are going further, setting the tone for 'safety by design' across the immersive ecosystem. For example:

36.   LEGO and Epic Games (makers of Fortnite and the Unreal Games engine) have recently teamed up to co-design metaverse spaces and experiences that they hope will be safe and fun for children. They set out three core principles that they will use to inform future development:

  – Protect children's right to play by making safety and wellbeing a priority.
  – Safeguard children's privacy by putting their best interests first.
  – Empower children and adults with tools that give them control over their digital experience.

37.   This approach has resonance with the UN Convention on the Rights of the Child (UNCRC) which details the '3Ps' of children's rights. These rights suggest that children are entitled, not just to '**protection**' from harms, but to the '**provision**' of age-appropriate content, and the right to '**participate**' in the culture that they are themselves a part of. With this approach, digital experiences should not just be 'made safe' for children, but should be designed with them in mind from the outset.

38.   LEGO have also partnered with UNICEF to found Responsible Innovation in Technology for Children (RITEC), an initiative looking specifically at the wellbeing of children in a digital age.[30]

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[27] Segovia, K. Y., & Bailenson, J. N. (2009). Virtually True: Children's Acquisition of False Memories in Virtual Reality. *Media Psychology*, *12*(4), 371–393. https://doi.org/10.1080/15213260903287267.

[28] Bailey, J. O., Bailenson, J. N., Obradović, J., & Aguiar, N. R. (2019). Virtual reality's effect on children's inhibitory control, social compliance, and sharing. *Journal of Applied Developmental Psychology*, *64*, 101052. https://doi.org/10.1016/j.appdev.2019.101052.

[29] McIntosh, V., & Allen, C. (2023). *Child Safeguarding and Immersive Technologies: Key Concepts*. https://learning.nspcc.org.uk/research-resources/2023/child-safeguarding-immersive-technologies.

[30] UNICEF. (2022). *RESPONSIBLE INNOVATION IN TECHNOLOGY FOR CHILDREN Digital technology, play and child well-being*. https://www.unicef-irc.org/ritec.

RECOMMENDATIONS

Addressing the potential impacts of virtual reality (VR) on children requires a multi-faceted approach. First and foremost, we recommend launching a public education programme to inform parents and caregivers about the potential risks and benefits of VR use in children.

Alongside this, technology companies specialising in VR could enhance their co-location features, allowing simultaneous use of two or more linked devices, in the same physical location, facilitating joint parent-child experiences in the virtual realm. This could make parental supervision feel much more natural.

Additionally, policymakers should re-evaluate their current laws related to child likeness and pseudo imagery within VR environments, to check that these laws adequately protect children in this novel context.

Finally, to address potential misuse of VR, resources could be allocated for the training of specialist policing and judiciary to specifically tackle crimes in the VR domain.

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7.   Creativity

A new art form emerges

39.   Immersive media such as virtual and augmented reality has had a profound influence on the creative industries. Artists, filmmakers, theatre makers, games designers and musicians have been amongst the quickest to explore and incorporate these materials into their craft.

40.   There is a 'toolkit' that immersive technologies offer artists – a set of qualities and capabilities that the medium particularly excels in offering. These include the ability to elicit physiological responses in audience members, the ability to provide direct, frameless experience and the capability to alter mood, perspectives, or behaviour.

41.   Europe has a strong international reputation as a hotspring for creative talent in immersive media. Award winning European creative studios such as Atlas V, Anagram, Marshmallow Laser Feast, All Seeing Eye and No Ghost create some of the most highly regarded, innovative work in the arts and culture sector. Strategic investments from European institutions such as ARTE (France and Germany) and Digital Catapult (UK) have helped to develop cultures of making and viewership. Key educational institutions such as the EVENT Lab in Barcelona, Spain and Mixed Realities Lab in Nottingham, UK have helped to foster virtuous cycles of research and development amongst students, practitioners and academics in the sector.

Creative expression for everyone

42.   Even for those who do not work in the creative industries, immersive media also presents the opportunity to explore your creativity, engaging with 3D, digital arts in an accessible and intuitive way. Immersive tools for VR headsets such as Tilt Brush and Gravity Sketch allow users to create designs in 3D spaces, resulting in something that feels like a powerful blend of a sketch and a sculpture.

Reaching new audiences

43.   Recognising the creative potential of XR, various immersive-only arts venues have opened across Europe and internationally. Existing cultural institutions have also begun to integrate this technology into their programmes. Initiatives range from reviving historical moments to fantastical sensory journeys.

44.   One example is Frameless, a purpose-built 30,000 square foot venue in central London that launched in 2022. Art from renowned artists including Cézanne, Monet and Klimt has been made immersive, through projection and soundscape. As visitors walk across the floor of the gallery, artworks come to life through animation and music.

45.   Centquatre Paris' exhibit of Peach Garden in 2020, by director Hayoun Kwan offered a free-roaming virtual reality experience influenced by the work "Dream of Journey to Peach Blossom Land" by 13th century Korean painter, An Gyeon. The exhibition presented a surreal and visually stunning garden for audiences to explore in real time.

46.   Many existing film and games festivals have added 'immersive' strands to their programmes. European festivals such as IDFA DocLab (Amsterdam), Cannes XR, Venice Immersive, London Film Festival Expanded and AWE EU (Augmented World Expo) have become key convening moments for the industry, and provided an opportunity for select audiences to experience the latest in immersive creativity.

47.   As more and more households invest in virtual and augmented reality devices, artists have also begun to design experiences that can be downloaded via app stores and experienced by large audiences in their own homes and in their own time.

Transforming media landscapes

48.   VR documentary 'You Destroy, We Create'[31] by NowHere Media documents the impact of Russian aggression on Ukraine's cultural heritage sites. Sitting in the centre of a blasted museum as a curator looks you in the eye and tells you why she has chosen to stay, can be a profoundly affecting experience.

49.   Released from the rectangular media frame of the screen or page, many film and documentary makers are now using immersive media to transport viewers into the centre of unfolding, non-fiction stories.

50.   Traditional broadcast and print media companies such as the BBC, Guardian, and the New York Times were among the first to commission content for virtual and augmented reality in the 2010s. Professor Mandy Rose points to 'The Immersive Turn'[32] taken by journalists and non-fiction producers towards immersive media, attracted by its capacity to tell rich and powerful stories. Mass adoption of virtual reality technology progressed slower than predicted and many media outlets scaled back their investments.

51.   With traditional media companies standing back, the majority of XR media is now created by independent production companies, with revenue supplemented by public funding, private investment and co-production with charities, companies and brands. Several of the leading tech companies in this space also have mechanisms for commissioning or showcasing content e.g. Meta's 'VR for Good' initiative and HTC VIVE Arts.

52.   Consumers generally access media directly from tech companies via app stores e.g. augmented reality apps via Apple's App store and the Google Play store and virtual reality content through the Meta Quest store and Google's YouTube 360 service. All of whom have their own approaches to content curation and moderation. It is understood that various large streaming services are currently considering the inclusion of immersive content in their media libraries.

Public service media

53.   With the continued decline of traditional media usage (newspapers, broadcast television etc), metaverse contexts may offer new forum to connect with citizens. Metaverse destinations can be mobilised to share news, information and provide access to public services. As with previous technological advances in media, populations will need support and guidance during the adoption phase. Public literacy campaigns would enable citizens to engage confidently with new platforms, and to distinguish between authentic and inauthentic sources.

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[31] NowHere Media. (2022, November). *You Destroy. We Create*. https://www.nowheremedia.net/you-destroy-we-create/more.

[32] Rose, M. (2018). The immersive turn: hype and hope in the emergence of virtual reality as a nonfiction platform. *Studies in Documentary Film*, *12*(2), 132–149. https://doi.org/10.1080/17503280.2018.1496055.

54. Additionally alternate, and equivalent (non-metaverse) sources will likely need to be maintained outside of virtual environments to avoid the creation of inequity for those without access to, or interest in immersive tools.

RECOMMENDATIONS

Immersive technologies offer a new artistic medium, which could both add to public quality of life and grow the creative industries economically. In order to achieve this, the report authors recommend policies that foster thriving creative, immersive ecosystems. Whilst it is important to support the art work itself, there is also crucial work to be done in establishing distribution channels. There are already many very talented artists in the field, some with almost a decade of experience. What is missing are sustainable routes to market - a sustained audience culture and financially sustainable distribution channels are now necessary.

Funding or incentives for creative industry organisations to develop these more immature aspects of the ecosystem would help greatly in allowing this new medium to truly flourish.

Review approaches to public service media to reflect the shift away from traditional media and towards online information channels, including metaverse spaces.

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8. Climate and sustainability

Minimising travel

55. Metaverse technologies have been shown to offer more social, spatial and productive connectivity than can be achieved with video calls, and represent a significantly lower financial and environmental cost when compared with road and air travel.

56. In 2022, 35 countries and 146 industry stakeholders from the European aviation sector committed to achieving net zero CO_2 emissions by 2050. Excellent progress is being made; however, business travel, one of the highest contributors to global emissions, remains stubbornly high. Business leaders frequently reference the need for face-to-face contact in order to build interpersonal relationships and develop trust with partners and clients.[33] New approaches are needed if targets are to be met and new immersive tools such as virtual and augmented reality could play a pivotal role in bridging the gap between online and offline communication.

Connection to nature

57. Immersive tools may also be helpful in supporting those cut off from nature due to hospitalisation, incarceration, limited mobility and lack of access to non-urban spaces. In 2019 the Covid crisis created a worldwide common experience of confinement as billions remained in their homes for protracted periods in order to keep one another safe. The sensation of longing to travel, and to connect with nature, referred to in German as 'fernweh' of 'far woe' will be familiar to many. Whilst immersive technologies will never offer the same experience as physically spending time in nature, simulated nature walks, VR 'forest bathing' experiences etc have been shown to offer health benefits such as mood enhancement, vitality and the reduction of stress.[34] Research has also shown that they can be compelling tools in helping us to feel more closely connected to the natural world.[35] [36]

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[33] Poom, A., Orru, K., & Ahas, R. (2017). The carbon footprint of business travel in the knowledge-intensive service sector. *Transportation Research Part D: Transport and Environment*, *50*. https://doi.org/10.1016/j.trd.2016.11.014.

[34] Reese, G., Stahlberg, J., Menzel, C. (2022) Digital shinrin-yoku, Journal of Virtual Reality, 26(3) https://doi.org/10.1007/s10055-022-00631-9.

[35] Soliman, M., Peetz, J., Davydenko, M. (2017) The Impact of Immersive Technology on Nature Relatedness and Pro-Environmental Behavior, Journal of Media Psychology, 29(1). https://doi.10.1027/1864-1105/a000213.

[36] Scott-Stevenson, J. (2020). Finding Shimmer: Immersive Non-Fiction Media and Entanglements in Virtual Nature. *Digital Culture & Education*, *12*(2). https://www.digitalcultureandeducation.com/volume-12-2.

Considering resource intensity

58.   As with all consumer electronics, immersive technologies are not 'carbon neutral'. Materials involved in manufacture are similar to those used in mobile phones and researchers have warned that an expected increase in the production of virtual reality hardware, with the associated use of scarce resources, global distribution and data processing, will further exacerbate the environmental impact of digital technologies.[37] Rapid cycles of technology obsolescence and a lack of support for repair, reuse and recycling schemes are also contributing to worldwide issues of waste and pollution.

RECOMMENDATIONS

Trial metaverse destinations for conferences/events/projects that might otherwise involve significant amounts of international travel for participants.

Consider codes of practice/regulations that involve life cycle assessment (LCA) of XR technologies, and encourage responsible practices through investment and regulation. This might include the use of recycled gold and other rare earth minerals in the production of hardware, and minimising the transportation involved in current distribution models.

Improve public literacy and access to repair, reuse and recycling facilities for consumer electronics.

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9.   Commerce

New ways of working

59.   Professional metaverse tools have the potential to meaningfully connect people to one another, wherever they may be in the world. The spatial nature of this connection supports a range of working environments that were previously restricted to in-person collaboration. Digital tools such as shared virtual workspaces, live data AR annotation of physical objects, digital twinning, and the ability to collaborate remotely on 3D designs are frequently cited as attractive commercial use-cases.

60.   In some instances, the hybridity of virtual environments may offer distinct advantages over in person collaboration. For example, the use of AI and Natural Language Processing software in VR and AR to enable live, multilingual translation. Such tools can be used to overcome language barriers in real time e.g. one person speaks into a virtual reality headset's microphone in Swedish and their avatar in the metaverse simultaneously speaks in Portuguese to the colleague joining from Sao Paulo, in French to the colleague in Nice, and in Japanese to the colleague connecting from Osaka. When each colleague replies, the original speaker hears their lip-synced responses in perfect Swedish as the intermediary AI provides live translation.

New marketplaces

61.   The metaverse is sometimes referred to as a new technology stack, a series of interdependent infrastructure layers that deliver digital experiences in new ways. Each of these layers potentially create commercial opportunities for new and existing entities. Opportunities for innovation and entrepreneurship run the gamut from underpinning technologies such as decentralised/distributed cloud systems, blockchain ledgers, and digital asset solutions, to the more user-facing elements such as hardware manufacturing, experience design, brand activation and tools for user-generated content.

Competition and Markets

62.   In the early stages of an emergent sector monopolies can go undetected or seen as a necessity to catalyse the growth of a small scene with relatively few players. The risk as the sector grows is that the same monopoly is allowed to retain a stranglehold over the sector, and in so doing dictate the business model, user expectations and commercial imperatives of the industry. Leaving the market

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[37] Andrea, A. (2017) Life Cycle Assessment of a Virtual Reality Device. Challenges. 8(2). https://doi.org/10.3390/challe8020015.

vulnerable to exploitative practices, and a small handful of players in anti-competitive positions. New entrants are de facto excluded due to the scale and power of larger players.

Standardisation

63.   At present no single set of standards has been universally applied to the metaverse. A number of industry-led entities have been formed to collectively design standards that will enable metaverse products and services to be compatible and interoperable. Key bodies include (not an exhaustive list):

- OpenXR - members include Google, Meta, HTC, Microsoft, Pico, Unity and Epic Games
- OpenUSD (Universal Scene Description) – members include Apple, Pixar, Adobe, Autodesk and Nvidia (the latter two are also members of OpenXR)
- The Metaverse Standards Forum - members include the Khronos Group, World Wide Web Consortium (W3C), Open Geospatial Consortium, OpenAR Cloud, Spatial Web Foundation
- OMA3 (Open Metaverse Alliance) - members include Decentraland, Africarare, Metaverse Japan

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RECOMMENDATIONS

At present, one or two players in the immersive ecosystem could be described as having a controlling interest across the hardware, software, content production, publishing, data management, advertising and user safety markets. This level of monopoly would be unlikely to be accommodated in more mature media sectors and should be carefully considered by policymakers as the immersive industry continues to move into the mainstream.

Create opportunities and encouragement for new entrants to develop business models and deliver innovation across the metaverse technology stack

Closer collaboration between industry, policymakers and civil society in the development of practical and ethical metaverse standards

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10.   Data and Privacy

Data processing and surveillance

64.   The metaverse, particularly when accessed via wearable devices such as VR and AR headsets, has the potential to generate user data at an unprecedented level. Whilst user behaviour online is currently understood in terms of clicks, shares, scrolling and dwell time, activity in virtual environments provide platforms with invaluable information about how users behave and what motivates behaviour.

65.   These enhanced data sets offer a range of creative and commercial opportunities for makers looking to optimise and personalise experiences for users. They also represent significant risks to user privacy and GDPR compliance.

66.   Existing protections around management of personal data such as name and protected characteristics may no longer be sufficient as behavioural data can be used to uniquely identify and profile users through alternate means.

Biometric psychography

67.   Researchers have demonstrated that 95% of VR users can be personally identified using easily obtained body dimension and movement data from VR headsets and controllers.[38] Researchers in Berlin suggest that eye tracking data available with most modern headsets;

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[38] Miller, M. R., Herrera, F., Jun, H., Landay, J. A., & Bailenson, J. N. (2020). Personal identifiability of user tracking data during observation of 360-degree VR video. *Scientific Reports*, *10*(1), 17404. https://doi.org/10.1038/s41598-020-74486-y.

"*may implicitly contain information about a user's biometric identity, gender, age, ethnicity, body weight, personality traits, drug consumption habits, emotional state, skills and abilities, fears, interests, and sexual preferences. Certain eye tracking measures may even reveal specific cognitive processes and can be used to diagnose various physical and mental health conditions.*"[39]

68.   This data becomes even more granular when considered in combination with additional biometric markers that can be extracted from wearable devices e.g. speech recognition and facial expression capture.

69.   Recent investment and patent activity suggests that neurological data such as EEG (brain signals) and EMG (muscle micro-movements) will soon form part of consumers' everyday interface with wearable technologies such as in ear-headphones[40] and wristbands,[41] further enhancing the level of biometric information that is potentially available to providers.

70.   The collection and processing of this type of data is frequently referred to as 'biometric psychography'.[42] It involves interpreting the biometric activity of users to psychologically profile individuals and groups. The potential to infer information about users at such intimate levels of detail is proving highly attractive to many companies interested in the metaverse.

71.   In terms of self-regulation, companies have been taking differing approaches as regards biometric data. Apple, for example, have stated that gaze data from the forthcoming Apple Vision Pro will be used for practical functionality such as ID validation, but that the data "never leaves the device". Meta have stated that they store data generated by current VR users such as abstracted eye tracking, speech, hand movements and facial expression on its own servers. This information is understood to be used for the effective delivery of services, as well as "to provide measurement, analytics and other promotional services (including ads and commercial content)".[43]

RECOMMENDATIONS

Review how GDPR applies in metaverse contexts and assess current and future issues of (non)compliance for platform providers and content creators.

Policymakers now need to consider how an individual's right to mental privacy might be preserved in this context. Researchers at Columbia University recently called on the UN to include 'Neuro rights' and as a fundamental tenant of human rights.[44] Others are similarly calling for a principal of 'Cognitive Liberty' to be applied to laws governing brain computer interfaces (BCI) and neurotechnology, including

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[39] Kröger, J. L., Lutz, O. H.-M., & Müller, F. (2020). *What Does Your Gaze Reveal About You? On the Privacy Implications of Eye Tracking* (pp. 226–241). https://doi.org/10.1007/978-3-030-42504-3_15.

[40] Apple Inc. (2023). *Biosignal sensing device using dynamic selection of electrodes* (Patent US-20230225659-A1). https://image-ppubs.uspto.gov/dirsearch-public/print/downloadPdf/20230225659.

[41] Facebook Reality Labs (now Meta). (2021). *Inside Facebook Reality Labs_ Wrist-based interaction for the next computing platform*. Tech at Facebook. https://tech.facebook.com/reality-labs/2021/3/inside-facebook-reality-labs-wrist-based-interaction-for-the-next-computing-platform/.

[42] Heller, B. (2020). Watching Androids Dream of Electric Sheep: Immersive Watching Androids Dream of Electric Sheep: Immersive Technology, Biometric Psychography, and the Law. *Technology Law Vanderbilt Journal of Entertainment & Technology Law*, *23*(1). https://scholarship.law.vanderbilt.edu/jetlaw/vol23/iss1/1.

[43] Meta. (2023). *Supplemental Meta Platforms Technologies Privacy Policy*. https://www.meta.com/gb/legal/privacy-policy/.

[44] Yuste, R., Genser, J., & Herrmann, S. (2021). It's Time for Neuro-Rights. *Journal of International Relations and Sustainable Development*, *1*(18), 154–164. https://www.cirsd.org/files/000/000/008/47/7dc9d3b6165ee497761b0abe69612108833b5cff.pdf.

the use of biometric psychography to analyse and commodify the use of immersive technologies.[45] [46] [47]

11. Convergence with Artificial Intelligence (AI)

72.   Developments in metaverse technologies and services are likely to be intimately entwined with parallel developments in artificial intelligence (AI). The entanglements are likely to occur in three main areas:

- i.   Generative AI: The use of generative text, speech and image tools to autonomously create content such as virtual environments, avatars and scenarios
- ii.   Moderation: Use of AI to monitor and moderate activity in social spaces. This may include age validation, screening for the sharing of illegal or copyrighted content, and identifying inappropriate use of language, gesture or activity such as hate speech and harassment
- iii.   Behavioural modelling: aggregating large-scale user data in order to profile, predict and influence user behaviour, including potentially coercive/manipulative personalisation of advertising and content recommendations

73.   The convergence of AI and immersive technologies, particularly in the case of wearable augmented reality has the potential to exaggerate the asynchrony of experience seen elsewhere online. If each person's (literal) view of the world becomes heavily augmented according to algorithmic assumptions about their preferences, politics and personality, it will be more difficult to assume a common sense of objective reality for those sharing the same physical space.

74.   The AI Bill from the European Parliament sets out a series of rules according to risk level, the uppermost of which being classified as 'unacceptable risk'.

Excerpt from AI Bill:

Unacceptable risk - AI systems are systems considered a threat to people and will be banned.

They include:
- Cognitive behavioural manipulation of people or specific vulnerable groups: for example voice-activated toys that encourage dangerous behaviour in children
- Social scoring: classifying people based on behaviour, socio-economic status or personal characteristics
- Real-time and remote biometric identification systems, such as facial recognition

75.   From early indications, some metaverse architecture is structurally at risk of violating all of the above. If these risks are to be mitigated, significant work could be required to ensure that metaverse ecosystems are designed to be compliant from now onwards. Some possible (non-exhaustive) steps towards this below:

RECOMMENDATIONS

Consider how the use of artificial intelligence might be made transparent to users in immersive environments and within ecosystems. For example, clear and legible signalling could be mandated enabling users to distinguish between avatars operated by a natural person and AI-driven 'bot' avatars.

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[45] Bublitz, J.-C. (2013). *My Mind Is Mine!? Cognitive Liberty as a Legal Concept*. https://doi.org/10.1007/978-94-007-6253-4_19.
[46] Farahany, Nita. A. (2023). *The Battle for Your Brain: Defending the Right to Think Freely in the Age of Neurotechnology*. St. Martin's Press.
[47] Sententia, W. (2006). Neuroethical Considerations: Cognitive Liberty and Converging Technologies for Improving Human Cognition. *Annals of the New York Academy of Sciences*, *1013*(1). https://doi.org/10.1196/annals.1305.014.

AI monitoring to be limited to in situ consideration of user behaviour - upholding user's rights and the rule of law. Behavioural data including speech, gaze tracking and interpersonal exchanges only to be retained when a suspected breach has taken place, and retained only for as long as is necessary for the assessment of said breach, and to enable disclosure to proper authorities. Retention of behavioural data could be explicitly forbidden from commercial and state uses such as social scoring and cognitive, behavioural manipulation.

Where AI monitoring and moderation systems are in place, the mechanisms needed for users to understand and consent to their use must be considered and implemented. The following questions should be considered;

What assurances might they need to be confident that data generated by monitoring will be used in accordance with the declared terms of use? What recourse do citizens have if they believe that they have been misunderstood, misrepresented or maligned by the AI monitoring system? Likewise what recourse might users have if they believe the AI to be insufficient or ineffectual in upholding the terms of service of the virtual environment? What right might users have to engage with an informed, human arbitrator in the event of disputes and harms?

Lawmakers and policymakers may wish to consider establishing appropriate reporting and response systems such that potentially illegal behaviours identified by AI in metaverse contexts such as abuse, harassment, fraud, extortion, CSAM etc can be effectively referred to proper authorities. Once identified, such authorities will likely require additional resources including training in immersive technologies, virtual criminality and on the role, limitations and biases of reporting AI systems.

12.   Social and political manipulation

76.   In these early moments for the 'metaverse', much of the behaviour that has been examined in research, and in the media relates to the actions of individual users, such as anti-social and abusive behaviour. Increasingly, the business models and experience design approaches of tech companies are also subject to scrutiny. As immersive technology adoption increases however, becoming more and more ubiquitous, it is likely that more pernicious trends will emerge. Like social media before it, the metaverse has significant potential to be used for strategic social and political manipulation.

77.   Virtual and augmented reality is often regarded as uniquely powerful in eliciting emotional responses in users. Filmmaker Chris Milk famously referred to VR as an "empathy machine"[48] and much subsequent research has explored its potential to shift perspectives and to encourage new 'pro-social' behaviours.[49] [50] Whilst this is frequently cited as a positive potential of immersive tools, the inverse effect should be equally considered, including the potential for anti-democratic political manipulation, and for at-scale radicalisation, misinformation and coercion.

78.   The metaverse opens new opportunity for information and ideas to be shared at scale. In 3D environments ideas are transformed from the flat renderings of the internet; videos, imagery and the written word, into live, embodied and dynamic interactions. Now the person with the big idea can appear to be 'in the room' with you, recruiting you to their cause. As mentioned in 'Childhood and Education', messages delivered in virtual reality are understood to have an outsized impact on recipients, particularly younger people. Spaces that are simultaneously psychologically plausible[51] and yet demonstrably artificial are additionally understood to have a disinhibiting effect on users. This could

[48] Milk, C. (2015). *Chris Milk: How virtual reality can create the ultimate empathy machine | TED Talk*. TED. https://www.ted.com/talks/chris_milk_how_virtual_reality_can_create_the_ultimate_empathy_machine.

[49] Bailenson, J. (2018). *Experience on demand: what virtual reality is, how it works, and what it can do* (First edit). W.W. Norton & Company.

[50] Slater, M., & Sanchez-Vives, M. V. (2016). Enhancing Our Lives with Immersive Virtual Reality. *Frontiers in Robotics and AI*, *3*. https://doi.org/10.3389/frobt.2016.00074.

[51] Slater, M. (2009). Place illusion and plausibility can lead to realistic behaviour in immersive virtual environments. *Philosophical Transactions. Biological Sciences*, *364*(1535), 3549–3557. https://doi.org/10.1098/rstb.2009.0138.

make them more receptive to ideas and behaviour that they might not entertain outside of such contexts.[52] [53]

79.   Those with a particular agenda may use metaverse platforms to proliferate disinformation and manipulative messaging. There are similarities with known issues in existing physical and digital contexts, however in immersive environments additional risks include:

- AI 'bot' avatars - avatars with no human operator, designed to steer social encounters towards specific 'talking points' or political agendas
- Deep fake avatars – avatars created to impersonate a natural person in order to gain users' confidence, commit fraud, or to undermine the trust that other users may have in that individual
- Nudge psychology – adapting environments and interactions to steer users towards a particular point of view, including radical ideology
- Propaganda and targeted advertising – leveraging data-based social profiling (e.g. where users go, who they talk to, what motivates them to act etc) in order to deliver tailored propaganda materials and coercive messaging most likely to influence them. This could be particularly damaging to the democratic process, for example the proliferation of propaganda and misinformation across metaverse platforms in order to influence voting behaviour, or to encourage non-participation of particular groups

80.   The scale and potency of these types of strategies is likely to depend (as with previous social media paradigms), on the commercial, state or covert availability of at-scale user data. Those with access to such data at scale will be able to hyper-personalise approaches in the metaverse, potentially leading to manipulation at individual and societal levels.

RECOMMENDATIONS

Policymakers should consider a form of content regulation akin to the broadcast and cinema sectors.

Apply learnings from the past decade of social media regulation to intervene in the mechanisms by which state and private sector parties can manipulate user behaviour.

Consider limiting the scale of investment and influence that single state and corporate entities are entitled to accrue across metaverse ecosystems.

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13.   Criminality and justice

81.   For citizens to be empowered to engage in these new frontiers, they need confidence that their fundamental rights, civil liberties and the rule of law will be upheld in 'metaverse' environments. Both platform providers and lawmakers need to work together now to establish protections appropriate for the medium – those rooted in actions and real time activity – not protections merely based on the 'content' being 'posted' as with earlier, 2D iterations of the internet.

82.   Whilst many traditional protective measures for the internet and social media can be applied to VR and AR environments, due to the unique simulative attributes of virtual realities, additional tools may be required. This need for additional regulation should not be seen as a daunting task; virtual realities, in essence, mimic or overlap with real-life venues, events, and markets. Laws, norms, and customs that have worked for offline spaces can serve as a solid foundation for their virtual and augmented counterparts, though adjustments may be necessary.

83.   One challenging area is that of jurisdiction. Criminality in the metaverse may take place on platforms run by a company registered in one territory, utilising server capacity in another, and with offenders and victims using the platform dispersed across territories around the world. In such cases

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[52] Lapidot-Lefler, N., & Barak, A. (2012). Effects of anonymity, invisibility, and lack of eye-contact on toxic online disinhibition. *Computers in Human Behavior*, *28*(2), 434–443. https://doi.org/10.1016/J.CHB.2011.10.014.
[53] Suler, J. (2004). The Online Disinhibition Effect. *CyberPsychology & Behavior*, *7*(3), 321–326. https://doi.org/10.1089/1094931041291295.

where jurisdiction is ambiguous or contested; crime detection, evidence gathering and prosecution can all prove challenging.

84.   This ambiguity potentially leaves space for organised crime networks to exploit the gaps between differing nations' attitudes to oversight and governance. Without joined up thinking and a rule of law-based approach to standardisation, it will be possible for criminal networks to leverage the 'a-territorial' and interoperable nature of the metaverse to coordinate illegal activity with low expectation of discovery or prosecution. International cooperative frameworks may need to be initiated or strengthened to discourage and protect against criminality in metaverse environments.

85.   In a 2022 report 'Policing in the metaverse: what law enforcement needs to know' the Europol Innovation Lab express concern that existing legislation is likely to be "inadequate for the metaverse".[54] They recommend that those involved in law enforcement should be supported to gain first-hand experience of immersive technologies, allowing them to apply their expertise to these new contexts, identifying shortfalls in existing systems and developing new measures where needed.

86.   We can infer from UK data that public sentiment generally supports the application of existing laws in virtual spaces.[55] Consequently, the stereotypical notion of the metaverse as a limitless Wild West 'where anything goes' needs re-evaluation, particularly when such fantasies could lead to harm or potential risk to users.

> RECOMMENDATIONS
>
> We would recommend encouraging a greater understanding of immersive technologies among politicians, policymakers and civil servants. This could be accomplished through a strategic promotion of immersive literacy across governments, ensuring those tasked with governance and decision-making are well-versed in the technological landscape.
>
> The rapidly evolving nature of these immersive environments and technologies necessitates a dynamic approach to governance. Therefore, legislation must be subject to continual review and regularly updated to maintain comprehensive, contemporary protections for citizens.
>
> Work with international agencies such as Interpol to ensure the complementarity of different governmental approaches. Review and enhance international cooperation agreements to support cross-jurisdictional prevention and response to crime using metaverse technologies.

14.   An overview of recommendations

Further detail of each can be found in the relevant sections of this report.

Community and connectivity

● Investment in immersive platforms that model positive social structures
● Champion hosted virtual space over open ended spaces
● Develop a code of ethics that promotes diversity and inclusive participation in the sector
● Create inclusive opportunities in enterprise and user engagement with the metaverse

Digital Democracy

• Host public engagement and active citizenship initiatives in metaverse environments
• Co-design metaverse activity with young people
• Consider creating or reserving opportunity for initiatives that prioritise inclusion

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[54] Europol. (2022). *Policing in the metaverse: what law enforcement needs to know, an observatory report from the Europol Innovation Lab.* https://doi.org/10.2813/81062.
[55] IET. (2023, June 8). *Pixels overtake playgrounds for kids' social lives*. Institute of Engineering and Technology. https://www.theiet.org/media/press-releases/press-releases-2023/press-releases-2023-april-june/8-june-2023-pixels-overtake-playgrounds-for-kids-social-lives.

- Prioritise investments that close the 'digital divide', engaging those isolated by geography, mobility, health or lack of economic opportunity

Harassment and Abuse

- Extend legal rights, freedoms and protections into virtual and augmented territories, including freedom from abuse and harassment
- Require third party platform developers to adhere to the terms and conditions set by VR app stores. More consistent oversight and accountability in the event of breaches of trust
- Stronger links between metaverse activity and national law enforcement agencies
- Revisit existing laws on sexual assault to ascertain whether they adequately address instances of assault occurring within the metaverse

Health and Wellbeing

- Encourage knowledge sharing across healthcare providers to share best practice
- Develop a series of internationally relevant professional standards to clinicians wishing to engage with emerging technologies

Childhood and Education

- Launch a public education programme to inform parents and caregivers about the potential risks and benefits of immersive technologies for children
- Enhance co-location features, facilitating joint carer-child experiences in the virtual realm
- Re-evaluate laws related to child likeness and pseudo imagery within VR environments
- Allocate resources for the training of specialist policing and judiciary

Creativity

- Create systems of support for the development of content, matched with investment in establishing sustainable routes to market and distribution channels in order to connect with audiences
- Funding or incentives for creative industry organisations to develop the more immature aspects of the ecosystem
- Review approaches to public service media to reflect the shift away from traditional media

Climate and sustainability

- Trial metaverse destinations for conferences/events/projects that might otherwise involve international travel
- Consider life cycle assessment (LCA) of XR technologies
- Improve public access to repair, reuse and recycling facilities for all consumer electronics

Commerce

- Review possible instances of market monopoly in the current immersive industry
- Create opportunities and encouragement for new entrants to deliver innovation across the metaverse technology stack
- Enable closer collaboration between industry, policymakers and civil society in the development of practical and ethical metaverse standards

Data and Privacy

- Review how GDPR applies in metaverse contexts and set measures of (non)compliance
- Consider legislature that protects an individual's right to mental privacy and 'cognitive liberty in immersive environments

Convergence with AI

- Consider how the use of artificial intelligence might be made transparent to users e.g. clearly distinguish between avatars operated by a natural person and AI-driven 'bot' avatars
- AI monitoring to be limited to in situ consideration of user behaviour - behavioural data only to be retained when a suspected offence has taken place to enable disclosure to proper authorities
- Where AI monitoring and moderation systems are in place, mechanisms are needed for users to understand and consent to their use
- Create pathways for citizens to report if they believe that they have been misunderstood, misrepresented or maligned by the AI monitoring system
- Establish appropriate reporting and response systems such that potentially illegal behaviours identified by AI in metaverse contexts can be effectively referred to proper authorities

Social and political manipulation

- Consider a form of content regulation akin to the broadcast and cinema sectors
- Apply learnings from the past decade of social media regulation to intervene in the mechanisms by which state and private sector parties can manipulate user behaviour
- Consider limiting the scale of investment and influence that single state and corporate entities are entitled to accrue across metaverse ecosystems

Criminality and justice

- Encourage a greater understanding of immersive technologies among politicians, policymakers and civil servants
- Adopt a dynamic approach to legislation, making it subject to continual review to maintain comprehensive, contemporary protections for citizens
- Harmonize approaches across territories and strengthen international cooperation agreements

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