The Institution of Engineering and Technology

Safeguarding the metaverse

A guide to existing and future harms in virtual reality (VR) and the metaverse to support UK immersive technology policymaking.

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Contents

***Safeguarding the metaverse* is published by the Institution of Engineering and Technology (IET).**

Please note that the views expressed in this publication are not necessarily those of the IET. The report only intends to identify the relevant issues and to inform a public policy debate around the topic, rather than to provide a definitive solution.

The IET Digital Policy Panel welcomes comments on the contents of this report as well as ideas for future digital publications. Please get in touch by emailing **sep@theiet.org**.

The Institution of Engineering and Technology

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1. Opening remarks

The UK has many key building blocks to prepare for the new digital age, in terms of knowledge, technologies and skilled individuals and teams. In some ways we are already at this point, as Covid-19 has accelerated the digitalisation of our lives and normalised online communication and engagement.

There is now a rise of immersive technologies which are shaping our society in terms of the way we innovate, work, and socialise. With these opportunities comes risks and challenges which need to be managed with the right structures, laws and processes in place to ensure the safety of all users including, and especially, young people.

The metaverse has the potential to bring these building blocks together and play a vital role as leading nations move to exploit an increasingly digitally driven global economy.

The metaverse is a relatively recent addition to the vocabulary of the digital media landscape. It is an umbrella term that describes a rich, fully immersive virtual space where people can be educated and interact with one another and undertake experiences, such as seeing new places that they wouldn't ordinarily have access to in the real world.

Harnessing the power of the metaverse for good is important for unlocking a future for the public, industry and governments from across the globe but with any new technology comes an exploitative risk, similar to the introduction of the internet in 1991. It is vital that the UK is a digitally safe country and that this transformative technology is used for the right purpose.

This report focuses on virtual reality (VR) as a gateway to the metaverse, highlights potential harms and ways we can safeguard it for future generations.

It documents both best practice for further dissemination and pitfalls to avoid. The report identifies a series of policy actions for Government, regulators and other stakeholders. While I am pleased to see the Online Safety Bill, I strongly believe that it could and must go further to futureproof technologies of tomorrow which will be mainstream within months.

The UK and the rest of the world are at the start of a dramatic transformation that will have an impact on the lives of everyone. This landmark report could be pivotal in informing amendments to the Online Safety Bill and future regulations.

The Institution of Engineering and Technology (IET) is determined to ensure that best principles are applied to the metaverse and aims to facilitate these key developments, making this report the first of many conversations.

Carol Vorderman M.A.(Cantab) MBE
Honorary Fellow of the Institution of Engineering and Technology.

2. About this report

Safeguarding the metaverse has been produced by the Institution of Engineering and Technology (IET) to examine the potential harms associated with virtual reality (VR) and the metaverse. It examines the background and context of the adoption and uptake of VR technologies as well as its benefits to wider society. It also highlights areas in which there could be negative outcomes created by engagement with the metaverse, while addressing areas of concern regarding safeguarding for users, particularly minors. This report is written for government, policy makers, digital industry and technology professionals.

The metaverse is a comparatively recent addition to the vocabulary of the digital media landscape. It is an umbrella marketing term that brings together related technologies such as virtual reality (VR), augmented reality (AR), the internet, computer gaming and digital communications. As a network of connected 3D virtual worlds, the metaverse provides increased positive opportunities in medical, leisure, creative and industrial sectors, allowing multiple users to interact in a virtual space without the need for real-world proximity.

The full value of the metaverse can only be achieved if the safety, privacy and other rights of users are protected. User comfort, supervision of children and issues such as digital dependence can only be addressed through a clear understanding of appropriate ways of using metaverse-associated equipment, such as headsets, screens and the physical environment users operate in.

This report details existing harms known to be associated with VR, such as the unsupervised use of virtual space, desensitisation, exposure to age-inappropriate/illegal content and behaviours, as well as harassment and abuse. There is also risk associated with children failing to differentiate between virtual reality and real-world reality. The report examines important longer-range issues including: privacy, data and 'big tech', national security, digital poverty, digital inequality, the future of work and challenges of governance.

The metaverse is a major milestone on the digital media timeline, representing vast opportunities for users to benefit from the immersive virtual environment. As well as positive outcomes, the metaverse also brings with it various threats and vulnerabilities for its users that need to be addressed at industry, regulatory and government levels.

This report was commissioned by the IET Digital Panel, an expert volunteer group that creates thought leadership and policy advice to inform government, regulators and communication sectors. The authors are Catherine Allen and Verity McIntosh.

Catherine Allen, Limina Immersive

Catherine Allen is most well known as a UK leading expert in immersive technology and its relationship with the public. Her approach is future-thinking and imaginative, yet heavily audience-centric and grounded in data. After working on the BAFTA-winning iPad app Disney Animated, Catherine led the creation of two of the BBC's first virtual reality experiences in 2015 – 2016. Finding VR an incredible artistic medium, but with a frustratingly narrow audience, she founded Limina Immersive in late 2016; a VR events and research company dedicated to bringing immersive tech to broader audiences. Limina ran cultural VR events across the world to a total of over 15,000 audience members. Catherine now focuses on consultancy and research, with her insights having been featured in The Sunday Times, BBC News, Radio 4's Today Programme, Wired Magazine, British Vogue and Bloomberg.

Verity McIntosh, University of the West of England

Verity McIntosh is a researcher and senior lecturer in virtual and extended realities at the University of the West of England. As a member of the Digitial Cultures Research Centre, her research focuses on the ethics of presence, access and inclusion in immersive experiences, multi-person virtual experiences, and the simulation of unsafe spaces in VR. Verity has written and spoken about the metaverse around the world, including recent features in BBC World Service and ITV World Service. Verity runs a pioneering industry-led, practice-based Masters programme offering students the opportunity to develop their craft as immersive storytellers, adding VR/AR/XR to their creative toolkit, and critically engaging with the politics, business and culture of this emerging field.

3. Recommendations

When a person straps on a VR headset and enters a metaverse space, they deserve to keep their dignity, safety and rights. Governments have a responsibility to ensure this. Below are three recommendations for where policy makers should begin.

1 Futureproofing the Online Safety Bill

Whilst the Online Safety Bill does apply to immersive technologies and the metaverse, it needs some adaptations to make it properly fit for purpose, rather than an afterthought. The bill is currently focussed on content that is published rather than activity that happens. In the metaverse, activity happens in real time. The bill must be adapted to work well in these live, active contexts that are more akin to real life events.

2 Encouraging a positive, healthy metaverse culture

In the case of the metaverse and immersive technologies, user-driven safety features aimed at addressing harassment and abuse are not enough. The solutions being offered by technology companies for user safety, for instance the block and mute feature, are primarily instigated by the victim. By the time a victim has found the block, mute and report button, the psychological damage has often already been done. Technology companies must be incentivised to address these issues of harassment and abuse at their core - addressing the culture of these spaces - rather than placing the onus onto victims.

3 Fast tracking immersive literacy in policy makers, regulators and politicians

A wide range of VR users say the metaverse feels like an unsafe wild west. This needs addressing. Governments, politicians and policy makers must be aware of these immersive technologies and the activity that occurs on these immersive platforms. Without this awareness, decisions will either be made in the dark, or not at all. Decision makers must experience VR and spend some time in the metaverse. The IET will offer support and access to equipment to support this development of immersive literacy.

4. Introduction

> To unleash growth we need to ensure there is trust in technology.
>
> Online Harms White Paper, UK Government 2020

Virtual reality is a powerful new form of digital media and a gateway into the metaverse. When a user participates in VR, the experience is one not just of viewing, but of doing. As a result, critical distance is reduced. Today, the UK has a golden opportunity to use its democratic processes to shape the future of immersive media. The vast opportunity that VR and the metaverse presents can only be captured if the safety, dignity and rights of end-users are protected.

The recent House of Lords confirmation that the Online Safety Bill covers the metaverse[1] is significant. This confirmation now leads the way for policy makers and regulators to gain a deeper understanding of the immersive harms that end-users and society could face. Drawing from current research – including studies by the authors of this report – *Safeguarding the metaverse* outlines key existing immersive harms society is already facing, as well as potential longer-term harms.

Increased public adoption, increased need for safeguarding

Immersive technology is rapidly becoming established as a part of the digital media landscape. The number of people in the UK engaging with VR and accessing the metaverse is increasing rapidly. In 2021, the percentage of UK adults to have experienced VR has more than doubled, rising from 10 percent of internet users in January 2021, to 22 percent in December 2021.[2] Almost one in 20 internet-using adults now use VR at least once a week. One in 14 young people (aged 18 – 24) use VR on a weekly basis. There is evidence of younger users, despite the lower age limit for VR products being set at 13. By laying out the existing and potential harms, this report demonstrates the importance of critically engaging with immersive media. There is currently an opportunity to legislate for and regulate this form of media while norms are still being shaped.

VR headsets are one of the main and most immersive ways of accessing the metaverse. VR and metaverse experiences are powered by spatial computing technology, a technology that experts describe as the next big computing paradigm.

Many of the world's largest multinational tech companies – including Google, Apple, Meta and Microsoft – are investing billions of dollars in this field. They share the ambition of making immersive technologies ubiquitous and mainstream. In 2017, Meta's CEO Mark Zuckerberg stated his company's goal of achieving one billion users in virtual reality.[3]

Benefits of early safeguarding VR users

As well as the obvious benefit to individual users of increased safety, there are economic and societal rewards for early safeguarding.

Wider benefits to safeguarding include:

- Companies in the immersive sector will be incentivised to create applications for immersive technology that have a positive impact on society.
- Digital exclusion will be tackled. Safety equates to inclusion, so if the metaverse feels safer, a wider demographic of users will be made to feel more welcome.

[1] Hansard and Regulating the future: the Online Safety Bill and the metaverse, Carnegie UK Trust.
[2] Limina Immersive survey tracker, Dec 2021.
[3] Can Facebook really reach one billion VR users? | The Motley Fool.

5. Definitions

NB: For definitions relating to 'harm', 'duty of care' and 'safety', refer to the Draft Online Safety Bill definitions.

Metaverse

While the term metaverse can be traced back to Neal Stevenson's 1992 sci-fi novel *Snow Crash*, it did not gain widespread traction until the rebranding of Facebook to Meta in 2021. Metaverse, as a term, describes an embodied internet: one that no longer relies on representation on a flat screen, but which simulates direct experience.

The gateway into the metaverse exists in two connected but different ways: VR and AR. For the purposes of this report, the focus is on VR as it currently has more commercial and user activity, with more products, services and infrastructure. It also has higher levels of investment and customer engagement than AR.

Venice VR Expanded 2021's VRChat World as part of the Biennale's 78th Venice International Film Festival.

Virtual reality: a virtual destination

Virtual reality experiences are widespread in the gaming, arts and creative industries as well as in architecture, engineering and construction (AEC), medicine and healthcare, aerospace and defence, and training and education.

VR places users at the centre of a virtual world, allowing them to look up, down and all around to explore a full 360-degree environment. VR is usually experienced via headsets that provide rich visual and audio information, giving the user a first-person perspective into a virtual world that encompasses most of their field of view.

Multi-user VR spaces

Multiple participants can meet and spend time with one another regardless of where they are in the physical world. Virtual world designs can replicate real spaces (such as a meeting room, tourist destination or historic monument), or they may represent fictional worlds (for example, in gaming). Both exist entirely in the cloud as virtual destinations.

Avatars

Visitors to VR spaces choose an avatar to represent them. Avatar's movements and gestures are synchronised with the user as their head and hands are tracked by the VR headset and controllers. Users act as embodied puppeteers and gain a first person perspective of the virtual world. Avatars can travel freely through metaverse spaces, and the user is normally able to converse in real time with other avatars using audio communication technology built into their headset.

Objects

3D models, such as designs for a new vehicle or building can be brought into a metaverse space and reviewed at 1:1 (or indeed any) scale by team members and stakeholders around the world. Designers can incorporate feedback and adjust designs in real time before committing physical resources to a project. Existing objects and environments can also be recreated in metaverse spaces as digital twins to their real-world counterparts.

Electric/City by Yahoo, Selfridges, fashion designer Charli Cohen and Pokémon promoting physical and digital garments in a metaverse-style virtual reality '*fashion capital*'.

Financial systems

Commercial transactions in VR spaces are expected to be largely underpinned by cryptocurrencies such as Bitcoin or Ethereum. Non-fungible tokens (NFTs) are also strongly favoured as a way of tracking and validating the sale and ownership of digital goods.

What differentiates immersive from non-immersive content?

A defining feature of the immersive experience is "that peculiar sense of 'being there' unique to virtual reality".[4] Psychologists and neuroscientists have studied user experiences and have concluded that immersion in a virtual environment is markedly different to screen-based media such as film, television and gaming.

This difference lies partially in the fact that the participant is surrounded by the virtual environment from the moment they put on a headset. Free from distractions, they commit more fully to the sensory information delivered by the virtual experience. Researchers agree that immersed users understand that they remain in their real-world physical environment, but as one researcher says, the "virtual environment becomes more salient as a source of cognition for a user than the real environment".[5]

Contributing to this heightened sense of presence is another key feature of virtual reality: embodiment. On entering a multiuser metaverse space, users are usually invited to choose or design an 'avatar' that will represent them. The user then embodies the avatar as they move through a metaverse space, creating a first-person perspective of the virtual world.

[4] Bailenson, J. (2019) Experience on demand: what virtual reality is, how it works, and what it can do.
[5] Nunez, D. (2004) How is presence in non-immersive, non-realistic virtual environments possible?

6. Potential harms in VR and the metaverse

To safeguard the metaverse we must understand the harms users are exposed to. The remainder of this report aims to inform policy makers of the challenges that lie ahead.

6.1 Existing harms

Children in VR

While VR is often perceived as a family entertainment device[6], most consumer headsets have a lower age limit of either 12 or 13. This is written into the manufacturer's terms and conditions, with the main route to enforcement being through the linking of the headset to an online account elsewhere (e.g. a Facebook account), in which the user's date of birth has already been required. There is consensus among industry experts and researchers that the lower age limit is not widely adhered to.

At present VR headsets are covered by the UK ICO's Children's Code, which requires organisations providing online media to under-18s to include adequate age verification processes. Companies that do not conform to the code could be fined under GDPR legislation. It is evident from our research that VR is being used by children, and that the number of children in the UK using VR without intervention is unlikely to decline.

Andy Burrows, NSPCC's Head of Child Safety Online Policy said: "We are very concerned about a range of risks that VR and the metaverse present to children".

Unsupervised time in open social spaces

A key issue we identified in our fieldwork[7] is that of unsupervised children in openly accessed VR spaces. This includes under 13-year-olds and over 13-year-olds (the mandatory lower age limit for VR users). We met children in these spaces who told us they were as young as six. This means that children are interacting with adult strangers. This problem was seen on social platforms including Altspace, VRChat and Meta's Horizon Venues.

What makes this situation different to non-immersive media – such as chatrooms – is that VR is embodied. Strangers can not only say things and share content: they can also interact using their bodies, which are represented by avatars. On VRChat – one of the most popular metaverse apps on the Meta Quest – we also observed avatar nudity.

[6] Oculus trending on Christmas Day story.
[7] Fieldwork was conducted for the purposes of this report. The report authors Catherine Allen and Verity McIntosh and a team of three researchers spent many hours in multi-user VR spaces, recording their experiences, which were later reviewed and analysed.

> Of particular concern is the kind of sensory and immersive quality of these products. These qualities will provide new means for abuse to be perpetuated.
>
> Hannah Ruschen, Senior Policy and Public Affairs Officer, NSPCC

Research from the Centre for Countering Digital Hate (CCDH) shows that VRChat is "rife with abuse, harassment, racism and pornographic content".[8] CCDH researchers found that users, including children, are on average exposed to abusive behaviour every seven minutes. Abusive behaviour recorded and reported by CCDH researchers included:

1. Exposure to graphic sexual content.
2. Bullying, sexual harassment and abuse of other users, including children.
3. Minors being told to repeat racist slurs and extremist talking points.
4. Threats of violence.

User-driven safety features are available on all major VR social platforms, including:

1. Personal safety bubbles.
2. The ability to block or mute other users.
3. Reporting abusive behaviour to a moderator.
4. On some platforms there is an optional 'personal boundary'.

One aspect of VR that differentiates it from other forms of media is its personal nature. Unless the user specifically chooses to 'cast' their headset's view to an external screen, it remains a solo experience. Parents, teachers and caregivers cannot easily monitor what a child is doing or seeing. Some apps do not allow 'casting' or recording. This creates a 'black box' effect, in which supervision becomes difficult.

Blurred lines between virtual reality and reality

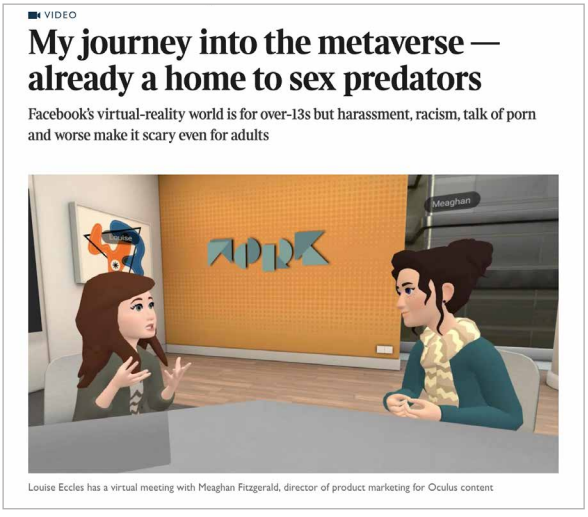
Studies indicate that VR can cause psychological issues for younger children, regarding the blurring of the line between imagination and reality. It is important to note that empirical studies involving VR and children are difficult to conduct and are hard to achieve ethical panel approval for. When they do happen, as a mitigation measure, children usually only spend a few minutes in VR. VR has been shown to create false memories in pre-school aged children and to confuse the boundaries between fantasy and physical reality.

Industry-recognised recommendations for responsible family VR use[7]

1. Limit children's VR use to no more than 15 in-headset minutes at a time.
2. During longer sessions take a break at least every 15 minutes.
3. Do not exit VR quickly or unexpectedly.
4. Always move furniture and objects away from your family's 'guardian boundary'.
5. Do not leave children to use VR unsupervised. Where possible, use 'cast' function.
6. It is harder for adults in VR to supervise a child.
7. Do not use VR 1-2 hours before bedtime, as it disrupts sleep.
8. Include VR in your family's approach to screen time, so VR usage is managed.

Harassment and abuse in VR

Harassment and abuse are common experiences for VR users when they spend time in open spaces where strangers can meet. This is an issue that Limina Immersive observed as a barrier to public VR adoption in 2017. If a space lacked a sense of monitored hosting or purpose, there was an increased likelihood of harassment especially to female users.


VIDEO

My journey into the metaverse — already a home to sex predators

Facebook's virtual-reality world is for over-13s but harassment, racism, talk of porn and worse make it scary even for adults

Louise Eccles has a virtual meeting with Meaghan Fitzgerald, director of product marketing for Oculus content

Sunday Times Consumer Affairs Editor Louise Eccles was confronted with simulated sex and questions about pornography on her first visit to Altspace.

[8] New research shows Metaverse is not safe for kids (counterhate.com).

Multiuser social spaces: negative experiences

In our own fieldwork, we observed and experienced targeted instances of:

- Racist language.
- Homophobic language.
- Transphobic language.
- Simulated violence.
- Virtual groping.
- Attempted non-consensual kissing.

Note: Our research team is all female and our avatars were also female.

Asha Easton, who leads industry body Immerse UK sets out the issue and her views on the topic:

> "How should we be dealing with the physical/sexual harassment of a person's avatar? Should it be treated in the same way as an attack on someone's physical body?
>
> I think, looking to the future, that it should. Especially as the technology evolves and people have an increasing feeling of presence."

Harms from interaction with physical set-up space

When users put on a VR headset, there is a loss of awareness of the physical world as the body and brain adjust to prioritise the virtual space. This means that the user's physical body becomes vulnerable with adults less unable to supervise children or property. Going into VR is like putting on a blindfold and noise cancelling headphones simultaneously. The way a user enters and exits VR, and the physical space they inhabit plays a vital role in the safety of VR headsets.

Physical injuries and property damage

It is vital that VR users set up their space adequately, moving furniture and lighting that is within reach, removing trip hazards, shutting pets away, closing large windows and letting others know you are about to enter VR. While VR-related accidents initially prompted comical viral memes on social media, these accidents can be serious.

Since 2016 there has been a marked increase in VR related insurance claims for accidental damage. According to UK insurer Aviva, there has been a 68 percent overall increase in virtual reality related insurance claims since 2016, usually related to broken televisions.

Disassociation due to inadequate off-boarding

Another risk relating to VR is disassociation. VR disassociation relates to coming out of VR and no longer feeling connected to your body, and/or perceiving the physical world as not real, which can induce anxiety or panic attacks. This phenomenon tends to affect new VR users. Research indicates disassociation is less likely after several weeks of regular use.

There are several key factors in good VR offboarding

These are helpful to new users, people who experience stress or anxiety, and experienced users who have had a break from VR.

1. **Never coming out** of VR unexpectedly.
2. **Entering a calm and safe** feeling environment.
3. **Taking deep**, slow breaths.
4. **Coming out of VR slowly**, ideally staggering the senses, so first the headset audio is turned down, then eyes are closed, and then the headset itself is removed.
5. **Minimising external sensory input** from the physical space, for instance turning off a television in the background or putting a mobile phone on silent.
6. **Sitting still and quietly** for a few moments.
7. **Using simple grounding mindfulness exercises**, for instance paying particular attention to how the air feels on your skin or how your feet feel on the ground.

6.2 Near-term future harms

A thread that runs throughout the following potential harms is that the same qualities that pave the way for effective VR – therapy, empathy building, and prosocial behavioural change – could also generate negative outcomes.

Desensitisation

Virtual reality can create conditions that desensitise participants to experiences that would have previously been shocking, anxiety inducing or frightening. Virtual reality exposure therapy (VRET) uses gradual exposure to a patient's source of fear to help overcome anxiety. This technique is now used in clinics across the world.

While VRET has positively changed the lives of many patients, the potential for VR to desensitise could be carried through into cases where VR is not intended to be a therapeutic tool, but is a by-product of another type of VR experience (for instance, a multiuser social space, entertainment product, or adult content). Desensitisation may result in normalising behaviours that are in the real world socially unacceptable or illegal.

CONTENT WARNING

Please be aware of the following themes before reading the next section.

- Simulated child sexual abuse.
- Non-consensual simulated sex.

Desensitisation: adult content themes in VR

Whilst there is already legislation in the UK regarding online pornography, it primarily centres around pornography available on a mobile phone or computer. Below are some particular themes in virtual reality pornography for policy makers to be aware of.

VR simulators featuring illegal sexual practices
One of the most popular VR pornography experiences available is After School Girlfriend. It is built for the Meta Quest and is available through 'sideloading' (i.e. unofficial sources). Users can simulate sex with a schoolgirl in a range of environments.

Detailed customisation features
A feature in many adult VR experiences is the ability to customise the character that the user is about to engage with sexually. Normalising this level of customisation could create further issues with young people's body image and unrealistic or unattainable expectations.

Lack of consent from sexual partners in VR
Most adult VR content involves non-player characters (NPCs) who are primarily female. They are often passive and when they do act it is at the request of the VR user. This context could cause the normalisation of lack of consent from a sexual partner.

6.3 Longer-term future harms

These are harms that are on the horizon but that have not yet had a substantial impact.

Privacy, data and big tech

There is a risk that metaverse spaces will be tightly defined and controlled by the 'big five' tech companies – Google, Amazon, Meta, Apple and Microsoft – as an extension of their existing majority control of online infrastructure. If metaverse spaces evolve along the same lines as platforms operated by these organisations, the economics underpinning metaverse platforms will be inextricably linked to the capture and commodification of user data.

In the metaverse, the level of detail of information available to platform owners is increased. Online, much can be inferred by user clicks, shares, dwell time and cookies. In the metaverse, this is supplemented by more subconsciously contributed indicators (such as gaze, gait, gesture, pupil dilation, breath and through the interpretation of natural speech), allowing for data capture at a higher level. Under these conditions, conservation of a user's rights to privacy and free will become challenging.

Asha Easton who runs the sector body Immerse UK raised her concerns:

> "My biggest concern for the future of this technology is around the ethical use of biometric data. What will the combination of existing data on a person combined with these new intimate details say about them?
>
> I think transparency around the collection, use and storage of this data, and the option to opt-out of any part of it, will be incredibly important."

Privacy and national security

The metaverse offers potential for enhanced levels of privacy: more so than is currently possible using online communication channels. Such privacy will provide cover for criminals operating in areas such as fraud, exploitation and terrorism. Criminals or extremists could use multiuser VR as a tool for training a globally distributed team of associates. Encrypted social environments will be of interest to police forces and national security agencies, who will need to establish legal conventions for metaverse platforms.

Digital poverty

In past cycles of tech adoption i.e. web 1.0 (fixed content published and accessed through a computer) and web 2.0 (participatory, user-generated content and social media) digital tools and technologies have not been uniformly adopted by whole societies simultaneously. Limitations such as affordability, accessibility and trust can create a 'digital divide' between those with and those without access to socially transformative tools. Citizens who do not engage with new technologies become isolated from resources and services. If a significant part of daily life moves to the metaverse, it becomes difficult for those lacking VR literacy and competence to find employment. This is amplified by the lack of geopolitical boundaries in the metaverse, putting applicants in competition with job seekers from all parts of the world.

The UK has introduced a digital literacy programme in recent years. Similar attention to immersive media literacy would allow citizens to make informed choices and to be prepared for rapidly evolving future professional contexts.

Digital inclusion

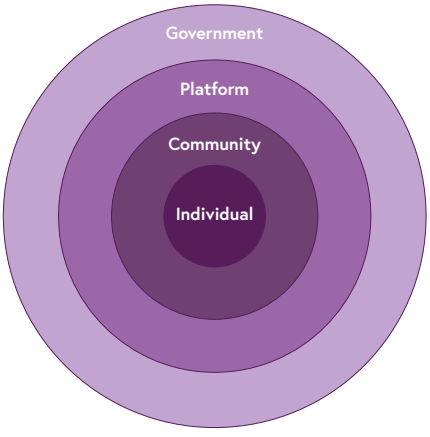
The metaverse represents a move into web 3.0, the next generation of the internet in which digital experiences will become more embodied, spatialised and relational. While there currently is a risk of intensifying existing social inequalities, there is also hope from the VR community that this new paradigm offers an opportunity to recalibrate the tech sector market: a chance for industry and policy makers to build a more responsible, equitable metaverse. Researchers suggest that to develop a global, scalable immersive media industry "it is imperative that we engineer robust participation of people from a broad set of communities, identity groups, value systems, and fields of knowledge in this emerging media landscape, in all roles and levels of power".[9]

Future of work

While much of the recent upswing in home working (WFH) is attributable to the Covid-19 pandemic, WFH is also an accelerated version of a pre-existing trend towards remote working. This trend is likely to develop post-pandemic, with the metaverse providing the medium for connecting remote workers. Given its capacity to simulate environments in 3D and to facilitate collaboration in real time with colleagues around the world, we will see jobs advertised with the option or requirement to work from home and/or in the metaverse.

Platform accountability – challenges of governance

In the VR space, it is not always clear who is responsible for monitoring or responding to illegal behaviour. Because the metaverse transcends geographical boundaries, the question of who will monitor the safety of its users is not straightforward. There are four main areas to consider in the governance of these spaces, each with a potential role to play in accountability for illegal behaviours: individual, community, platform and government.



Four potential sites of governance in the metaverse.

Regulation in VR: individuals, communities, platforms and governments

Individual users: Platforms provide individual users with a suite of tools designed to support safety in open VR environments. These tools range from 'mute' and 'block' functions to 'personal space bubbles' that stop others from coming within a certain range of your avatar. These tools change regularly and can be complex and awkward to use. Direct 'flag' or 'report' options that have become familiar in other online products are rarely made available to VR users in-app. Users are encouraged to add more and more layers of personal protection that limit their own experience within a social space. It is unclear what responses or punitive measures result from reporting action, as platforms are not obliged to disclose their response to the complainant or via the public record.

Community: Many platforms take the view that the community is the best monitor and regulator of behaviour in open VR spaces, and that longer-term users will support and protect newer entrants. Microsoft's social VR platform, AltSpace has a formal Community Helper Program that enlists regular users to "volunteer their time to share information, teach others, and serve as community ambassadors".[10] Researchers suggest that "co-opting members of the community to do difficult, time-consuming, and emotionally laborious moderation work for free is not exactly an ethical business model". Such community groups are often suspicious of outside influence, while over-reliance on community self-policing may inhibit or delay the proper reporting of illegal activities to higher authorities.

Platform owners: Hardware manufacturers and VR App Store owners distance themselves from open social VR space activity, pointing out they (for the most part) do not design or maintain the apps that are available on their platforms. Looking to the future, a serious issue for governance of these spaces will be pinpointing where responsibility lies when illegality and human rights violations occur. Platforms tend to position themselves as a facilitating 'middleware' technology rather than as a publisher, in order to maintain neutrality regarding responsibility for inappropriate content and activity. Issues such as harassment and fraud may become endemic to a platform, rather than specific to single apps. This will become increasingly challenging as metaverse spaces become more inter-operable and harmful activity becomes peripatetic across multiple apps.

Governments: Strategic investment, policy and legislature all have a role to play in the future of VR and the metaverse. Read our conclusions to learn what governments can do.

[9] Sinclair, K. (2020) Making A New Reality: A toolkit for inclusive media futures.
[10] Community helper program - AltspaceVR | Microsoft Docs.

7. Conclusions

What might a future metaverse look like?

There are many ways in which the metaverse might evolve, guided by market needs, consumer behaviour and government intervention. Below are some future metaverse scenarios to represent a diversity of possible outcomes:

The high seas

Fully decentralised libertarianism. The metaverse becomes a space that exists deliberately outside societal norms and governance. It will have a strong belief that the community found to be most confidently using the space is best placed to understand and police its behaviours. Resistant to external forms of oversight or accountability.

The metaverse surveillance state

All activity is tightly monitored and controlled, with state-level access to all activity at all times. Users expressing a desire for anonymity or privacy are treated with suspicion. Algorithmic monitoring of voice and behaviour seeks to identify undesirable behaviour and virtual transgressions that have serious real-world consequences.

The profit palace

A business-first environment where companies lock down specific facets of the metaverse to keenly protect and exploit new, highly profitable markets. Behavioural data from users is understood to be the invisible currency of these spaces, made available to platforms and corporations at high degrees of granularity, including psychological and biometric data without explicit, informed consent from users. This data will become productised, allowing companies to personalise and target advertising, and to apply nudge psychology that will prolong and influence user behaviour both in and outside the metaverse.

The democratic forum

A metaverse where the human rights, democratic processes, systems of justice and civil liberties established in real world contexts are presumed to carry through into virtual spaces. A digital world where privacy and freedom of expression co-exist with governance and accountability. Clear, fair and equitable terms of engagement enable companies to operate commercially within the metaverse, driving a culture of entrepreneurism and creativity while opening new markets on an international footing.

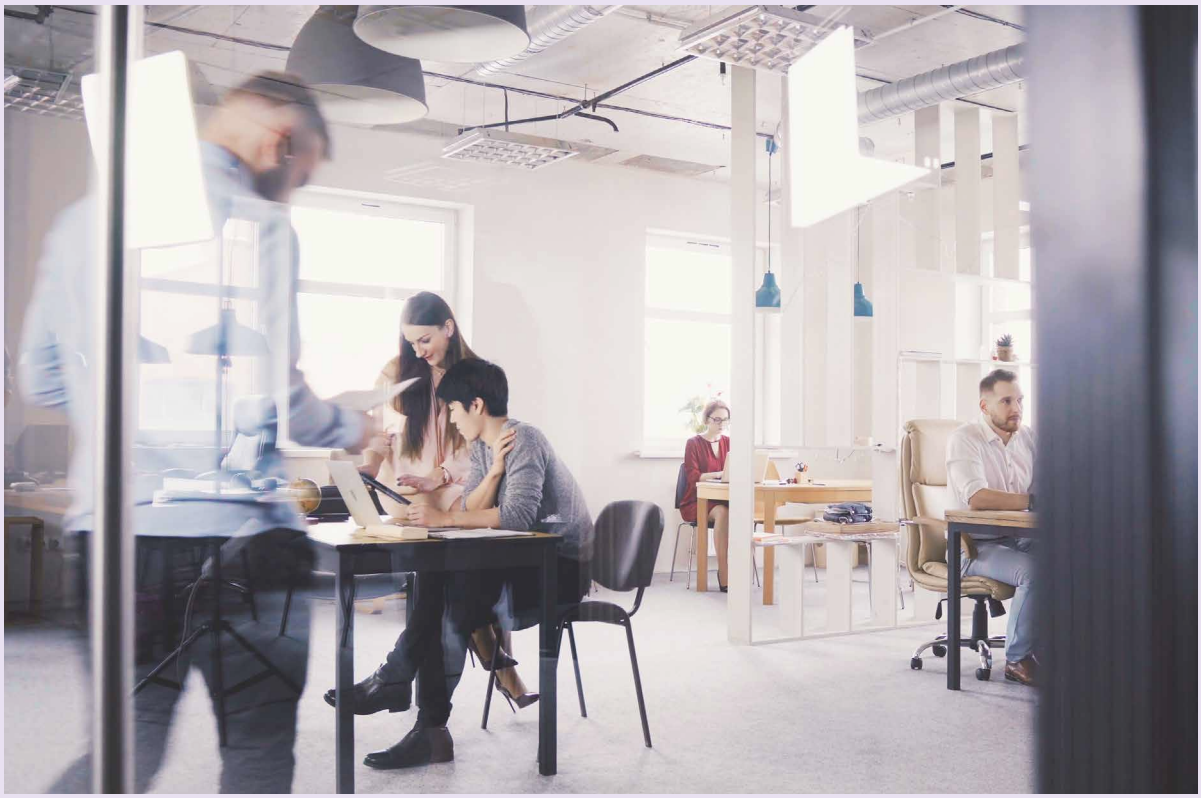
Policy decisions taken now are particularly likely to influence the shape of the metaverse that the UK public engages with in the future.

What can governments do?

There are several ways in which governments can shape the future of the metaverse:

1. **Investment in digital infrastructure**. The UK's commitment to providing accessible 5G capability will be invaluable to the proliferation of this next phase of the internet.
2. **Ensuring adequate legislation is in place** and enforced, to empower citizens to engage with VR and the metaverse as businesses and consumers, confident that their rights are preserved and protected in these spaces.
3. **Designating competent institutions** to monitor legal compliance of metaverse providers. Providing a safe process for whistle blowers and responding meaningfully to user complaints.
4. **Ensuring immersive literacy** of all responsible civic bodies, including police, civil servants, local government, MPs and ministers.

8. About the IET



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