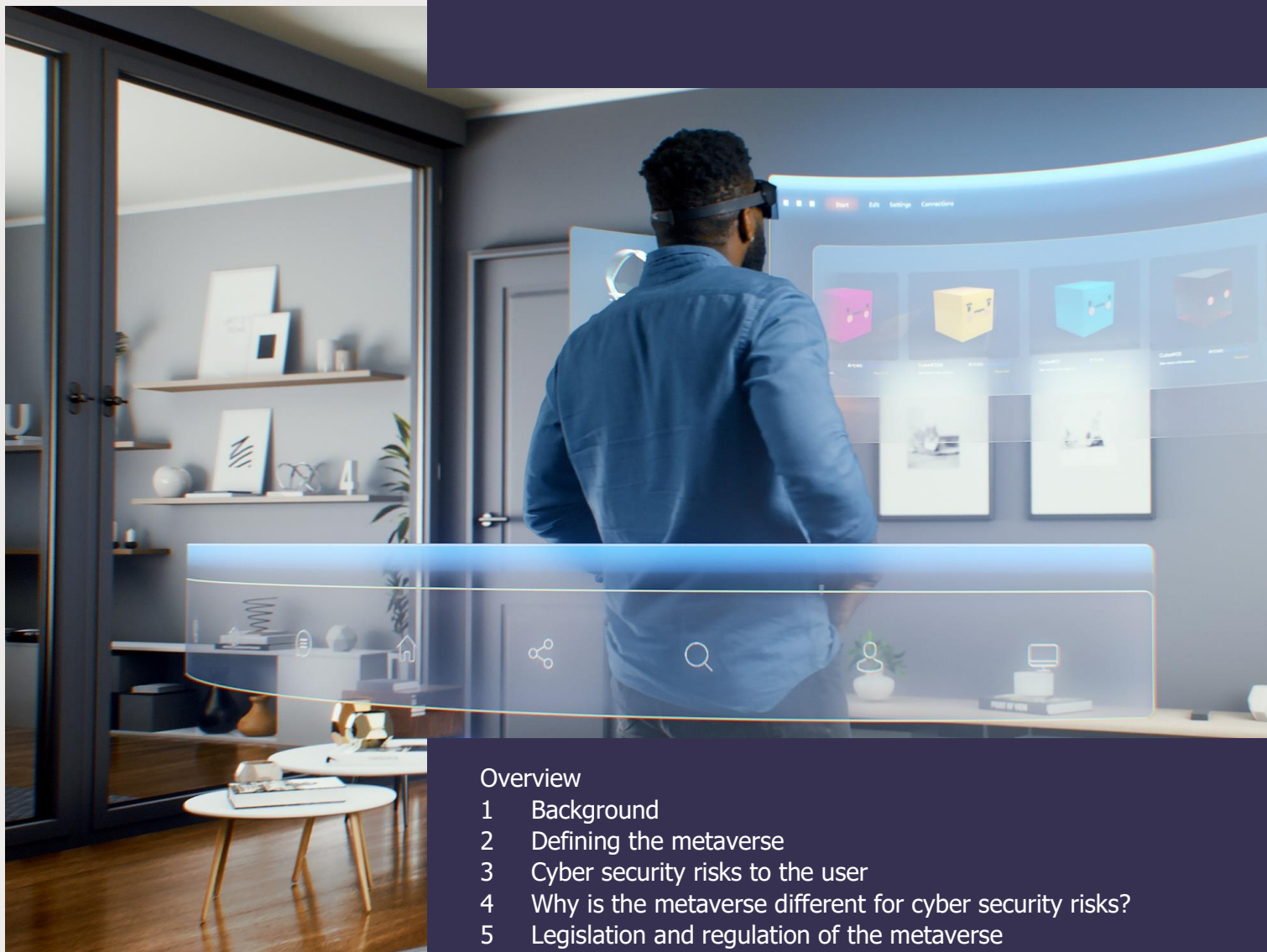


**POSTbrief 61**

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19 July 2024

# What is the metaverse and what impacts will it have for society?



## Overview

- 1 Background
- 2 Defining the metaverse
- 3 Cyber security risks to the user
- 4 Why is the metaverse different for cyber security risks?
- 5 Legislation and regulation of the metaverse

References

Contributors

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# Contents

<b>1</b>	<b>Background</b>	<b>5</b>
<b>2</b>	<b>Defining the metaverse</b>	<b>8</b>
<b>2.1</b>	<b>Definition</b>	<b>8</b>
<b>2.2</b>	<b>Possible benefits of the metaverse – examples</b>	<b>9</b>
	Education	9
	Medicine and healthcare	9
	Business	10
<b>3</b>	<b>Cyber security risks to the user</b>	<b>11</b>
	Identity fraud	11
	Assault	11
	Online Child Sexual Exploitation and Abuse (OCSEA)	12
	Extremism	13
	Collection of personal and biometric information	13
<b>4</b>	<b>Why is the metaverse different for cyber security risks?</b>	<b>15</b>
	Reasoning	15
	Perception	15
	Attention	15
	Memory	16
<b>5</b>	<b>Legislation and regulation of the metaverse</b>	<b>17</b>
<b>5.1</b>	<b>Current UK laws that could apply to the metaverse</b>	<b>17</b>
	Sexual assault	17
	Assault	17
	Harassment	17
	Hate speech	18
	Online Child Sexual Exploitation and Abuse (OCSEA)	18
<b>5.2</b>	<b>Jurisdiction</b>	<b>18</b>

# Overview

- The metaverse is a range of technologies that allow users to interact with virtual worlds, virtual objects, and each other. While in its infancy, it has received great interest from large technology companies.
- The metaverse differs from prior online worlds by its increased immersion, the state of having “stepped into” a virtual, believable world.
- It is expected to be the next stage in the changing internet, with one report expecting a quarter of all people to spend at least an hour a day in the metaverse by 2026. Its global worth may exceed £1 trillion by 2030.
- The metaverse is said to incorporate aspects of artificial intelligence as one of the foundational technologies.
- While realistic interactions between users and virtual objects in the metaverse may benefit education, healthcare, business and other sectors, such believable virtual worlds may have drawbacks. In early 2024, UK police investigated an alleged sexual assault that occurred in the metaverse.
- Technologies that currently drive the increasing sophistication of internet-enabled fraud, such as artificial intelligence, are also technologies that are important to the metaverse.
- While metaverse research is in its infancy, there is growing evidence to suggest exposure to virtual worlds may in some cases negatively affect decision-making and reasoning for some users.
- Safeguarding of children who are exposed to metaverse technologies may be difficult to deliver due to a lack of detect and prevent capabilities.
- Current UK laws may cover some but not all aspects of legal issues that present in the metaverse, and applicable law is yet to be tested by the courts.

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# 1

## Background

The metaverse is the next step in the changing internet.<sup>1</sup> While no standard definition yet exists, it is characterised by a change from the text and images that make up the current internet, to one of realistic three-dimensional environments, or virtual objects overlaid on to the physical world.

While connection between people within a three-dimensional world has been available over the internet for some time,<sup>2</sup> the future metaverse will be differentiated by increased immersion, the state of having “stepped into” a virtual, believable world.

Such realism is being driven by improvements in computing power,<sup>3</sup> graphics technologies,<sup>4,5</sup> and internet bandwidth.<sup>6</sup>

Interacting in believable virtual settings may benefit a wide range of fields, from medical training,<sup>7-9</sup> school and university education,<sup>10,11</sup> communication between international businesses,<sup>12</sup> socialising,<sup>13</sup> gaming<sup>14</sup> and healthcare,<sup>15-17</sup> among others.

As the metaverse is early in development, it may present future issues for users and organisations in respect of crime,<sup>18-20</sup> privacy,<sup>21-23</sup> or where countries have jurisdiction.<sup>24,25</sup> Users may have increased exposure to technologies important to the metaverse, such as blockchain and artificial intelligence (AI)<sup>26</sup> (see Box 1).

The metaverse has had considerable interest from the technology sector and in public discourse:

- Morgan Stanley expects the metaverse to be worth \$112 billion (around £90 billion) globally by 2030.<sup>27</sup> Goldman Sachs predicts this value to exceed £1 trillion,<sup>28</sup> about the same value as the GDP of the UK.
- The UK Information Commissioner’s Office has listed<sup>29</sup> the metaverse as one of eight technologies that may have “significant impact on our societies, economies and information rights in the next two to seven years”.<sup>a</sup>
- Microsoft, Nvidia, Sony, other large technology and entertainment companies – and organisations such as the World Wide Web Consortium – have formed a standards group for the metaverse.<sup>30</sup>

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<sup>a</sup> The Information Commissioner’s Office report, Tech Horizons, uses the term “Immersive virtual worlds”.

- Facebook, one of the world's most valuable companies, renamed itself "Meta"<sup>31</sup> in 2021 and its CEO Mark Zuckerberg has since positioned the metaverse and AI as its key priorities.<sup>32,33</sup>
- The Government of Tuvalu announced at COP27 that it aims to become the "First digital nation"<sup>34</sup> by recreating its islands in the metaverse as rising sea levels threaten the loss of its landmass.
- Apple Inc. released a metaverse-capable headset in 2024.<sup>35</sup>
- Technology consultant Gartner expects that 25% of people will spend at least an hour a day in the metaverse by 2026.<sup>36</sup>

## Box 1 Glossary

The metaverse may be dependent upon various technologies, although all may not be needed to experience it.

- **Artificial intelligence (AI):** POSTbrief 57<sup>37</sup> defines artificial intelligence as "Products and services that are 'adaptable' and 'autonomous.' The 'adaptability' of AI refers to AI systems, after being trained, often developing the ability to perform new ways of finding patterns and connections in data that are not directly envisioned by their human programmers. The 'autonomy' of AI refers to some AI systems that can make decisions without the intent or ongoing control of a human."
- **Avatar:** a representation of a human being in the virtual world.
- **Blockchain:** a secure, online ledger that is extremely difficult to change. It is most well-known as being a secure record of cryptocurrency transactions. The ledger can also be used to store non-cryptocurrency information, such as personal data.
- **Brain Computer Interfaces (BCI):** From POSTnote 614:<sup>38</sup> "Brain-computer interfaces connect the brain to an external computer and are typically used to control electronic devices."
- **Cryptocurrency:** a digital-only, international currency that is not reliant on a central authority or bank.<sup>39</sup>
- **Deepfake:** realistic images that are partly or wholly false, often produced with AI technology.
- **Digital twin:** a virtual reproduction of a real-world object or system.
- **Foveated imaging or rendering:** a technology that tracks the movement of the eye to increase the detail of an image at the point at

which the user is focussed. Increasingly used in virtual reality technologies, and named after the fovea, the centre of the retina.

- **Haptic technology:** allows the user to experience touch, for instance by vibrations or forces.
- **Immersion:** the state of having “stepped into” a virtual, believable world.
- **Web 3.0 (or Web3):** the next generation of the World Wide Web based on decentralisation of ownership, blockchain technologies, and access by everyone.

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## 2

# Defining the metaverse

The metaverse does not refer to any one type of technology, but rather a range that may change the way users interact with the internet and each other.

### 2.1

## Definition

There is no standard definition of the metaverse. The term itself derives from a 1992 novel called "Snow Crash" in which users connect in a three-dimensional world.<sup>40</sup> It is a portmanteau of the terms "meta" and "universe".

Descriptions of the metaverse have changed as technology has advanced. Common themes are:<sup>1,41-46</sup>

- **Immersion:** the metaverse is an immersive, three-dimensional virtual world in which users can interact with other people and objects over the internet. People may be represented as digital reproductions of themselves, or "avatars". This may be with full "virtual reality," or "augmented reality" technologies, with which people and objects are overlaid onto the physical world (see Box 2).
- **Physical world integration:** objects and their properties in the physical world can be represented and manipulated in real-time in the metaverse. These objects are sometimes known as "digital twins" (see Box 1).
- **Technology:** the metaverse is sometimes described as the next step of the changing internet, or Web 3.0. Blockchain and artificial intelligence are foundational technologies of Web 3.0. Blockchain technologies may be used to demonstrate proof of ownership of digital items bought in the metaverse<sup>47</sup>.



## Box 2 Which reality is which?

The metaverse is expected to be experienced via “realities”:

- **Augmented Reality (AR):** a technology that allows a user to see the physical world augmented by a digital overlay.
- **Virtual Reality (VR):** a fully simulated virtual world, often experienced with a virtual reality headset.
- **Mixed Reality (MR):** a technology that mixes virtual objects and real-world objects that can interact with each other in real-time.
- **Extended reality (XR):** an umbrella term for Augmented Reality (AR), Virtual Reality (VR) and Mixed Reality (MR).

## 2.2

## Possible benefits of the metaverse – examples

Experiences in the metaverse are increasingly realistic.<sup>5</sup> People and objects displayed in detail offer experiences that may benefit society, for example in education,<sup>7,48</sup> finance<sup>1</sup> and healthcare.<sup>49,50</sup> Some possible benefits are outlined, but see POSTnotes 708<sup>51</sup>, 712<sup>52</sup> and 719<sup>53</sup>, for instance, for wider information on how technologies that make up the metaverse may impact on these areas.

### Education

In 2021, Stanford University taught their first class in virtual reality worlds.<sup>10</sup> Students were taught with experiences that would ordinarily be too “dangerous, impossible, counterproductive or expensive”<sup>54</sup> such as travelling into space or to the bottom of the ocean. In 2022, medical students at Queen Mary University in the UK received their first lecture in the metaverse.<sup>55</sup> Such experiences were given in virtual reality.<sup>56</sup> In 2021 the Open University successfully trialled virtual reality training courts in which law students could practise and interact with each other.<sup>57</sup>

Some clinical research has shown better healthcare outcomes for patients when medical staff are trained on virtual patients.<sup>7–9</sup> The Royal College of Surgeons of England now uses virtual reality in robotic surgery training.<sup>58</sup>

### Medicine and healthcare

Experts think the metaverse may help in “consultation, graded diagnosis and treatment, clinical research, and even comprehensive healthcare”.<sup>15</sup>

A systematic review from 2022 has shown positive results for the use of virtual reality in the treatment of mental disorders such as anxiety, some phobias, addiction and PTSD.<sup>59</sup> In 2017, a clinical study at UK institutions

used “AVATAR” therapy in order to treat patients with auditory and verbal hallucinations for the first time.<sup>16</sup> Treatments involved patients talking to on-screen virtual avatars that represented their hallucinations. There were significant improvements to patients on average. A research study found metaverse training could reduce emotional and behavioural problems in children with Autistic Spectrum Disorder.<sup>17</sup>

There are also signs that some patients are becoming more comfortable with remote medicine following the increase in use of such technologies during the pandemic.<sup>49</sup>

Wider research has shown virtual environments can be chosen to promote positive psychological outcomes,<sup>60</sup> and virtual technologies have even been shown to help children learn to brush their teeth.<sup>61</sup> UK researchers have found that virtual reality technology is an effective, remotely supervised way for patients with chronic obstructive pulmonary disease to rehabilitate.<sup>b 62</sup>

## **Business**

A Deloitte report<sup>63</sup> commissioned by Meta in 2022 claimed a boost of £40 to £75 billion in additional UK GDP if the UK were to take advantage of metaverse technologies.

In 2022 Forbes reported the benefits of remote, three-dimensional metaverse meetings between companies.<sup>12</sup> With haptic technology for instance, it would be possible to shake hands in a meeting with someone on the other side of the world. Studies have found typical video conferencing software may be lacking when compared to in-person meetings.<sup>64-66</sup>

An upcoming report commissioned by the All Party Parliamentary Group for the Metaverse and Web3.0 is expected to find that eight million UK businesses in 2024 could benefit from the metaverse.<sup>67</sup> One of the authors of the report, Prof. Kieran Fernandes, says there are already growing clusters in London, Southeast England and the West Midlands.

Research indicates some industries are already benefitting from “digital twinning” technology, in which virtual environments mimic real-world objects or systems in real-time.<sup>68-70</sup> Inspection of supply-chain models, inventories and logistics could be enhanced by the metaverse.<sup>71,72</sup> One study indicates the architecture, engineering and construction industry benefits from metaverse technologies.<sup>73</sup>

The metaverse may also be a new marketing strategy for existing businesses, with metaverse-based experiences, such as touch, virtual environments and smell having been found to have positive results with consumers.<sup>74,75</sup> Some academics think there are significant opportunities in the worlds of retail and fashion.<sup>76-78</sup>

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<sup>b</sup> Chronic obstructive pulmonary disease (COPD) is the name for a group of lung conditions that cause breathing difficulties. According to the NHS, rehabilitation is an exercise and education programme designed for people with lung disease who experience symptoms of breathlessness.

Realistic worlds and more natural interactions with other users are advantages the metaverse has over the current internet, but they may also expose the user to new risks<sup>79</sup>. Some risks, such as identity fraud and assault, may be interlinked.

### Identity fraud

Fraud is carried out on the current internet and is becoming increasingly sophisticated<sup>80</sup> (see POSTnote 720<sup>81</sup>). It can be carried out by technologies that are important building blocks of the metaverse, such as artificial intelligence and blockchain (see Box 1).<sup>26,42,82</sup> For instance, in February 2024 an employee in the finance industry was manipulated with AI to defraud a company of \$25 million.<sup>20</sup> Fraudsters used artificial intelligence deepfake technology to mimic the appearance and voice of the chief financial officer in order to trick the employee into transferring the funds. Also, cryptocurrency fraudsters hacked into Elon Musk's Twitter account and pretended to run an event in 2021.<sup>83</sup> When one UK citizen entered, they lost £407,000. Microsoft expects believable, copied identities to be a significant feature of fraud in the metaverse.<sup>84</sup>

Researchers at Lancaster University have created AI-based digital faces that are "indistinguishable—and more trustworthy—than real faces".<sup>85</sup> In April 2024, Microsoft revealed AI technology that can produce realistic, animated, speaking faces from a single photograph and sound file.<sup>86</sup> Some commentators<sup>87,88</sup> suggest such technology<sup>26</sup> may be used to mimic identities with greater realism and believability than the current internet.

### Assault

As the metaverse environment gradually becomes more immersive,<sup>5</sup> virtual actions that in the physical world would cause harm are becoming increasingly realistic.

In January 2024, UK Police started investigations into allegations of virtual rape of a child by adult avatars.<sup>18,89,90</sup> The experience is alleged to have caused great distress. In the report, it is claimed the child "experienced psychological trauma" like that from a real-world assault. Similar assaults have occurred elsewhere.<sup>19,91–93</sup> The metaverse may also be home to assaults that can occur in no other medium (see Box 3). In response, Meta now requires a minimum distance between avatars.<sup>94</sup>

### Box 3 Types of assault distinct to the metaverse

Various attacks on users, such as hacking or virus attacks, may be shared between the current internet and the metaverse. However, some attacks are distinct only to the metaverse.<sup>95</sup>

- **Overlay attack:** With augmented reality, virtual information placed over the environment can aid the user in the physical world by showing directions, or for facial recognition for instance. However, there is a possibility that these “overlays” could be hacked to show malicious advertising, wrong directions, propaganda, or to make the environment more disturbing.
- **Cybersickness attack:** Also known as the disorientation attack. Hackers may change the direction or location of the virtual world with respect to the user. With only subtle changes needed to cause disorientation, the user may not know the cause of their cybersickness.
- **Human joystick attack:** where the attacker changes the virtual environment to cause the user to move to a position in the physical world not intended by the user, possibly leading to real-world harm.
- **Impersonation attack:** an impersonation of the user using their stolen personal or biometric information, possibly with deepfaked voices and images.<sup>41</sup> What may make this different for the metaverse is the potential high level of believability.
- **Shadow presence:** a term used by legal researcher Prof. Clare McGlynn KC to describe an avatar that has been blocked by a user (and made invisible to that user), but which continues to inhabit the same world. A shadow presence can invoke feelings similar to those from harassment or stalking.<sup>96,97</sup>
- **Passing through:** a term used by Prof. Clare McGlynn KC where one avatar passes through the body of another avatar. It can be used intentionally to invoke feelings of invasion.<sup>97</sup>

### Online Child Sexual Exploitation and Abuse (OCSEA)

Thirty three per cent of US children report owning a VR device in 2024.<sup>98</sup> While there are no figures for UK children, concern for the safety of children using this technology is high. In 2023, an NSPCC poll reported over 75% of people believe children are at significant risk of sexual abuse when using VR technology.<sup>99</sup> A survey of 1000 parents with children between 5 and 13 years of age conducted by the Institution of Engineering and Technology found that children’s engagement with virtual reality grew 320% between 2022 and 2023, with 25% of children between 5 and 10 using this technology weekly.<sup>100</sup>

In 2022, a report by Manchester University highlighted the possible dangers of the metaverse<sup>c</sup> with regard to Online Child Sexual Exploitation and Abuse (OCSEA).<sup>101</sup> Increasing immersion, realism, and the ability to more easily express oneself may further damaging interactions with children. Even if avatars of children are fully synthetic, some experts think interactions by abusers or potential abusers may reinforce damaging behaviours.<sup>101</sup>

A report by the NSPCC in 2023 examined how trust by children with abusers may be built more readily in an immersive environment.<sup>99</sup> The same organisation has said social media in virtual reality, and the enabling technology, is “dangerous by design”.<sup>102,103</sup>

## Extremism

The Prevent Strategy has noted that the current internet has been important in radicalisation and the recruitment of people to extremist organisations.<sup>104,105</sup> Particular qualities of the metaverse, such as the ease with which users can meet up “in-person” with seemingly real avatars, could aid this recruitment, training or spread harmful messages.<sup>106,107</sup>

With artificial intelligence thought to become an important technology to the metaverse, disinformation may also be produced and spread with greater ease.<sup>108</sup> Virtual training for terrorists, offensive overlay attacks in populated virtual worlds (see Box 3), and new ways to finance terrorism through easier access to non-regulated cryptocurrencies may also benefit from metaverse technology.<sup>109,110</sup>

## Collection of personal and biometric information

Immersion in the metaverse requires devices such as headsets, haptic wearables, and sensors such as cameras, temperature sensors and heartrate sensors.

A virtual reality headset alone, such as that released by Apple Inc. in 2024, has 10 cameras, and a LiDAR<sup>d</sup> sensor to track the environment. Four other cameras face the user’s eyes and track eye movement, pupil dilation, and allow iris scanning for identification. Such devices collect large amounts of data that the user will often not be aware of.<sup>21</sup>

As an example of what information can be extracted from this data currently, a neurotechnology researcher at Apple reported<sup>111</sup> that by watching users’ pupil response, his team were able to infer what users would interact with before the interaction occurred.

Cognitive states could be predicted by flashing visual or audio signals, such that the user was not aware, and measuring the user’s biological reactions.

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<sup>c</sup> Called “eXtended Reality” in the publication, but would come under the definition of metaverse used here.

<sup>d</sup> LiDAR (Light Direction And Ranging) is an emitter and receiver used to determine distances by timing how long it takes a laser pulse emitted from the device to return.

Artificial intelligence used signals “from the body and brain to predict how focused, or relaxed you are, or how well you are learning.”<sup>111</sup>

While predictions of personal characteristic or preferences by artificial intelligence - such as sexual orientation, gender, or political stance - are not new,<sup>22,112,113</sup> what makes the metaverse different is the scale of the data collected on the individual and the highly personal information now available to manufacturers, organisations or criminals.<sup>114</sup>

From UK General Data Protection Regulation (GDPR), this might be classed as biometric information and subject to specific regulation.<sup>29</sup> With devices being able to predict where you will interact and at the same time being in control of the user interface, some commentators have highlighted risks around the manipulation of a user’s free will, such as for voter manipulation.<sup>115–118</sup>

In 2022, Meta in the US and ByteDance in China accounted for 90% of all sales of virtual reality headsets worldwide.<sup>119</sup> They are large investors in the future of the metaverse: ByteDance recently spent £1 billion on virtual reality company Pico, and Meta invests £7 billion in the metaverse per year.<sup>120</sup>

Both companies have been involved in controversy in their handling of data.<sup>23,121</sup> ByteDance is also subject to the National Intelligence Law of the People's Republic of China that allows that government to access any data held by a Chinese company,<sup>21,25,122,123</sup> including data collected from overseas.

Socioeconomic status may also determine how much a user is exposed to such risks. Should less-wealthy people need access to the next version of the internet, some experts think they will be more likely to choose technologies whose cost is subsidised by data collection models, such as the current Meta Quest headset.<sup>124,125</sup>

## Why is the metaverse different for cyber security risks?

While risks from the current internet will be shared with the metaverse, such as financial fraud, disinformation and hacking, the metaverse may enhance particular risks to the user due to its immersivity.<sup>126</sup> Research on this topic is still in its infancy.<sup>126,127</sup> This section discusses how cognitive processes can be affected by technologies that will make up the metaverse, and how human judgement and decision-making may be changed.

### Reasoning

Research has found that reasoning processes, which allow a user to reach accurate and logical conclusions, may be affected while wearing technologies that will become part of the metaverse. Examples are haptic gloves or wearable devices.

In some cases these technologies can produce a positive effect on decision-making, such as the use of haptic clothing for firefighters that inform the user when surfaces are dangerously hot,<sup>128</sup> or feedback that helps users decide between a number of items while shopping.<sup>129</sup>

However, reasoning processes may be negatively affected by the metaverse with real-world impacts: virtual world experiences may affect the user's sense of risk, the weighting of rare events,<sup>130</sup> and financial confidence.<sup>131</sup> Misinformation, with the possibility of being more prominent in the metaverse, may negatively affect critical thinking and problem solving.<sup>132</sup>

### Perception

Academic research has found exposure to virtual environments can alter users' perception of space<sup>133</sup> and time.<sup>75,134,135</sup> This can persist even after exposure to virtual reality,<sup>136</sup> and may have an effect on how people make decisions. For instance, a sense of time is an important factor in how people view delayed rewards, which may impact impulsivity.<sup>137,138</sup>

### Attention

Virtual reality has been shown to increase a user's "cognitive load",<sup>139</sup> a psychological term to describe amount of memory used by a person.<sup>140</sup>

There is mixed academic evidence<sup>141</sup> on the effects of this increased load: in some cases, augmented reality reduces non-relevant information during learning,<sup>142</sup> but in other research, virtual reality significantly affect users' recall of details.<sup>143</sup> Elsewhere, higher cognitive load is linked with poor decision-making.<sup>144-146</sup>

## Memory

Virtual reality may enhance recall of events by affecting emotions,<sup>147</sup> possibly due to more meaningful experiences of immersion, sound and navigation than for the traditional internet.<sup>148</sup> However, other authors suggest the increased cognitive load could hamper memory processes such as learning<sup>139</sup> and visual working memory,<sup>149</sup> the ability to recall temporary visual information during a task.



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## 5

# Legislation and regulation of the metaverse

### 5.1

## Current UK laws that could apply to the metaverse

UK laws may cover some but not all aspects of legal issues that present in the metaverse. Applicable law is yet to be tested by UK courts.

### Sexual assault

In English law, the Sexual Offences Act 2003 defines sexual assault as the intentional, sexual touching of another person without consent.<sup>e 150</sup> "Touching" includes touching "with any part of the body," "with anything else," and "through anything,"<sup>f</sup> and is interpreted in the law as possible through clothing, and with an object or instrument.<sup>151</sup>

Metaverse technologies like haptic touch allow a user to feel as though they have been touched by another human being, even though the interaction is from one avatar to another. If this touching is considered non-consensual and sexual, it could be interpreted in the law as sexual assault.<sup>97</sup> However, in a recent legal review some experts think this is unlikely.<sup>97</sup>

### Assault

There may be interpretative challenges concerning Actual Bodily Harm. One legal researcher has noted the possible use of the Offences Against the Person Act 1861 for metaverse assault should Actual Bodily Harm be defined as "any hurt or injury calculated to interfere with the health or comfort of the victim."<sup>9</sup>

### Harassment

From the Protection from Harassment Act 1997, harassment is an offence when a person pursues a course of conduct they know – or ought to know – to be harassment.<sup>h 152</sup> For it to be pursued as an offence, their behaviour must also be shown to have crossed "the boundary between conduct which

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<sup>e</sup> Section 3 of the Sexual Offences Act 2003.

<sup>f</sup> Section 79(8) of the Sexual Offences Act 2003.

<sup>9</sup> R v Miller (1954) and Section 47 of the Offences Against the Person Act 1861

<sup>h</sup> Sections 1 and 2 of the Protection from Harassment Act 1997.

is unattractive, even unreasonable, and conduct which is oppressive and unacceptable".<sup>i 153</sup> Commentators have suggested this offence could be used to prosecute a range of offending conduct including domestic abuse and stalking. This law could be used for harassment in the metaverse and is currently used for harassment online.<sup>97</sup>

## Hate speech

The metaverse is currently covered by hate speech laws, which include text-based speech and speech via avatars. Legislation in England and Wales includes the Public Order Act 1986,<sup>j 154</sup> and the Hate Crime and Public Order (Scotland) Act 2021<sup>155</sup> in Scotland, which came into force in April 2024, and the Online Safety Act 2023.<sup>156</sup>

## Online Child Sexual Exploitation and Abuse (OCSEA)

Laws for children in virtual reality can be covered under laws such as the Sexual Offences Act 2003,<sup>150</sup> the Online Safety Act 2023,<sup>156</sup> the Communications Act 2003,<sup>157</sup> the Protection of Children Act 1978<sup>158</sup> and the Criminal Justice Act 1988.<sup>159</sup>

Any sexual images of under-18s, real or not, will fall under "Explicit Imagery of a Child" legislation.

The Information Commissioner's Office has also issued standards<sup>160</sup> that online services need to follow to protect children's data.

While many of these laws are expected to protect children, the NSPCC says "it will be difficult to know which existing laws will be deemed applicable"<sup>24</sup> until criminal charges are brought. The NSPCC report<sup>99</sup> on Child Safeguarding and Immersive Technologies gives high-level recommendations for the UK government, regulators, law enforcement and technology sector, including to "Review legislation on a rolling basis to ensure that immersive environments are adequately covered".

## 5.2

## Jurisdiction

The infrastructure that allows the metaverse to operate may be spread internationally. For example, a user from country "A" could access metaverse worlds hosted in country "B" that are owned by a company headquartered in country "C".

However, companies providing services in the UK are expected to follow UK regulations and laws.<sup>24</sup> For instance, UK actions against Chinese-owned TikTok<sup>161</sup> in 2023 for GDPR data breaches have seen the Information

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<sup>i</sup> *Majrowski v Guy's and Thomas' NHS Trust* (2006) para. 30.

<sup>j</sup> Parts 3, 4 and 4A of the Public Order Act 1986.

Commissioner's Office issue a fine of £12.7m.<sup>k</sup> Non-data international offences in the metaverse may be harder to address however, with "evidence gathering, investigation, arrest and prosecution for those not based in the UK" for child abuse in virtual reality a complex problem.<sup>24</sup>

Some UK legislation, such as the Domestic Abuse Act 2021<sup>162</sup> and the Sexual Offences Act 2003,<sup>150</sup> have extraterritorial powers<sup>163,164</sup> that extend UK jurisdiction outside UK borders. These powers depend on cooperation agreements between the UK and other countries, or "Mutual Legal Assistance" treaties.<sup>24,165</sup>

Elements of legislation in this space are devolved. For example, the Online Safety Act 2023 applies to all of the UK apart from a small number of issues. For instance, the Threatening Communication Offence<sup>l</sup> and the False Communication Offence<sup>m</sup> extends and applies to England, Wales and Northern Ireland, but does not extend to Scotland.<sup>166</sup>

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<sup>k</sup> TikTok is owned by Chinese internet company ByteDance.

<sup>l</sup> Threatening Communication Offence under sections 181 and 182.

<sup>m</sup> False Communication Offence under sections 179, 180 and 182.

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