



Access
Partnership



Metaverse
Policy Lab

Exploring the benefits of a future metaverse:

**What can we learn from current virtual
reality applications?**

January 2023





03

Introduction



05

Chapter 1:
Mass adoption
of metaverse
technology

08

Chapter 2:
VR in the
healthcare sector

11

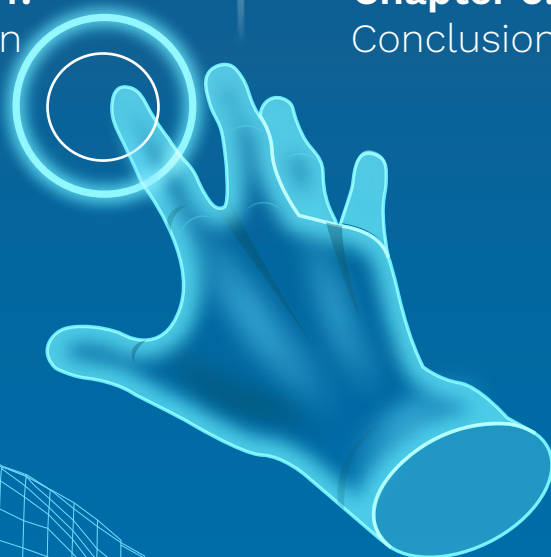
Chapter 3:
Enterprise
and VR

14

Chapter 4:
Education

17

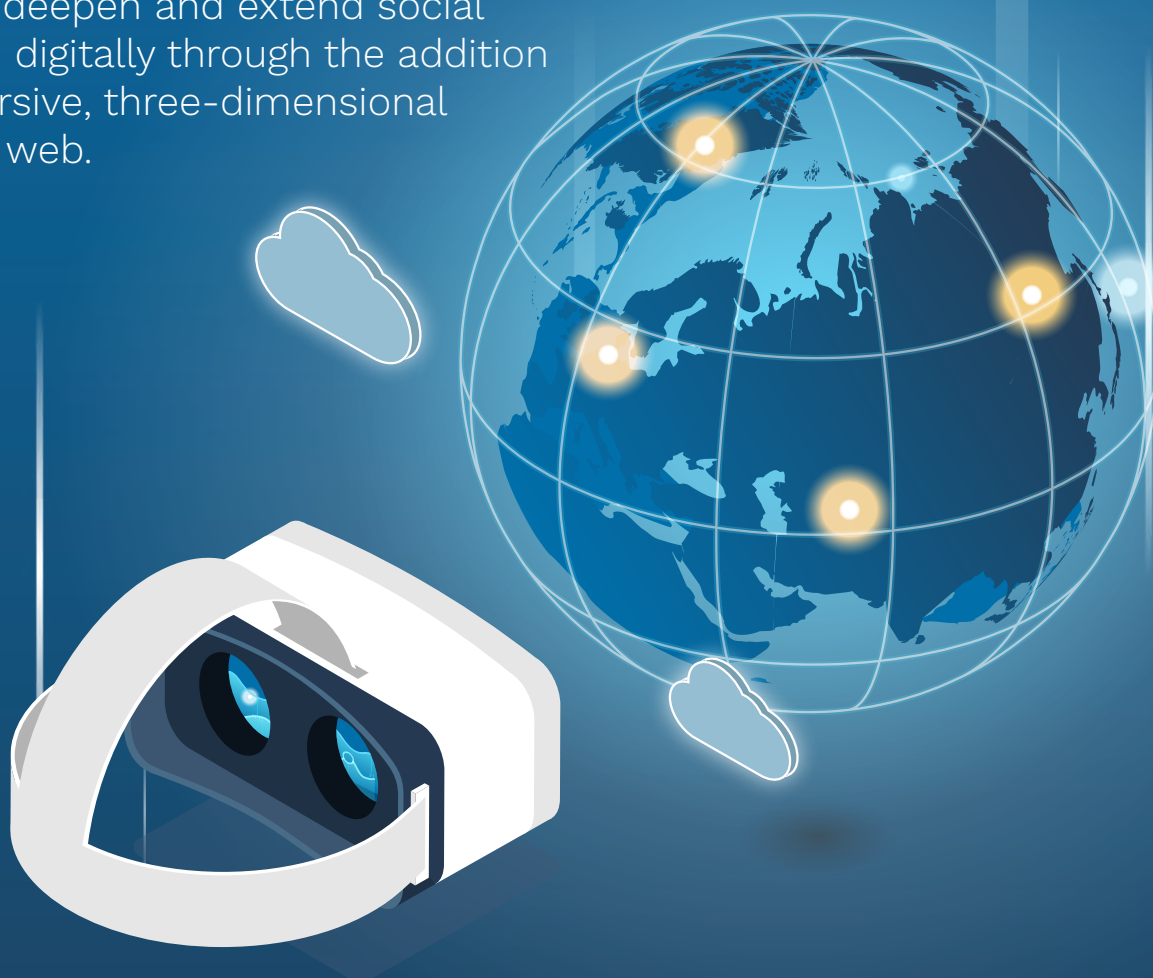
Chapter 5:
Conclusion





Introduction

The metaverse has been loosely defined as the convergence of our physical and digital lives to create a virtual community where we can work, play, relax, transact, and socialise. Rather than existing in a single virtual world, the concept presupposes the emergence of various environments in which people can deepen and extend social interactions digitally through the addition of an immersive, three-dimensional layer to the web.



The metaverse – a billion-dollar industry?

A year ago, research by Bloomberg estimated that the metaverse could be worth up to USD 800 billion by 2024 following a surge in interest during the COVID-19 pandemic. This represented a significant increase compared to 2020, where the metaverse was valued at USD 47 billion¹. Despite recent setbacks, Gartner named the metaverse as one of the top five emerging trends and technologies for 2022, highlighting its potential. This is exemplified by global spending on Virtual Reality (VR) and Augmented Reality (AR), the metaverse's foundational technologies, which Forbes estimates

will rise from USD 12 billion in 2020 to USD 72.8 billion by 2024. Potential adopters of these technologies, such as gaming, retail, arts, healthcare, and blockchain, are currently exploring how to position themselves as critical players in this emerging ecosystem.²

However, it is important to distinguish between the metaverse and metaverse platforms. As McKinsey & Company has noted, “Saying there are many metaverses is like saying there are many internets. The metaverse is the envisioned end state—incorporating all digital worlds alongside the physical



world, with interoperability between them all. As it exists now, metaverse users are spread across multiple platforms; for example, Decentraland, Fortnite, Minecraft, Roblox, and The Sandbox”.³

How do we demonstrate the value of the metaverse?

The metaverse has the potential to facilitate accessibility from the comfort of people’s homes, breaking down boundaries and democratising access to key goods, services, knowledge, and experiences. This technology presents an opportunity to reinvent how we operate as a society, creating virtual platforms that are characterised by a balance of fairness, art, curiosity, creativity, and safety.

In this paper, we explore how current VR applications are likely to evolve in the metaverse, as well as their potential to transform sectors including healthcare, education, and enterprise.

VR is defined here as technology that is “fully immersive, which tricks your senses into thinking you’re in a different environment or world apart from

the real world. Using a head-mounted display or headset... experience a computer-generated world of imagery and sounds in which you can manipulate objects and move around using haptic controllers while tethered to a console or PC”.⁴

Having already noted the tendency for VR technologies and applications to be conflated as representing the metaverse, we would like to draw the following distinction: current VR technologies are vectors for metaverse immersion but are not in themselves metaverse technologies. For example, while the gaming industry has been at the forefront of VR technology through Oculus headsets, this is a limited application of the metaverse’s full potential.

The case study approach enables an in-depth analysis of what metaverse technology can do. With this understanding, forecasts can be made regarding how the technology can become more deeply entrenched and beneficial. However, before delving into the benefits of the metaverse, it will first be useful to look at timelines of when a truly immersive metaverse is likely to be possible.

¹ <https://influencermarketinghub.com/metaverse-stats/>

² <https://influencermarketinghub.com/metaverse-stats/>

³ McKinsey Report Value of the metaverse page 12

⁴ <https://www.intel.com/content/www/us/en/tech-tips-and-tricks/virtual-reality-vs-augmented-reality.html>

01

Mass adoption of metaverse technology



VR headsets – still largely inaccessible

Envisioning the future of the metaverse would require us to account for the trajectories of key underlying technologies – in particular, VR headsets. Early internet users needed to own personal computers before surfing the web, just as social media users today need smartphones before they can participate online. In a similar vein, future metaverse users will need readily available VR headsets before being able to experience this new virtual reality. These headsets represent both the indispensable hardware layer of the metaverse and the new technological paradigm.

Only over recent years have VR headsets begun to make a breakthrough with mainstream consumers. Since 2018, at least 6 million headsets have been shipped annually around the world, with Credit Suisse estimating that this figure is set to grow rapidly to 42 million by 2025.⁵ In comparison, the volume of smartphones sold per year amounts to billions, while sales of personal computers, such as laptops and desktops, are above 300 million annually (Figure 1).

The rate of adoption of communication technologies has been increasing with every new technology

Adoption rate of communication technologies when first introduced
Number of years taken for at least 25% of US households to adopt technology, Years

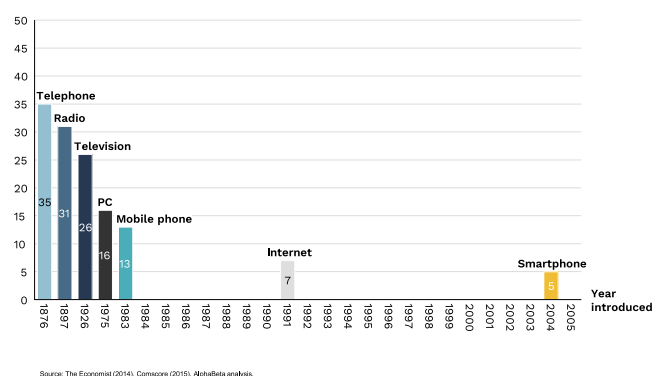
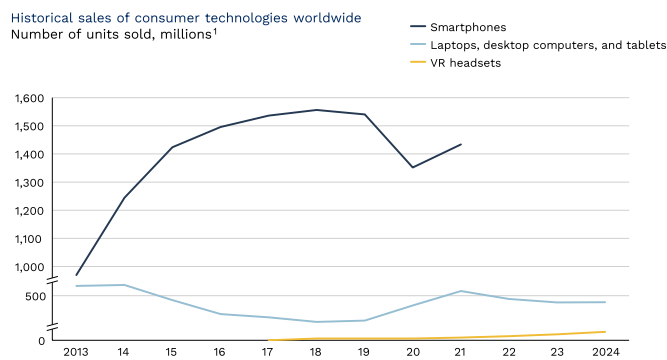


Figure 1: Adoption rate of communication technologies. Source: The Economist (2014), Comscore (2015); AlphaBeta analysis.

⁵ <https://www.credit-suisse.com/media/assets/corporate/docs/about-us/media/media-release/2022/03/metaverse-14032022.pdf>

While the scale of VR headset sales pales in comparison to incumbent communication devices, the current era may come to be seen as the beginning of widespread adoption. Previous technological shifts in which hardware components held the key show that the speed of adoption has increased with each new invention (Figure 2). Smartphones took around five years to reach the hands of at least 25% of US households following their introduction to mainstream consumers in 2004 – relatively faster than when personal computers (16 years) and the Internet (seven years) came to the fore.

Sales of VR headsets to mainstream consumers have only begun, and is set to ride the wave of digitalisation across the world



1. Breaks in each column refer to breaks in Y-axis values to bring all columns to scale.
2. Figures for 2022 onwards are rough projections of future sales.

Source: IDC, Statista, Credit Suisse, AlphaBeta-Access Partnership analysis.

Figure 2: Historical Sales of Consumer Technologies. Source: IDC, Statista, Credit Suisse; AlphaBeta-Access Partnership analysis.

The growth in sales that VR headsets would need to overtake the speed of smartphone and computer adoption would require comprehensive multistakeholder coordination. Without a concerted effort, the reality of a metaverse that reaches the scale of existing digital platforms may come later, rather than sooner. Technology developers and policymakers at various layers must take action to realise this goal. This includes maintaining affordable prices, creating a robust connectivity infrastructure, and developing devices fit for long-term use with minimal side effects.

Barriers to mass-scale adoption – price and broadband accessibility

To promote widespread adoption of these headsets, consumers must be given affordable prices or

alternative pricing models that allow them to finance their purchases – especially those who generally do not prefer one-off payments. VR headset prices today are already considerably lower than in previous years, contributing positively to the pace of adoption. An Oculus headset was priced at more than USD 600 in 2016, whereas the same headset is currently available for around USD 400.

By comparison, leading smartphones are priced above USD 300⁶ and are usually sold under bundling or subscription offers, enabling consumers to finance their purchases through affordable monthly payments. Ensuring that connectivity is robust is key to promoting adoption, as users would need seamless broadband services with minimal interruptions before considering joining a metaverse platform. As of today, broadband infrastructure has much more room to develop, even in well-connected areas.

However, an increase in the availability of offline or low-speed use cases, such as games or immersive entertainment experiences, could lead to a rise in adoption, even as connectivity infrastructure continues to advance. As connectivity options increase and prices fall, the adoption of headsets will become more realistic for a higher portion of consumers.





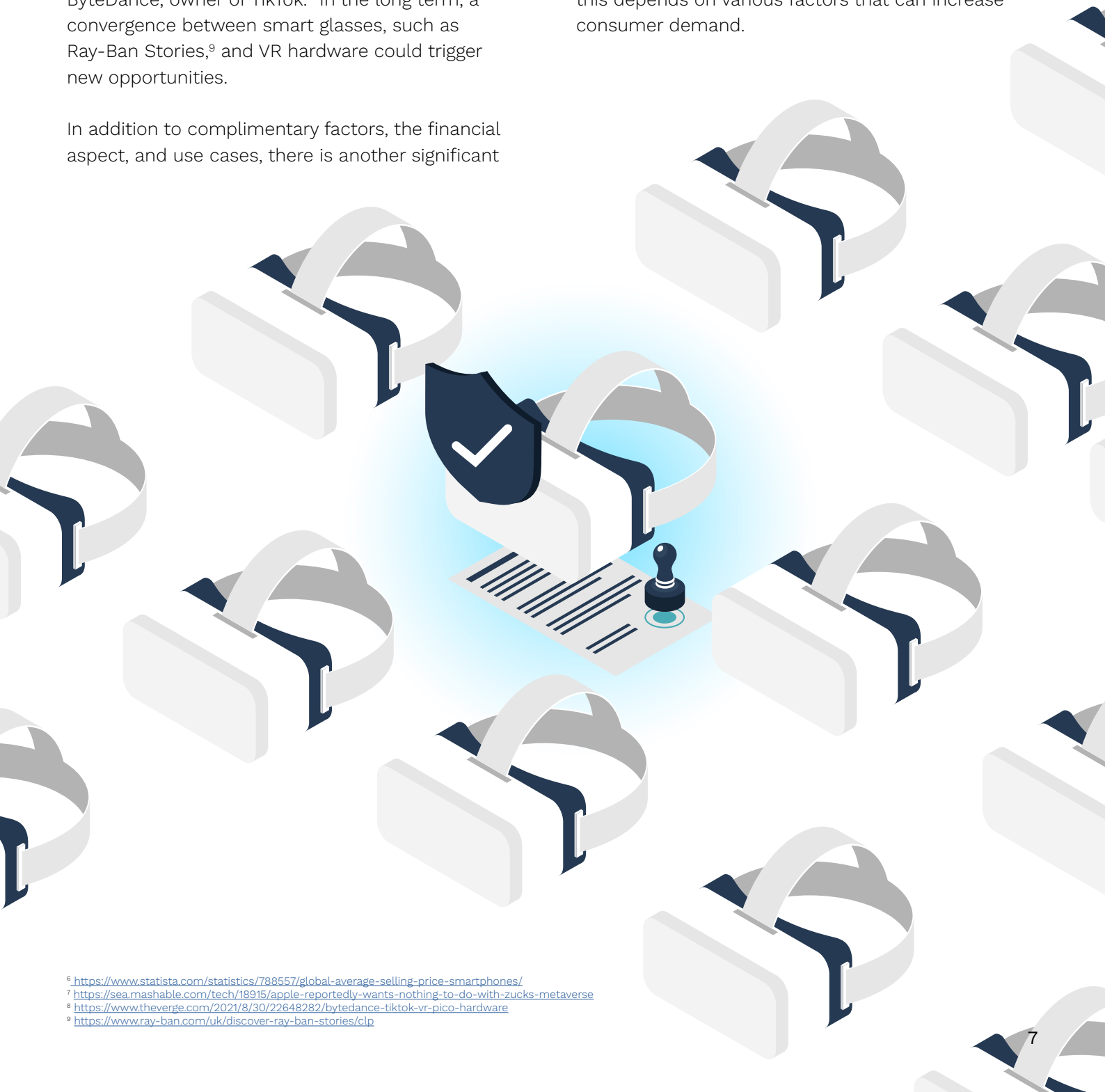
Technology convergence

The emergence of other innovative technology firms with different models may result in an early disruption to the headset market. For instance, Apple is considering a different model of engagement, where headsets are used for short-term bursts of experience rather than longer-term sessions.⁷ It would not be surprising to see further market consolidation and vertical integration around metaverse applications and VR headsets in the future, such as the acquisition of Pico, a major Chinese headset manufacturer, by ByteDance, owner of TikTok.⁸ In the long term, a convergence between smart glasses, such as Ray-Ban Stories,⁹ and VR hardware could trigger new opportunities.

In addition to complimentary factors, the financial aspect, and use cases, there is another significant

hurdle to be overcome before widespread adoption of hardware can be achieved: user experience. Currently, it has been shown that long-term use of headsets may trigger negative user experiences, such as nausea.¹⁰ Similarly, safety from household accidents during metaverse experiences should also be considered, with necessary precautions taken by developers.

In short, there is still a long way to go before mass adoption of metaverse-enabling hardware. VR headsets could become more widespread, but this depends on various factors that can increase consumer demand.



⁶ <https://www.statista.com/statistics/788557/global-average-selling-price-smartphones/>

⁷ <https://sea.mashable.com/tech/18915/apple-reportedly-wants-nothing-to-do-with-zucks-metaverse>

⁸ <https://www.theverge.com/2021/8/30/22648282/bytedance-tiktok-vr-pico-hardware>

⁹ <https://www.ray-ban.com/uk/discover-ray-ban-stories/clp>

02

VR in the healthcare sector



Although commonly touted as a recent innovation, VR and AR technology arrived in the healthcare sector years ago. In some hospitals today, medical students and doctors hone their skills within virtual environments through headsets.¹¹ Patients and health practitioners have also utilised virtual projections during treatments. These applications have existed for several years, but as technology develops, a more immersive, beneficial, environment is likely. However, these potential benefits can only be fully realised for the whole population once regulations and digital infrastructure are robust enough to support these innovations.

It is important to note that current applications of telemedicine do not take place in a metaverse. They imply the adoption of new information and communications technology in the field of medicine but do not incorporate the social interaction elements that define and characterise a metaverse.

Lessons from COVID-19 – an urgent case for telehealth adoption

In early 2021, with the COVID-19 pandemic continuing to unfold, global telehealth utilisation was 78 times higher than pre-pandemic levels as the scope of virtual visits broadened.¹² In effect, this allowed clinicians to intervene faster when diagnosing and addressing health-related problems. By asking patients to upload their biometric data onto a web platform and triggering automatic alerts if they fall out of normal ranges, healthcare providers were able to smoothen the consultation process and almost halve hospital admissions and emergency department visits per patient.¹³ As a result, telehealth became the first line of treatment for most US patient care.¹⁴

Prompted by the COVID-19 pandemic, 57% of surveyed frontline providers and 97% of surveyed primary care physicians in the USA used telehealth in some form in 2020 (Figure 4).

¹⁰ What causes motion sickness in VR, and how can you avoid it?; An example on muscle strain and discomfort: The effects of target location on musculoskeletal load, task performance, and subjective discomfort during virtual reality interactions

¹¹ <https://business.oculus.com/case-studies/uconn-health/>

¹² <https://www.mckinsey.com/industries/healthcare-systems-and-services/our-insights/telehealth-a-quarter-trillion-dollar-post-covid-19-reality>

¹³ <https://pubmed.ncbi.nlm.nih.gov/28446045/>

¹⁴ <https://www.bain.com/insights/us-doctors-turn-to-telehealth-as-covid-19-limits-in-person-care-snap-chart/>



Figure 3: Doctors operating in the metaverse. Source: Adobe Stock

Primary care physicians, in particular, became reliant on this application, with half of those surveyed using telehealth for 75% of the care they provided during the pandemic. While the uptake of telehealth solutions may potentially subside – only half of surveyed adults in the US expect to continue using telehealth once the pandemic is fully over – it represents an inflection point in the use of technology in medicine as more healthcare providers become open to utilising novel applications. During the pandemic, at least 50% of the time spent on telehealth by frontliners and primary care physicians involved providing urgent care (Figure 5), showcasing how compatible telehealth can be in healthcare provision, particularly for individuals who are returning to visit their own clinicians.

Telehealth becomes the first line of treatment for a majority of US patient care amid Covid-19

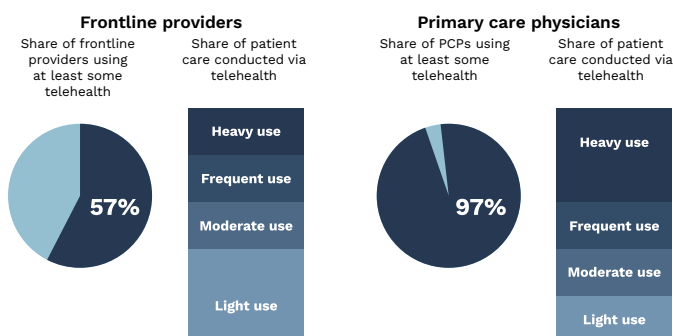


Figure 4: Telehealth in the US. Source: <https://www.bain.com/insights/us-doctors-turn-to-telehealth-as-covid-19-limits-in-person-care-snap-chart/>

In the future, the use of telemedicine can be further expanded through the adoption of metaverse-related

extensions, including digital twins – like-for-like digital models of patients that doctors can use for experimental treatments or to forecast the impact of interventions. Such applications can enable faster and more impactful decision-making for practitioners, helping to save time and lives.

Where are US doctors using telehealth the most?

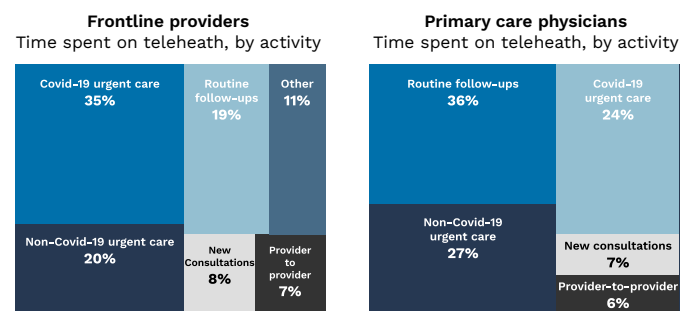


Figure 5: Telehealth in the US. Source: <https://www.bain.com/insights/us-doctors-turn-to-telehealth-as-covid-19-limits-in-person-care-snap-chart/>

Healthcare training in the metaverse – geographic boundaries and cadavers become redundant!

Healthcare practices have also undergone immense change with the help of VR and AR tools, and the metaverse can transform this sector further still. Through virtual reality headsets, residents can practice multiple times on virtual models in a simulated environment, whereas using cadavers limits certain procedures to once only. A study of senior surgical residents who trained using VR headsets estimated that participants learned 570% faster than those who learned through traditional approaches.¹⁵ Residents who used headsets could engage in purposeful practice thanks to the immersive training experiences and replicability. Students can also attend virtual classrooms and utilise VR anatomy software, helping them to visualise the human body for their medical education.¹⁶ Finally, AR technologies have allowed doctors to visualise the anatomy of their patients and procedures in real-time, enabling them to see exactly where to drill a bone or place a screw as the patient remains constrained.¹⁷ The metaverse promises to expand these applications, enabling doctors to digitally visualise real patients located miles away and conduct or assist in surgical procedures.¹⁸

¹⁵ <https://business.oculus.com/case-studies/uconn-health/>

¹⁶ <https://assets.kpmg/content/dam/kpmg/au/pdf/2022/future-of-XR-white-paper.pdf>

¹⁷ <https://www.yankodesign.com/2022/05/15/the-metaverse-has-the-power-to-improve-healthcare-and-it-has-already-begun/>
<https://www.hopkinsmedicine.org/news/articles/johns-hopkins-performs-its-first-augmented-reality-surgeries-in-patients>

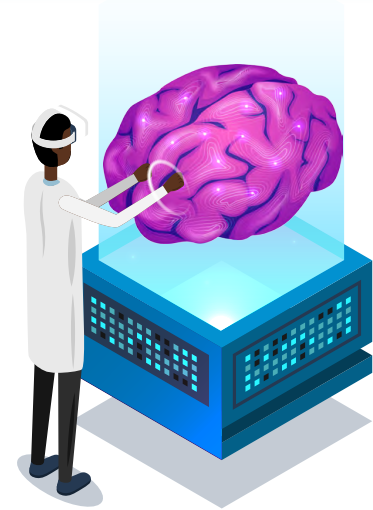


Case Studies

Case Study - VR Application

In 2016, Stanford University's School of Medicine opened a new VR lab at the Neurosurgical Simulation and Virtual Reality Center boasting technology that "allows trainees to explore three-dimensional, digital renditions of brain structures".¹⁹ This application improved resident education and clinical practice by using VR goggles and handheld controllers to navigate and explore an actual patient's neuroanatomy.

Into the Metaverse: Future uses of this technology could combine VR applications with a virtual environment to make the learning experience more interactive and dynamic, while also benefiting from VR renditions of brain structures.



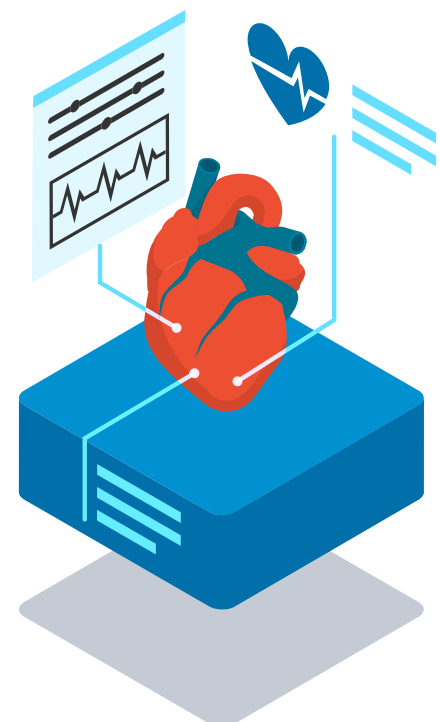
Case Study – AR Application

In London's St Mary's hospital, Microsoft is collaborating with Imperial College to test Microsoft's HoloLens AR capabilities in the reconstruction of damaged tissue during surgical procedures.²⁰

The HoloLens overlays a virtual version of a patient's anatomy before they start slicing. The testing so far has been successful, with surgeons and doctors reporting on the benefits of using this technology. In addition, during the COVID-19 pandemic in 2020, the Imperial College Healthcare NHS Trust partnered with Microsoft to use mixed-reality headsets to tackle frontline patient care at a safe distance. The Hospitals forming the Imperial College Healthcare Trust reported a fall of up to 83% in the amount of time staff were spending in high-risk areas.²¹

Into the Metaverse: While not strictly leading to a metaverse-like virtual dynamic environment, the use of these technologies can increase the uptake of AR/VR headsets and devices in the healthcare sector, which could facilitate the creation of new health-related metaverses.

Try to contact authors of: <https://cloudblogs.microsoft.com/industry-blog/en-gb/health/2022/02/11/how-the-healthcare-sector-is-innovating/>



¹⁸ <https://aithority.com/technology/augmented-reality/proximie-surpasses-5000-surgical-procedures-in-35-countries-as-covid-spurs-exponential-growth-of-the-innovative-ar-platform/>

¹⁹ <https://med.stanford.edu/news/all-news/2018/03/new-neuroanatomy-lab-bridges-virtual-reality-operating-room.html>

²⁰ <https://eurradiolex.springeropen.com/articles/10.1186/s41747-017-0033-2>

²¹ <https://news.microsoft.com/en-gb/2020/05/19/imperial-college-healthcare-nhs-trust-uses-microsoft-hololens-to-protect-doctors-and-reduce-need-for-ppe/>

²² <https://venturebeat.com/2022/06/11/strategies-for-the-ecommerce-metaverse-journey/>

²³ <https://venturebeat.com/2022/06/11/strategies-for-the-ecommerce-metaverse-journey/>

03

Enterprise and VR



The VR market's economic potential is incredibly promising. The metaverse is forecast to see a 77% compound annual growth rate (CAGR), with USD 1.8 billion in retail revenue alone.²² The consumer sector of the metaverse should account for 50% of all commerce,²³ signalling its efficaciousness and popularity.

A workplace metaverse

There is an ongoing debate regarding whether virtual environments or in-person meetings are better for productivity and creativity. Innovation comes in many forms, but rarely stems from individual and siloed thinking. Research shows that informal 'water cooler' conversations account for 90% of business development,²⁴ while Zoom and Microsoft Teams calls limit people's ability to stay engaged.²⁵

Metaverse work platforms (like the one demonstrated by Meta) could make 2D meetings more engaging and interactive, simulating in-person environments where colleagues can high-five each other and interact on a virtual whiteboard.²⁶

Given the stress and burden induced by commuting, researchers have found that three in five tech workers would be open to using a VR headset for their day-to-day work, ranging from training to professional development.²⁷ The US Government Accountability Office (GAO) recently reported that the metaverse can act as a crucial conduit for workforce productivity.²⁸ In a survey of tech workers, 23% said their companies have deployed VR headsets among their workforces,²⁹ which can act as guinea pigs to test the metaverse's real-world efficacy.



Figure 6: Metaverse in the workplace. Source <https://www.benefitnews.com/news/the-metaverse-is-changing-the-workplace>

²⁴ <https://www.shrm.org/resourcesandtools/hr-topics/talent-acquisition/pages/pros-and-cons-virtual-in-person-interviews.aspx>

²⁵ <https://www.shrm.org/resourcesandtools/hr-topics/talent-acquisition/pages/pros-and-cons-virtual-in-person-interviews.aspx>

²⁶ <https://www.meta.com/gb/work/workrooms/>

²⁷ <https://morningconsult.com/2022/05/31/tech-workers-survey-metaverse/>

²⁸ <https://morningconsult.com/2022/05/31/tech-workers-survey-metaverse/>

²⁹ <https://morningconsult.com/2022/05/31/tech-workers-survey-metaverse/>

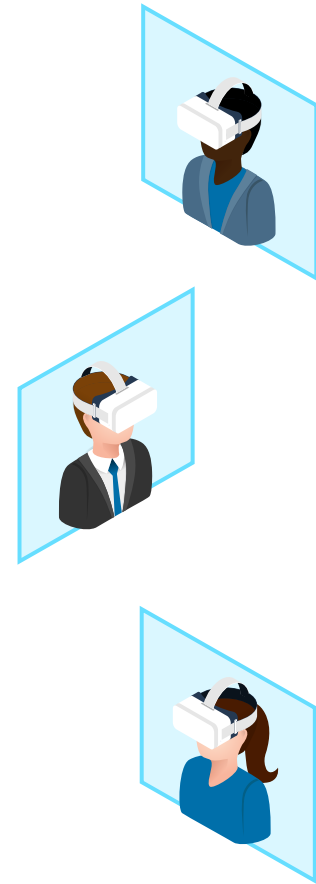


Case Study: Accenture and the Metaverse

Accenture is among the companies using VR headsets (FT), which are mainly deployed to onboard and train new staff. Accenture's Nth floor came via collaboration with Microsoft, and the company will leverage its own metaverse for various events, including executive gatherings (Fortune 1).

Accenture bought 60,000 Oculus headsets for new employees to use and provides interoperability to access the Nth floor via either a laptop or desktop (Fortune 2). The company plans to have 150,000 employees access the Nth floor by the end of FY22 (Fortune 2). Additionally, it has filed 600 patents for metaverse-compatible technology and experiences. The Accenture HR team has observed the efficacy of onboarding via the Nth floor, noting the interactive capabilities of the metaverse and how easily it has been for new joiners to integrate into its culture (Fortune 2).

Moreover, Accenture's pioneering activity has expanded into client offerings through its Metaverse Continuum Group (Consulting US). Accenture hopes to have 150,000 employees working in the Continuum Group by the end of 2022 (Consulting US). The work will include, but is not limited to, building 'new experiences', such as extended reality, blockchain, digital twins, and edge computing (Consulting US).



KPMG, for example, has invested USD 30 million into metaverse upskilling courses.



The metaverse's upskilling, online learning, and onboarding applications

According to the Harvard Business Review, on-demand, AI-enabled digital coaches have the potential to revolutionise training processes and provide career advice, condensing the time needed to develop new skills.³⁰ In terms of onboarding, VR can provide 3D 'how-to' guides and role-playing exercises, facilitating 'day-in-the-life' simulations that enable new employees to immerse themselves in a company's culture.³¹ For employers, the metaverse will allow companies to reuse training courses and simulations, saving them time and money.³² KPMG, for example, has invested USD 30 million into metaverse upskilling courses. AR/VR upskilling has also been positively received by employees, with simulations receiving high marks on usability and efficacy from 90% of trial participants.³⁴

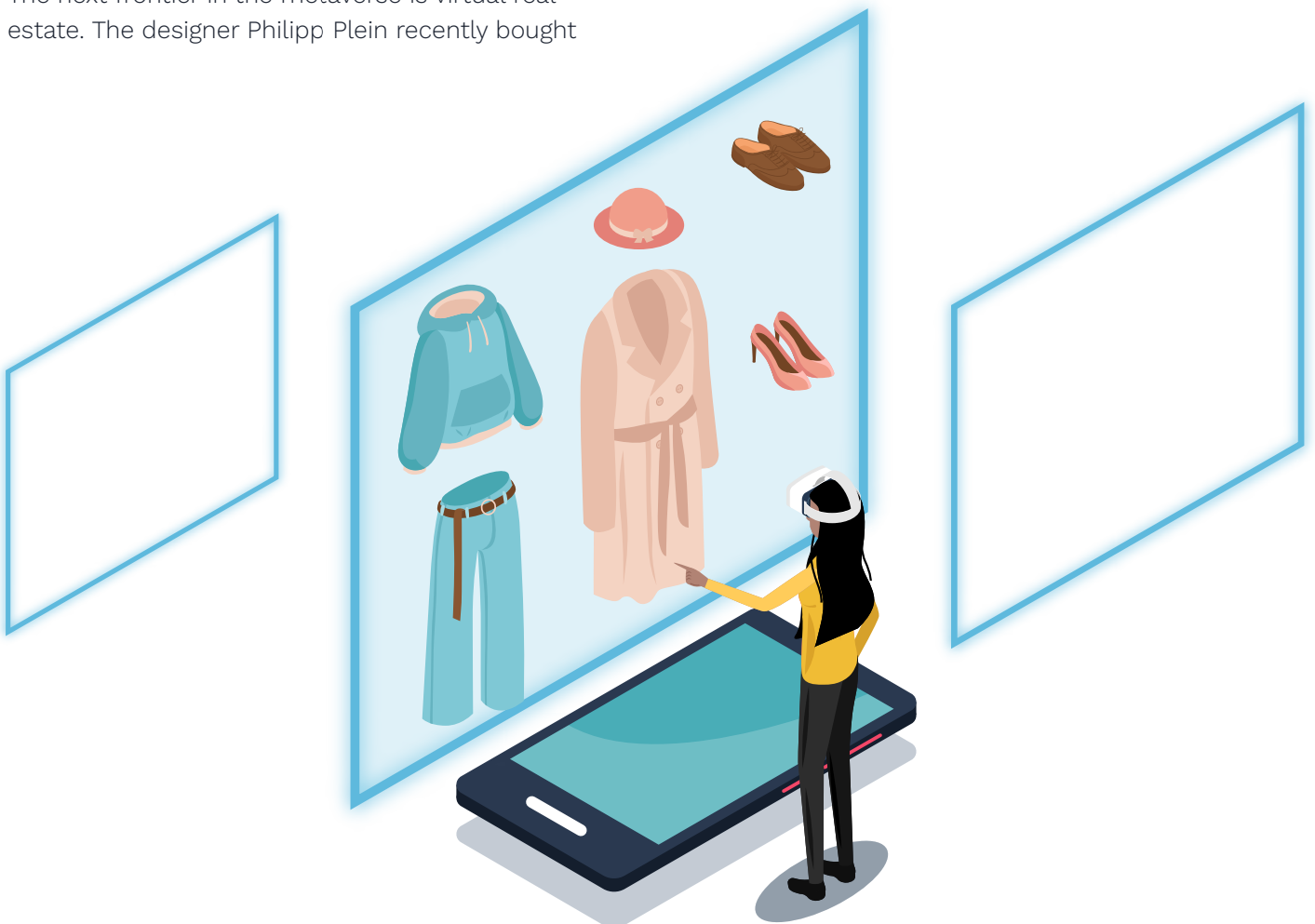
The commercial appeal of the metaverse and democratising the e-commerce market

The global number of digital shoppers has increased

by over one billion since 2014, with that growth set to continue.³⁵ Research shows that consumers make more unintended purchases when entering a physical store compared to using an online marketplace.³⁶ As the metaverse replicates brick-and-mortar experiences, retailers can emulate this process and harness demand for virtual retail among younger buyers. According to a recent survey by Zipline, 85% of Gen-Z respondents, 75% of millennials, and 69% of Gen-Xers would want to shop in the metaverse.³⁷ One of the driving forces behind this trend is the large retail market for video game environments, which the metaverse would augment. Virtual goods accounted for USD 61 million in 2021, with the market expected to reach roughly USD 200 billion by 2025.³⁸

USD 1.4 million of prime real estate in the popular platform Decentraland.³⁹ Traditional brick-and-mortar retailers are investing in the metaverse due to demand and the ability to offer sample products. The recent Metaverse Fashion Week saw 108,000 unique attendees, signalling the metaverse's ability to showcase products that lead to purchases. This technology also allows consumers to visualise products, such as where a piece of furniture might fit in or what a shirt would look like on them. Online product returns account for USD 428 billion in lost revenue, most of which stems from products not living up to an image on a website.⁴⁰ With 60% of shoppers wanting to visualise products,⁴¹ the metaverse fills an important gap in the legacy e-commerce space.

The next frontier in the metaverse is virtual real estate. The designer Philipp Plein recently bought



³⁰ <https://hbr.org/2022/04/how-the-metaverse-could-change-work>

³¹ <https://hbr.org/2022/04/how-the-metaverse-could-change-work>

³² <https://hbr.org/2022/04/how-the-metaverse-could-change-work>

³³ <https://www.livemint.com/news/world/kpmg-forays-into-metaverse-invests-30m-for-employee-training-11656486881283.html>

³⁴ <https://www.mdpi.com/2079-9292/11/3/317/html>

³⁵ <https://www.inventiva.co.in/trends/how-metaverse-transforming-ecommerce/>

³⁶ <https://www.forbes.com/sites/cathyhackl/2022/07/05/metaverse-commerce-understanding-the-new-virtual-to-physical-and-physical-to-virtual-commerce-models/?sh=2322fc9d5632>

³⁷ <https://www.forbes.com/sites/cathyhackl/2022/07/05/metaverse-commerce-understanding-the-new-virtual-to-physical-and-physical-to-virtual-commerce-models/?sh=2322fc9d5632>

³⁸ <https://www.forbes.com/sites/cathyhackl/2022/07/05/metaverse-commerce-understanding-the-new-virtual-to-physical-and-physical-to-virtual-commerce-models/?sh=2322fc9d5632>

³⁹ <https://www.barrons.com/articles/crypto-style-fashion-moves-into-the-metaverse-01656002700>

⁴⁰ <https://venturebeat.com/2022/06/11/strategies-for-the-ecommerce-metaverse-journey/>

⁴¹ <https://venturebeat.com/2022/06/11/strategies-for-the-ecommerce-metaverse-journey/>

04

Education



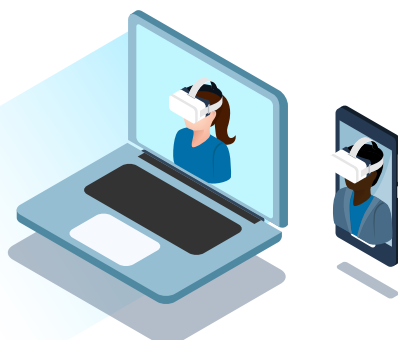
Since the beginning of the COVID-19 pandemic, the world has witnessed a drastic transformation in education, with school closures affecting more than 1.6 billion pupils globally. This has led to a surge in demand for remote education.

Figures from Fortune Business Insights reveal that the global EdTech and smart classroom market is predicted to increase from USD 101 billion in 2022 to USD 319 billion by 2029 at a projected CAGR of 17.8%. Moreover, the pandemic-induced trend in remote working, combined with the rapidly evolving world of work, has also drawn keen interest from professionals in skills development through online education. In 2021, more than 20 million new learners registered for courses on the online learning site Coursera – as many as in the three years prior to the pandemic.

Even if the adoption of online learning does not persist post-pandemic, the growing appetite for remote education has already sparked the industry's interest in discovering the metaverse's potential for enhancing the virtual learning experience.

Case Study: Dallas Hybrid Prep

Dallas Hybrid Prep, which opened at the start of the 2021-2022 school year and uses a hybrid model of virtual and in-person learning, is one of the first schools in the country to implement a metaverse platform. Students use their laptops or tablets to access the STEMuli metaverse, a learning management system that builds asynchronous work within an enhanced virtual learning environment. As Olga Romero, founding principal at Dallas Hybrid Prep, explains, 'Our fifth-grade students join with their teachers while learning from home to collaborate and complete gaming-style assignments, using avatars and earning online currency for completing the assigned tasks' (EdTech).



⁴² <https://www.insider.com/fully-remote-students-are-less-engaged-with-learning-classmates-2021-3>

⁴³ <https://uei.utsa.edu/files/pdfs/DistanceLearningBrief2-8-17-20.pdf#ga=2.259105162.1867524491.1657537498-1710821842.1657537498>



Figure 7: Education in the metaverse. Source: <https://www.letsoglearn.com/math-curriculum/education-in-the-metaverse/>

Immersive education

Although remote education has significantly improved the accessibility, flexibility, and continuity of education, studies have revealed⁴² that students who are enrolled solely in online learning often feel disconnected from other pupils and are less engaged in learning. According to research conducted by the University of Texas at San Antonio, 54% of local students reported that they had fewer engaging lessons during the pandemic, while 64% of local students and parents found that the former learned less during emergency distance learning.⁴³

By leveraging VR technologies, the metaverse has the potential to offer a more immersive learning experience that significantly boosts learner engagement. A recent study found that employing VR in the presentation of a virtual field trip produced higher levels of engagement and enjoyment, as well as short- and long-term knowledge retention, compared to presenting the same trip with a 2D video.⁴⁴

Additionally, current VR applications enable learners to take part in experiments and professional development sessions, which are challenging to produce due to their high risks or heavy costs, in a virtual setting. Besides being risk-free, the incorporation of VR into training courses also allows learners to participate in training sessions from a first-person perspective, flexibly adjust their learning progress to their own pace, and seek immediate assistance for the development of knowledge and skills.

Gamification meets the metaverse

Gamification has been widely researched as a proven approach to increasing student engagement, motivation, and learning outcomes.⁴⁵ Gamified

elements such as tasks, points, timers, badges, and leaderboards have been utilised in education to help encourage learner participation, stimulate in-class discussion, and achieve positive learning outcomes. Kahoot, for instance, offers a gamified approach to assist students in processing their lessons through its online game-based learning platform, where interactive games are easily created, shared, and played. With the integration of VR and AR simulation platforms, learners gain a more immersive and interactive gamified learning experience in the metaverse, allowing them to compete, cooperate, and share their learning experience with counterparts across the world. Recent research shows that the provision of a gamified learning experience in the metaverse, allowing them to compete, cooperate, and share their learning experience with counterparts across the world. Recent research shows that the provision of a gamified participatory educational experience in the metaverse can not only overcome the drawbacks of online learning but also helps to ensure equal, equitable, and high-quality educational opportunities for all.⁴⁶

Making education inclusive

The world's unprecedented and sudden shift from physical to virtual classes has compounded disparities in learning and achievement due to the lack of support provided to disadvantaged pupils – especially those with special educational needs and disabilities (SEND). A YouGov survey found that 59% of parents in the UK reported that their SEND children were disengaged from remote learning, compared with 39% of parents of children without additional needs.⁴⁷ The UK's Universities and Colleges Admissions Service (UCAS) has also discovered that online learning might have failed to suit students with disabilities, who were found to be more inclined

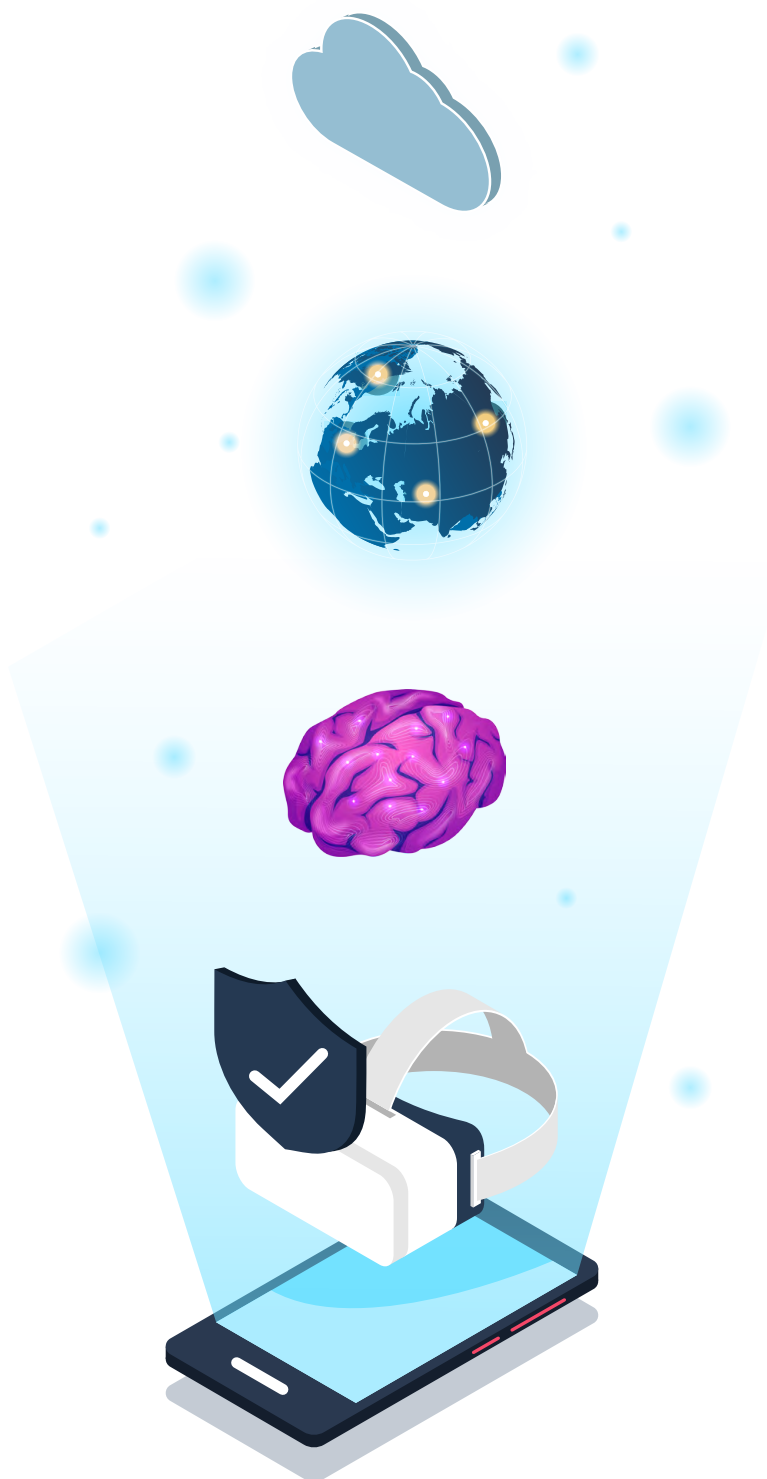
to be deterred from entering higher education for at least a year.⁴⁸

With the help of immersive media and technologies, the metaverse can accommodate students with special educational needs and disabilities by improving their online learning experience. In fact, VR has been utilised since the mid-1990s to create virtual environments that help autistic people manage stressful encounters or situations, such as job interviews and public speaking.⁴⁹ It can also be deployed to benefit learners with reading and listening disorders given its potential to create highly customisable virtual learning materials on metaverse platforms.

Challenges and future prospects

Despite the potential impact of the metaverse on the future of education, public concerns surrounding topics such as data privacy, online safety, and mental health have led to further discussions on the consolidation of governance. To expedite the adoption of the metaverse while ensuring the protection of user rights, policymakers and regulators should propose guidelines to stimulate both government and public confidence in the virtual-physical blended cyberspace.

Moreover, while developed economies are exploring how to take advantage of the metaverse's potential benefits, an estimated 37% of the world's population – 2.9 billion people – have yet to gain equal access to the Internet, let alone the budget for high-priced VR devices. To achieve Sustainable Development Goal 4 (SDG 4), policymakers and industry stakeholders are encouraged to propose solutions to democratise the metaverse in education to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all.



⁴⁴ <https://link.springer.com/article/10.1007/s10648-022-09675-4>

⁴⁵ <https://www.thesa.com/wp-content/uploads/2021/10/102621BenefitsOfVideoGamesInK-12Education.pdf>

⁴⁶ https://www.researchgate.net/figure/A-case-study-on-the-gamification-in-the-metaverse-for-educating-public-officials-8_fig2_358128393

⁴⁷ <https://www.gov.uk/government/publications/remote-education-research/remote-education-research>

⁴⁸ <https://www.timeshighereducation.com/news/disabled-students-more-likely-defer-during-pandemic>

⁴⁹ <https://www.timeshighereducation.com/news/disabled-students-more-likely-defer-during-pandemic>

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Conclusion



Debates around what the metaverse is, how it works, and its wider societal implications are ongoing. What is clear, however, is the high level of interest in what the metaverse could become through mass adoption of accompanying technology and its wide-ranging applications across various sectors.

As the case studies above demonstrate, both VR and AR technology have the potential to radically transform how people connect and interact. In healthcare, these technologies have already been in operation for several years, with future developments set to create even more immersive environments for training and treatment. Metaverse-related extensions like digital twins will enable medical professionals to forecast the impact of experimental interventions and connect with colleagues and patients across borders.

In terms of enterprise, metaverse technologies can enrich experiences for employers and employees alike. Within the workplace, VR and AR can be used to add a new dimension to in-person meetings,

streamline onboarding processes, and aid skills development. For customer engagement, the same technologies can help to replicate brick-and-mortar shopping experiences, showcasing new products and reducing product returns.

Few sectors have been as radically altered by the COVID-19 pandemic as education, and the metaverse is well-placed to step in as the solution to the isolation and lack of engagement caused by remote learning. This potential applies to people of all ages, as well as those with educational needs and disabilities, who have already benefitted from VR technologies dating back to the last century.

While the mass-scale adoption of VR headsets is achievable by 2030, most users will encounter an interactive 2D metaverse platform via their computers and mobile phones. Meta, for example, has announced that, from next year, users will be able to use Zoom to partake in Horizon Metaverse Conferencing. Microsoft Office integration will also be enabled to allow immersive work applications.⁵⁰

⁵⁰ <https://www.xrtoday.com/uncategorized/meta-partners-with-zoom-for-horizon-metaverse-conferencing/>



A virtual world simulator, which will incorporate 3D projections to create a virtual environment around multiple visitors without the need for headsets.

While this paper has focused on VR technology, the possibility remains that the metaverse will also prompt the creation of completely new forms of technology. Earlier this year, Disney filed a patent with the US patent office for a virtual world simulator, which will incorporate 3D projections to create a virtual environment around multiple visitors without the need for headsets.⁵¹

distinctions are made by others over the coming years, however, we are perfectly positioned to help companies understand the fundamental issues driving these debates and recognise the opportunities it presents for your business.

Access Partnership does not aim to define what the metaverse is or set limits on its parameters. As such





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Our finger is always on the metaverse pulse – if you'd like to know more, please subscribe to our Metaverse Policy Lab updates on LinkedIn.

How can we help? Access Partnership is the world's leading public policy firm dedicated to opening markets for technology. We shape national, regional, and international policies to ensure a fair, long-lasting environment for technology that drives growth. Our teams in six offices across the globe uniquely mix policy and technical expertise to drive outcomes for clients operating at the intersection of technology, digital immersion, data, and connectivity.

We are uniquely placed to help you understand the different components and complexities of the metaverse. Our policy experts can help you navigate areas such as interoperability, data protection, online harm, connectivity, and fintech.

Metaverse Policy Lab

Access Partnership's Metaverse Policy Lab provides a vendor and technology-agnostic forum where honest and insightful conversations around the metaverse can take place. We are helping to steer the tech industry in defining what the metaverse is (where we are going) and navigating the related policy challenges (how we get there).

Metaverse Dialogue

To encourage this exchange of ideas, we have introduced our successful Metaverse Dialogue Webinar Series, designed to promote discussion and collaboration between metaverse stakeholders. The webinar series explores some of the challenges that the metaverse faces and looks to build consensus on what best practice would look like.



A lack of certainty among government stakeholders over what benefits the metaverse will deliver for their citizens, as well as a current focus on protecting citizens from harm in the metaverse, risks reducing the opportunity and delaying the adoption of metaverse products. To assist with this process, Access Partnership can provide the following:

Strategic analysis and review:

Access Partnership can review and analyse current policies that are crucial components of the metaverse, including regulations around data protection, digital identity, and online harm. Once this review is complete, we will have a comprehensive understanding of current and forthcoming regulations. Based on the regulations, Access Partnership can also help to define companies' business strategies moving forward.



Engagement:

Access Partnership can facilitate discussions with policymakers, addressing policy concerns around the metaverse and highlighting its positive socio-economic impacts. Access Partnership can work with governments to facilitate metaverse pilot projects.



Business case and opportunity valuation:

Access Partnership helps clients to define the most viable (in an economic and regulatory sense) use cases for technologies, as well as to determine the value of the opportunity. This looks at the impact on users of the metaverse and the value of that impact.



Best practice guidelines:

Here, Access Partnership will create a 'rules of the road', which will underpin how companies can align and modify their internal policies and processes, ensuring that they are metaverse-ready.



Enabling environment for metaverse tech:

As the shift towards XR technology becomes inevitable, Access Partnership can work with governments to implement policies that will incentivise the growth of metaverse technology, ensuring that skills and know-how are not just retained but actively encouraged.



⁵¹ <https://www.inavateonthenet.net/news/article/disney-patent-signals-metaverse-virtual-world-development#:~:text=The%20patent%20describes%20a%20potential,for%20goggles%20or%20external%20devices.>



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Access Partnership is uniquely placed to understand the different components and complexities of the metaverse (interoperability, data protection, online harm, connectivity, fintech).

Our Metaverse Policy Lab provides a vendor and technology-agnostic forum where honest and insightful conversations around the metaverse can take place. We'll help steer the tech industry to define what the metaverse is (where we are going) and help to navigate the related policy challenges (how we get there).

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