FORESIGHT BRIEF

Metaverses

The metaverse – sometimes referred to as the future internet – remains a hard concept to pin down. However, there is a common conceptual framework at the core of most visions of the metaverse. Its essential characteristics include three-dimensionality (3D) and high degrees of interactivity, openness, compatibility, and persistence.

While some expect a single, all-encompassing metaverse to evolve, a variety of challenges may prevent this. Instead, the future could bring multiple metaverses controlled by specific platforms, corporations, communities, or states. Whatever form or forms the metaverse takes, it could be more ingrained in everyday life tomorrow than social media is today.

Factors likely to shape the development of metaverses in the near term include: rising investments, changing online business models, growing markets, emerging technologies, evolving cultural norms around gaming and digital goods, and diverging Internet governance models.

If highly popular metaverses emerge, a range of challenges and opportunities could follow for policymakers. Metaverses may: leave people less connected to the real-world systems that support them; offer efficiencies for complex systems; have pros and cons for human health and the environment; and create challenges for current tax regimes, content moderation strategies, policing, and rights frameworks.

This brief aims to deepen readers' understanding of metaverses and their implications for a range of policy areas, including some that may be unexpected. Anyone who engages with the following areas might find this brief relevant to their work: the economy, education and training, energy, environment, governance, health, identification and privacy, information ecosystem, international, reconciliation, rights and social justice, security, and work. Thinking about the changes shaping the future of metaverses can help decision-makers understand some of the forces already influencing their policy environment. Considering the potential implications of such changes can also help policymakers identify opportunities to make decisions today that may benefit Canada in the future.

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Canada

Metaverses

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Introduction

The metaverse - sometimes referred to as the future internet - remains a difficult concept to pin down despite all the attention it has received. This is because people use "metaverse" to describe a variety of things. Sometimes it means the next generation of the Internet, and sometimes a space that integrates digital and physical worlds. At other times, it refers to a cluster of intersecting technologies, or a shift in how users interact with technologies and spaces. It can even denote a proprietary online platform.[1] These variations reflect the complexity of the metaverse as a phenomenon that may emerge at the intersection of digital infrastructure, gaming technology, business models, cultural practices, and ideas about public and private space.

Yet there is a common conceptual framework at the heart of most visions of the metaverse. Three dimensionality and interactivity often appear as essential characteristics of a metaverse. This includes everything from 3D environments accessed on mobile device screens, through AR overlays on physical environments, to fully immersive virtual worlds where users can feel and interact with digital objects.

Today's online gaming worlds provide glimpses of what a metaverse might become.[2] That holds for both the spatial, immersive, and interactive nature of gaming experiences, and the way their unique structures and user interfaces shape the experiences they offer. It also holds for the range of important activities already flourishing within games, such as commerce, work, learning, social interaction, cultural expression, simulation, harassment, journalism, radicalization, and political activities.[3] Video games—already the preferred form of entertainment for Gen Z (ages 10 – 27)—also hint at the potential popularity of the metaverse.[4]

Some believe there will be a single metaverse, where numerous screen-based, AR, and VR worlds integrate seamlessly, and shrink or erase the distance between virtual and physical reality. This version of the metaverse would host an unlimited number of users represented by customizable avatars. It would also be interactive, enabling users to manipulate digital artifacts and environments. Finally, it would be persistent; i.e. users' identities, properties, entitlements, histories, and changes to the environment would be preserved when they go offline.

Excitement about this vision of the metaverse peaked in 2021, particularly when Facebook rebranded itself as Meta and announced that it would focus on building the metaverse and metaverse technologies.[5] A backlash followed from critics of Meta and those who remained skeptical about whether the metaverse as a general concept was practical or desirable.[6] More recently, slow uptake of Meta's version of the metaverse and the firm's move to prioritize generative AI investment has been seen as evidence that the idea of the metaverse is more hype than substance.[7]

A variety of technical, business, and political challenges[8] may prevent the emergence of a single, all-encompassing metaverse as the next iteration of the Internet for a large percentage of users around the world. Even so, the number of immersive, interactive, and persistent online and hybrid spaces may continue to grow as games, online socializing, and hybrid work continue to expand. Instead of one metaverse, the future could bring multiple metaverses controlled by specific platforms, corporations, communities, or states. Each would rely on a similar suite of technologies and might offer a similar range of opportunities and experiences. However, they would host far fewer users, and might be only loosely connected and partially compatible with one another.[9]

Changes shaping the development of metaverses

Rising investments. Some firms remain convinced that major business opportunities will develop in metaverses and metaverse technologies.[10] As a result, capital continues to flow into both, with Big Tech firms and gaming companies leading the way.[11]

Changing business models. Some distribution platforms have created walled gardens that maximize their profits and limit competition. This approach appears to be weakening.[12] A few powerful actors, such as Meta and Microsoft, are opening their ecosystems by reducing fees and technical restrictions on developers, who are key to building metaverses.[13] Others, like NVidia, are building open platforms such as Omniverse, designed to facilitate low-cost collaboration among developers.[14]

Emerging technologies. Some technologies core to the metaverse are progressing rapidly, but others seem stalled. VR has not lived up to the hype of the past decade, but has found success in specific areas such as gaming and training simulations.[15] At the same time, new sensing technologies, such as Lidar, which enable users to create accurate 3D digital models of physical items and spaces, are making smart phones better tools for co-creating metaverses.[16] Generative AI may soon be able to create code for the 3D assets that make up dynamic immersive environments. However, the speed and efficiency of digital networks continues to hinder the building of interactive 3D spaces, which require massive data flows.

Evolving cultural norms. The popularity of gaming continues to grow, as does the scope of in-game experiences and activities.[17] There is also a growing interest in owning various kinds of digital goods.[18] People continue to embrace new opportunities to express themselves with digital content.[19] Together, these changes point to a strong demand for the types of experiences and opportunities that most people expect from metaverses.

Diverging governance models. Distinct regulatory regimes are already splintering the Internet experience.[20] Some jurisdictions limit access to certain parts of the Internet,[21] while others use legislation and penalties to control Big Tech with respect to privacy, content moderation, or content distribution algorithms.[22] Such differences will likely apply to metaverses as well, causing their look and feel, the range of experiences and activities they encourage, their economies, and political cultures to vary greatly in different jurisdictions.

Whatever form or forms the metaverse takes, it could be more ingrained in everyday life 'tomorrow' than social media is today. Metaverses may become the primary worlds in which we learn, work, socialize, create, consume, protest, access some healthcare supports, and entertain ourselves.[23] Such spaces could improve the social, professional, and recreational prospects for those with certain types of neurodiversity or physical differences.[24] Metaverses also seem likely to host significant economic activity within ten years.[25] In the most transformative view, metaverses might even liberate human creativity from the constraints of physical reality, and enable us to solve wicked problems with yet unimagined tools and perspectives.

However, **the challenges for the metaverse, like any transformative technology, go beyond mere technical issues.** The massive expansion in computing power required to generate and sustain dynamic metaverses could cause serious environmental harms in terms of natural resource extraction, climate change, and pollution.[26] The nature of these spaces may not align well with some kinds of important activities—such as those that involve multitasking, nature exposure, or some familiar forms of democratic engagement. They could also generate new forms of crime, harassment, bias, espionage, mis/disinformation, anxiety, and extremism.[27] Even if metaverses somehow avoid these challenges, they could deepen equity gaps for marginalized, rural, and remote populations so long as digital divides persist. People without reliable high-speed Internet service, access to metaverse technologies such as AR glasses, or the literacies needed to flourish in metaverses may not be able to enjoy all the opportunities and advantages those spaces offer.

Whatever trajectory or trajectories metaverses take, they will likely have significant implications for public policy.

Policy implications

The implications listed below emerged through an exploration of plausible metaverse futures. They represent policy considerations that might emerge but are not inevitable. Failing to reflect on them could lead to policy failure.

This list is not exhaustive, and policy makers are encouraged to further reflect on the challenges and opportunities listed here. Based on these policy implications, decision makers could ask themselves the following questions:

- How might metaverses challenge specific policies or programs?
- How would the assumptions built into today's policies and programs fare in the face of challenges and opportunities created by this future?
- What actions could be taken now to maximize opportunities and mitigate challenges related to metaverses in the future?

Institutions and shared spaces

- A disconnect may arise between the real-world systems and institutions people depend on for food, water, physical security, transport, and rights, and the metaverses that may become the focus of their professional, social,

recreational, and cultural lives. If enough people come to find more value in metaverses than physical spaces, it may become harder to reach social consensus on the value of some traditional institutions and shared spaces. Examples range from community centres, libraries, and parks, through universities and art galleries, to policing, highways, and healthy forests.

- Some metaverses may allow radically new forms of creative expression or experiences that could enrich people's lives, improve social cohesion, and deepen national attachment. However, such experiences could also further antisocial causes, such as the production of mis/disinformation and the promotion of extremist violence.[28]

- Metaverses designed and owned by firms may offer little in the way of truly public spaces free of corporate surveillance and influence. These firms could demand access to all the data that users generate in metaverses as a condition of access. They could also limit users' ability to opt out of exposure to advertising and troubling content. At the same time, metaverses could provide new opportunities for spontaneous social interactions or participation in cultural events that promote social cohesion. They could even offer novel and more equitable ways for people to access some public services.

Insights and efficiencies

- The ability to simulate and study complex real-world systems (e.g. weather, transportation, power grids, cities, and ecosystems) in metaverses could reveal new insights about how they work.[29] These could lead to reduced operating costs for transportation or water treatment infrastructure, along with improved response to natural disasters, and breakthroughs in the efficiency and sustainability of energy systems.

- If digital divides shrink, metaverses could provide radical efficiencies in delivering a wide range of services and opportunities to rural and remote communities. This in turn could make access to healthcare, education, employment, and the arts more equitable. As noted above, if digital divides persist or widen, so will equity gaps for those who cannot access the best versions of metaverses.

Health and the environment

- Massive growth in the number of metaverse users would require an equally massive increase in computing resources. This could also expand the carbon footprint of online activity.[30] On the other hand, if a wave of consumers shift to digital goods and experiences with minimal carbon footprints compared to their physical equivalents, the consumer economy's carbon footprint could shrink.[31]

- Long immersion in digital environments disconnected from the physical world in which humans evolved may have unexpected physical and mental health consequences. Increasingly inactive lifestyles could mean rising obesity rates. Yet new social opportunities in metaverses could reduce loneliness associated with anxiety and depression.

- Immersive simulations of natural environments, including those that omit unpleasant aspects of nature such as biting insects or extreme temperatures, might be more attractive than the real thing for some. This could leave more people alienated from nature, and uninterested in climate change or biodiversity loss. Alternatively, such a retreat from nature could reduce pressures on some parks and wild spaces, helping to preserve biodiversity.

Regulation and safety

- Metaverses could give the states and tech firms that control them unprecedented powers of surveillance over and insight into their users. Since these spaces will allow users to do more, they will generate more data and more opportunities to cross-reference that data with specific behaviour. Metaverses may also enable new forms of direct and indirect communication, such as the manipulation of sensory stimuli in virtual environments. Deeper insights about user behaviour combined with new ways of communicating could give those who own metaverses power to influence users' economic, social, or political behaviour.

- Tax regimes, content moderation strategies, privacy laws, policing, and rights frameworks adapted to the current Internet might not suit emerging metaverses that allow new activities. For example, metaverse users could enter into work agreements for entirely novel tasks (such as building a custom sensory environment for a digital home owned by someone in a different

country) and get paid in digital tokens that are not legal tender. If so, would it be possible to guarantee the safety of the sensory environment, enforce the contract, or tax the payment in tokens? Modifying existing frameworks or creating new ones may prove to be a complex and time-consuming project.

Conclusion

Multiple metaverses offering different degrees of immersion and various levels of integration with the physical world could emerge in the near term. Some of these may well become important sites of economic, social, and political activity, albeit with fuzzy jurisdictional boundaries and confusing regulatory frameworks. The special features of these spaces may enable entirely new activities, experiences, and perspectives limited by imagination rather than physics, geography, or morality. As a result, metaverses stand poised to disrupt numerous aspects of society, including democratic institutions, education, the environment, health, infrastructure, national security, social cohesion, and work. Maximizing the opportunities these disruptive spaces present may prove even harder than meeting the many challenges Web 2.0 brought to the world.

Learn more

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Endnotes

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