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The Metaverse & Insurance

Pixel Perfect?

January 2022

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The Z/Yen Group

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Foreword

The genesis of this paper is the need we have felt at our TECHNGI project[1], to address a big question: is the Metaverse the next frontier for the Insurance industry? We have conducted extensive work on established technology innovations and insurance, with a focus on Artificial Intelligence. It would be remiss not to look a little further into the future.

There are widely diverging views on the Metaverse. On 28 October 2021, Mark Zuckerberg, Founder of Facebook, announced that the new holding company for Facebook would be called "Meta", stating: "*We are at the beginning of the next chapter for the internet, and it's the next chapter for our company too. The next platform will be even more immersive — an embodied internet where you're in the experience, not just looking at it. We call this the Metaverse, and it will touch every product we build*."[2]

William Sherden assessed prognosticators in his book "The Fortune Sellers." Technological predictions got a poor rating, yet numerous pundits would have us believe that 'the Metaverse is upon us'. Technology hype statements are ubiquitous, so much so that Gartner promotes its 'hype cycle' as a way of assessing the state of a technology. People exhibit 'fear of missing out' so much that use of the acronym FOMO has risen sharply since it emerged around 2009.

Such a mixture of excitement and skepticism is very familiar to us from our work at TECHNGI. This report was commissioned by us on 13 October 2021, so we clearly weren't just jumping on a Zuckerberg bandwagon. In fact this report isn't encouraging anyone to jump on any Metaverse bandwagon that might collapse. What we asked for was a balanced set of thoughts on what the Metaverse might mean for insurance, that can also help readers arrive at a Goldilocks point, not too much, and not too little, hype; but just right.

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[1] https://www.technngi.uk/
[2] https://about.fb.com/news/2021/10/founders-letter/

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Preface

Just a few years after 'metaverse' was coined in 1992, the Financial £aboratory Club (F£C) was formed.[3] The F£C was a £1.9 million limited liability partnership conducting research into financial risk management over 1997 and 1998. The objective was to visualise the abstract risks of finance, and some progress was made. F£C members were The London Stock Exchange, Royal & Sun Alliance, Barclays, and Z/Yen. The programme manager was the Ministry of Defence's Defence Evaluation and Research Agency. Supporting organisations included Silicon Graphics, the Worshipful Company of Information Technologists, and City University. Finance and the Metaverse are not new.

A fascination with technology and its impact on society (fuelled by a shared addiction to science fiction) meant the authors had to maintain the strictest discipline while writing of this report, lest we 'digressed' ourselves. As the implications of the Metaverse for the insurance sector were mapped, a myriad of fascinating paths revealed themselves, leading off to other industries, sectors, or speculative fiction.

Our heartfelt thanks go to the insurance and technology professionals we interviewed in the course of this report, who helped to keep us on the straight and narrow – but also indulged us by speculating on possibilities. Three common themes emerged during these speculative discussions:

- seismic potential - the Metaverse could well transform everything, though the advent of television didn't wipe out radio;
- privacy - Metaverse feedback from physiological reactions (your eyeballs tracked, your heartbeat measured, AI guessing your next move) mean your soul may be laid bare to scrutiny, and privacy is yet again eroded by new ICT;
- new worlds - the Metaverse allows the creation of infinite new psycho-geographies, each with its own 'land grab', and insurers will need to keep a close eye on cyberspace they wish to control.

We hope that this report helps you "get a detailed grip on the big picture", while avoiding the hype, so that you "get a big picture grip on the details."[4] Please enjoy the speculation, hopefully mind-expanding.

Professor Michael Mainelli & Simon Mills
Z/Yen Group

[3] https://www.zyen.com/work/sectors/financial-services/financial-laboratory/
[4] https://www.zyen.com/publications/books/clean-business-cuisine/

Executive Summary

'Metaverse' describes interlinked, persistent, shared, artificial reality spaces. The portmanteau of 'meta', beyond, and uni-'verse' implies an alternate space for social commerce.

Insurers may feel that their products and services lie outside this domain, but already some insurance firms use Metaverse approaches to help sell and manage insurance, e.g. YuLife - https://yulife.com/. This short report will explain the Metaverse, examine potential applications for insurers, and explore the business implications of widespread adoption of the Metaverse.

The Metaverse can be considered an artificial reality-based successor to the Internet. As virtual reality is 3D, the persistence of the Metaverse emphasises 4D, i.e. time plus the usual three dimensions of space. Companies that deliver their services or content digitally will find that their presence in the Metaverse will increase their interactions with customers, but also their interaction with other services and products. The fight for the customers' eyeballs will place significant emphasis on the user experience in augmented and virtual reality. The look, motion, sound, texture, and 'feel' of digital content may become more important than the 'back end' functionality. The advent of the Metaverse has several implications:

- **Hyper-connectivity** - Companies delivering their services digitally will find that their presence in the Metaverse will increase their interactions both with customers, and their interaction with other services and products online.
- **Semblance Of Quality Dominance** - The look, motion, sound, texture, and 'feel', the aesthetics of digital content, may become more important than the 'back end' functionality.
- **New Land Grabs** – with new worlds, new geographies, and new concepts of spacetime, allowing a deeper understanding of connections between entities in the virtual and physical realms, insurers will need to keep a close eye on the psychogeography or cyberspace they wish to control.

The Metaverse is likely to be an evolutionary, rather than a revolutionary technology, and several factors mitigate against rapid wide-scale adoption.

- The technology required for full emersion is bulky, uncomfortable, and not suitable for mobile access.
- A fast, low-latency connection to the internet is a prerequisite.
- The Metaverse lacks formal connectivity among its various domains so it currently exists as a series of 'walled gardens'.

Despite these limitations, several use cases are emerging:

- **Entertainment** - Virtually all areas of entertainment are being explored, and already several high-profile concerts by well-known artists have taken place in the Metaverse with significant audiences and earnings.
- **Business interaction** - Many corporates are exploring next-generation VR and Telepresence technologies associated with the Metaverse, perhaps driven by the recent, rapid increase in remote working and online conferencing, as well as showcasing.
- **Specialist simulations** - The Metaverse has applications for education (the 'metaversity'), training, medicine, health, exercise, disaster management, construction, maintenance, and telerobotics.
- **Online culture -** Gamers, coders, and other persistently online communities are early experimenters, and perhaps adopters, with one example being commercial auctions in the Metaverse of Non-Fungible Tokens (NFTs) by venerable auction houses.

If the Metaverse becomes widespread, it will create challenges and opportunities for people concerned with risk:

- As the Metaverse is a new creation, the risks to its users are not fully understood and could create long-term health or mental risk issues, e.g. adolescent brain formation, novel eye, hand, mental, or physical conditions, or coordination issues.
- The emergence of the Metaverse may create new socio-economic and political risks, for example creating conditions for widespread addiction or making Metaverse activities relevant to gaining or retaining employment, or changing the nature of geo-political power through increased influence of foreign populations.
- As the Metaverse is likely to be resident in 'the cloud', dispute resolution will be difficult: where are things happening legally? who will regulate transactions in the Metaverse? how will disputes be arbitrated? how will decisions be enforced?

- The Metaverse is yet poorly understood, but as a core network technology its own still unclear effects might be multiplied by combining with technologies such as machine-learning (AI), quantum computing, malware, mind-altering drugs, or widespread surveillance.

In the light of these developments insurers might consider the following actions:

- Familiarise themselves with the concept of the Metaverse, visualisation, machine-learning (AI), connectivity, big data, and other 4IR (fourth industrial revolution technologies) as well as some of the current highly active areas such as NFTs or cryptocurrencies;
- Enhance their skills base in the Metaverse's wide range of requisite expertise by investing in training and recruiting more specialist expertise in areas such as visualisation, machine-learning (AI), connectivity, big data, aesthetics, or psychology;
- Explore ways of offering new Metaverse products and services. These could include:
  - managing the risks associated with an individual's personal data and a corporate's Metaverse data;
  - managing the risks associated with digital assets, in particular theft, regulation, government policy, and legal jurisdiction risk;
  - developing specific insurance products for Metaverse applications, such as the protection of personal data and digital assets, or insuring against long-term physical or mental harm;
  - offering risk control and mitigation products, rather than just compensation for loss suffered, more akin to the services offered by cyber-security firms such as Norton and McAfee.
- Consider new funding mechanisms, particularly extensions of crowdfunding. The Metaverse, if it achieves scale, is particularly suited to large numbers of users guaranteeing things. For example, an insurance-linked security insuring specific online assets could be tied to users' guarantees, or gambling markets used to create portfolios for risk management.

1. What is the Metaverse?

Introduction

Wikipedia defines the Metaverse as a collective virtual shared space, created by the convergence of virtually enhanced physical reality and physically persistent virtual space, including the sum of all virtual worlds, augmented reality, and the Internet. Although it is unusual to rely on Wikipedia for a definition, despite the hype of being 'the next-next big thing', the Metaverse barely exists at present.

The Economist describes, "a persistent virtual world, accessible via special goggles, where people could meet, flirt, play games, buy and sell things, and much more besides. In 2022 it refers to the fusion of video games, social networking, and entertainment to create new, immersive experiences, like swimming inside your favourite song at an online concert. Games such as Minecraft, Roblox, and Fortnite are all stepping-stones to an emerging new medium".[5] This reports slightly shorter definition is:

'Metaverse' - interlinked, persistent, shared, artificial reality spaces.

The Metaverse combines and relies upon numerous elements of technology, including virtual reality, augmented reality, video, network connectivity, mobile devices, sensors, motion devices, perambulators, suits, goggles, and various other technologies so that users 'live' within a digital universe. This 'combinatorial technology 'characteristic means that the definition is fluid, and the success of the Metaverse depends at any one time or application on the successful integration of a useful set of technologies.

This combinatorial technology characteristic also means that the Metaverse is hard to assess. When has it arrived? What is a 'true' Metaverse? 'Electrical power', 'the telephone', and 'the internet' were 'core network technologies' that enabled many widespread applications. In turn, the many applications each core network technology spawned affected society, other technologies, economics, and politics to the point that the core technological term became synonymous with those effects. When comparing the Metaverse with the historical trajectory of other technologies it is more akin to the arrival of electrical power, the telephone, or the emergence of the internet, than an

[5] "What Next? 22 Emerging Technologies To Watch In 2022", The World Ahead 2022, The Economist, page 98 - https://www.economist.com/the-world-ahead/2021/11/08/what-next-22-emerging-technologies-to-watch-in-2022.

isolated technology, say a new metal alloy or a new strain of rice, however significant. The breadth of depth of change the Metaverse must produce to meet its own hype means it will only be a success if it becomes ubiquitous and overwhelming.

Origins

The concept of 'living' in immersive virtual reality has been around since the 1980s, with a proto-Metaverse described by William Gibson in his seminal works "Neuromancer" (1984) and "Count Zero" (1986) - shortly after ARPANET adopted TCP/IP[6], at least five years before Sir Tim Berners-Lee invented the World Wide Web (WWW)[7]. The actual term 'Metaverse' was first used by Neal Stephenson in his 1992 science fiction novel "Snow Crash" Stephenson's first explanation goes:

"So Hiro's not actually here at all. He's in a computer-generated universe that his computer is drawing onto his goggles and pumping into his earphones. In the lingo, this imaginary place is known as the Metaverse. Hiro spends a lot of time in the Metaverse. It beats the shit out of U-Stor-It."
[Neal Stephenson, "Snow Crash", 1992]

The Metaverse continued to inspire fiction, particularly science fiction, for example, Richard Morgan's "Altered Carbon" (2002), Charles Stross's "Accelerando" (2005), Iain M Banks' highly dystopian "Surface Detail" (2010) where the Metaverse contains artificial hells, where virtual afterlives of the mind-states of the dead are tortured. The Metaverse has been picked up as a trope in films such as "The Matrix" (1999), "Minority Report" (2002), "Avatar" (2009), "Ready Player One" (2018), and "Free Guy" (2021), as well as implied in earlier films such as "Tron" (1982), "Who Framed Roger Rabbit" (1988), and "Lawnmower Man"(1992).

Although in fiction and film the Metaverse is often depicted as an extreme virtual dystopia, or as a fantasy realm to escape a physical dystopia where protagonists adopt gleaming avatars to do battle with evil corporations, crack code, and set data free, the reality is a little more prosaic. While the Metaverse does not yet exist, it is clearly coming and speculation on its commercial risks and opportunities can begin.

[6] University System of Georgia "A Brief History of the Internet" https://www.usg.edu/galileo/skills/unit07/internet07_02.phtml
[7] CERN "The Birth Of The Web" https://home.cern/science/computing/birth-web

Box 1 - Ariana Grande Sings In The Metaverse

Pop Star Ariana Grande is just one of a number of musicians to perform a series of concerts in the Metaverse. Using the video game 'Fortnite' as her platform, in August 2021 the singer performed a 15 minute set. The show was held five times in different time zones, with the very first concert attracting 1 million people at its peak. The event has subsequently been watched on YouTube over 1.5 million times.

The attraction of this type of event to the audience, is that through their avatar, they get to experience a live concert by their favourite singer – much like an interactive music video. The advantages to the artist are:

- A significant cost saving in comparison to hosting a live concert (no transport, staging, or security costs);
- Market segmentation and the ability to accurately target the audience demographic with personalised promotional material prior to the event;
- The ability to boost sales of tie-in promotional material and other content through interactive features- for example promotional t-shirt 'skins' for avatars.

The merchandising aspect is particularly important. Forbes estimates that a concert event put on by Fortnite with Travis Scott earned the artist $20 million in merchandise sales (https://tinyurl.com/3t7vbp8z).

Growth

"Most human beings have an almost infinite capacity for taking things for granted".
[Aldous Huxley, "Brave New World", 1932]

In all likelihood, moving society into an infinitely connected DayGlo™ world will not be a revolution but a punctuated and, at times, uncomfortable evolution. Internet 1.0 was dial-up and restricted to word-heavy static pages and library catalogues. Internet 2.0 was powered by broadband and opened up the world of multi-media and streaming content. Internet 3.0 was mobile and allowed instant transactions and access to services from your phone. Internet 4.0 is today - the 'internet of everything' (IoE) connecting "people, processes, data, and things, turning information into actions that create new capabilities, richer experiences, and unprecedented opportunities."

Table 1 - Four Phases Of The Internet

Phase 1	Phase 2	Phase 3	Phase 4
Connectivity	Networked economy	Collaborative experiences	Internet of everything
Digitise access to information	Digitise business process	Digitise interactions (business and social)	Digitise the world, connecting
• **email** • **web browser** • **search**	• e-commerce • digital supply chain • collaboration	• social • mobility • cloud • video	• people • process • data • things
The first phase started over 20 years ago and is referred to as 'connectivity'. Email, web browsing, and searching for content was just beginning.	The second phase started in the late 1990s and was the 'networked economy' phase. This was the birth of e-commerce and digitally connected supply chains. It changed the way we shopped and how companies reached new markets.	The third phase started in the early 2000s and is known as the 'collaborative experiences' phase. This phase is dominated by widespread use of social media, mobility, video, and Cloud computing. This phase completely transformed the world of work.	The current phase is called the 'internet of everything (IoE)'. This phase connects people, processes, data, and things, turning information into actions that create new capabilities, richer experiences, and unprecedented opportunities.

["The Internet Of Everything", OpenLearn, Open University - https://www.open.edu/openlearn/ocw/mod/oucontent/view.php?id=48444&section=1.1, downloaded January 2022]

Today's Internet 4.0 coincides with people promulgating the "Fourth Industrial Revolution (4IR)". The first industrial revolution (1IR) of the 19th century encompassed iron, steel, and mechanisation. The 2IR was the era of electrical power and transport, alongside an explosion in mass production. The 3IR describes the digital revolution in computing and connectivity, leading to new mechanisms of centralisation and decentralisation. The 4IR considers pervasive cyber capabilities physically integrated everywhere, encompassing machine-learning (AI), big data, and hyper-connectivity.

The Metaverse concept coincides with Internet 4.0 and 4IR. The Metaverse is the front man, the stage, the window onto Internet 4.0 and 4IR. It won't succeed them but build upon them, and iteratively transform them. Consider the Metaverse an over-arching way of including people in an artificial universe that allows them to interact with the machinery and technologies they created in a visual and immersive environment. It is important to remember that Internet 3.0 and earlier left woes of their own. By not addressing security issues we are left with rampant cybercrime, impersonation, data theft, and industrial espionage. By not addressing societal issues we have pornography, trolling, and divisive social discourse. These issues will persist in Internet 4.0, 4IT, and the Metaverse. The observation that "data is the new oil" may be hackneyed, but also true. The Metaverse will be powered by data, and threatened by the quality and quantity of data supply.

The birth of Internet 4.0 is often pinned to 29 June 2007 with the release of a 'killer app', the Apple i-phone. The killer app for the Metaverse has yet to be invented, although Google made a spirited attempt with Google Glass[8]. VR headsets are still cumbersome and expensive, and their use is restricted to a few specialist applications (including gaming), but their price and size are reducing. In 2019, Samsung was awarded patents for smart augmented reality (AR) contact lenses[9], though they have yet to make it into production.

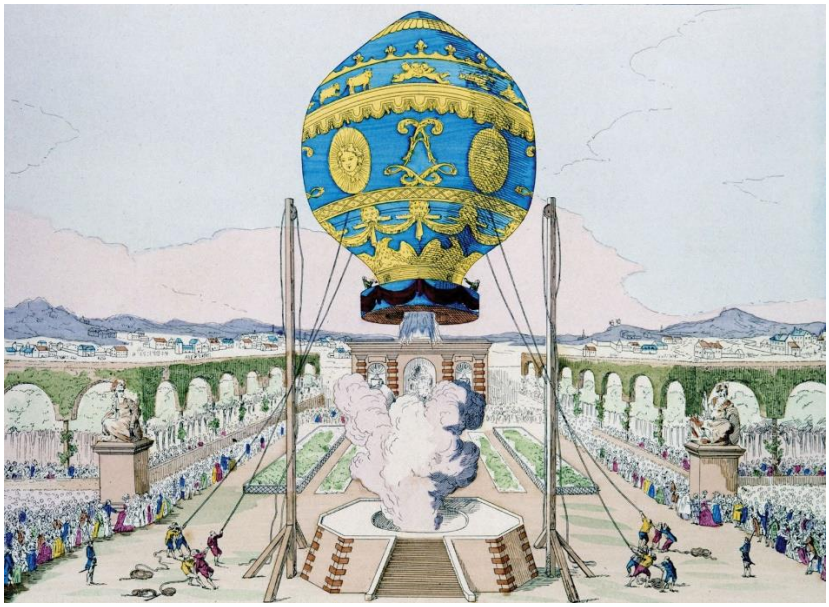
Brain interface technology is also receiving a great deal of attention. Silicon Valley start-up Neuralink[10] is developing a fully-implanted, wireless, high-channel-count, brain-machine interface (BMI) to enable people with paralysis to directly use their neural activity to operate computers and mobile devices. It is only a matter of time before BMI and the Metaverse collide.

[8] https://www.google.com/glass/start/
[9] https://www.vrfocus.com/2019/08/smart-phone-to-smart-contact-lenses-samsung-wins-patent/
[10] https://neuralink.com/blog/series-c/

Move beyond the CGI and flights of fancy, and increasingly people are being wrapped in a cloak of internet-linked technologies – health and fitness monitors, personal assistants, internet-enabled domestic goods, smart TVs, and smartwatches. The plumbing for the Metaverse is rapidly being installed.

2. How Big And Pervasive Might The Metaverse Become?

Parallels



Remarking on Etienne Mongolfier's hot air balloon,
« Eh! à quoi bon l'enfant qui vient de naître? »
"What use is a newborn baby?"
[Benjamin Franklin, recorded by Baron von Grimm in "Correspondance Littéraire", 1783]

In 1783, while in his role as Minister to the Court of France, Benjamin Franklin witnessed the Montgolfier brothers' first public demonstration of the hot air balloon at Versailles. A member of the royal party turned to him with a sneer and enquired what use the Aérostat Réveillon might be, to which the great man is said to have replied, "*What use is a newborn baby?*"[11]

For some people, it is difficult to see uses for the Metaverse beyond entertainment such as music concerts and video games, much as in the earliest days of the internet it was difficult to see uses beyond library catalogues and chatrooms. Recent history contains a plethora of product innovations that promise revolution. Some have delivered on this promise, some remain in development limbo, awaiting the killer app or market opening that will allow them to transform processes or change lives.

[11] https://www.americanheritage.com/what-good-new-born-baby & https://founders.archives.gov/documents/Franklin/01-40-02-0342

Table 2 - Internet Impact On Other Technologies

Innovation	Impact
Mobile Phones	**Revolutionary:** The modern iteration of the mobile phone came to market in 1985. Although initially bulky and cumbersome, they saw very rapid up-take. Technological innovation saw them shrink in size until 2007 when Apple released its iPhone. The impact of the mobile phone and subsequently mobile internet access has transformed the modern world.
Online Shopping	**Revolutionary:** E-commerce was invented in 1979 by Michael Aldrich[12] but did not become economically viable until the advent of the Internet. Amazon, founded in 1995, has transformed shopping habits for consumers and has had a profound effect on the retail, commercial property, and jobs markets.
Streaming Video	**Revolutionary:** The advent of high-speed internet connections allowed the transformation of the entertainment industry, sounding the death knell for physical media such as vinyl, CDs, and videotapes, bringing in a new era of consumer choice, and IP theft.
Machine-Learning (AI)	**Revolutionary:** Machine learning algorithms have pervaded a wide variety of sectors, from insurance where they are used for assessing crash damage[13], to medicine where they are used in lab-testing and diagnosis. Their use (and misuse) may have a profound but subtle impact on society as a whole – for example exacerbating divisions and extremism by creating echo chambers in news and media feeds.
Internet-Enabled Devices	**Evolutionary:** Although internet-enabled home thermostats and fitness trackers have not yet wrought society shaping changes, they are laying the foundations for a networked world, that some commentators have compared to a panopticon[14].
3D Printing;	**Yet to achieve its full potential:** Despite promises to transform manufacturing and unleash a new era of creativity, 3D printing remains confined to the realms of niche manufacturing and hobbyists.

The majority of the innovations described in the table above owe their existence to the internet, for which everything changed in 1990 when Sir Tim Berners-Lee and others developed HyperText Transfer Protocol (HTTP), HyperText Markup Language (HTML), Universal Resource Identifiers (URIs), and Universal Resource Locators (URLs). In 1991, Berners-Lee released the code to create web pages free of charge on the internet, and the WWW was born.

[12] https://tinyurl.com/3fjxuxkv
[13] https://tinyurl.com/2p9cwtet
[14] https://tinyurl.com/4p96hyx4

But, for two years the WWW remained quiescent. Then, in 1993, Marc Andreessen and others at the National Center for Supercomputing Applications at the University of Illinois developed the Mosaic web browser. Mosaic opened the web to a new audience of non-academics, and hobbyists began creating their own HTML web pages. The number of web pages on the WWW grew from 130 in 1993 to over 100,000 by 1996. This rapid growth was then further spurred by the dot-com bubble[15]. As traffic grew exponentially, the internet was seen as the philosopher's stone, able to rejuvenate economies and grant eternal life to start-ups. Venture capitalists and small investors alike threw fistfuls of cash at new companies seeking to provide services on the WWW.

Box 2 - The Internet, The World Wide Web, The Metaverse, The Spatial Web & Web 3.5

The terms Internet and the World Wide Web are often conflated: For the purist, the internet is the infrastructure that connects internet enabled devices together, whilst the World Wide Web is the way in which information is accessed (via the medium of the internet). However, in general parlance the term 'internet' is winning as a catch-all term for any activity involving 'the web'.

The concept of The Spatial Web (integrating convergent technologies into a single network) and Web 3.5 (pervasive, interactive, and autonomous agents) bear many similarities with the Metaverse, though the two have a heavier emphasis on real world intersection, particularly around internet enabled devices.

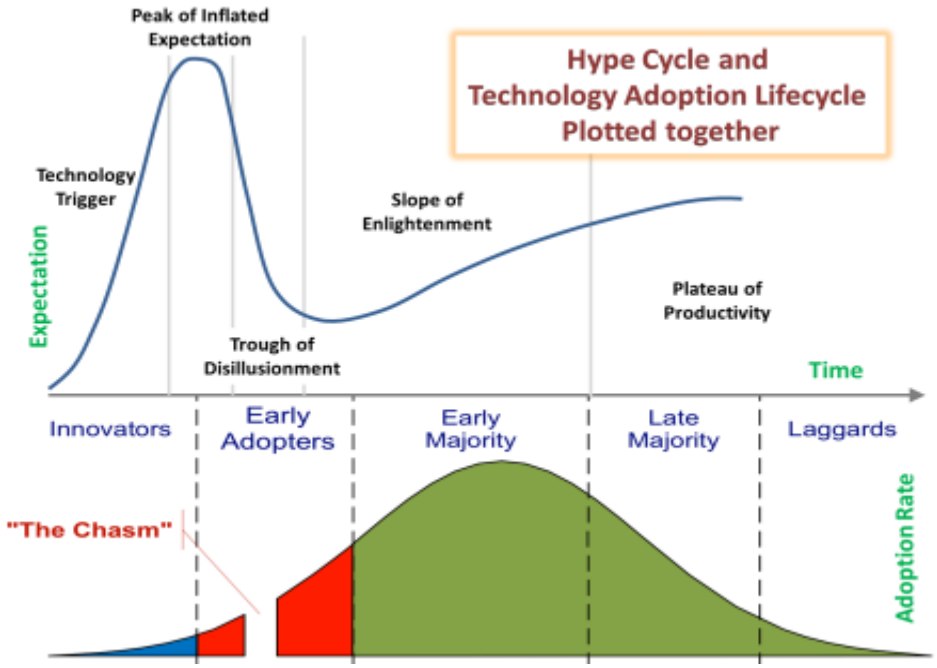
Unfortunately, many of these new companies were established by individuals or groups with a shaky grasp of business planning, and the investors had unrealistic expectations of growth and profits. Although many founders and a handful of investors became very rich, the crash, when it came in 2000, was cataclysmic, wiping out all but a handful of companies. However, from the wreckage emerged survivors (Microsoft, Apple, Google, Paypal, Netflix) and newcomers (Facebook) that dwarf the industrial giants of the 20th century.

[15] *https://corporatefinanceinstitute.com/resources/knowledge/trading-investing/dotcom-bubble/*

Issues For Discussion

The internet first emerged three decades ago, and its impact on the world of business has been immense. As with all new technologies it passed through the Gartner Hype Cycle and the Technology Adoption Cycle simultaneously, initially as a series of solutions in search of a problem, but latterly as an all-pervasive medium that creates the infrastructure for diverse products and markets. However, tempting to compare the WWW with the Metaverse, several factors mitigate against drawing too close a parallel.

Figure 1 - The Gartner Hype Cycle & Technology Adoption Cycle



Source: https://setandbma.wordpress.com/2012/05/28/technology-adoption-shift/

Table 3 - The Evolution Of The WWW

Year	Number Of Websites*	Internet Users	Websites launched
2020	1,295,973,827**	4.6 billion	
2019	1,518,207,412	4.3 billion	
2018	1,630,322,579	4 billion	
2017	1,766,926,408	3.8 billion	Teams
2016	1,045,534,808	3.4 billion	TikTok
2015	863,105,652	3.1 billion	
2014	968,882,453	2.9 billion	
2013	672,985,183	2.7 billion	
2012	697,089,489	2.5 billion	Zoom
2011	346,004,403	2.2 billion	
2010	206,956,723	2 billion	Pinterest, Instagram
2009	238,027,855	1,766,206,240	Whatsapp
2008	172,338,726	1,571,601,630	Dropbox
2007	121,892,559	1,373,327,790	Tumblr
2006	85,507,314	1,160,335,280	Twttr (Twitter)
2005	64,780,617	1 billion	YouTube, Reddit
2004	51,611,646	910,060,180	Facebook, Flickr
2003	40,912,332	778,555,680	WordPress, LinkedIn, Skype
2002	38,760,373	662,663,600	
2001	29,254,370	500,609,240	Wikipedia
2000	17,087,182	413,425,190	Baidu
1999	3,177,453	280,866,670	PayPal
1998	2,410,067	188,023,930	Google
1997	1,117,255	120,758,310	Netflix
1996	257,601	77,433,860	
1995	23,500	44,838,900	Amazon,AuctionWeb (EBay)
1994	2,738	25,454,590	Yahoo

**Note, for the purposes of this table, a website is a registered domain name. Many domain names are registered but inactive – for example in 2020 there were over 4.6 billion registered domain names, but only around 180 million of these were active (showed traffic)[16] **There has been a recent large fall in the number of registered websites, as many top-level domain operators have stopped low-cost registration promotions[17].*

[16] https://siteefy.com/how-many-websites-are-there/
[17] https://domainnamewire.com/2021/06/03/total-domain-counts-are-falling-heres-why/

Open Source versus Walled Gardens - The first stumbling block is the nature of the Metaverse as it currently exists. The internet was established as a not-for-profit endeavour arising initially from a public defence project funded by the Defense Advanced Research Projects Agency Network (DARPANET) in cooperation with businesses and academic institutions as a method of collaboration. The WWW was created similarly. ICANN, the charitable body widely regarded as the 'guardian of the internet' was established to "*preserve the operational stability of the Internet; to promote competition; to achieve broad representation of the global Internet community; and to develop policies appropriate to its mission through bottom-up, consensus-based processes*[18]"

Releasing WWW code for free opened the gates to innovation for hobbyists and commercial entities alike, allowing the WWW to grow exponentially and find an audience of billions. By contrast, the Metaverse as it currently exists is not a universal construct, but a series of 'walled gardens'. A Walled Garden is a closed ecosystem in which all the operations are controlled by the ecosystem operator[19]. The ecosystem operator fiercely guards the source code, innovation must be licensed, activities are closely monitored and rent may be sought from both users and content providers. It is in the interests of the ecosystem operator to discourage users from looking elsewhere, so a principle that lies at the heart of the WWW, open connectivity, is absent.

Universal Access versus Exclusivity - While people still active today can remember dial-up modems and 28kbs connections, the millennial generation has come to view high-speed broadband as nearly a fundamental human right. The four parameters are high bandwidth[20] (the amount of data that can be received and transmitted), high reliability (the stability of a connection to the internet), low latency (the time it takes for a data packet to travel from one place to another), and low cost. The four parameters are significant issues for some internet users, particularly the poor, developing nations, and remote areas. For the Metaverse, high bandwidth, high reliability, and low latency are essential. If costs are high, then when specialist equipment such as VR headsets or BMI is added, the Metaverse becomes a playground for the affluent.

Functionality versus Aesthetics - crisp 3D graphics, Dolby surround sound, and lifelike avatars might be important for video games and music events, but they

[18] https://www.icann.org/
[19] https://www.techslang.com/definition/what-is-a-walled-garden/
[20] Ball M & Navok J 2021 "*Networking and the Metaverse - The Metaverse Primer Part III*" https://www.matthewball.vc/all/networkingMetaverse

are less important for other applications. In this respect, one argument is that, rather than replacing the WWW, the Metaverse will sit alongside it, with some transactions, such as online banking or accessing newsfeeds being more suited to staying outside the Metaverse. What this argument ignores is that the Metaverse community may become sufficiently large for 'boring' application companies to feel they have to enter the Metaverse because it holds a sizable proportion of their customers.

On a related point, given two similar ICT applications, if the functionality of the two systems is broadly similar, then the competitive edge is focused on the last centimetre or two from the AR or VR headset to the eyeball, and from the earpods or headphones to the cochlea. My, say, claims management system wins over yours based on the aesthetic quality of the user experience in AR or VR. Your, say, retail home & contents valuation application, wins over mine because it 'feels' better, less intrusive, more informative, or friendlier, despite doing the same thing. Competing on aesthetics means insurers, or perhaps more accurately their systems providers, will need to assemble far more diverse skills than coding, e.g. music, artwork, lighting, kinesthetics, or navigation, even smell, with psychology and other social sciences. Insurers will, at the very least, have to become more sophisticated buyers of systems. Writing this report uncovered, for example, research projects at a Dutch university focused on improving in-app navigation and location signalling through better aesthetics, to give just one example.

Casual versus Immersive - This last point is arguably the most important factor in determining use cases and reach for the Metaverse. Currently, the WWW can be accessed by a range of devices, from mobile phones to desktop computers, from a range of locations – from the office or bedroom to bus stops or cafes. For the full Metaverse experience, users will require specialized equipment that will render them vulnerable unless they are in a secure location - zoning out whilst waiting for the Number 43 bus to London Bridge may get you robbed, assaulted, or knocked over by a van. One of the strengths of the WWW is its accessibility to people on the move and the ability of its users to multitask. As currently configured, at the extreme the Metaverse is not mobile. This is why many people believe the dominant technology will be Augmented Reality, not Virtual Reality.

Use Cases

The eventual uses of new technologies are often overlooked, but for the Metaverse, several uses already stand out.

"More and more studies conclude that using immersive VR in training results in better comprehension and retention. One study showed a retention rate of up to 80% over the following year, against 20% over the next week for traditional training. Another, that two immersive sessions resulted in retention rates of 95%".

[Michael DaCosta Babb, CMO Titan VR, VR StartUp NED, and VR Educator]

Entertainment - Virtually all areas of entertainment are being explored, and already several high-profile concerts by well-known artists have taken place in the Metaverse with significant audiences and earnings. Multiplayer videogames such as Fortnight and Minecraft have already made the leap to music events, concerts, and plays are sure to follow. The Metaverse may even produce new genres of entertainment which combine elements of all of these. Using the Metaverse as a platform can cut costs for content producers whilst opening up a myriad of opportunities for marketing and merchandising.

Business Interaction - Many corporates are exploring next-generation VR and Telepresence technologies associated with the Metaverse, perhaps driven by the recent, rapid increase in remote working and online conferencing, as well as showcasing. Full motion body and real-time face capture could deliver a more comprehensive experience for business calls, negating the need for face-to-face meetings. Add in machine-learning (AI) analysis and the stress levels and 'truthfulness' of attendees could be monitored in real-time to give an edge to those willing to pay. The conception of the Metaverse as an infinite shopping mall is an obvious one. Users' avatars in clothes shops can try before they buy. Perusing the aisle at a virtual supermarket could enable you to have 'in-person' tuition from a top chef showing you how to use the ingredients you have ordered, or the fleet manager at a transport firm can see whether the 18 wheeler truck she is thinking of buying can turn around in her firm's yard.

Specialist Simulations - The Metaverse has applications for education, training, medicine, health, exercise, disaster management, construction, maintenance, and telerobotics. Numerous specialist applications are already deploying at scale, from surgical training to helping treat dementia. Care homes, hospices, and treatment centres already use devices such as a virtual reality treadmill (e.g.

ROVR Systems[21]) to help patients. Interestingly, some firms providing such systems are being paid to use certain locations, e.g. Welsh beaches, or certain makes and models of automobiles or sailing boats for promotion. There are strong analogies here with film distribution via cinema. The artificial reality spaces provide enormous opportunities for product and service placement, just as films do. As ever, cinemas, read Metaverse locations, often get paid to run advertisements before screenings. At the moment, in terms of real applications, education is second only to gaming.

Online Culture - Gamers, coders, and other persistently online communities are early experimenters, and perhaps adopters, with one example being commercial auctions in the Metaverse of Non-Fungible Tokens (NFTs) by venerable auction houses.

Impact

The Metaverse is widely touted as an artificial reality-based successor to the Internet with the potential to impact a wide variety of fields. The likely impact on company's may be summarised as:

Hyper-Connectivity - Companies delivering their services digitally will find that their presence in the Metaverse will increase their interactions both with customers, and their interaction with other services and products online. Customers will expect instantaneous interactions, which may require companies, such as insurers, to rebuild their asynchronous processes to be synchronous.

Semblance Of Quality Dominance - The look, motion, sound, texture, 'feel', and the aesthetics, of digital content may become more important than the 'back end' functionality. The fight for the customers' eyeballs will place significant emphasis on the quality of the user experience in augmented and virtual reality. This may be a concern to insurers because safety may come last, not first.

New Land Grabs – with new worlds, new geographies, and new concepts of spacetime, allowing a deeper understanding of connections between entities in the virtual and physical realms, insurers will need to keep a close eye on the psychogeography or cyberspace they wish to control. Imagine walking down a virtual street in the Metaverse. It is lined with the headquarters of major corporations. You focus on one, and with a blink, you can summon up data

[21] https://rovr.systems/

showing which countries they trade in, what names they trade under in those countries, the brands they own, news articles about them (good and bad), current job vacancies, their real-time stock price (with options to buy, sell or vote on shareholder resolutions at their AGM), their turn-over and profits, the patents they own, their competitors and suppliers, the remuneration of their CEO, the debt they are carrying, the amount of carbon they produce, the tax they pay and current lawsuits against them (with an option to contribute to crowd-funding their prosecution).

3. Metaversal Studios – The Leading Players

The Metaverse is in its very earliest stages of development however, some current announcements demonstrate growing interest outside of just technologists and companies:

- **Barbados** has announced it is going to create an "embassy" in the Metaverse[22]. The embassy will be established in Decentraland (https://decentraland.org/) a VR site, accessible through the internet, and powered by Ethereum. Although Barbados has been trumpeted as the world's first country to recognise digital sovereign land, the embassy cannot be classified as a diplomatic mission under the Treaty of Vienna[23] any more than any other website. Commentators have speculated that Barbados's interest in the Metaverse is driven more by the opportunities associated with cryptocurrencies and NFTs than the Metaverse itself.
- **South Korea** has launched an alliance between 17 of the country's industry leaders to explore potential applications for the Metaverse. The City of Seoul Metropolitan Government (SMG) announced[24] that it will be the first major city to enter the Metaverse. It intends to create a virtual communication ecosystem for all areas of its municipal administration in three stages from 2022.
- **Infinite Metaverse Alliance** (IMA) is a US-based Research and Development Philanthropic Foundation that has been formed to encourage open-source code development, coding standards, and a refined architecture framework. In many ways, the IMA mirrors ICANN.

Second Life

No discussion of the Metaverse would be complete without touching on what many people see as the progenitor, Second Life. Second Life is an application that allows people to create an avatar for themselves and have a 'second life' in an online virtual world. Developed and owned by the San Francisco-based firm Linden Lab and launched in 2003, it saw rapid growth? and peaked in 2013 with approximately one million regular users. It still has a small, but loyal, group of users who use the application for social events and to buy digital assets using the in-game currency.

[22] https://www.coindesk.com/business/2021/11/15/barbados-to-become-first-sovereign-nation-with-an-embassy-in-the-Metaverse/
[23] https://legal.un.org/ilc/texts/instruments/english/conventions/9_1_1961.pdf
[24] https://www.euronews.com/next/2021/11/10/seoul-to-become-the-first-city-to-enter-the-Metaverse-what-will-it-look-like

YuLife

This London-based start-up was founded in 2016 by Sammy Rubin. It has been described as a cross between Fitbit and Fortnite and aims to 'gamify' the life insurance sector. Users can access hundreds of virtual worlds—known as the 'Yuniverse'- each of which represents real-life tasks (for example a daily step total). Players can earn in-game currency (see note 27) which can be converted into real-world discounts and Amazon vouchers. Yulife is one of a range of similar start-ups which aim to *"deliver life insurance 2.0 to the YouTube generation*[25]".

Exhibit 1 - The YuLife Phone App

Roblox

California-based company Roblox with 1,234 employees is a leading contender in the Metaverse, having created a seamless user experience that merges gaming with publishing and a unique meta-economy. Launched in 2006, by April 2021 Roblox had gained 202 million monthly active users. The platform went public, and with predicted annual revenue of USD 509.3 million (up 102% on 2020, which in turn was up 127% on 2019)[26] trading has been very brisk.

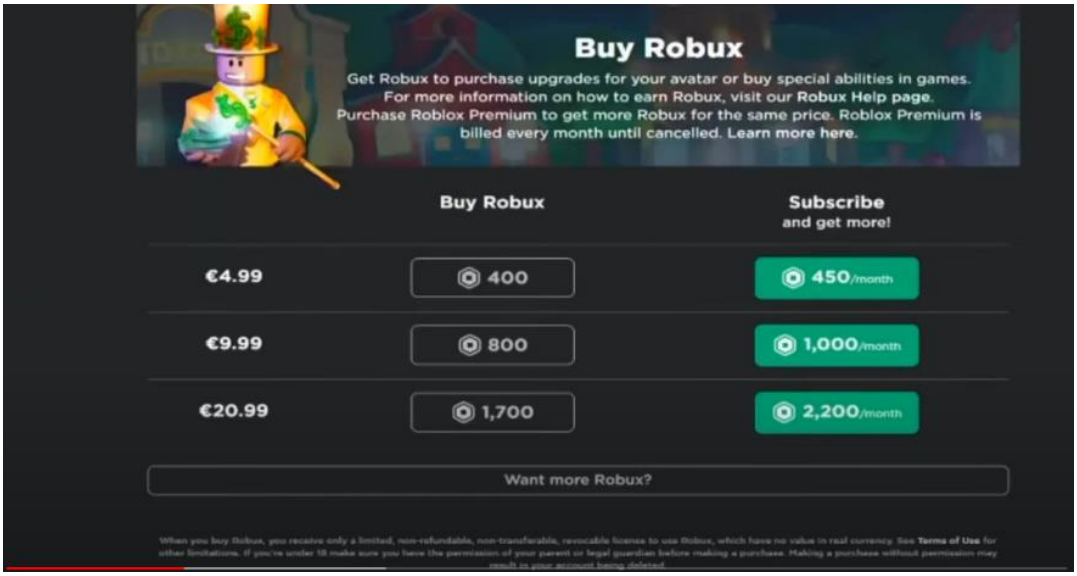
Roblox is not a game, but an online platform and storefront where users go to play games made by other developers (many of them users themselves). In this

[25] https://www.theatlantic.com/technology/archive/2021/07/great-life-insurance-rebrand/619603/
[26] https://www.cnbc.com/2021/11/08/roblox-rblx-earnings-q3-2021.html

sense, Roblox is similar to platforms such as Steam[27] or Epic[28]. Where Roblox differs is by allowing users to explore the Roblox Metaverse and participate in social interactions, such as virtual choirs or chats, or participate in single or multiplayer games, either for free or by using the platform's in-game currency Robux[29]. There is a virtual Starcourt Mall, replicating a place in Netflix series "Stranger Things", where a virtual copy of a Gucci handbag sold for around USD 4,100 in November 2021.[30]

A great deal of emphasis is placed on the user's avatar, which can be infinitely customised with clothes, hats, shoes, or made into a variety of forms using Robux, the Roblox currency. All the games on the platform are made by its users using a unique programming interface more like Lego than a programming language. The programming interface has allowed users and developers to create extremely complex worlds, over 20 million of them according to the official website. As developers can monetise their creations within the Roblox meta-economy, some of them have become extremely wealthy in the real economy. Community developers have made over USD 328 million on Roblox since its foundation[31].

Exhibit 2 – Roblox Buying Screen For In-Game Currency



[27] https://store.steampowered.com/
[28] https://www.epicgames.com/store/en-US/
[29] **Note**: Robux are not a crypto currency but a company scrip (a substitute for government-issued legal tender or currency) as such the exchange rate is not volatile, but controlled by the company.
[30] https://www.economist.com/business/the-video-game-industry-has-metaverse-ambitions-too/21806341
[31] https://backlinko.com/roblox-users

Buoyed by the company's success, its CEO, David Baszucki, has talked about developing future shopping and business applications on the platform, all set within its own virtual economy powered by its Robux currency.

Decentraland[32] & Legacy[33] & Superworld[34] & Republic Realm[35], etc.

Launched in beta in 2017 and open to the public in 2020, Decentraland[36] is software running on Ethereum that seeks to incentivise a global network of users to operate a shared virtual world. Decentraland users can buy and sell digital assets, such as "land", while exploring, interacting, and playing games within this virtual world. Two different types of tokens power the Decentraland economy:

- LAND – A non-fungible token (NFT) that defines the ownership of "land parcels" within the Decetraland Metaverse.
- MANA – An Ethereum based cryptocurrency that allows the purchase of 'Land' and virtual goods and services.

Decentraland software is governed through a collection of blockchain-based smart contacts, which allow the owners of Mana to vote on policy updates, land auctions, and subsidies for new developments. Although the graphics are stylised, and the majority of participants access the site through conventional screens rather than VR headsets, Decentraland seems the closest environment yet to Neil Stephenson's vision of the Metaverse.

Legacy is an NFT funded recreation of London. As of January 2022, users have spent some US$54 million for plots of land which are still under development. There is no launch date. Superworld tries to replicate Earth itself with people able to buy digital versions of any place on Earth. "In November, Republic Realm, a company that manages and develops digital real estate, paid USD 4.3 million for land in a platform called the Sandbox, the biggest virtual-property investment to date. That same month Tokens.com spent USD 2.4 million for a plot in Decentraland's Fashion Street district."[37]

If people want to buy it, someone is prepared to sell it. Perhaps this entry should conclude, *ad nauseam.*

[32] https://decentraland.org/
[33] https://playlegacy.game/
[34] https://www.superworldapp.com/
[35] https://www.republicrealm.com/
[36] https://decentraland.org/

Exhibit 3 - Driven By Interest In NFTs Sotheby's Have Opened A Branch In Decentraland

Epic Games

Founded in 1991 by CEO Tim Sweeney, Epic Games is a US company headquartered in North Carolina. It has 3,200 employees and more than 40 offices worldwide. Epic is best known in the world of video games, having developed the Unreal Engine, which powers a large number of 'AAA' game franchises including Assassins Creed, Gears of War, Bioshock, and Medal of Honour. The graphics engine has been adopted by film and television for CGI production, as well as by architects and automotive manufacturers for simulations.

Exhibit 4 – Every Other Week

Epic aims to provide an end-to-end digital ecosystem for developers to build, distribute, and operate games and other content. Notably, Epic operates Fortnite, one of the world's largest games with over 350 million user accounts. By leveraging this user base and associated data, Epic has run several mass-attendance entertainment events in the Fortnight Metaverse. *"In 2020 the rapper, Travis Scott, hosted a virtual concert. The malleable physics of the digital world allowed him to do things no amount of stagecraft could accomplish in reality. His hundred-foot-tall avatar, wreathed in lightning, danced and stomped through the game's pixellated universe, shaking the ground with every step. Around 12.3m people attended, around 60 times more than can fit onto the fields of Glastonbury, a big music festival*."[38]

Epic intends to build on its experience in developing the Metaverse, and in April 2021 it announced that it had completed a USD 1 billion round of funding[39], which will allow the company to support future growth opportunities. Epic's equity valuation is around USD 28.7 billion.

[38] https://www.economist.com/business/the-video-game-industry-has-metaverse-ambitions-too/21806341
[39] https://www.epicgames.com/site/en-US/news/announcing-a-1-billion-funding-round-to-support-epics-long-term-vision-for-the-Metaverse

Exhibit 5 - Promotional Material For Ariana Grande Metaverse Tour

The Virtually Group

The Virtually World is a digital platform with ambitions to provide interactive entertainment, exhibition, and retail services. The browser-based interface is impressively powerful. Currently, the platform consists of 'The Crypt' – A virtual gallery for NFT for art and collectibles, but there are plans for a 'Virtually Shopping Mall', Gaming Centre, Cinema, and Sports Village.

Exhibit 6 – The World Awaits

Microsoft

Microsoft Corp's CEO Satya Nadella has stated that the company is working to build an "enterprise Metaverse" focused on the convergence of the digital and physical worlds. Details of the full vision are still vague, but innovations such as Mesh for Microsoft Teams and Microsoft's Hololens headset make it possible to hold meetings in virtual reality[40]. Microsoft owns Xbox one of the leading home gaming machines, as well as the world-building game Minecraft. Microsoft has integrated avatars into its Teams video-conferencing. It remains to be seen how these pieces of the puzzle will come together.

Nvidia

Major computer chip maker Nvidia Corp has been building processors since 1993 and is credited with creating the first dedicated Graphical Processing Unit (GPU), the GeForce 256. Through strategic partnerships with Sega, Microsoft, and Intel, as well as acquisitions of companies such as Arm[41] (currently delayed by an investigation by the European Commission) it has cemented a reputation for high-end products.

Nvidia has made a foray into the Metaverse via its Omniverse platform which it markets as the "plumbing" on which Metaverses could be built[42]. Currently, the Omniverse platform is squarely aimed at professional applications, with graphically (and power-hungry) ray tracing technology and advanced physics engines which make it possible to create lifelike simulations of real-world buildings and factories. BMW uses Omniverse to make it easier to reconfigure its factories for new cars

Meta

Facebook's holding company started trading as Meta Platforms on 1 December 2021. The company, which has around 3 billion users, has been investing heavily in augmented and virtual reality equipment development. In 2014, Facebook acquired Oculus for USD 2 billion. The Oculus headset is a standalone device that can run games and software wirelessly under an Android-based operating system or link to a computer.

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[40] https://www.microsoft.com/en-us/mesh

[41] **Note**: Arm chips are ubiquitous in the android mobile market and are used by major manufacturers such as Samsung and Huawei.

[42] https://developer.nvidia.com/nvidia-omniverse-platform

Exhibit 7 – The Oculus Headset

Facebook has also developed a VR environment called Horizon, launched in 2019, which can be accessed through its Oculus Quest headsets. Horizon is billed as a collaborative platform.

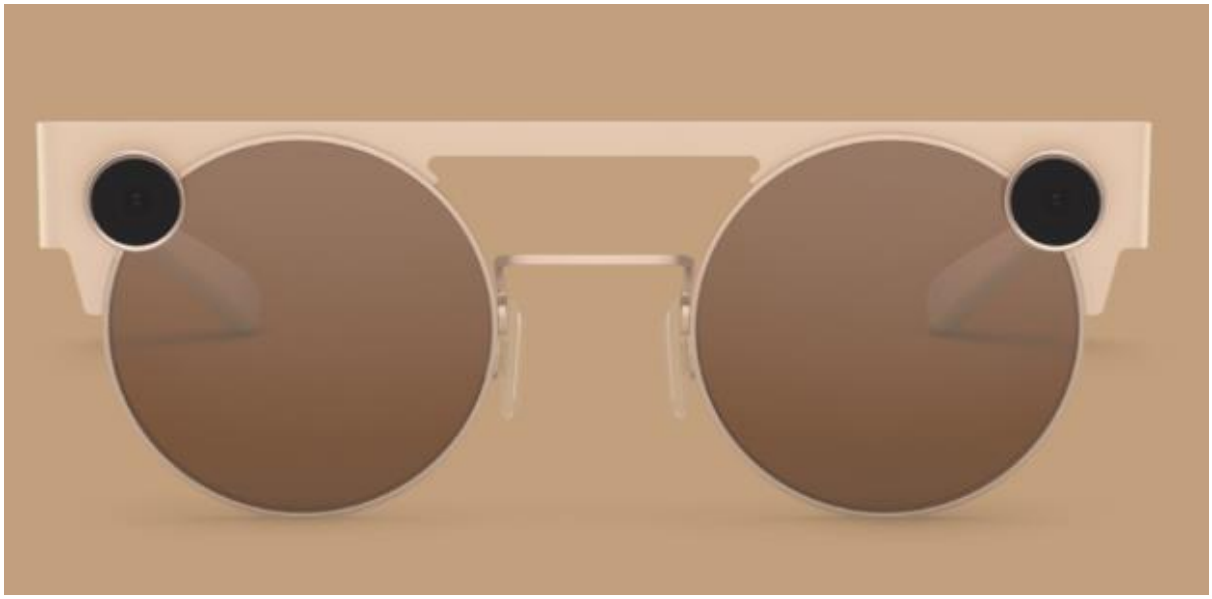
Exhibit 8 – Facebook Horizon

So far, Facebook Horizon is an invitation-only immersive environment,where users can mingle and chat in a virtual space with a cartoon avatar through Oculus headsets. The company is also a significant player in cloud computing.

Snap

Snap Inc, owner of the Snapchat app, has a great deal of experience in building custom avatars and augmented reality filters to overlay digital features on the real world. In 2021, it unveiled 'spectacles', augmented reality glasses, which were made available for developers to experiment with creating experiences.

Exhibit 9 - Snap Spectacles



Google

Google was an early entrant with Lively in 2008[43]. Lively was an alternative to Second Life. It consisted of a series of 3D chat rooms but was pulled within a few months.

Google has not made major announcements on the Metaverse so far and withdrew from the manufacture of its AR headsets 'Google Glass' in 2019. Its seeming lack of ambition in this space may be down to its poor leverage within the social media space (Google's foray into chat apps was short-lived).

Exhibit 10 - Google Maps Live

[43] https://www.economist.com/business/2008/08/21/if-you-build-it

However, Google is a major player in mobile Augmented Reality output, and products such as Google Lens and Google Maps Live View overlays could bridge the gap between the Metaverse and reality. It is also a significant player in cloud computing. It would be unusual for Google not to make a major move in a prime area of internet real estate.

ByteDance

ByteDance, the Chinese company behind TikTok and Douyin, has ambitions to establish a base in the Metaverse[44]. The company, which has more than 1 billion users outside China, is well placed to challenge Meta. ByteDance made another move into the Metaverse in 2021 with the acquisition of VR start-up Pico Interactive. ByteDance said the purchase of Pico will support its long-term investment in VR. Pico ranked third in global VR headset sales in the first quarter of 2021.

[44] https://www.wired.co.uk/article/tiktok-future-facebook

Exhibit 11 – Pico Interactive

Tencent

Hong Kong-based tech giant Tencent Holdings is the world's largest video gaming firm by revenue and has stakes in major game studios like Epic Games and Activision Blizzard. The South China Morning Post reported that Tencent, along with Chinese firms Baidu and NetEase, have registered several Metaverse associated trademarks[45]. On 10 November 2021, Tencent's CEO Pony Ma spoke on the Metaverse for the first time.

"Anything that makes the virtual world more real and the real world more rich with virtual experiences can become part of the Metaverse."
[Pony Ma, CEO, Tencent]

Other Players

There will be significant opportunities in the Metaverse for firms associated with entertainment. These include Netflix, Amazon, and Disney, all of which have yet to announce significant activity. Software developers focusing on Computer-Aided Design, Geographical Information Systems, Artificial Intelligence and Augmented Reality, and hardware manufacturers specialising in wearables, such

[45] https://www.scmp.com/tech/big-tech/article/3155664/tencent-says-it-has-technology-build-Metaverse-and-beijing-does-not

as VR and AR headsets, telepresence haptic[46] systems, ambulation, olfactory systems, taste systems, and teledildonics[47] are also likely to exploit opportunities.

Exhibit 12 - HaptX Gloves DK2 For VR And Telerobotics

[46] https://www.smithsonianmag.com/innovation/heres-what-future-haptic-technology-looks-or-rather-feels-180971097/

[47] https://www.forbes.com/sites/kittyknowles/2017/02/09/teledildonics-meaning-what-are-teledildonics-iot-sex-toys-vr-porn/?sh=1104f9585565

4. Implications For The Insurance Sector

It is easy to speculate on how such a wide-ranging and synthesising technology might affect insurance. Claims adjustment might be online with complete end-to-end monitoring and recording. The idea of whole-life asset risk management would be similar to concepts of digital twinning. According to IBM:

"A digital twin is a virtual model designed to accurately reflect a physical object. The object being studied — for example, a wind turbine — is outfitted with various sensors related to vital areas of functionality. These sensors produce data about different aspects of the physical object's performance, such as energy output, temperature, weather conditions and more. This data is then relayed to a processing system and applied to the digital copy.

Once informed with such data, the virtual model can be used to run simulations, study performance issues and generate possible improvements, all with the goal of generating valuable insights — which can then be applied back to the original physical object." [48]

Other applications include highly-intrusive views of health as people use the Metaverse for training, remediation, and other health benefits. Insurers might require people to undergo a minimum of a few sessions before taking out vehicles, "what to do if you experience a breakdown or an accident". Insurers may find themselves competing for prime online real estate to be near clients or markets with which they intend to engage.

Determining the implications of this new technology for the insurance sector involves much guesswork. Taking Michael Porter's classic approach to "*How Competitive Forces Shape Strategy*"[49] (Harvard Business Review 1979), a swift examination of the challenges and opportunities that the Metaverse presents to the insurance sector follows.

[48] https://www.ibm.com/topics/what-is-a-digital-twin
[49] https://hbr.org/1979/03/how-competitive-forces-shape-strategy

Figure 2 - Porter's Five Forces Model

Competitive Rivalry

On the supply side, discussion with insurance professionals identified several areas where the Metaverse may confer new market and marketing opportunities:

- Sales could be conducted through virtual insurance agencies: Heungkuk Life Insurance in Korea has already opened a 'virtual counselling window' in the Metaverse[50].
- As well as Yulife, other market participants using gamification technology in insurance-related areas include Hong Kong's MetLife Infinity app which allows users to curate their own legacy by uploading important documents, photos, and videos, and allowing them to share them with loved ones at a set date in the future – even after death.
- Through technology such as Microsoft Mesh, a virtual underwriting room could be created for underwriter/broker collaboration.
- The Omniverse platform could be used to virtually assess insurable assets and advise on risk mitigation; similar technology could also be used in claims for virtual damage assessment post-event.

[50] https://www.archyde.com/insurance-companies-riding-the-Metaverse-heungkuk-life-insurance-opens-a-virtual-counseling-window/

Buyer Power

The two questions around buyers of insurance products in the Metaverse are, who are they and what are they likely to want to insure? They may be segmented as:

- **Current buyers of current products in the real world** - In many ways, catering to this segment of the market is unlikely to change products dramatically or services dramatically, though underwriters may be able to more accurately assess risk and loss using the modelling techniques described above.
- **Current buyers using the Metaverse** - Using gamification to sell and upsell products provides an opportunity to engage younger customers.
- **New buyers doing new things** - People may want to insure their Metaverse lives/assets (in-game currencies, Metaverse assets). Specific products may need to be developed for Metaverse applications. Seguro Go is an insurance policy for Pokemon Go players against being mugged or killed[51], similar insurance may be needed by customers using the Metaverse as a mobile application. Several of the insurance professionals consulted in the course of researching this report flagged up personal data and identify as a the primary risk.

While most businesses, particularly financial services, are digitised, the issue of personal identity remains mired in the analogue world. Anti-money laundering legislation requires financial services organisations, including the insurance sector to 'Know Your Customer' (KYC), imposing significant burdens on consumers wishing to open new accounts who must either turn up in person to present official documentation or send physical copies of notarised documents. The creation of a secure, verified digital identity can overcome these problems. According to the UK Government "*digital identities are an easy way to help us prove who we are without the need for physical documents. They can also help us prove things about us, such as our age or our qualifications.*"[52].

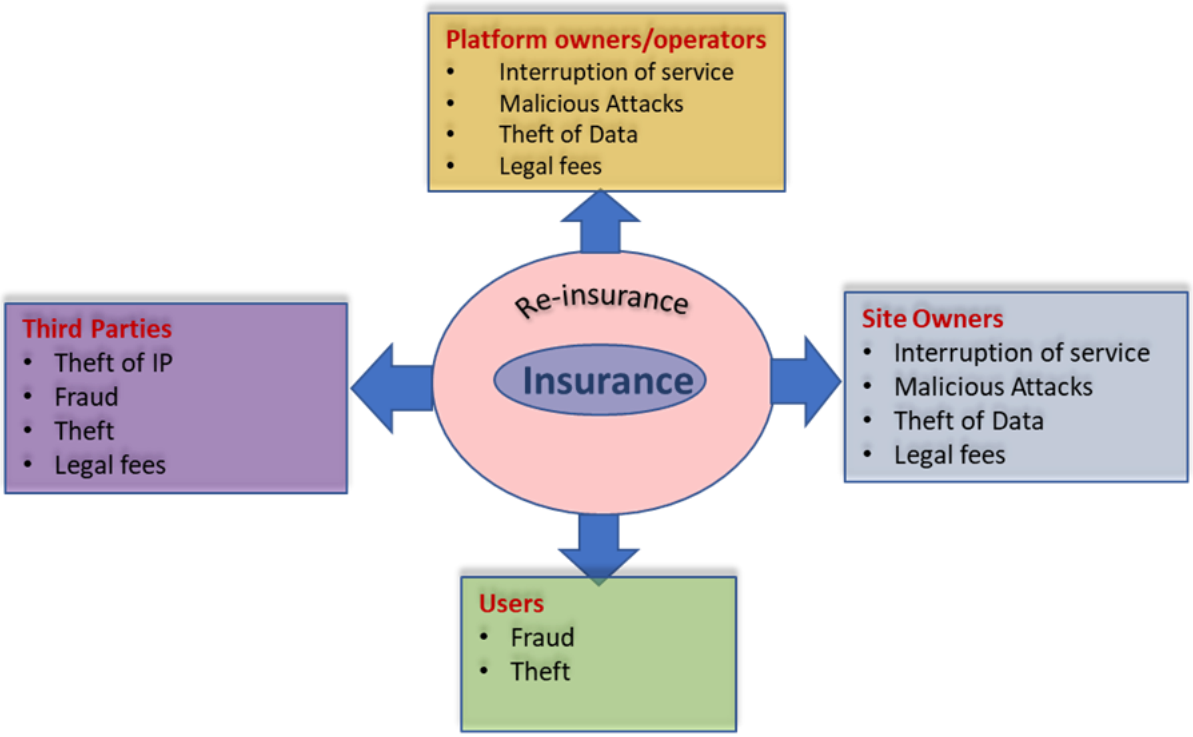
Self-Sovereign Identity (SSI) is one method of establishing a secure digital identity that safeguards privacy by removing the need to store personal information on a central database and gives individuals control over what information they share. The insurance sector is at an early stage in offering corporate cyber protection against theft of data or identity. Theft of personal

[51] https://www.dailymail.co.uk/news/article-3775627/For-16-year-Pokemon-fanatics-insured-against-mugged-run-KILLED-world-s-policy-launched.html

[52] https://www.gov.uk/government/consultations/digital-identity-and-attributes-consultation

data remains a big issue for consumers and there is a dearth of products available for individuals seeking protection from the theft of personal data or identity. Consumers may not wish to enter fully into the Metaverse's offerings until some of the obligations, risks, and compensations are more clearly specified.

Figure 3 - Potential Buyers Of Insurance In the Metaverse



Supplier Power

Insurers should consider what services they may wish to seek from their suppliers if they are to take advantage of the Metaverse. These include the obvious, such as ICT services, but the scope should also encompass advertisers, who will have to consider how to reach a new audience in a new medium, and legal services, who will have to carefully consider legal risks and litigation in a milieu with unclear jurisdictions and regulatory boundaries.

Substitution

Insurance contracts have four important characteristics[53]:

i. The purchaser of insurance must have an insurable interest - in other words, the insured party must face a financial loss if the risk event occurs.
ii. The risk must exist at the start of the contract.
iii. The insurance contact must transfer a proportion of the risk from the purchaser of the insurance to the provider or seller in return for a premium, to the seller.
iv. The contract is of *uberrima fides* (made in good faith).

All of these characteristics are problematic when dealing with the Metaverse:

i. Claimants may find it difficult to prove financial loss when dealing with intangible assets such as non-fungible tokens, avatars, or digital assets – in which jurisdiction was ownership registered and where is the claim being made? How was the asset valued – in sovereign money or cryptocurrency?
ii. As the Metaverse is a new creation, the risks to its users are not fully understood – machine-learning (AI), quantum computing, malware, and the physiological effects of VR are still emergent threats.
iii. Setting premiums for Metaverse insurance will be difficult until the risks are fully understood.
iv. As the Metaverse is likely to be resident in the cloud, dispute resolution will be difficult - who will regulate transactions in the Metaverse? How will disputes be arbitrated and how will decisions be enforced?

Ironically the last of these is the issue that insurers are best placed to deal with. A senior reinsurer interviewed for this report drew parallels with shipping. A ship may be built in Korea, bought by a German company, flagged in the Philippines, and sailing in international water, but it will still be insured. Given the difficulties with insurance contracts in the Metaverse flagged above, it is likely that for corporate clients Alternative Risk Transfer[54] (ART) vehicles will be used as substitutes for commercial insurance, whether risk securitisation through catastrophe bonds, captive insurance, or enterprise-wide risk management.

[53] http://www.virtusinterpress.org/IMG/pdf/10-22495_rgcv5i4c1art11.pdf
[54] https://www.artemis.bm/library/what-is-alternative-risk-transfer/

Threat of New Entry

New entrants will inevitably aim to disrupt the insurance sector in the Metaverse. Perhaps offshoots of the online gambling sector or machine-learning (AI)-based actuaries will offer insurance-like bets (rain on a wedding day) or life policy extensions. New entrants may benefit from a lack of regulation and oversight in the early stages.

If the Metaverse is constructed as a series of discrete walled gardens, rather than modelled on the WWW, the platform operators themselves may act as a barrier to entry for the insurance sector either by seeking rent (for example charging for access to the data required to prove a claim) or excluding competitors so they can provide their own services.

As one insurance professional pointed out, a Metaverse provider may know its internal algorithms and could price insurance 'perfectly' - depending on the threat – however as many threats would still come from humans using the system, this would remain an externality, even to the platform provider.

5. Meta Issues & The Metaverse

Although many of the risks associated with the Metaverse are similar to those posed by the internet, e.g. security, molestation, and illegal markets, the socio-economic impacts that may arise from the growth of the Metaverse are less well defined. It is too early to speculate on differential effects among brokers, underwriters, reinsurers, specialists, regulators, investors, and customers. The Metaverse is an overwhelming space in which all interact. Among the speculations were suggestions such as:

- brokers going so virtual around physical geography that concentration increased – or – brokers specialising more and more given access barriers were lowered;
- underwriters finding the technology too overwhelming – or – underwriters having better data than ever before – or – underwriters forced to price to IT titans who know how to handle data;
- reinsurers being made redundant through large enough distribution – or – sophisticated reinsurers becoming indispensable in gargantuan online markets;
- regulators have extraordinary oversight – or – regulatory boundaries impeding any ability to control the markets.

Table 4 - Potential Risks & Impacts Associated With The Metaverse

Risks	Impacts
• Bad actors • Cyberattacks • Fraud & Theft (data, money, and IP) • Accidental loss (e.g. programming errors, power cuts, natural disasters) • Loss – virtual • Loss – physical	**Social Impacts** Health risks- medical impacts of long term inactivity, neurological impacts, psychological impacts Societal impacts –social isolation, crime, and anti-social behaviour **Technical Impacts** Bandwidth implications (slowing internet traffic for everyone) Energy (and associated impacts on climate change) **Economic Impacts** Further disruption to traditional (real world) retail Disruption to the commercial property market Impacts on travel Loss of tax revenue **Political Impacts** Regulation and enforcement

Social Impacts

"AI will almost certainly trade in an unethical fashion because it will teach itself that manipulative behaviour is the more profitable route."
[Mark Yallop, Chair of the Fixed Income, Currencies and Commodities Markets Standards Board, "Man On A Mission", The Review, Chartered Institute For Securities & Investment (February 2020)]

The health risks associated with prolonged periods of immobility are well known[55], however, if the use of the Metaverse becomes widespread, musculoskeletal and cardiovascular complications, as well as obesity, will likely become more commonplace amongst the general population, placing strain on public health systems. Loneliness and isolation, which impact health and mental health may increase. There may also be desensitisation to real-world risks, and an erosion of social norms due to consequence-free actions in the Metaverse.

An extreme concept that appears in "Snow Crash" are Langford Visual Hacks, or basilisks. In fact, the title of the book is a reference to these as virtual drugs, snow, that crash the brain. The concept, which originated in science fiction author David Langford's writings[56], starts with images, colloquially called 'basilisks'. Mythical basilisks can cause death with a single glance. Online basilisks crash the human mind by showing images that trigger thoughts the mind is physically or logically incapable of thinking. Far-fetched ideas certainly, dubiously at the edge of the theoretically possible, but our understanding of neuroscience is so basic that repeated exposure to certain imagery or auditory sequences might just trigger unusual or harmful responses or conditions.

A common issue raised by interviewees was that consideration must be given to the rights of individuals to control their personal data within the Metaverse[57]. In addition to enhanced biometrics, which can track an individual's focal points, eye movements, and stress levels, to directly target them with tailored content designed to influence their purchasing or political decisions, the Metaverse could enhance the threat of data theft and fraud. It was almost universally agreed by interviewees that personal data risk is an area where the insurance sector had "failed to step up". Although cyber risk insurance is available to

[55] https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2379624/
[56] https://en.wikipedia.org/wiki/David_Langford
[57] https://www.reuters.com/legal/transactional/ai-bots-user-data-is-there-space-rights-Metaverse-2021-11-12/

companies seeking to indemnify themselves against data and any resultant breach of GDPR or similar regulations.

The Metaverse will present a whole new attack surface for hackers, whether state-sponsored or private criminals. In addition to denial-of-service attacks, theft, and vandalism, hackers may find ways of turning users' VR and haptic equipment against them to steal biometric data or cause physical or neurological harm. As one interviewee noted, "AR and VR can be like slapping a polygraph on your forehead".

Technology Impacts

The Metaverse is a 'bandwidth hog', and as the complexity and importance of virtual simulation grow, the amount of data that needs to be streamed will increase[58]. Many users of the WWW already notice increased lag and latency issues during times of high traffic, solving this issue will require massive investment in infrastructure, including the removal of legacy copper cable and its replacement with fibre optics. Although this is already happening in many urban areas, rural and poorer communities are at the back of the queue for this type of investment. Latency issues pull processing 'to the edge', i.e. closest to the user for swifter response, and contrast with machine-learning (AI) voraciously consuming large data volumes for processing in 'the cloud'. Load balancing 'the edge' and 'the cloud' will be an increasing issue for Metaverse-based operations.

The energy implications of the Metaverse, and concomitant carbon emissions, were an issue raised by many of the insurance professionals consulted while researching this report. According to the BBC, internet usage already accounts for around 2% of global greenhouse emissions[59] (equivalent to global airline traffic). The numbers are imprecise about other ICT, e.g. data centres and home devices. Some research predicts that communications technology could account for as much as 51% of global electricity use by 2030[60]. Given the enormous data processing requirements of the Metaverse, the carbon emissions impact of ICT usage are set to grow markedly.

[58] https://www.matthewball.vc/all/networkingMetaverse
[59] https://www.sciencefocus.com/science/what-is-the-carbon-footprint-of-the-internet/
[60] Andre S & Edler T 2015 ***On Global Electricity Usage of Communication Technology: Trends to 2030*** https://www.mdpi.com/2078-1547/6/1/117/htm

Economic Impacts

The commercial property sector, already under siege from the twin blows of the pandemic and internet shopping, may see a further decline if the Metaverse proves a fertile space for e-commerce. If the Metaverse reduces the demand for driving, flights, and train journeys the wider economy will be affected. Equally, a reduced need for transportation means reduced environmental impact. On the other hand, the Metaverse's increased processing and equipment requirements will increase ICT energy consumption, perhaps enormously.

Governments may see further erosion of their tax base should business and e-commerce move to the Metaverse. Not only will it be difficult to determine the jurisdiction that business takes place in, but transactions may also be conducted in cryptocurrency, further complicating the ability to trace the parties. If the Metaverse aids cryptocurrency takeup, another long, complex debate, then the increased volatility of cryptocurrencies combined with widespread use may increase financial system instability.

Political Impacts

Some commentators view Mark Zuckerberg's announcement that Facebook intends to move from being a social media company to a Metaverse company[61] with some cynicism.[62] Beset by accusations, such as complicity in fomenting of right-wing extremism that may have led to the storming of the Senate building in January 2021[63], it has been suggested that the move is an attempt to leave these troubles behind. If the strategy is to leave the WWW behind, it may be flawed. Although the WWW was initially founded with wide-eyed optimism, and in its early day filled with pages of recipes, scientific papers, and arts reviews, before long it was populated by pornography, racism, fake news, and extremism of all forms. The Metaverse is likely to follow similar paths without serious attention, regulation, and investment to prevent its subversion.

Social media companies already face huge challenges with moderating content. Attempts to use machine-learning (AI) for moderating have so far met with poor or mixed success[64], but human moderators, forced to wade through the worst

[61] https://s21.q4cdn.com/399680738/files/doc_financials/2021/q2/FB-Q2-2021-Earnings-Call-Transcript.pdf
[62] https://www.economist.com/business/2021/12/18/the-billionaire-battle-for-the-metaverse
[63] https://www.ft.com/content/abaf9ea7-c5dc-4ba7-8f80-48b488aee5ae
[64] https://www.politico.eu/article/facebook-content-moderation-automation/

sewage that human minds can produce are both fallible and fragile, with some suffering from post-traumatic stress disorder (PTSD) as a result of their exposure to harmful content[65]. This problem will be thrown into sharp relief in the Metaverse. Recent revelations by whistleblowers[66] that Facebook's algorithms pushed some users into radicalism set a disturbing precedent. The use of VR and haptic technology could allow platform operators to collect biometric data on users, allowing unscrupulous operators to conduct behavioural tests, refine responses and use the data to nudge real-world policy.

One US source of this weed infestation in the Garden of Eden is section 230 of the Communications Decency Act[67], a piece of US legislation that sought to protect '*interactive computer services*' from being sued over what users post. Without section 230, it would not be possible to run a social network, a site like Wikipedia, or a news comment section. Under the Act, internet platforms were considered distributors, not publishers and as such were not liable for defamatory or illegal content unless they knew, or should have known, about illegal content. At the moment, it is most likely that the troubles of the WWW will follow companies into the Metaverse. Governmental, corporate, and institutional attitudes to addressing societal risks are often far too slow in a rapidly changing technological world.

"The truth is that the state is the ultimate manager of risk, but it is woefully unequipped to manage it, lacking both technical expertise and political will".
[Senior corporate risk manager interviewed for this report]

Parallels may be drawn with efforts to tackle climate change. The causes of climate change lie beyond the scope of a single government to 'fix'. Market failure, an inability to deal with externalities, exacerbates the problem. The Metaverse has parallel externalities in crime, abuse, trafficking, mental health, physical health, tax evasion, and much else.

As a response to climate change, the UK government passed the Climate Change Act in 2008. The act sets out emission reduction targets that the UK must legally comply with. The Act established the independent Committee on Climate Change (CCC) which advises the government on emissions targets and reports to Parliament on progress made in reducing greenhouse gas emissions. It was suggested by one insurance professional that, as the Government had failed to

[65] https://www.bbc.co.uk/news/technology-52642633
[66] https://www.nbcnews.com/tech/tech-news/facebook-knew-radicalized-users-rcna3581
[67] https://www.eff.org/issues/cda230

tackle internet associated issues such as personal data, e-commerce, fake news, hate speech, and the influencing of public opinion which were corrosive to society, a similar approach should be taken with the management of online risk.

6. Reality Versus Talk

Look beyond the hype and the company videos, and it is apparent that the Metaverse as envisioned in science fiction is still a way off. Significant technical and practical hurdles need to be overcome, particularly around accessing virtual reality and securing the bandwidth necessary to enable universal access, if the Metaverse is to become more than a niche application for specialist functions and hobbyists. EverQuest, launched in 1999, had half a million subscribers. World of Warcraft, launched in 2004, hit 12 million. Roblox has some 200 million a month but might well fade.

Unlike the WWW, which is unified through interconnectivity, it is likely that there will be many Metaverses each of which will serve a particular function:

- entertainment, where companies such as Epic Games have moved beyond proof of concept to delivery for music events.
- markets, where Decentraland has demonstrated how NFT's can form the basis of property ownership within the Metaverse, how cryptocurrency can be a medium of exchange, and how smart contracts can form the basis of governance.
- Digital Twinning, where companies can use the Metaverse for a variety of professional applications, linking their physical world with online simulations.

There are ways to assess the likely state of the Metaverse aside from hype cycle estimates. One simple approach is to look at the scale of funding as it grows. Structured funding has begun with over half a dozen exchange-traded funds already marketed as 'Metaverse funds' in 2021 : Evolve Metaverse ETF, Fount Metaverse ETF, Horizons Global Metaverse Index ETF, Mirae Asset TIGER Fn Metaverse ETF Fund, NH-Amundi Hanaro K-Metaverse MZ ETF, Roundhill Ball Metaverse ETF, and Samsung KODEX K-Metaverse Active ETF. Another approach is to look at consumer video game spending, some US$178 billion in 2020[68]. Yet another approach is tracking how much people are paying for 'rights' to 'land', 'location', 'co-location', or 'proximity', i.e. paying for 'persistence' in the Metaverse's neighbourhoods. Finally, parody is a sign of arrival.

[68] https://newzoo.com/insights/trend-reports/newzoo-global-games-market-report-2021-free-version/ & https://www.pocketgamer.biz/news/76488/newzoo-games-market-decline-2021/

"The Icelandverse is unlike any other open-world experience with "-verse" in its name, because it's real. Plus, you don't need a funny-looking VR headset."[69]

Thus does Iceland's tourist board promote its nation. The fictional Zack Mossbergsson extols, "After millions of years in development, Iceland brings you 'Icelandverse', an entirely immersive open-world experience. It isn't a single place that was built alone and it wasn't built overnight, Icelandverse is actual reality, it's Iceland."

Exhibit 13 - Welcome To The Icelandverse

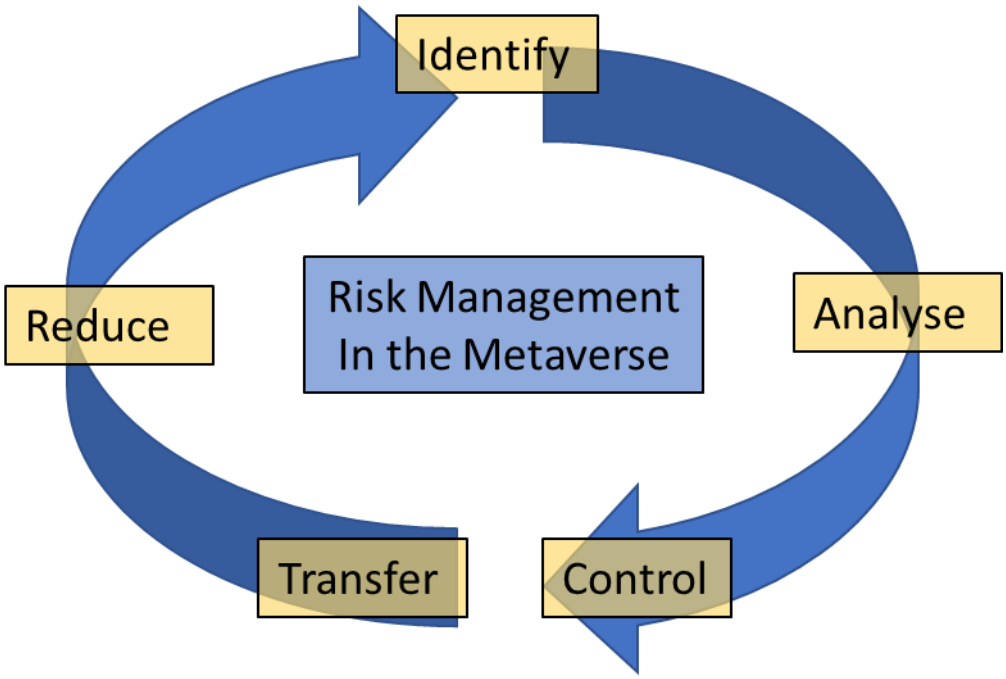
[69] https://www.youtube.com/watch?v=enMwwQy_noI & https://www.inspiredbyiceland.com/culture/welcome-to-the-icelandverse/

7. Recommendations & Conclusion

"The Metaverse is for an Insurer the best dream and the worst nightmare. A world where you can monitor everything, have the data and assess risks, and at the same time a space where the security and control is highly uncertain."
[Senior insurance professional interviewed for this report]

Risk management in the Metaverse is no different than risk management in the real world. Traditional insurance approaches apply.

Figure 4 – Traditional Risk Management Approach



Insurers might consider the following actions:

- Familiarise themselves with the concept of the Metaverse, visualisation, machine-learning (AI), connectivity, big data, and other 4IR (fourth industrial revolution technologies), as well as some of the current highly active areas such as NFTs or cryptocurrencies;
- Enhance their skills base in the Metaverse's wide range of requisite expertise by investing in training and recruiting more specialist expertise in areas such as visualisation, machine-learning (AI), connectivity, big data, aesthetics, or psychology;
- Develop new links and relationships with non-insurance firms involved in the Metaverse, which for insurers used to managing disparate skills

provided by other companies, e.g. in claims management or risk assessment processes, should be exercising a core skill;

- Explore ways of offering new products and services. These could include:
  - managing the risks associated with an individual's personal data and a corporate's Metaverse data;
  - managing the risks associated with digital assets, in particular theft, regulation, government policy, and legal jurisdiction risk;
  - developing specific insurance products for Metaverse applications, such as the protection of personal data and digital assets, or insuring against long-term physical or mental harm;
  - offering risk control and mitigation products, rather than just compensation for loss suffered, more akin to the services offered by cyber-security firms such as Norton and McAfee.
- Consider new funding mechanisms, particularly extensions of crowdfunding. The Metaverse, if it achieves scale, is particularly suited to large numbers of users guaranteeing things. For example, an insurance-linked security insuring specific online assets could be tied to users' guarantees, or gambling markets used to create portfolios for risk management.

"Buy land, they aren't making it anymore." [70]
[Mark Twain (1835-1910)]

With an exciting nascent technology such as the Metaverse, it is easy to over-engage. However, one big recurring point is that the Metaverse is creating 'new worlds', 'new geographies', 'new land'. With regard to Mark Twain's advice above, perhaps the biggest change is that the Metaverse permits multiple, even infinite, geographies. There have been booms and busts in WWW land grabs before, recall people staking out domain names in the late 1990s and early 2000s. The Metaverse is more complicated.

Physical geography constraints are well understood. The Metaverse removes those. Online geography is still primitive. The current WWW structure, and our reliance on search engines, means that the WWW is 'flat'. You go to Google to get to a claims adjuster. Then you go to Google to get to an actuary. You have little idea online of the 'geography' of either the claim adjuster's or actuary's geographical relationship with you, let alone more complex relationships equivalent to proximity. The search engine just gets you there.

[70] https://www.forbes.com/sites/forbesbusinesscouncil/2021/12/28/they-are-making-more-digital-land---should-you-invest/?sh=7275aaa719c1

In the Metaverse there are many potential geographies, ranging from an analogue with the physical world, British, French, American, Chinese, Indonesian, etc. However, there can be business geographies, regulatory geographies, investment-scale geographies, consumer geographies, and many others besides. The simulated proximities relate to different variables. The simulated proximities may differ by scale. Imagine a Metaverse subsector of reinsurance where market capitalisation increases with longitude, while turnover increases with latitude. How do you set out your stall there?

People will strive to have the most attractive Metaverse space, increasing fragmentation, to the point everyone is so stretched that consolidation occurs. One can anticipate several cycles of 'walled gardens' growing, followed by users shrinking to a few oligopolistic providers, and back again. Competition will determine the winners, but insurers may have to place numerous bets on which sites will win, with little indication ahead of time what determines success.

We might think of these numerous geographies as zones or ghettos or 'alleys'. An insurer may be on 'insurance alley' for sure, but may also need to be on 'risk management alley', 'French finance alley', 'balance sheet alley', 'fintech innovation alley', and numerous other 'alleys' besides. The closest analogue to virtual real estate so far has been the early WWW and dot.com days of domain name staking. The Metaverse might be an order or two of magnitude more expensive and complicated than deciding which of .com, .co.uk, .net, .biz, .tokyo, etc., a firm wishes to register. The Metaverse is 'crinkly', not 'flat'. Insurers will need to develop their thinking and strategies for staking out their claims to Metaverse real estate.

Conclusion - Neither Pixilated Nor Pixel Perfect, But Worthy Of Attention

The Metaverse's revolutionary capacity hinges on whether it is so compelling for consumers that everyone has to follow the market. Linked with existing advances in simulation, machine-learning (AI), real-time monitoring, smart contracts, NFTs, cryptocurrencies, and other technologies, the Metaverse may offer opportunities, near-term possibilities for simple cost savings, income growth, and increasing the speed and accuracy of processes, without necessarily fulfilling its revolutionary hype. Insurers must stay abreast of both incremental and revolutionary innovation. The Metaverse may offer both kinds of opportunities.

"The vision is a fever dream for gamers who'd love to immerse themselves in their online worlds and not have to worry about the messy details of physical existence."
[Paul Carroll, "Beware The Metaverse" [71],
Insurance Thought Leadership (2 November 2021) -

The German author, Heinrich Hoffman wrote a disturbingly interesting book in 1844, "Der Struwwelpeter", perhaps best translated as Shaggy Peter. The book contains stories of naughty children who wilfully challenge the boundaries of safety and good manners to receive their just desserts, sometimes including death. One such story concerns Hans Guck-in-die-Luft (Johnny Look-In-The-Air), a boy who habitually fails to watch where he's walking. This is the tension for insurers regarding the Metaverse, trying not to stare so avidly at hot air that you ignore good proposals right in front of you. It's not easy to reach for the skies while simultaneously keeping your feet on the ground. Or as the title of this report alludes, don't get so pixilated by future pixels you miss the opportunities around now.

[71] https://www.insurancethoughtleadership.com/beware-the-metaverse/]

The growth of the Metaverse has the potential to offer new business opportunities and the development of new products and services which could have a strong impact on insurers over the next few years. Equally, the Metaverse increases many existing risks and introduces a few new ones. The Metaverse should join the list of new technologies worthy of strategic debate at both corporate and market levels, but not dominate that debate.

Sources

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Distributed Futures is a significant part of the Long Finance research programme managed by Z/Yen Group. The programme includes a wide variety of activities ranging from developing new technologies, proofs-of-concept demonstrators and pilots, through research papers and commissioned reports, events, seminars, lectures and online fora. Distributed Futures topics include smart ledgers, artificial intelligence, cryptocurrencies, blockchains, FinTech, RegTech, and the internet-of-things. www.distributedfutures.net

The TECHNGI Project focusses on Technology Driven Next Generation Insurance. It is a cross-disciplinary research project investigating the opportunities and challenges for the UK insurance industry arising from the application of new machine-learning (AI) technologies, including machine-learning (AI), distributed ledger, automated processing, and the explosion of available data. Led by Loughborough University, TECHNGI brings multiple academic and industry partners together and is funded as part of the UK's Next Generation Services Industrial Challenge. The project is funded by Innovate UK and the Economic and Social Science Research. It is part of the £20mn Next Generation Services Research Challenge, one of the twenty-one research challenges supported by the UK government's Industrial Strategy Challenge Fund. www.techngi.uk

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