11

Can we escape the Metaverse? Should we?

Fausto de Carvalho, Altice Labs
CFausto@alticelabs.com

Leonel Morgado, Universidade Aberta & INESC TEC
Leonel.Morgado@uab.pt

In view of the strong market presence and leverage of major corporations involved in this topic, the most straightforward answer to the questions above is 'No'. Nevertheless, multiple perspectives should be considered. Thus, in this article we reflect on the concept of 'metaverse', what parts of it exist today, and what is foreseen that makes this concept a much-discussed game changer.

Keywords

How did we get here?

The term 'metaverse' has been around for quite some time, despite becoming a hot buzzword recently. It was created by Neal Stephenson in his 1992 novel Snow Crash [1]: *"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."*

In Stephenson's vision, the Metaverse was not a concept, but a specific virtual place, one contiguous virtual world. It did not stop there, though: he also stated that his protagonists were interacting with others as virtual bodies, being thus bodily present in that virtual world (as opposed to viewing it but not being part of it, the 'cyberspace' perspective which was a more common perspective at the time): *"He is not seeing real people, of course. This is all a part of the moving illustration drawn by his computer according to specifications coming down the fiber-optic cable. The people are pieces of software called avatars. They are the audiovisual bodies that people use to communicate with each other in the Metaverse."*

This concept of virtual worlds populated by embodied avatars had predated Stephenson. Depending on how we organize the History of this field, we are now probably in its fourth [2] or sixth [3] era of development and excitement. They originated in the late 1970s and early 1980s, leveraging prior text-based single-player 'adventure' games, where environments were described rather than shown. As in those single-player adventures, in the first multiplayer system, 'Multi-User Dungeon' (MUD), the participants were indeed inside: they would move around, pick objects, and fight, all via text descriptions and typed commands [3]. Inspired by MUD, many systems emerged, and, eventually in 1985, a first graphical multi-user world that employed the term 'avatar' for the embodied participants,

Lucasfilm's Habitat [4], albeit short-lived. The 1990s saw such systems leverage the higher number of participants enabled by the internet, rather than by dial-in telephony systems, originating the still-used term MMORPG, for massively multiplayer online role-playing game, such as Ultima Online's 100 000 paying players [2][3].

FIGURE 1 – SLACTIONS 2009 virtual conference in Second Life

The MMORPG enthusiasm blended with the proposal of non-gaming social worlds, emerging in the early 2000s, such as Active Worlds [5], IMVU [6], and, indeed, the media sensation of the late 2000s, Second Life [7]. It was during this era that the term 'metaverse' started to emerge again, with each individual virtual world being designated as 'a metaverse', and popular culture embracing the concept of vast, immersive worlds for entertainment, socializing, education, events, and more. As an example, **Figure 1** was taken during an academic conference held in Second Life in 2009. Common examples in other areas of popular culture are science fiction movies such as 1999's The Matrix [8] and books such as 2011's Ready Player One [9]. This was the computing and cultural panorama influential to Google, Amazon, and Facebook founders, among others.

What is the Metaverse today?

At some point in the early 21st century, the view of 'metaverse' as a synonym with individual virtual worlds changed. Our world - our existence, was increasingly being understood as a blend of physical and virtual elements, given the quasi-omnipresence of the internet. And so, the concept emerged of the Metaverse, instead of multiple, isolated metaverses: "*interconnection between virtual worlds that could lift them from the BBS age into the web age*" [10]. Envisioning the existence of a "*post-reality universe, a perpetual and persistent multi-user environment merging physical reality with digital virtuality*" [11].

Such a transformative perspective on how and where people interact naturally led to intense interest from the tech giants, each attempting to be at least part of the core technology that supports this vision. Microsoft announced its metaverse strategy at the Build 2022 conference [12], and Facebook changed its own corporate name to Meta the year before with this rationale [13]: "*(...) an embodied internet where you're in the experience, not just looking at it. We call this the metaverse (...). The metaverse will not be created by one company. It will be built by creators and developers making new experiences and digital items that are interoperable and unlock a massively larger creative economy than the one constrained by today's platforms and their policies.*"

However, the tech giants are arriving on a scene brimming with new, innovative players who have mastered the development of user communities, platforms, interaction, and dynamics. These include Fortnite from Epic Games, with initiatives such as the recent MetaHuman Creator [14], Minecraft (acquired by Microsoft in 2014), and Roblox, which enable children to create innumerable and vast interactive worlds [15]. The immersive virtual reality experience with headsets such as Facebook's (i.e., Meta's) own Oculus or others is abuzz with companies such as Rec Room, AltSpaceVR (acquired by Microsoft in 2017), VRChat, and more [16].

The technology

"*Designed for gamers, by gamers, to take 3D gaming to the next level*", Oculus Rift crowdfunding in 2012 boosted the virtual reality (VR) scene deeply. With over 9500 backers, it raised almost 2.5 million USD, a factor of 1000 to the original Kickstarter campaign goal [17]. Despite the motion sickness problem, immersive VR games skyrocketed in popularity, with headsets reaching the affordable price range of USD $300 for the few buyers who managed to acquire them (**Figure 2**).

FIGURE 2 – Oculus Rift Development Kit v1 (2012) (source: virtuall.hu)

There are now, in the stead of Oculus Rift, several high-quality devices available in the market, such as Sony PlayStation VR, Valve Index, HP Reverb G2, and HTC Vive Pro 2, among others. As for the emblematic Oculus headset, the company was acquired by Meta/Facebook in 2014, and the current version of the headset is the Meta Quest 2 (formerly Oculus Quest 2). It remains

FIGURE 3 – Left: VR-OBT - Virtual Reality On Board Training (2022) (source: European Space Agency); Right: Oculus Quest 2 guardian boundary breaching situation (source: arvrtips.com)

the benchmark for comparison with others, with features that include the freedom of a truly wireless untethered experience, high-resolution video, broad field of view, smooth motion tracking, finger-tracking controllers, high refresh rates, and low latency to avoid nausea (a.k.a. motion sickness).

The availability of this class of technology has been fueling countless applications for education and training, using powerful role-playing scenarios and taking advantage of the easy exploration of interactive 3D content and models, even when orbiting Earth (**Figure 3, left**). Particularly relevant is the guardian boundary features (**Figure 3, right**), which display a grid to the user if the arms or body extend beyond a previously-defined safe area without obstacles. Should the user step outside of it, the outside cameras of the headset dismiss the virtual world and present the physical world image to the user to avoid accidents.

Mixing holographic or virtual content with live video and augmenting reality are key requirements for many interesting professional use cases. The technology for building affordable and comfortable mixed reality (MR) headsets or glasses has been more challenging and evolved slower than VR, but it's finally catching up. Microsoft Hololens 2 is currently the MR market reference headset, albeit expensive, with

Magic Leap One and Nreal Air glasses (**Figure 4**) emerging as attractive, light, and simpler devices, tethered to a mini PC that almost look like regular sunglasses.

FIGURE 4 – Nreal Air glasses (2022) (source: Nreal)

As hinted above, current metaverse platforms are mostly proprietary and non-interoperable. So creating a particular scenario, e.g., hosting a virtual conference, typically requires custom content development and 3D building on top of whatever resources and templates are made available by the service provider. This situation is improving somewhat by emerging standards for 3D models, but there are no widespread ways to do the same for automated interactions. Consequently, users can't reuse assets across

environments, e.g., the same embodied avatar that represents them. Frame VR [18] is a recent collaborative virtual reality platform by Virbela, mitigating complexity by providing a simple and customizable immersive online meeting space that works right from the web browser, including simple presentation-style creation tools, without the need to download or install anything, accessible with most VR headsets or even with a mobile device.

What's next?

It's commonplace to acknowledge that we are still in the early stages of the adoption of metaverse technologies, and fragmentation is one typical major hurdle facing widespread adoption [19]. Still, the technology has moved beyond proof-of-concept and has the stability, ease of use, and price range to enable it: the stand-alone Oculus Quest 2 is available in Portugal with 128 GB storage for €457 with the 256 GB version available from €559 (KuantoKusta.com, Sep 25, 2022). These are price points around the overall context of gaming consoles for comparison: Sony PlayStation 5 825GB at €799, Microsoft Xbox 1 TB at €489, and Nintendo Switch 32 GB at €259.

In the enterprise and educational worlds, 3D virtual collaboration is in its infancy, as shown above. Recent studies reinforce social aspects of being online together, which helps explain the effectiveness of communication and people interaction in virtual immersive settings [20], something that regular users quickly experience. The COVID-19 pandemic made further evidence of this, and we have seen important moves in the tech giants world, pushing new formats of remote teamwork, with Meta introducing Horizon Workrooms and Microsoft adding Mesh mixed reality communication to Teams collaborative platform (**Figure 5**), with hundreds of millions of users.

The anticipated rise in the professional use of immersive collaborative platforms, along with the 3D gaming habits of the younger (and not-so-young) generations, will expose a growing audience to VR and MR, getting relatives and friends acquainted with technology and eager to give it a try. Immersive social networking and entertainment will thrive in light of this multiplicative effect, further boosted as the hardware prices fall and the applications improve.

In the coming years, metaverse scope is likely to be enhanced by technological confluence, e.g., artificial intelligence (AI) empowering persistent personal assistants and content creation, multisensorial devices bringing deeper immersion, 5G mobility enabling MR massive experiences, distributed ledger technology (DLT) and non-fungible token (NFT) allowing new business models and supporting novel art and media formats. It will be a vibrant ecosystem of innovative digital platforms teeming with new opportunities, new skills, and new jobs. The European Union is aiming for a strong position
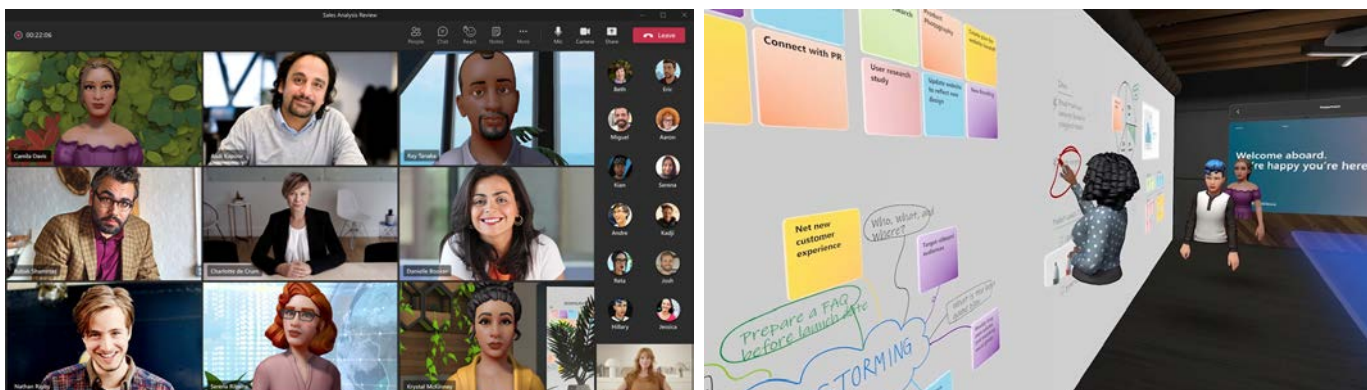

FIGURE 5 – Microsoft Mesh for Teams (2022) (source: Microsoft)

and brought together stakeholders from key metaverse technologies into the Virtual and Augmented Reality Industrial Coalition [21].

Currently, there is a huge buzz and many ideas flowing around metaverse topics. Each major player seems to be attempting to fit their current services, technology or portfolios into exploitation roadmaps, bending definitions of what the Metaverse actually is and will be in the future. The bottom line is that none of them is completely right or wrong: it's very likely that the Metaverse will be a bit of all those disjoint visions, and many use cases being discussed make sense and will certainly have a significant impact in the market, either for good or less favorable reasons.

There are some good teasers of what might be upcoming in the metaverse domain, which should probably be carefully watched by anyone willing to grasp a good insight on these questions, in the same spirit that the book 'Snow Crash' was at some point required reading for Facebook's management team.

The immense success of the science fiction movie 'Ready Player One' directed by Steven Spielberg (2018) [22], based on the aforementioned Ernest Cline's novel of the same name [9], which itself can be described as a novel inspired by the Second Life virtual world [23], recently provided new cultural fuel to the vision of near-future enmeshed with a virtual reality universe used by almost everyone to escape from their dystopian reality into a massive multiplayer video game, and explores several technological and social key aspects of a fully immersive metaverse.

Moving away from complete isolation and escapism to alternate totalitarian virtual realities, Niantic, among other companies, sees the Metaverse as a powerful and versatile way to augment reality with virtual content through the use of augmented reality devices. The company behind successful games such as Ingress [24], Pokémon Go, and Harry Potter's Wizards Unite, made recently available the Lightship platform, which allows the management of dynamic content overlays onto the real world, allowing millions of people to have a consistent, simultaneous, synchronized and shared interaction experience with digital objects in the physical world [25]. Liquid City is partnering with Niantic and prepared the interactive installation 'Reality Channels' (**Figure 6**), demonstrating a future vision for this Real-World Metaverse at Niantic's developer conference, the Lightship Summit 2022 [26].
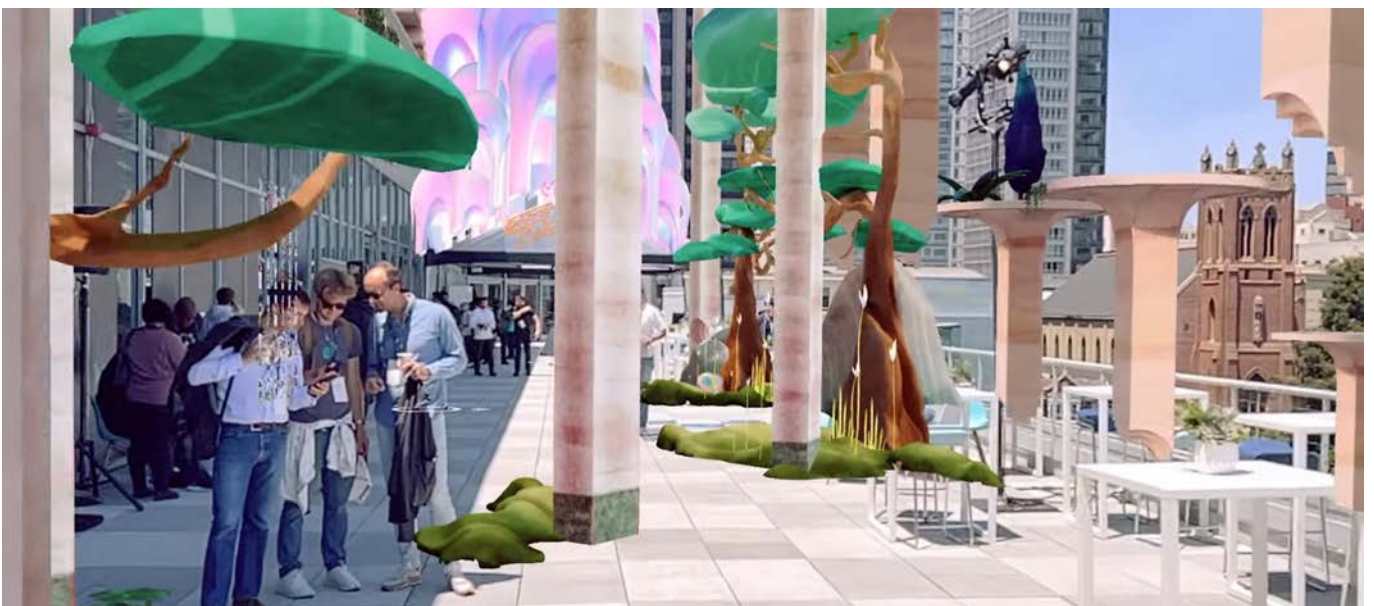

FIGURE 6 – Reality Channels prototype @Lightship Summit 2022 [26]

Closing remarks

It's not foreseeable, and in fact, it is much undesirable, that at some point we will become like Snow Crash gargoyles, individuals that *"wear their computers on their bodies (...) serve as human surveillance devices, recording everything that happens around them"* [1]. Yet, we are more often than not permanently connected, always on, living and working in a fully immersive experience, blending our physical surroundings with the virtual elements that arrive via the device-rich environment of our lives. The Metaverse will certainly bring many game-changing aspects of human-machine interaction to our day-by-day digital way of life. In the forthcoming years, mobile extended reality (XR), powered by 5G, edge computing, AI, and comfortable augmented reality glasses or contact lenses, will steadily make room for more and more powerful applications and sophisticated metaverse scenarios, bringing more magic into the thin and breathtaking borderline between reality and science fiction.

So, we can't escape the Metaverse, whatever it will be, unless we escape human society itself. As to whether we should, the answer is philosophical as much as political, but must be answered in this entangled context: the Metaverse will be enmeshed with society, and decisions about one will be decisions about the other.

"Any sufficiently advanced technology is indistinguishable from magic." Arthur C. Clarke

References

[1] N. Stephenson, *Snow crash*, Bantam Books 1992

[2] S. Downey, "History of the (Virtual) Worlds", *The Journal of Technology Studies*, 40(2), 2014

[3] R. A. Bartle, "From MUDs to MMORPGs: The History of Virtual Worlds", in J. Hunsinger, L. Klastrup, & M. Allen (Eds.), *International Handbook of Internet Research*, 2009, (pp. 23–39)

[4] C. Morningstar & F. R. Farmer, "The Lessons of Lucasfilm's Habitat", *Journal of Virtual Worlds Research*, 1(1), 2008

[5] M. Tatum, "Active Worlds", *ACM SIGGRAPH Computer Graphics*, 34(2), 56–57, 2000

[6] R. van Voorst, M. T. Kechadi, & N. A. Le-Khac, "Forensic Acquisition of IMVU: A Case Study", *Journal of Digital Forensics, Security and Law.*, 2015

[7] R. Antunes, B. Fonseca, P. Martins, & L. Morgado, "Use of 3-D Virtual Environments to support the learning of programming", *Current developments in technology-assisted education*, 689–692., 2006

[8] L. Wachowski & L. Wachowski, (Directors), *The Matrix*, 1999

[9] E. Cline, *Ready Player One* (1st ed), Crown Publishers, 2011

[10] L. Morgado, "Interconnecting virtual worlds", *Journal for Virtual Worlds Research, 1*(3), 2009

[11] S. Mystakidis, "Metaverse", *Encyclopedia, 2*(1), 486–497, 2022

[12] M. Muchmore, "What Is Microsoft's Metaverse Strategy?", https://www.pcmag.com/news/what-is-microsofts-metaverse-strategy, 2022

[13] M. Zuckerberg, "Founder's Letter", Meta, https://about.fb.com/news/2021/10/founders-letter/, 2022

[14] Z. Fang, L. Cai, & G. Wang, "MetaHuman Creator The starting point of the metaverse", *2021 International Symposium on Computer Technology and Information Science (ISCTIS),* 154–157, 2021

[15] P. 'asher' Rospigliosi, "Metaverse or Simulacra? Roblox, Minecraft, Meta and the turn to virtual reality for education, socialisation and work", *Interactive Learning Environments*, 30(1), 1–3, 2022

[16] R. Cheng, N. Wu, S. Chen & B. Han, "Reality Check of Metaverse: A First Look at Commercial Social Virtual Reality Platforms", *2022 IEEE Conference on Virtual Reality and 3D User Interfaces Abstracts and Workshops (VRW)*, 141–148, 2022

[17] Kickstarter, "Oculus Rift: Step into the Game", https://www.kickstarter.com/projects/1523379957/oculus-rift-step-into-the-game, 2012

[18] Virbela, "Frame VR", https://framevr.io/, 2022

[19] Gartner, "What is a Metaverse?", https://www.gartner.com/en/articles/what-is-a-metaverse, 2022

[20] V. Wikström et al, "Inter-brain synchronization occurs without physical co-presence during cooperative online gaming", *Neuropsychologia*, Volume 174, 2022

[21] T. Breton, "People, technologies & infrastructure – Europe's plan to thrive in the metaverse", https://ec.europa.eu/commission/presscorner/detail/en/STATEMENT_22_5525, 2022

[22] S. Spielberg , (Director), "Ready Player One", 2018

[23] W. J. Au, "Which World is More Like the OASIS of Ready Player One -- Second Life or Metaplace?", https://nwn.blogs.com/nwn/2013/09/ready-player-one-second-life-or-metaplace.html, 2013

[24] L. Morgado, "Ingress: Potencialidades pedagógicas de um jogo georreferenciado de realidade alternativa em rede", in J. A. Moreira, D. Barros, & A. Monteiro (Eds.), Inovação e formação na sociedade digital [online]: Ambientes virtuais, tecnologias e serious games (pp. 151–164), 2015

[25] J. Hanke, "The Metaverse is a Dystopian Nightmare. Let's Build a Better Reality", Niantic, https://nianticlabs.com/news/real-world-metaverse, 2021

[26] K. Matsuda, "Reality Channels - behind the scenes", Niantic Lightship Summit, https://vimeo.com/735285111, 2022