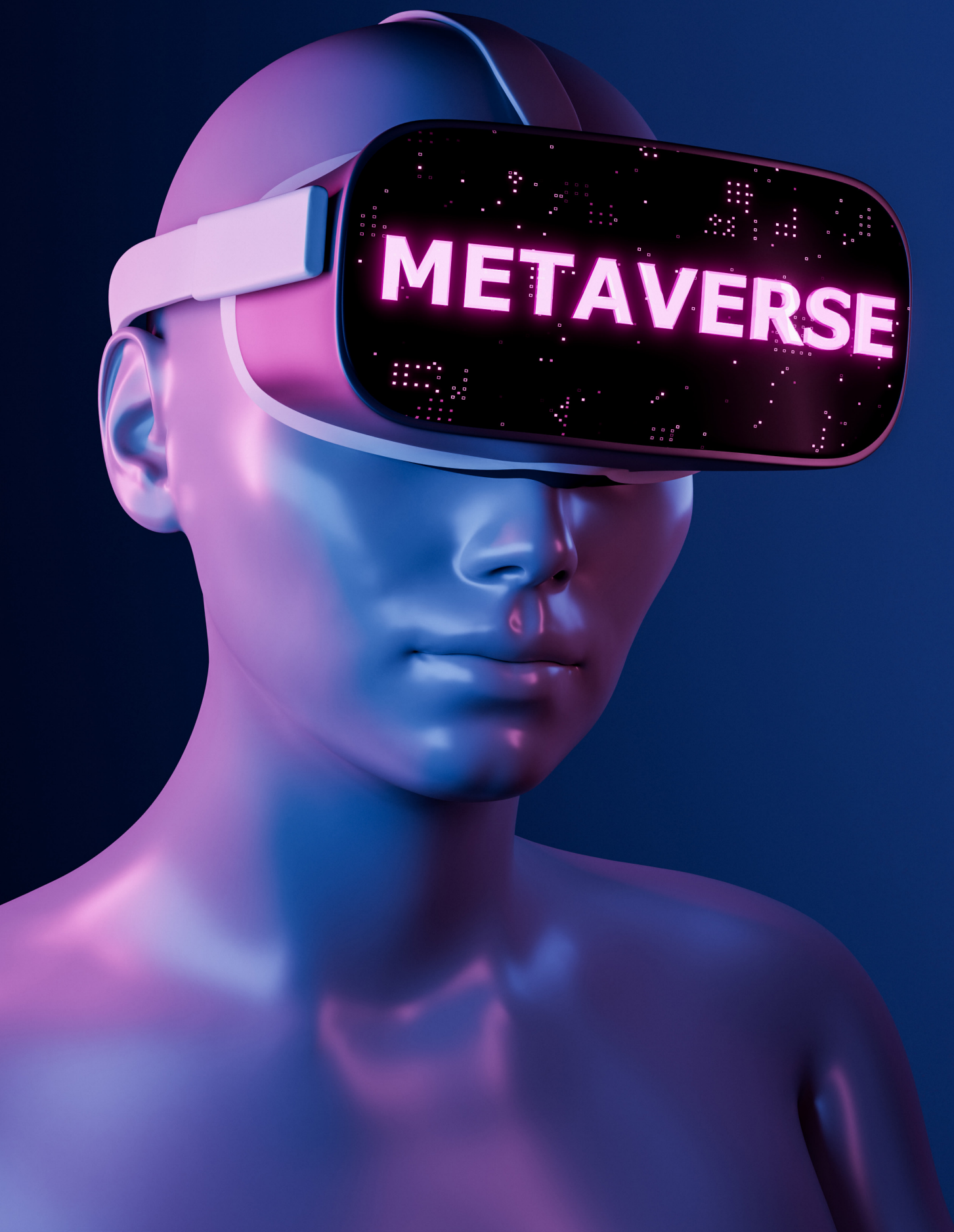cifs.dk/metaverse

THE FUTURE OF THE METAVERSE

This whitepaper explores four plausible future scenarios on the immersive metaverse developed by the Copenhagen Institute for Futures Studies to challenge and inspire perspectives on the future and help readers get a better and deeper understanding of the critical uncertainties shaping the metaverse.

Content

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Introduction

Imagine a future where the physical and virtual worlds have merged. Where your surroundings are supplemented with virtual layers, enabling you to experience and interact in completely new ways. What might the different possible futures look like? How is this going to influence your life? And how will the development affect the way we live?

The metaverse has emerged as the next big thing after mobile internet, and the term *'metaverse'* has exploded in popularity over the last year. However, the term is often used without a definition, and when it does have a definition, it is often rather vague – and the implications are often challenging to comprehend.

At the Copenhagen Institute for Futures Studies, we believe that the metaverse is a concept that we need to dive deeper into when it comes to the possible futures. Rather than defining what it is today, we find it more productive to define what it might become. Once the technologies and use cases supporting the concept have matured, the metaverse will revolutionise our society. This creates a need for anticipation and preparation.

The following scenarios were envisioned by the Copenhagen Institute for Futures Studies to provide a set of qualified and possible developments of the metaverse with a focus on immersive and spatial aspects. The scenarios were created to challenge and inspire perspectives on the future of the metaverse and help readers get a better and deeper understanding of critical uncertainties.

WHAT IS THE METAVERSE?

Before moving into the scenarios, we want to create a common understanding of what we believe the metaverse as a concept currently stands for. In our view, the metaverse overall is the seamless convergence of our physical and digital lives. A core aspect of this convergence will be a set of interoperable virtual spaces where we can work, play, learn, relax, socialise, communicate, interact, transact, and own digital assets. These spaces will create a sense of belonging – bringing people, spaces, and things together in virtual or augmented digital worlds.

In this whitepaper we distinguish between the elements of immersiveness and the underlying infrastructure. Web3 is primarily concerned with who will own and govern the internet of the future, enabled through e.g. blockchain technology, digital assets, social tokens, non-fungible tokens (NFTs), personal avatars and, in general, a higher degree of user participation like decentralised autonomous organisations (DAOs). In contrast, the immersive metaverse is more concerned with how people will interact with and experience the internet of the future.

What does it take for the metaverse to evolve?

Maturity

METAVERSE

Critical technologies for the metaverse

Status-Quo

2022   2023   2024   2025   2026   2027   2028   2029   *Future*   **Time**

Emerging Metaverse

Advanced Metaverse

Mature Metaverse
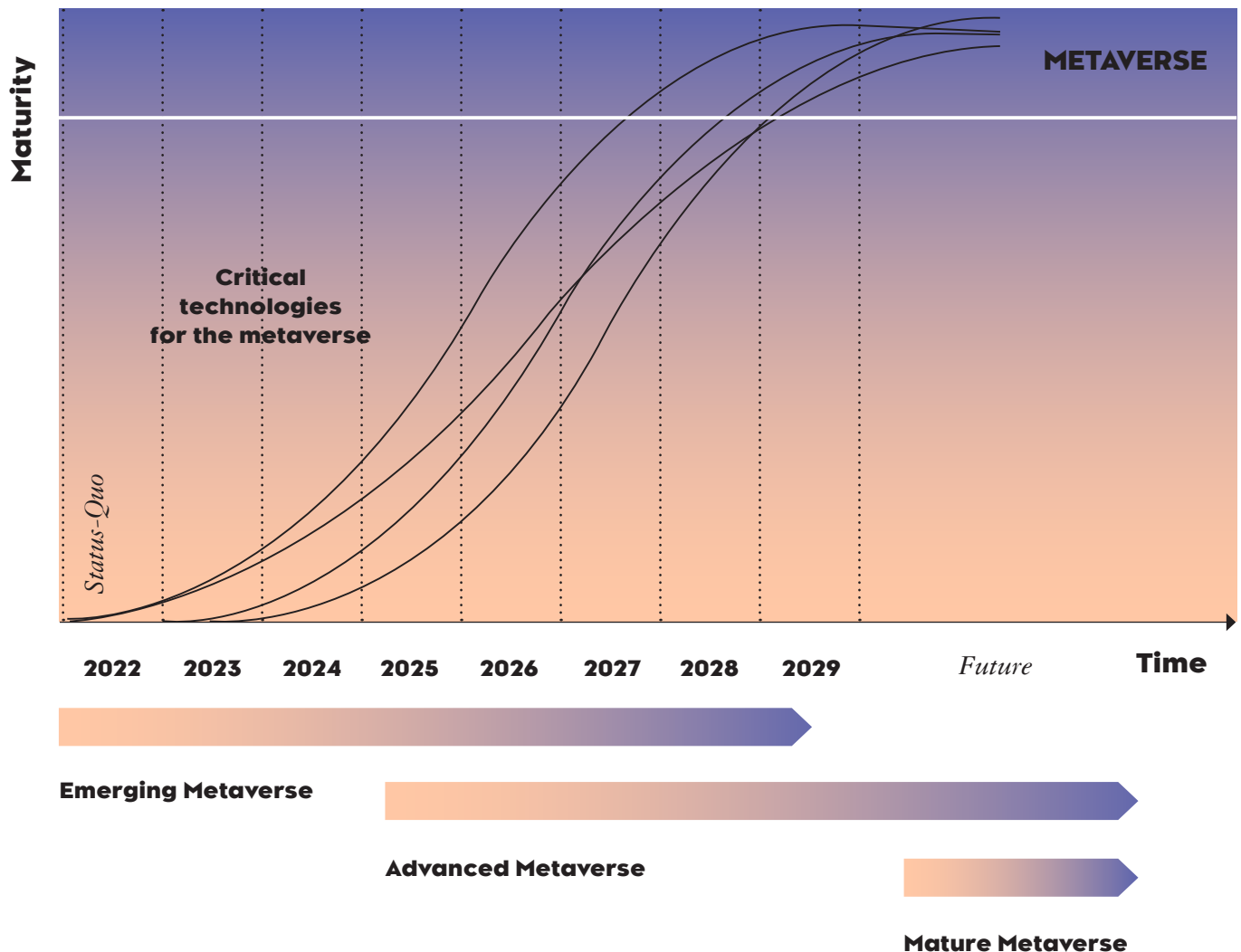
"The development of the metaverse will depend on a set of technologies that are fully developed, scaled, and adopted by the mass market. Critical technologies such as Virtual Reality (VR), Augmented Reality (AR), Web3, and the Internet of Things (IoT) that will enable a more seamless convergence of the physical and virtual reality."

Illustration: Copenhagen Institute for Futures Studies, 2022. Combined with Gartner; "Evolution Spectrum for the Metaverse", 2022.

We hence summarise under the term *'metaverse'* our daily reality once a set of technologies is fully developed, scaled, and adopted by the mass market. This set of critical technologies from fields such as Virtual Reality (VR), Augmented Reality (AR), Web3, and the Internet of Things (IoT) will enable a more seamless convergence of the physical and virtual reality. We believe it is vital to prepare for this new reality today, to recognise what is likely to change and how to adapt accordingly.

BETAVERSES AND METASPACES

Following our description, the metaverse is already beginning to emerge. Today, we see fragments of what will eventually become the metaverse – fragments that we call 'betaverses'. In our opinion, these 'betaverses' are often confused with 'the metaverse'; individuals and companies have a tendency to believe that the fragments we see today are true metaverses. This leads to what we describe as 'meta-washing', wherein companies claim to be part of the metaverse based on a simple immersive or blockchain-based initiative.

In the spirit of building a solid foundation on which we can build our future work on the metaverse, this whitepaper will focus on a central aspect of the metaverse: *Metaspaces*, i.e., virtual worlds and digital layers augmented on top of our physical world.

We believe that in any version of the metaverse, a user will be able to access (one or more) home spaces with ways to be connected to selected private or public digital environments – *metaspaces* – for all sorts of purposes, whether it be shopping, gaming, entertainment, education, socialising, or all of the above. Some commercial metaspaces may require tickets or membership for visits, while others rely on "in-space" purchases, much like the "in-game" purchases we see in today's gaming industry. Some sell virtual accessories that can be added to avatars without changing the basic avatar – a way to dress your avatar up for special occasions or simply to show off virtual 'bling'. You can also decorate your home spaces with purchased art or furniture, or you can make your own or choose from a vast selection of open-source content. Commercial or personally created accessories and other content have registered ownership, e.g. with NFTs.

OUR SENSE OF REALITY

The metaverse is also challenging our sense of reality as our traditional understanding of physical reality as 'more real' than virtual realities might no longer be sufficient. While older generations will have a hard time grasping this, younger generations already view virtual interactions, skins, and digital assets as being just as 'real' as their physical counterpart and having equal or often higher value than physical clothes and objects.

HOW TO USE SCENARIOS

In an era where forecasts are insufficient, scenarios help to foresee potential outcomes 'beyond the numbers'.

- **Scenarios are plausible narratives about potential futures that can create a common framework for understanding and discussing critical strategic uncertainties and future challenges.**

- **Scenarios can guide and inform companies about future developments and help identify key areas for R&D, innovation, and risk mitigation.**

- **Scenarios will rarely play out in isolation and will more likely unfold in a mix of the different scenarios.**

Uncertainties shaping the metaverse

There are many uncertainties related to the development and shape of the Metaverse: What technologies will be included? Who will implement it? How will it be accessed? Will it be centralised or decentralised?

There are also a set of uncertainties regarding how the metaverse will be used: Will it be mainstream or niche? What will users mainly use it for? How widely used will it be? Will it be plagued by crime (e.g. phishing, Ponzi schemes, identity theft, abuse of data and images), and what social dynamics will arise that are unique to the metaverse?

The development of the metaverse also raises a number of concerns regarding accessibility, equity, diversity and representation, since the metaverse may – instead of becoming a democratisation of value and power – become an amplifier of the dynamics and biases of the world we live in today – a struggle of rich vs poor, young vs old, female vs male, etc.

The metaverse could end up as a polarising machine where the privileged and/or tech-savvy have the upper hand. We might see a metaverse where these people can participate and profit from the immense value-creation, while the less privileged or not so resourceful will quickly be excluded from participation on equal terms. Even though Web3 is said to be synonymous with the democratisation of value – and the virtual land of opportunity – there are many different scenarios that can unfold.

Among the many uncertainties that are related to the development of the Metaverse, we have identified the following two critical uncertainties as having the most significant impact:

Open vs Proprietary

Convergent vs Separate

A

**The Free
Metaverse**

B

The Nerdverse

D

**One Metaverse to
Rule Them All**

C

**Betaverses
Disunited**
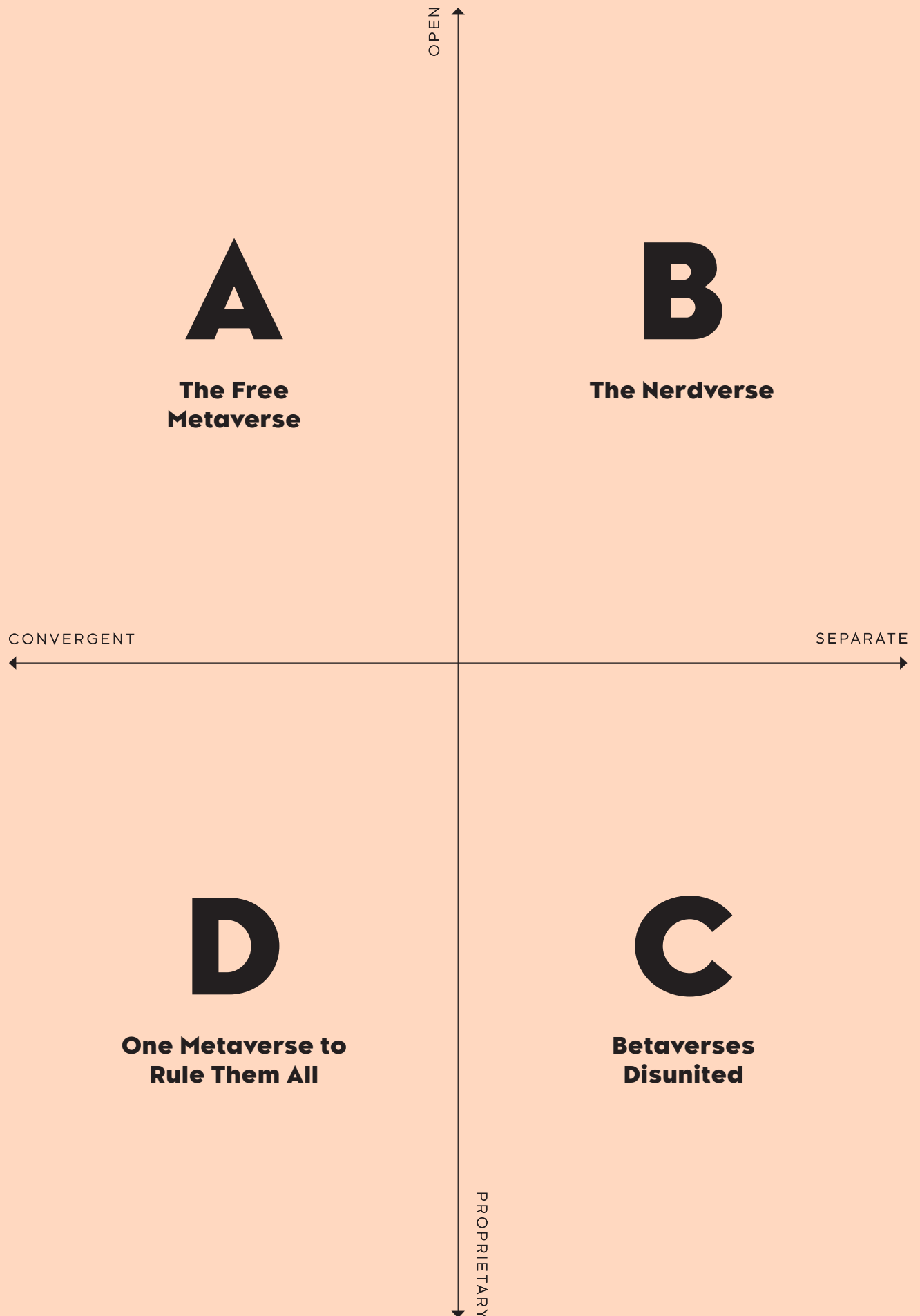
Open
versus
Proprietary

Will a universal metaverse be created around open, non-proprietary protocols, much like those that govern the internet, e-mail, and blockchain-enabled technologies like Bitcoin, Ethereum, and other cryptocurrencies? Or will there be several centralised, commercial, and proprietary 'metaverses', quite possibly with one or a few being dominant, the way that Google has been the dominant search engine, Facebook and TikTok the dominant social media platforms, Amazon the dominant e-commerce platform, and YouTube the dominant video-sharing platform in the Web2 era?

In the Open outcome, everybody can access and add content to the metaverse without asking or paying any commercial interest, and content is solely owned by the creators. The software and protocols enabling the metaverse are updated by a voluntary organisation rather than by a commercial entity. Even so, the universal metaverse is likely to be inhabited (perhaps even dominated) by commercial entities, as is the case in the current state of the World Wide Web. However, like on the World Wide Web, there is also room for non-commercial entities that might radically change the overall power structure. The interoperable and open-source culture serves as a step towards democratising ownership over data and digital assets (the Internet of Value). We can compare this with the Open Document Format (ODF), which can be used freely by any application for creating and editing documents, whether free or commercial, unlike proprietary formats, the use of which may require paid licences from a commercial entity. We also see a range of self-organising communities, such as decentralised autonomous organisations (DAOs), changing how organisations are structured. The underlying technologies are (mainly) open-source and working on shared standards, supporting a high level of interoperability between different services.

In the Proprietary (closed) outcome, competing metaverses will have incompatible protocols and exist as separate entities, much like the Windows, macOS, and Android operating systems. Content is only available across platforms if they are 'localised' for the different platforms – and there may be a fee or 'tax' to pay for commercial users, much like how Amazon and Apple get shares of income from content published and sold on their platforms. There is only a limited degree of interoperability in these scenarios, with the metaverse split into several competing commercial platforms (with possibly one being dominant). This centralisation is driven by the attention economy and the allure of profit, either directly or through consumer data harvesting. The metaverse's merging of offline and online spheres presents many new opportunities for value-creation and -extraction, and Big Tech will prefer to own the platform(s) rather than seeing a single, open, decentralised metaverse that may be harder to exploit. Like today's 'dark web', a decentralised Dark Metaverse may exist alongside the proprietary ones, but its universal operability is limited, relegated to an often exclusive, criminal, or tech-savvy underworld.
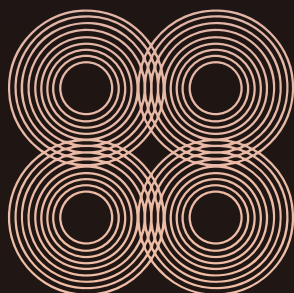
Convergent
versus
Separate

Will the metaverse become a universal, default, virtual three-dimensional interface to online content, products, and experiences, the way that the World Wide Web is the ubiquitous two-dimensional interface today – or will the metaverse be one or more separate entities accessed via the World Wide Web or apps, where people go at times for specific purposes? Will the metaverse be a (true or de-facto) replacement for the World Wide Web or several, non-interoperable add-ons?

In the Convergent outcome, the metaverse will grow to become the dominant way of online access, with multiple XR (*Extended Reality*, e.g. VR and AR) devices and haptic interfaces (manipulating virtual features with hand or body movements) increasingly replacing screens and keyboards, allowing for a far more immersive experience where the physical and virtual worlds increasingly merge. Just as the World Wide Web has grown onto the earlier internet to the extent that most people use the terms interchangeably, the metaverse will be considered simply the 'new World Wide Web', with a virtual 3D interface replacing today's browsers as the primary interface. This metaverse could, like the World Wide Web, be based on open-source protocols, or it could be a commercial, proprietary entity that has become so universally preferred by users that no real alternative exists, much like how Generation Z tends to prefer Facebook's closed and proprietary ecosystem (which includes Messenger, WhatsApp, Instagram, and more) for communication over the open and non-proprietary e-mail or text-messaging systems.

In the Separate outcome, the World Wide Web, perhaps with some minor Web3 additions, will remain the dominant interface for general online experiences. Add-on options exist, commercial and/or open-source, that allow full 3D immersion and the merging of physical and virtual settings, but they have not become ubiquitous the way World Wide Web has, and the several add-ons tend not to be interoperable, each using their own protocols for 3D representation and user interaction that we refer to as 'betaverses'. People will mainly use these betaverses for specific purposes where they want a more immersive experience than what the World Wide Web offers, such as gaming, social activities, or specific job functions like remote-controlling devices. The betaverses will be something we 'dial into', not a metaverse that we automatically log into whenever we use the internet.
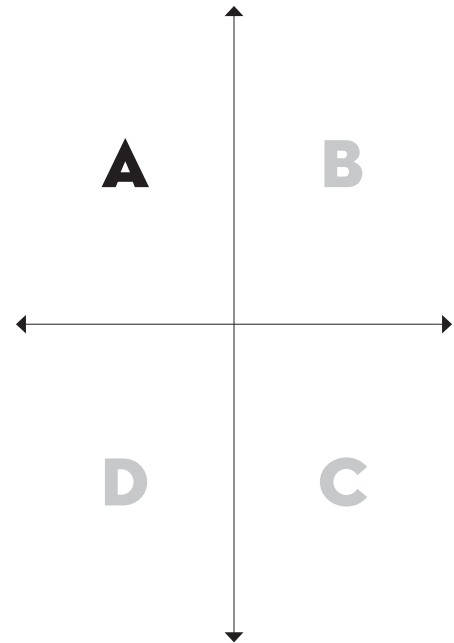
FUTURE SCENARIOS FOR THE METAVERSE

The Free Metaverse

Scenario A *Open and Convergent*

A B

D C

In this scenario, groups of interested people – some voluntary, some commercial – come together to create a metaverse that they see as the replacement of the World Wide Web (or 'Web2'), a new decentralised, interoperable go-to interface to the internet; one that blends the physical world with a shared virtual universe using various XR technologies. This scenario incorporates blockchain technologies that enable decentralised proof of ownership of both digital and physical assets (via NFTs and smart contracts) and native support of cryptocurrencies as a 'masked' underlying currency that is converted in real-time into the individual user's preferred (local or international) currency, allowing seamless payments all over the metaverse. In this scenario, we see a new range of business models where decentralised autonomous organisations (DAOs) own many of the big brands, and where new 'Web3-native brands' have grown to become the biggest and most powerful in the world.

This scenario comes to be known as 'the Free Metaverse'. It is built around non-proprietary open protocols for how virtual 3D objects, spaces, and digital assets are represented and interacted with, making it easy to use the same digital assets across multiple instances, much like a JPEG image can be imported into all sorts of content. Virtually created objects, characters and spaces can be added as augmented reality overlays to the physical world, and physical objects, people and spaces can be copied into purely virtual settings (augmented virtuality). Acknowledging bandwidth limitations, 3D content is typically represented digitally in simplified versions, with complex textures added and animated locally on users' devices, which can be set to different levels of detail according to the device's capacity. Different users in the same virtual setting may hence view the same scene in different levels of detail, from the cartoony to the high-fidelity hyper-realistic, and may even choose different styles of visual representation based on the same simplified representation.

The primary interface technology for The Free Metaverse consists of various AR or VR devices such as goggles and lenses for output and haptic devices, laser scanners, or cameras for input. Many of these products have built-in cameras or infrared laser scanners that track hand movement, allowing interaction with virtual

objects much like you interact with physical objects. Feeling textures, weight, and solidity requires haptic feedback from gloves or even full-body suits – though few users want to go that far, except for dedicated gaming or specific virtual reality experiences. Voice control and eye-tracking add to a seamless experience, and special sense-pads such as lickable screens (like the 'Taste the TV' prototype presented by the Meiji University's School of Science and Technology in Tokyo) allow getting more immersive experiences like taste and smell. On the other end of the scale, you can still access the virtual parts of the metaverse with a screen and a mouse.

The Free Metaverse is very simple to use because of the intuitive similarity to physical experiences, and children and the elderly find it easier and more instinctive than using the traditional internet. Once the inevitable teething troubles in the system are dealt with, it has become the standard way to access and share digital content, whether purely in a virtual space or overlaid on the physical world as augmented reality. Just as the World Wide Web replaced earlier ways of accessing the internet, such as bulletin boards and Usenet, the Free Metaverse has quickly replaced the World Wide Web, though this still exists as an underlying content layer.

When users create avatars, they automatically gain the rights to the looks and close variations thereof, with an NFT proving ownership across the Free Metaverse. Ownership can be sold, but no single user is allowed to own more than a score of universal avatars to prevent commercial interests from claiming rights to every conceivable shape and colour. Because the NFTs denote ownership of avatars, it is difficult to get away with harassing or swindling other presences in the metaverse because the identity behind the avatar can be established. There is no limit to the number of specialised avatars users can have for specific purposes, such as games, but these avatars can't be exported to the overall metaverse if this means that the avatar limit is exceeded or the avatars are made as open content.

Companies or organisations may also create unlimited AI-created and AI-controlled synthetic characters for their presence in the metaverse. AI systems have become so convincing that it is impossible to distinguish between humans and AI. Therefore, it has become legally required in most jurisdictions to inform humans that they are currently interacting with an AI, although it is difficult for the different systems to determine if a purportedly real person is, in fact, synthetic.

Because of the decentralised nature of the metaverse, there are few rules beyond those hardwired into the protocols, but many metaspaces have codes of conduct – such as no virtual nudity and abuse of other users – and have integrated "personal boundaries" tools such as setting limitations of personal interactions. There are also several paid or voluntary moderators (both human and AI) that can warn or ban offenders. This makes much of the metaverse safer for the users, unless, of course, they are lured away from the safe regions. Parents may restrict their children's access to third-party-approved or verified metaspaces, but bright kids will always find a method to bypass such limitations. Some bad experiences have led organisations to call for strict governance of the metaverse, but due to the decentralised nature of The Free Metaverse, it is impossible to ensure complete 'purity', and criminals lurk in the dark corners, hidden from standard search engines and access points.

The Nerdverse
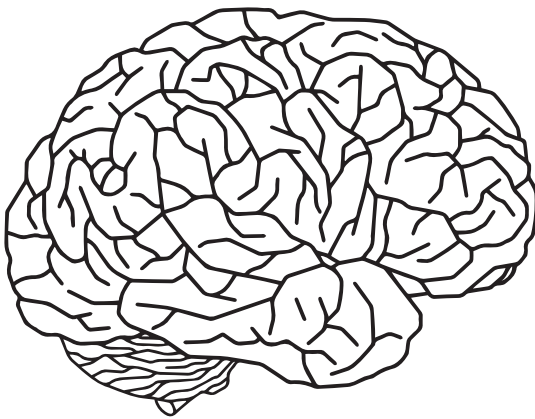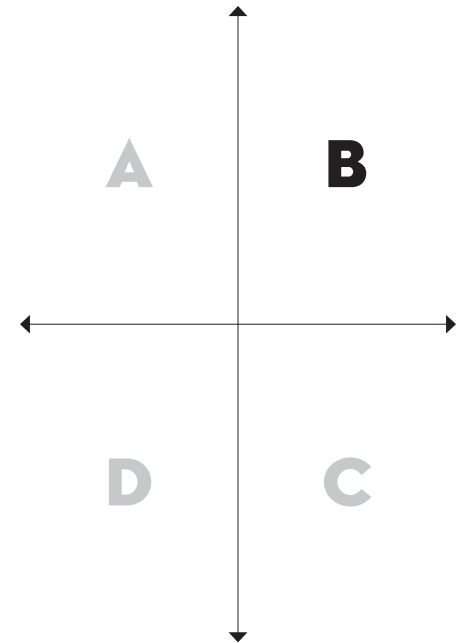
Much like in Scenario A, groups of interested people are working on creating the metaverse as a successor to the World Wide Web, but sustained interest turns out to be limited once the initial curiosity has passed. Much like earlier 'betaverses' like Second Life, the metaverse does not offer anything that most users feel they really need, the technologies around the metaverse haven't really proven their worth, and the big 'legacy' brands who invested heavily in entering the metaverse didn't manage to integrate the new Web3 logics into their solutions, hence failing to understand the new consumer needs of co-creation and co-ownership. An example of this was Nike suing Web3 creators in the early days of the metaverse that eventually resulted in a lot of users not supporting their Web3-solutions. Hence, the metaverse in this scenario is a world where the ideology of Web3 failed because of politics and power struggles of the new virtual economy.

The metaverse only brings few improvements to the existing World Wide Web with the addition of some blockchain technologies and limited options for using VR and AR (like how the option of using smartphone touchscreen interfaces was introduced in the 2010s), and people, in general, are satisfied with what they have. The metaverse's focus on high-quality 3D graphics also somewhat excludes users with poor connections or low-end devices, including much of the developing world since the connection from satellites like Starlink fail to deliver the same broadband as urban hi-tech users have access to.

This does not mean that nobody uses the metaverse. It does offer levels of immersion that the traditional internet does not, and that attracts enthusiasts of visual experiences and lifelike interactions in e.g. fitness and work-related activities. The main part of the core users of the metaverse, however, are most likely to be those who have invested heavily in gaming equipment or early VR and AR devices in the past. These users do not object to being called tech nerds or Metaheads – they are more likely to take pride in the terms – and hence, the metaverse is often jokingly called the Nerdverse. This image becomes self-reinforcing, since only self-proclaimed nerds want to use a Nerdverse.

Experienced users sometimes make fun of less tech-savvy users or enforce strict codes of conduct, and a considerable amount of friction in the structure scares casual users away. With few users, little oversight, and built-in anonymity in blockchain-enabled transactions, the metaverse has also become a hotbed of hate speech, conspiracy theories, and criminal dealings. Far from the unified metaverse the creators envisioned, the metaverse is fragmented into many metaspace networks with very limited interaction between them. This situation is not improved by frequent "implementation wars", where different groups of developers disagree on what and how new Nerdverse functionalities should be implemented and operate metaspaces that only function with their set of implementations.

However there are also bright sides to the metaverse. It is where the latest VR and AR technologies are tested, including full-body haptic suits of a sort that casual users would never use, even if they could afford to. Besides a few high-end commercial games and experiences like interactive pornography, the advanced haptic technology is also used by networks of people cooperating to create complex worlds that offer very realistic, immersive experiences, where users can feel the wind blow in their hair, the effort of walking up a hill, the touch of other bodies, the smell of flowers, the taste of food, and much more. For some users, such virtual worlds become more important than the physical world, and they spend every free moment exploring or adding to their favourite worlds and interacting with other avatars. Some even go as far as to volunteering for experimental brain-machine interfaces, even neural implants, accepting the risks of such experimental devices as a small price for a greater degree of immersiveness.

Requiring less extreme technology, other users of the metaverse combine AR lenses with location technology and scanners to create overlays of the physical world. Either to give an extra layer of information to guide them through the day, e.g. visual traffic notifications or important notification, or add-on visual layers in order to make the day prettier or more exciting or for gaming purposes, ranging from pervasive games as seen with Pokémon Go to live-roleplaying scenarios that add scenery, creatures, and magical effects to mundane spaces. Outsiders shake their heads when witnessing these activities that they only see half of, but true Metaheads are never bothered by what 'outsiders' think.

Because of the relatively few, often private or even furtive users, many of the teething troubles of the metaverse are never addressed; instead, users find workarounds or just live with the occasional bugs and glitches. This instability of the metaverse also scares many newcomers away and contributes to making it niche.

Betaverses Disunited

Scenario C *Proprietary and Separate*
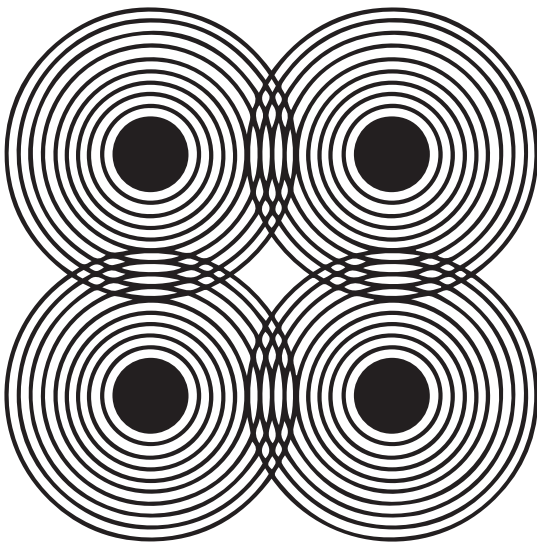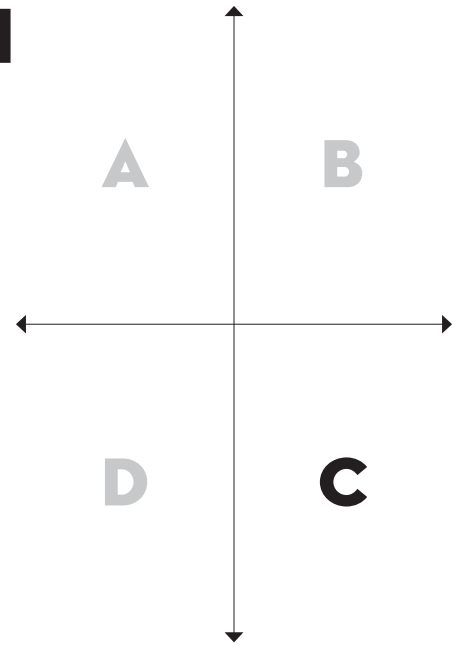
In a rush to cash in on the (somewhat nebulous) hype of the metaverse, a dozen major Big Tech companies each come forward with their own product they say is The Metaverse. Superpowers like China and Russia make their own public, censored versions. About all they have in common is the use of virtual 3D metaspaces that can be accessed by XR technology as well as by more conventional interfaces. None aim to replace the World Wide Web as a general internet interface but are basically virtual social spaces where you can represent yourself with an avatar, interact with others in public or private metaspaces, and buy all sorts of things from virtual marketplaces – with the company behind the individual 'metaverse' taking their cut. These 'metaverses' are better-termed *Betaverses*, since their lack of interoperability and limited options prevent them from becoming what we see as a 'true' metaverse: the seamless convergence of our physical and digital lives, creating an interoperable virtual space.

Not wanting to be left out, most companies make sure they have a presence in all the Betaverses, or at least the major ones, even though this means adapting their

software to the different protocols and requirements of the different Betaverses. This is not unlike how app companies today must adjust their software to work on Android, macOS, and Windows operating systems to reach all potential users, with the result not always being quite the same. Users in one proprietary Betaverse find it impossible to interact with users in another Betaverse, much like today, where Messenger, Telegram, WeChat, and Signal can't send messages to each other. You must either join all the Betaverses or accept that there are some people you can't meet and interact with in the same metaspace.

Users can create their own content, including personal avatars, but the company that owns the Betaverse is charging a heavy fee for using its services. You can't easily move content to other Betaverses, and if you sell your content on a marketplace, the owner takes its share, or 'tax', of the sales price. The Betaverses compete in offering the best conditions for content creators in the creator economy, although the 'tax rate' is the same everywhere since the companies realise that competition in this aspect would hurt them all. The Betaverses are ripe with advertisements of all sorts, often seamlessly integrated into metaspaces, such as billboards in virtual cityscapes or popular music played in the background of social spaces, with easy opportunities to buy. This advertisement is a major source of income for the Betaverse owners, but they take measures to not overwhelm users with advertisements to the extent that they become an irritant.

The World Wide Web not only survives alongside the Betaverses; it is a portal to them, though the Betaverse companies prefer that you use their apps rather than a browser to access them (and offer a little extra functionality if you do). Apps keep users inside the company's closed ecosystem, so they can't be tempted away by competitors.

Because the Betaverses are centralised and proprietary, the owners know everything going on in them. They use this to harvest user data for various commercial purposes, and in some countries that allow it, sell the data to data brokers (and sometimes also share them with intelligence services). However, perhaps more importantly, the data is also used to police metaspaces in the Betaverses to prevent criminal activities or activities the owners consider amoral, like hate speech, sexual predation, fake news, or nudity, at least outside closed metaspaces paid for and run by political or commercial interests. The benign aspect of this is that the Betaverses can be made safer for kids and 'safe for work' unless users pay to get into the closed metaspaces and/or prove they are adults. In this regard, parents can consider the Betaverses safer for their children than the old-fashioned World Wide Web with its dark corners and alleys.

Some non-profit groups attempt to make a decentralised, open-source, 'true' Metaverse. However, they have difficulties attracting both funding and users, since most people are quite satisfied with what the Betaverses offer and don't mind being locked into closed, commercial ecosystems if that's the price for getting smooth-running functionality and instant gratification – after all, they know that there is no such thing as a free lunch.

The limited character of the Betaverses makes it challenging to invent entirely new social dynamics. In the end, the Betaverses are not much more than prettified 3D versions of things we have known for decades.

One Metaverse to Rule Them All

Scenario D *Proprietary and Convergent*
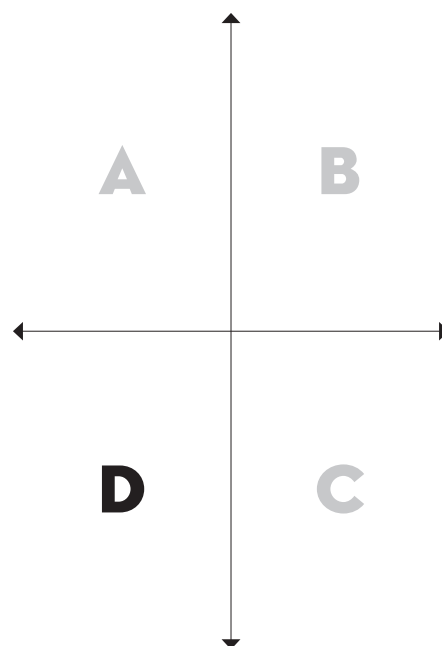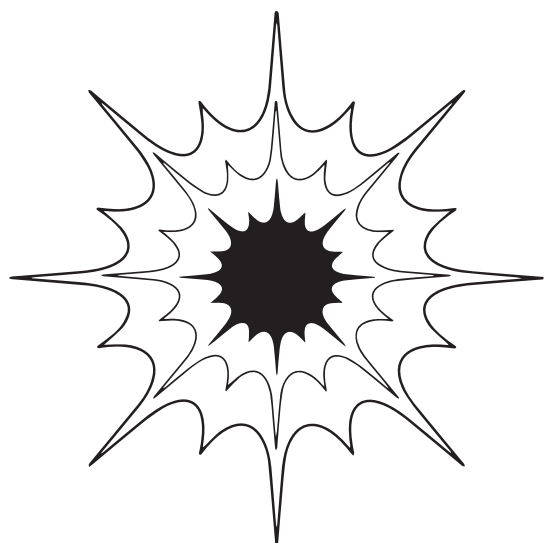
As in Scenario C, many Big Tech companies rush to build their own versions of the metaverse. However, one of them quickly becomes far more popular than the others, either because of better functionality, better conditions for content creators, having the best advertisement campaign on the right channels, or simply being a successful first mover. This popularity becomes self-reinforcing as the increased money resulting from it enables continuous enhancement and extension of the functionality and aesthetic experience of their metaverse to a degree that competitors cannot match – and, of course, users want to go where other users are. After all, it isn't much fun bowling alone. This is an example of *inclusive value* from having the same as everybody else, as opposed to *exclusive value* – not that the dominant metaverse, by whatever name, lacks opportunities for purchasing exclusive content and functionality.

As functionalities are added to this metaverse, it grows to become a unified metaverse where people can work, play, learn, relax, socialise, communicate, interact, transact, and own digital assets. That this version of the metaverse is proprietary doesn't bother most users, who are used to everything being proprietary. The Web3 pioneers/evangelists have not been successful in persuading the general Web2 community to integrate blockchain into the basic web protocols. The users are fully aware that data is the product, that we can never fully own our own data, and they trust that regulation is removing the worst exploitation of data.

The open-source community has fallen on hard times because authorities demand governance and certification that the decentralised open-source organisations find it difficult to live up to, such as checking all content against copyright and trademark violations and policing forums against hate speech and fake news. Most successful open-source systems have been de-facto acquired by commercial interests that can afford to handle the complex and extensive regulations.

Blockchain technologies and applications like NFTs and cryptocurrencies become part of the metaverse, but in versions that ultimately are strictly monitored by the gatekeepers of the metaverse "for added security". This claim has a great deal of truth to it as the metaverse administration does strike down on Ponzi schemes and other swindles within the metaverse and has the option to block ill-begotten digital wealth and ban repeat offenders. Those hit by these interventions have the option to sue, but this is rarely successful, in part because the central metaverse administration is situated in a jurisdiction that makes such lawsuits difficult to win. Since the metaverse requires documentation of identity from all users, e.g. an associated bank account, it is easy to document who is responsible for an offence and provide evidence of the crime. This contributes to making the metaverse a safe, if Orwellian, space for all.

Advanced users use brain-scanning headsets that allow interaction with the virtual world by pure thought, but feedback directly into the brain (brain-machine implants) is only being used in experimental devices aimed at disabled (e.g. blind) users, since such brain input is coarse and can be dangerous. It is possible that implanting neural nets inside the skull eventually will enable experiencing virtual worlds with all senses, including smell, taste, touch, and balance. However, until then, the majority is entirely satisfied with the visual and auditory output, perhaps with the addition of limited haptic feedback.

To avoid anti-monopoly regulation, the metaverse owners actively support the continued existence of their competitors, even allowing them to use some of their software, though not enough to allow them to become serious competitors. The unspoken threat is that if one competitor tries to become too big, they will stop getting aid from the ruling metaverse.

There is a lot of censorship and regulation in the metaverse in this scenario, but most of it is localised. Nudity is forbidden in some countries, sexism and racism in others, criticism of religion or rulers in yet others. This locks users in some jurisdictions out of certain metaspaces, but a lot of censorship can be handled by simply having AI trained to locally remove or replace offending content, e.g. by automatically removing swastikas if users post them or deleting or blacking out offensive words or images. The technology can also be used to remove elements in the users' daily lives, such as removing exposure to commercials or trash in the street with Diminished Reality (DR).

The metaverse owners want to have good relations with all jurisdictions; it is better to offer limited functionality to some users than not having these users, as would be the case if the metaverse was banned locally. Some criticise the metaverse for going too far with censorship, for example when classical art is censored, but better safe than sorry.

Implications in each scenario

Scenario A *Open and Convergent*
The Free Metaverse

USER EXPECTATIONS

"It is great to have free access to a single platform that can access all content."

"I love that I automatically own the content I create."

Who calls the shots?
USERS

- The Metaverse is open source and maintained by the users in ongoing agreements and self-regulation.
- DAOs own many of the biggest Metaverse brands, alongside legacy Big Tech.

Benefits

- Free and open access.
- Users own their personal data and virtual assets.
- Low technological entry barrier.

Challenges

- The decentralised nature of the Metaverse makes it difficult to police – there will always be dark and dangerous corners.

Governance

- There are few rules beyond those hardwired into the protocols, and the decentralised nature makes governance difficult.
- AI and human moderators help enforce codes of conduct in popular metaspaces.

Scenario B *Open and Separate*
Nerdverse

USER EXPECTATIONS

Majority: *"The "Nerdverse" is too complicated for me, and it is full of bugs."*

Users: *"I love the deep immersion the metaverse offers – it is well worth the steep learning."*

Who calls the shots?
THE TECH-SAVVY

- The 'Nerdverse' is developed and used by tech-savvy users.
- It is too complicated to have become mainstream, hence few big brands bother to have a presence.

Benefits

- A high level of innovation makes the Nerdverse a testing ground for cutting-edge technologies, such as direct neural interfaces.

Challenges

- The Nerdverse is too complicated to attract mainstream users.
- It is a haven for hate speech and criminal activity.

Governance

- Nothing prevents the creation and operation of metaspaces based around immoral, illegal or hateful activities.
- A high level of anonymity makes it difficult to find and punish perpetrators.

Scenario C *Proprietary and Separate*

Betaverses Disunited

USER EXPECTATIONS

"The 'verses I use are cool and easy to use, and I don't mind that I can't port content between them."

"I love that I can let my kids loose without worrying about what they may encounter."

Who calls the shots?
POWERFUL ORGANISATIONS

- The betaverses are owned and run by big tech companies or governments.
- The owners decide who can use their beta-verses and how – users can take it or leave it.

Benefits

- The betaverse owners control and ensure smooth and safe user experiences.
- You can easily find a betaverse with the sort of content you like.

Challenges

- The lack of interoperability between the betaverses makes it challenging to establish universal experiences that can give rise to new dynamics since they are inside closed ecosystems.

Governance

- The betaverse owners monitor and control all content and activities in their betaspaces.
- Registration requirements to get access makes it easy to identify and ban abusers and criminals.
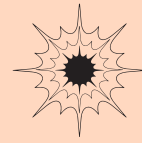
Scenario D *Proprietary and Convergent*

One Metaverse to Rule Them All

USER EXPECTATIONS

"I'm not bothered that the Metaverse is owned by a corporation– that's just how things are."

"The surveillance and control make me feel safe, and anyway, I have nothing to hide."

Who calls the shots?
MONOPOLY

- A single, commercial metaverse has arisen to become a de-facto monopoly.
- The owner calls the shots, but listens to requests from governments.

Benefits

- Almost all people and brands are present in a single, interoperable metaverse – as permitted by local jurisdictions.

Challenges

- All data and content in the Metaverse is co-owned by the Metaverse corporation, which monetises everything that can be monetised.

Governance

- Many jurisdictions ask the Metaverse owner to implement censorship or other restrictions, and the owner is very willing to comply, lest the Metaverse should be banned in these jurisdictions.

QUESTIONS TO ASK WHEN SHAPING THE FUTURE OF THE METAVERSE

In this whitepaper, we have provided a set of qualified and possible developments of the metaverse, focusing on immersive and spatial aspects built upon a set of critical uncertainties.

When it comes to shaping the future of the metaverse, there is a great number of crucial topics that need more exploration. The following is a breakdown of a few of those questions.

- How will the metaverse be regulated, and by whom?

- To what degree will users own and control the content they create?

- What are the roles of individual users, communities, platform owners and governments?

- How will the metaverse affect our society? How will it affect democracy?

- Will user identities be anonymous, pseudonymous, or public?

- What will the social dynamics be in the metaverse?

- What role will AI play in the creation, moderation, and governance of the metaverse?

- How can we encourage a positive, healthy culture in the metaverse?

- How can we ensure metaliteracy among the general population, businesses, and government institutions?

METAVERSE GLOSSARY

A

Augmented Reality (AR)

Augmented Reality is an enhanced version of the physical reality created using technology to overlay digital information on an image of something being viewed through a device. Some examples of AR technology at use include Instagram filters, Snapchat's lenses and Pokémon Go.

Avatar

An avatar is a virtual character that represents an individual in the virtual environment. Avatars can be static or animated, and many of us will already have some experience with them as images on social media or characters in games.

B

Betaverse

Today, we see fragments of what will eventually become the metaverse – fragments that we call 'betaverses'. In our opinion, these 'betaverses' are often confused with 'the metaverse'; individuals and companies have a tendency to believe that the fragments we see today are true metaverses. The betaverse is something we 'dial into', not a metaverse that we automatically log into whenever we use the internet.

Blockchain

A blockchain is a platform that allows a network of computers, rather than a central authority, to maintain and update a shared database of proof of ownership and verified data. A blockchain can also be described as distributed ledger technology (DLT). This distributed ledger uses cryptography to confirm, carry out, and secure actions and transactions.

C

Creator Economy

The creator economy is a software-facilitated economy allowing creators to earn revenue from their creations. Examples of creator economy software platforms include YouTube, TikTok, Instagram, Facebook, Twitch, Spotify, Substack, and Patreon. Virtual worlds in the metaverse are set to depend largely on content creation by creators (both by humans and AI), who will contribute content and experiences for other users to interact with.

D

Decentralised Autonomous Organisation (DAO)

A DAO is an organisation constructed by rules encoded as a computer program that is often transparent, controlled by the organisation's members and not influenced by a central government – they are member-owned communities without centralised leadership. Blockchain technology, digital protocols and smart contracts are used to enforce the DAO's rules, governance structure, and decision-making process. Currently, an increasing number of metaverse initiatives use DAOs to provide users with voting rights and influence over the project's development, thereby making the metaverse more participatory and community driven.

Digital Asset

A digital asset is anything that exists only in digital form and comes with a distinct usage right. Types of digital assets include, but are not exclusive to photography, logos, illustrations, animations, audio-visual media, digital paintings, text documents, electronic mails, websites, and a multitude of other digital formats and their respective metadata.

Diminished Reality (DR)

Diminished reality is a form of computer-assisted reality that enables you to remove, conceal, or delete physical objects or sounds from your environment via the use of technology. Information from your environment is then replaced with seemingly believable backgrounds, objects, or sounds.

Extended Reality (XR)

Virtual and augmented reality, as well as mixed reality, are all included under the broad term 'extended reality', referring to all physical-and-virtual combined environments and human-machine interactions generated by computer technology and wearables. By bringing all of this together, extended reality may offer a wide range of new possibilities in both real and virtual worlds like the metaverse.

Haptic Technology

Haptic technology, or haptic interface, refers to any technology that can create an experience of touch or manipulation of virtual features by applying forces, vibrations, or motions to the user. These technologies can be used to create virtual objects in a computer simulation, to control virtual objects, to enhance remote control of machines and devices or to experience physical feedback from virtual experiences. Simple haptic devices are common in the form of game controllers and joysticks but can also be experienced in haptic suits. The word haptic, from the Greek: ἁπτικός (haptikos), means *"tactile, pertaining to the sense of touch"*.

Interoperability

Interoperability is a characteristic of a product or system to work with other products or systems. In the metaverse it applies to the ability for identities, digital assets, and virtual experiences to travel unchanged across platforms or metaspaces.

Internet of Things (IoT)

The Internet of Things refers to physical items that are equipped with sensors or other forms of technology that can communicate with other devices and systems using the internet or other forms of electronic communication.

Metaliteracy

With the emergence of the metaverse, a new kind of literacy has become necessary. Metaliteracy is a framework for understanding the new dynamics and the need for critical thinking in the digital age. Metaliteracy is not yet completely defined, but it challenges the conventional skill-based approaches to information literacy by incorporating emerging technologies.

Metaspace

Virtual worlds and digital layers augmented on top of our physical world. We believe that in any version of the Metaverse, a user will be able to access one or more home spaces with ways to be connected to selected private or public digital environments – metaspaces – for all sorts of purposes.

Metaverse

In our view, the current understanding of what the metaverse stands for is the seamless convergence of our physical and digital lives. A core aspect of this convergence will be a set of interoperable virtual spaces where we can work, play, learn, relax, socialise, communicate, interact, transact, and own digital assets.

These spaces will create a sense of belonging – bringing people, spaces, and things together in virtual or augmented digital worlds. The term was first coined by Neal Stephenson in his 1992 science fiction novel *Snow Crash*.

Metawashing

A term we use to describe companies that claim to be part of the metaverse based on a simple immersive or blockchain-based initiative that cannot be considered a true metaverse, as we define it.

Mixed Reality (MR)

In mixed reality, virtual components are anchored to matching physical elements in your surroundings, or vice versa; you may still physically interact with things and surfaces, but their look and responsiveness may be augmented virtually or reproduced in virtual environments. Mixed reality experiences are neither purely physical nor purely virtual, but rather a combination of the two. Extended reality (XR) is more of an umbrella term (see definition).

Non-Fungible Token (NFT)

A Non-Fungible Token is a digital certificate of authenticity of ownership of any given digital asset secured on a blockchain. It is used to certify authenticity and ownership, as the data of each NFT can be tied to digital files like images, music, collectibles, avatars, and more. NFTs are unique and non-interchangeable (non-fungible). An NFT can also carry additional rights and benefits with it, often referred to as a utility NFT. An NFT can be transferred by its owner, allowing NFTs to be sold and traded. Many Web3 believers see NFTs as the new pathway to having true ownership over digital assets.

Social Token

A social token is a form of cryptocurrency used to monetise a brand. It can be personal (a creator tokens) or a community token. Social Tokens provide creators with ways to be compensated via the sale of tokens, with buyers receiving special perks such as meet-and-greets with the creators. The rewards associated with each token are determined by the creator and gives holders a sense of belonging to a certain community.

Virtual Reality (VR)

Virtual reality (VR) is an immersive, interactive, computer-generated environment. The word 'virtual' refers to a digital copy or simulation of a physical object that exists on a computer or computer network. Users can be fully immersed in these simulated realities with the help of dedicated VR headsets, haptic devices, and even environmental feedback, enabling a virtual three-dimensional 360-degree view in a virtual world that people can experience and interact with.

Web3

Web3 (also known as Web 3.0) is a proposed new iteration of the World Wide Web based on blockchain technology, which incorporates concepts such as decentralisation and token-based economics. Web3 has been associated with the rise of technological advancements like blockchain, NFTs, decentralised autonomous organisations (DAOs) and the metaverse, ushering in a new form of the internet based on peer-to-peer transactions, transparency, and data democracy. The term was coined in 2014 by Ethereum co-founder Gavin Wood.

Want to know more ?

How is the metaverse going to effect your company or organisation?

Feel free to reach out

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Read more about the future of the metaverse

cifs.dk/metaverse