

Can Metaverse Break Constraints of Physical World?



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Executive Summary

Metaverse and why should we care about it?

Imagine zip lining through the Amazon Forest or exploring Socotra Island with your friends from around the world, without ever leaving your room. Or how about a live, interactive tour of the Louvre Museum without burning a hole in your pocket?

Meta Platforms (formerly known as Facebook) thinks it is an extension of social networking. Web 3.0 enthusiasts (who are big on the web being decentralised and open) think it is about tokenisation while non-Web 3.0 enthusiasts think it is about immersive virtual worlds.

Many people confuse Metaverse with Web 3.0 developments. In our view, Metaverse development will be driven by both Web 2.0 and Web 3.0 worlds. The large customer base of Web 2.0 companies works in their favour.

The metaverse is an alternate digital reality that gives humans a chance to break free from the constraints of the physical world and experience what is otherwise impractical or impossible. We define the metaverse as one where humanity is living, playing, and working in a digital reality and that digital reality is interacting with the physical.

Metaverse could be bigger than most imagine

While a lot has been published about the metaverse, we think it could be bigger than what most people imagine. Actualising the metaverse would blur the boundary between the physical and online world. We believe it may be influential enough that, at some point, the digital lives of people could become more important than their physical ones. Some users – especially younger ones – may eventually earn, spend, and invest most of their money in digital worlds.¹

Who might win in the metaverse?

The premise of the metaverse is an experiential offering engaging a wide band of human senses. Yet those senses need to be engaged in a way that sparks imagination. Successful metaverses will be those with superior, immersive, and engaging content. We expect content owners and providers to decide the technology infrastructure, and not the other way around.

Persistent and immersive content experience will be a big change from the way content is being consumed today.

¹ <https://www.cbinsights.com/research/metaverse-market-map/>

Figure 1. We expect best-of-breed players to emerge across various categories



Source: DBS Bank

Beyond digital avatars and gaming

Earlier metaverse concepts were restricted to digital avatars and connecting in a 3D world. Now, it is more than that. By enabling the connection between people, finding communities and venturing into new business prospects, we expect people to build their lives in the metaverse.

Beyond *just gaming*, players are likely to be able to experience other aspects of life – virtual adventures, virtual concerts, virtual real-estate, virtual work, virtual tours, and virtual fashion to name a few. Companies can provide tools and infrastructure for Augmented Reality, Virtual Reality and Artificial Intelligence but ultimately, it is the content which needs to spark the imagination of users.

By and large, best-of-breed content players are likely to appear across various categories. Although there are few players like Meta Platforms, trying to develop a solitary platform offering multiple content categories.

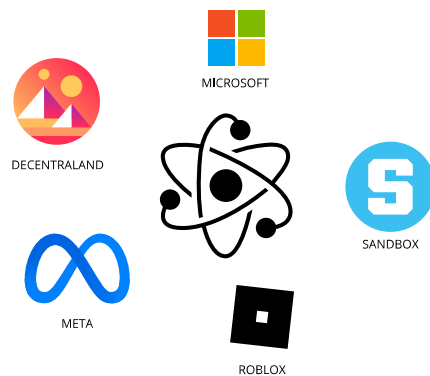
However, what works in a virtual concert may not necessarily work in a virtual tour or virtual work. In contrast to the one-size-fits-all approach, Microsoft continues to focus on virtual work and enterprise metaverse, leveraging the success of *Microsoft Teams* and its *Office* software.

Which business models could emerge in the metaverse?

We see three kinds of business models in the metaverse:

- Incorporating the metaverse into existing business models to drive competitive differentiation (virtualising a production line, or a sales demonstration);
- Creating or orchestrating new experiences in the metaverse (gaming, high-risk exploration, social engagement); and
- Providing the underlying infrastructure and components (the “picks and shovels”) of the metaverse

What is the point of “closed” metaverses?



No man is an island, and the same can be said of metaverses. We hope to see multiple metaverses built by decentralised players (e.g., Decentraland and Sandbox) and those built by traditional players (e.g., Roblox and Microsoft). Hence, we see a “multiverse” of metaverses, instead of a single homogenous metaverse.

Interoperability is crucial to connect multiple metaverses

If these metaverses are not interoperable, we would not be able to transfer our avatars and purchases between different platforms – making the user experience a disconnected one as they ‘move’ between worlds.² Interoperability is crucial to connect multiple metaverses, the same way it happens in the real world where we move from one place to another.

Financial players as partners for value-transfer across metaverses

There is no doubt that users would like to travel between metaverses and physical worlds while bringing their accumulated digital assets with them. If a player picks up a legendary gear or crafts a unique armour set while playing a game in one metaverse, he should be allowed to bring it to another metaverse, without any loss in value. This interoperability not only requires digital assets to be transferable, but also that value transfer is guaranteed. Currency earned in the metaverse would also

² <https://www.leewayhertz.com/metaverse-interoperability/>

require a bridge, in the event a user chooses to convert it to fiat currency. Current players within the technology or content space may not be prepared to accommodate such interoperability due to the lack of legal and financial expertise. Financial service providers are well positioned to facilitate this seamless interoperability, in partnership with metaverse players.

Many banks and neobanks (i.e., entirely digital bank with no physical branches) will be pursuing what DBS characterises as an “outside-in” business model – replicating banking experiences, customer engagement, and branding with augmented or mixed reality functionality. What we find more interesting is the “inside-out” business model – enabling and embedding value-added financial services into the metaverse, including facilitating exchange between digital and non-digital financial assets and flows.

A seamless movement through the metaverses and the real world will require partnerships between companies operating in the virtual and physical realms, and DBS welcomes engagement from the community.

Interoperability is crucial to connect multiple metaverses, just the way it happens in the real world where we move from one place to another.

Metaverse: Key to Break Constraints of Physical World?

Imagine zip lining through the Amazon Forest or exploring Socotra Island, without ever leaving your room. Travelling to exotic locales tend to be costly affairs but the metaverse could make it much more affordable. Think big events and concerts – have trouble scoring tickets to Bad Bunny or BTS' concerts? Instead of watching the YouTube concert from your couch, imagine being in a virtual stadium with an all-access pass allowing you to watch the concert in 3D, with other crazy fans in tow. The metaverse could allow users to have an immersive virtual experience.

For the first time ever, the Sundance Film Festival went totally virtual this year. Attendees' digital avatars took their seats in the virtual theatre, complete with bobbing heads in front of the screen and smatterings of annoying chatter. Festival attendees were able to soak themselves in the immersive virtual experience by donning an Oculus Quest 2.³ This is just a start of what the metaverse could offer.

What is the metaverse?

According to a survey, only 15% of people know how to explain metaverse to someone else⁴. Even in the tech world, the definition varies:

- Meta Platforms (formerly known as Facebook) thinks of the metaverse as an extension of social networking, expanded into three dimensions and projected into the physical world. It would allow people to share immersive experiences with others, even when they can't be together.
- Web 3.0 enthusiasts think it is about tokenisation. For each metaverse, there is a unique type of token, known as metaverse token. For example, Sandbox is a virtual gaming world where players can earn SAND tokens which can be used to buy virtual goods in Sandbox.
- Non-Web 3.0 enthusiasts think it is about immersive virtual worlds where people can live, work and play.

³ <https://www.washingtonpost.com/technology/2022/02/04/sundance-metaverse-quest-virtual-reality/>

⁴ <https://bestmediainfo.com/2022/05/metaverse-awareness-has-more-than-doubled-in-less-than-a-year-wunderman-thompson-intelligence-s-analysis>

The metaverse is an alternate digital reality

DBS thinks it is more than that. The metaverse is an alternate digital reality, allowing humans a chance to break away from the constraints defined by the physical world and experience what is otherwise impractical or impossible. The metaverse is so compelling because it gives humanity a promise of escapism, catharsis, progression, achievement, and more – with little or no risk.

We define the metaverse, as one where humanity is living, playing, and working in a digital reality and that digital reality is interacting with the physical.

This concept, while new to some, is familiar to video game players and creators over the past three decades. The concept and current form of virtual worlds are, after all, sourced from video games. It is an online virtual world, constructed via layers of code, hosted on computer servers across the globe, and legally owned by a corporate entity.

The pandemic-led virtualisation of life has sparked greater interest in the metaverse as many now understand what virtual reality can offer beyond just video games.

Is the metaverse inevitable?

People like to live in their imaginary worlds. For instance, a Harry Potter fan could fulfil their dream of receiving a Hogwarts acceptance letter, getting sorted into a house by the Sorting Hat, and wandering the castle garbed in their own Hogwarts robes. The rising popularity of virtual concepts could be a major catalyst for the growth of metaverse. The pandemic-led virtualisation of life has led to a spike in its demand beyond video games. Advancements in technologies such as Augmented Reality (AR), Virtual Reality (VR), and Artificial Intelligence (AI) can generate enough immersive metaverse experiences.

Workplace environments have adopted an online/offline hybrid work model because of COVID-19, short-format video has supplanted long-form video in social media, non-fungible tokens (NFTs) and play-to-earn models have emerged. The entertainment world is getting onboard too – Travis Scott and Ariana Grande have conducted online experiential concerts to a far larger audience than would be possible to accommodate in a physical venue⁵, and even Swedish pop legend ABBA is throwing a comeback concert after 40 years using the metaverse.⁶ Underpinning this has been continued development in the hardware and software powering the metaverse.

⁵ <https://amplify.nabshow.com/articles/ariana-grandes-fortnite-concert-opens-up-the-metaverse/>

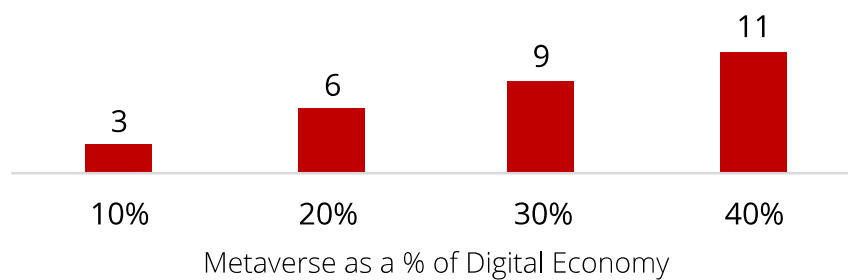
⁶ <https://theconversation.com/abba-and-tupac-in-the-metaverse-how-digital-avatars-could-be-the-bankable-future-of-band-touring-181222>

How Big Can the Metaverse Get?

While a lot has been published about the metaverse, we think it could be bigger than what most people think.

Figure 2. Metaverse could be worth 10-40% of digital economy and 3-10% of total economy by 2030

Metaverse market value (US\$tn) in 2030



Source: OECD, DBS Bank

The metaverse could be worth US\$3tn to US\$11tn in 2030

Potential market estimates of the metaverse opportunity range from US\$3tn to US\$11tn in 2030. The actual size will depend on the share of the digital economy that shifts to the metaverse and the market expansion. The Organization for Economic Co-operation and Development (OECD) forecasts global GDP growth of 3.5%, to hit US\$142tn by 2030.⁷ A 2017 report from Oxford Economics estimated that the digital economy would be 25% of global GDP⁸. However, we believe the digital economy would be 20% of global GDP as current inflationary environment, COVID-19 impact, and other geopolitical tensions were not considered in 2017.

We expect the metaverse economy to fall towards the lower end of expectations if:

- The created content fails to fulfil the purpose which results in users reducing or avoiding the continuous participation in virtual worlds
- Digital identity theft and anonymous behaviour causing inappropriate or criminal activity
- Instances of assault and harassment that happen in the metaverse could be harder to police than existing social media
- Consumer discretionary spending takes a hit due to sustained high inflation

⁷ <https://data.oecd.org/gdp/gdp-long-term-forecast.htm>

⁸ https://www.huawei.com/minisite/gci/en/digital-spillover/files/gci_digital_spillover.pdf

Social media giant Meta Platforms has already spent more than US\$10bn on research and development (R&D) to build out its vision for the metaverse.⁹ It announced plans to hire 10,000 people in Europe over the next five years to build the metaverse and invest US\$150m in immersive learning to train its next gen creators.¹⁰

Look beyond dollars and cents

Watch amount of time spent in Metaverse instead

According to Gartner, by 2026, 25% of people will spend at least an hour a day in the metaverse for work, shopping, education, social and/or entertainment. 30% of organisations will have products and services ready for metaverse by 2026.¹¹

A KPMG survey predicted that people would spend more time in the metaverse than in the actual world by 2030, or as many as 15 hours a day.¹² As people spend more time in the metaverse, the financial value of metaverse assets will begin to threaten that of physical world assets. People will work, shop, have social gatherings and even marry in the metaverse.¹³ Actualising the metaverse would blur the boundary between the physical and online world. We believe it may be influential enough that at some point, the digital lives of people could become more important than their physical lives. Some users – especially younger ones – may eventually earn, spend, and invest most of their money in digital worlds.¹⁴

The metaverse may be influential enough that at some point, the digital lives of people could become more important than their physical lives.

⁹ <https://www.theverge.com/2021/10/25/22745381/facebook-reality-labs-10-billion-metaverse>

¹⁰ <https://www.bbc.com/news/world-europe-58949867>

¹¹ <https://www.gartner.com/en/newsroom/press-releases/2022-02-07-gartner-predicts-25-percent-of-people-will-spend-at-least-one-hour-per-day-in-the-metaverse-by-2026>

¹² <https://home.kpmg/xx/en/home/insights/2022/04/the-future-of-the-metaverse.html>

¹³ <https://www.consultancy.com.au/news/5210/10-predictions-on-the-future-of-extended-reality-and-metaverse#:~:text=By%202030%3A,get%20married%20in%20the%20metaverse>

¹⁴ <https://www.cbinsights.com/research/metaverse-market-map/>

Who Might Win in the Metaverse?

Persistent and Immersive content experience will be a complex change from the content of today.

Persistency in the metaverse means that when users return, they are back where they left off, ensuring continuity. The content is live by default and will continue even if you leave the environment.¹⁵ For instance, if a user purchases a costume in the gaming world, he should get to wear it in his social media world and in addition, get to have an AR wearing experience in the physical world.

An immersive content experience is possible, for example, when consumers have the ability to spend time in their favourite worlds and with their favourite characters in the metaverse. People watch Marvel movies to feel what it is like to be Spider-Man or Captain America. Can the metaverse allow them to spend more time with these characters as if they are real? An interactive experience also opens up a lot more possibilities, scenarios, and endings. For example, Bandersnatch, the new interactive film from Charlie Brooker’s Black Mirror, has five main endings. Netflix viewer’s choice leads to those different endings.¹⁶

Different Approaches Across Various Categories

Figure 3. We expect best-of-breed players to emerge across various categories



Source: DBS Bank

¹⁵ <https://www.hollywoodreporter.com/business/digital/hollywood-in-the-metaverse-content-considerations-1235080985/>

¹⁶ <https://www.thewrap.com/black-mirror-bandersnatch-netflix-5-main-endings-secret-kill-dad-movie-set-mom-pearl-ritman-coronavirus/>

By and large, we expect best-of-the-breed players to emerge across various categories. Beyond gaming, we expect players to emerge across various categories – virtual experiences, virtual work, virtual property and supporting services to name a few. Companies can provide tools for AR, VR and AI but to win users over, content is king.

Microsoft, for example, is taking a very different approach from Meta Platforms. Unlike Meta Platforms, who is looking to develop a single platform that extends across multiple categories, Microsoft continues to direct its focus on the virtual work and enterprise metaverse space, leveraging the success of *Microsoft Teams*.¹⁷

Understanding virtual work and enterprise metaverse space

Mesh, Microsoft’s initial offering in the metaverse, is a collaborative VR platform with features that enhance the user experience of *Microsoft Teams*.¹⁸ It blends the mixed reality capabilities of Mesh with the productivity tools and collaborative functions of Teams. One example of its features is the ability to participate in meetings and video conversations via animated avatars. These avatars are built by studying characteristics like speech patterns and the way you raise your hand, which are then animated accordingly. Additionally, there will be virtual meeting spaces where avatars can meet, and users in different physical locations can get together and join in shared VR experiences.¹⁹

Figure 4. Microsoft Mesh is a collaboration-first experience in the enterprise space



Source: Company

¹⁷ <https://www.zdnet.com/article/microsoft-to-extend-its-enterprise-metaverse-strategy-with-mesh-for-teams/>

¹⁸ https://www.codit.eu/blog/how-microsofts-metaverse-can-be-a-gamechanger-for-the-industry/?country_sel=be

¹⁹ <https://www.microsoft.com/en-us/mesh>

Metaverse as an extension of social networking

Meta Platforms endeavours to become one-stop app for virtual gaming, virtual concerts, virtual work, and everything else. *Horizon Worlds* is an online gaming and social VR platform by Meta, which includes ways for users to create and explore user-generated worlds.²⁰ Meta plans to merge its live event app *Horizon Venues* entirely into *Horizon Worlds*, wherein users will be able to attend live events in VR directly within *Horizon Worlds*.

As of February 2022, *Horizon* has reached 300,000 monthly users, a 10-fold growth since its roll-out in early December 2021.²¹ On education, Meta has partnered with numerous institutions to develop immersive and collaborative experiences, such as VictoryXR and Byjus FutureSchool. Meta is actively working on becoming a metaverse superapp, encompassing work, entertainment, and everything in between.²²

Figure 5. Meta envisions multiple categories accessible within a single platform



Source: Companies, DBS Bank

The near and distant future of the metaverse

Microsoft's metaverse plans may bear fruit in the near term, while Meta's vision reaches into a distant future. In Meta's vision, people will eventually spend most of their lives in immersive virtual worlds. Microsoft's enterprise solutions *Teams* and *Office*, in contrast, are already dominating the present. The innovation of more immersive collaboration capabilities seems to be a natural trajectory apt for the near future.

²⁰ <https://www.engadget.com/2019-09-25-oculus-social-vr-world-facebook-horizon.html>

²¹ <https://vr-expert.com/meta-announces-300000-users-on-horizon-worlds-and-venues-platforms/#:~:text=In%20December%202021%2C%20Meta%20launched,user%2Dgenerated%20worlds%20and%20games.>

²² <https://analyticsindiamag.com/meta-bucket-list-facebooks-recent-collaborations-to-support-its-metaverse-ambitions/>

Unlike Meta, who is planning a metaverse powered by virtual reality headsets, Microsoft appears set on making the virtual world accessible via any device, without discriminating between a laptop with a single microphone and a HoloLens headset with six microphones and 16 cameras.

Which Business Models Will Succeed?

Possible business models in the metaverse

1. Incorporating the metaverse into existing business models to drive competitive differentiation (virtualising a production line, or a sales demonstration);
2. Creating or orchestrating new experiences in the metaverse (gaming, high-risk exploration, social engagement); and
3. Providing the underlying infrastructure and components (the “picks and shovels”) of the metaverse

Figure 6. Pokemon GO’s AR-based concept was the major catalyst behind its wild success



Source: Pokemon Go App

Content-driven experiences

The first two types of business models will need to focus on what we refer to as content-driven experiences. The premise of the metaverse is an experiential offering engaging a wide band of human senses. Yet those senses need to be engaged in a way that sparks imagination. Successful metaverses will be those with superior, immersive, and engaging content. For the business model to remain sustainable, the content needs to be able to continuously retain customer engagement over the passage of time. Again, here is where Disney, or any other major intellectual property franchise owner such as Nintendo (Pokémon), is a strong candidate to be a winner. It also follows that just focusing on enabling a virtualised experience is insufficient. It must drive a deeper underlying job to be done. An example would be a manufacturing process that is made better because of virtualisation or a virtualised hands-on test of a new car's limits without the risk of a high-speed crash.

We expect content owners and providers to decide the technology infrastructure, and not the other way around. A human-centric approach starts with the conceptualisation of the intended experience. Following which, the technology that can best deliver this experience is determined. This results in the content owners and providers having the commercial power to decide the technology infrastructure to be used, much in the same way Disney+ introduced competitive pressure to Netflix. Disney's in-house content ranging from animated movies to its Marvel universe and TV series featuring the likes of Spider-man, Thor, and Black Widow has been a key differentiator.²³

This is not to say that the third business model of providing underlying technology infrastructure is always subservient. Technology infrastructure has been the key for video streaming, Web 3.0 cross-chain interoperability or NVIDIA's next-generation graphics processing unit (GPU). We think there are some other more complex perspectives to be considered, particularly when considering social responsibility and sustainability.

For the business model to remain sustainable, the content needs to be able to continuously retain customer engagement over the passage of time.

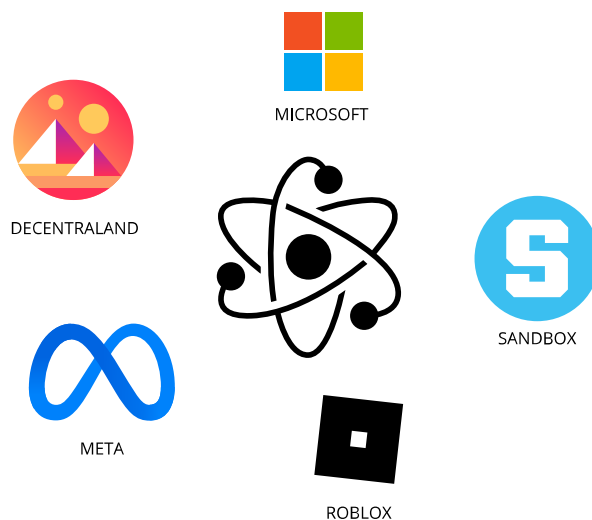
²³ <https://techcrunch.com/2022/02/10/disney-outshines-netflix-with-11-8m-new-subscribers-in-q1-strong-forecast/>

Interoperability in a “Multiverse” of Metaverses

Not a homogenous metaverse but a “multiverse” of metaverses

The metaverse is likely to be a space over which no single entity will have complete control. We see potential metaverses built by decentralised players (e.g., Decentraland and Sandbox) in addition to the ones built by traditional players (e.g., Roblox and Microsoft). Hence, the digital space will likely comprise a “multiverse” of metaverses, as opposed to a single homogenous metaverse. Indeed, commercial considerations and competition will necessitate such a “multiverse”.

Figure 7. “Multiverse” of metaverses



Source: Companies, DBS Bank

Interoperability is crucial to connect multiple metaverses

If these metaverses are not interoperable, customers would not be able to transfer their purchases between different platforms. Interoperability is crucial to connect multiple metaverses. It would enable avatars to freely switch between metaverses and explore different infrastructure, much like the way we move from one place to another in the real world while our identities and assets remain intact. As the metaverse grows, we expect the value of digital assets to grow to a sufficiently large scale that financial service providers can no longer ignore.

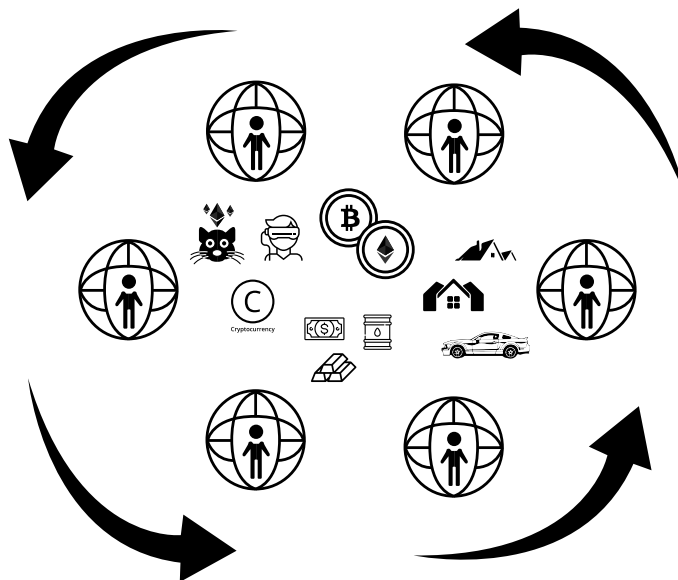
In this scenario, interoperability, and intermediation between metaverses and the physical world would be essential. This interoperability is technical as well as legal and financial. Even for a simple transaction like an asset transfer, for instance, transferring gold between two countries, there are various legal and financial steps involved. Parties need to comply with the customs rules of both countries and declare the value of the gold in the local currency of the receiving country after accounting for tax imputations.

From a Financial Services Perspective

“Inside-out” or “outside-in” business model?

Many banks and neobanks (i.e., entirely digital bank with no physical branches) will be pursuing what DBS characterises as “outside-in” business models – replicating banking experiences, customer engagement and branding with augmented or mixed reality functionality. Much has been said on this subject already, so we will not dwell here. What DBS finds more interesting is the “inside-out” business model – enabling and embedding value-added financial services into the metaverse, including facilitating exchange between digital and non-digital financial assets and flows.

Figure 8. Interoperability to enable avatars and assets to travel from one metaverse to another



Source: DBS Bank

As the metaverse grows, we expect the value of digital assets to grow to a sufficiently large scale that financial service providers can no longer ignore.

Exploring partnerships between financial service providers and content giants

Financial service providers are not likely to generate sufficiently engaging content to drive an “inside-out” business model on its own. However, an “outside-in” strategy may not generate enough moat too. . A credible “inside-out” strategy, therefore, involves financial service providers partnering content giants or intellectual property franchises and incorporating financial service expertise in co-designing economic and financial interoperability between one or more metaverses and the physical world. The reasons for this:

1. Financial service providers know about embedded finance – the idea that financial services can be designed into customer journeys – a loan and security package intrinsically forming part of a house purchase, rather than as a separate and distinct process (this idea also comes about from a human-centric, customer-focused approach).

2. Commercial considerations and competition will necessitate a “multiverse” of metaverses. To add further value, such financial services providers need to be fully conversant with the “picks and shovels” of the multiverse of metaverses. Considerable inefficiency will be introduced if the financial services offering is incompatible with popular metaverses and/or the physical world and vice versa. Many of these issues will occur if financial service providers are not sufficiently prepared for the challenges of the digital space. For example, if customer onboarding, anti-money laundering and sanctions tooling are stuck in a non-digital age, financial service providers would not be able to prosper in the metaverse.

How can financial service providers add value to metaverse content builders?

Financial service providers are experts in economic and financial intermediation. The currency swap was born from exchange control; the equity derivative in part from foreign shareholding limits; securitisation from the need to unlock trapped value eating up balance sheets and capital limits; the payments ecosystem from the need to drive efficiencies at massive scales; and the foreign exchange and interest rate markets from the underlying trading, hedging and risk management activity at even larger scale. Learning from the past, we believe, financial service providers are well positioned to meet the needs of users traversing between metaverses and the physical world.

We hope this paper demonstrates that DBS is approaching the questions posed by the metaverse thoughtfully and from a strong human-centred lens. We certainly don't claim a monopoly on answers, but we can promise an excellent, wide-ranging and fun conversation. We welcome any reader to engage, debate, and if we find common ground, to collaborate.



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