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# Enter the Metaverse





### **What happened?**

We are at an inflexion point where more people and businesses are building their presence in a virtual universe, underpinned by the convergence of new technologies and social attitudes. The transition to a virtual reality is underway and expected to undergo rapid development in the coming years.

### **Why does it matter?**

Technological advancements and better digital infrastructure in the recent years has stimulated the rise of the Metaverse – a collection of virtual worlds overlapping with physical realities – which is likely to see greater adoption as businesses and consumers increasingly engage virtually.

### **What does this mean for investors?**

New technologies are likely to be developed. These, together with the resulting new ways to create, own, transact, socialise and experience are likely to create attractive market opportunities over the coming 3-5 years. The purpose of this piece is to give an overview on the Metaverse and potential investment implications.

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# Transiting into the new digital era

The Metaverse is a network of linked virtual worlds, overlapping with physical realities, that facilitates an immersive experience to meet, interact and transact without geographical boundaries.

The word Metaverse is a combination of “Meta” (experiences that transcend a physical setting) and “Universe” (an emerging virtual economy that generates real-world value). Broadly speaking, it portrays a broad shift in how we interact with technology through the convergence of physical, virtual, augmented or even mixed reality<sup>1</sup> that embraces the emerging Web 3.0 technology.

The current Internet is based on Web 2.0 technology where we can only “read” or “write” across various online platforms. Yet, Web 3.0 technology represents the next iteration of the Internet, where it unlocks a decentralised, human-to-human economic network. Under Web 3.0, one can bypass intermediaries to own and transact digital content/assets produced. In Web 3.0, there is an added three-dimensional layer to the web, allowing for a more immersive and authentic experience. With Metaverse, geographical and time boundaries can be significantly mitigated, providing massive convenience to the access of goods, services and even job opportunities.

Imagine yourself hanging out with friends, working with colleagues, and attending parties in a surreal environment whenever and wherever you favor. In fact, this is not as distant as it seems. Over the past years, technology gurus and software developers have proactively conceptualised a borderless interaction in a virtual setting. Complemented with the prevalence of digital headsets and devices, the Metaverse eliminates physical boundaries between peers and seeks to extend social interactions to a virtual setting. With only one click in their personal virtual reality (“VR”) or augmented reality (“AR”) headsets, users can simulate the physical world into a virtual atmosphere and enjoy an immersive experience to virtually interact with peers.

In the coming sections, we will talk about how Metaverse can be integrated into different parts of our lives, as well as the associated opportunities/risks as more people adopt such technology.

*<sup>1</sup>See endnotes*





## How our web infrastructure has evolved



### Web 1.0<sup>2</sup>



### Web 2.0



### Web 3.0

#### PLATFORM INFRASTRUCTURE

##### Medium

Static Text

Interactive Content  
(E.g. social platforms)

Virtual Economies

##### Storage of data

Static pages

Centralized system

Decentralized system

##### Accessibility of content

Personal computers

Cloud & Mobile

Blockchain Cloud

#### USER EXPERIENCE

##### User's interaction

Read

Read-Write

Read-Write-Own

##### User's identity

Content viewer

Digital profiles for  
online engagement

More complex digital  
avatars, interoperable  
identity<sup>3</sup>

##### Activities

Access to digital  
content

Social engagement,  
video games, streaming  
platforms

Game-as-a-platform  
– Community events,  
concerts, fashion shows

#### ECONOMIC ACTIVITIES

##### Ownership of assets

Unavailable

Temporal lease in the  
platform where assets  
are purchased

Non-fungible tokens

##### Transferability of assets

Unavailable

Only within platforms  
where assets are  
purchased

Transferrable

##### Payment

Unavailable

Online payment,  
(E.g. PayPal, credit/  
debit cards)

Cryptocurrencies,  
digital tokens

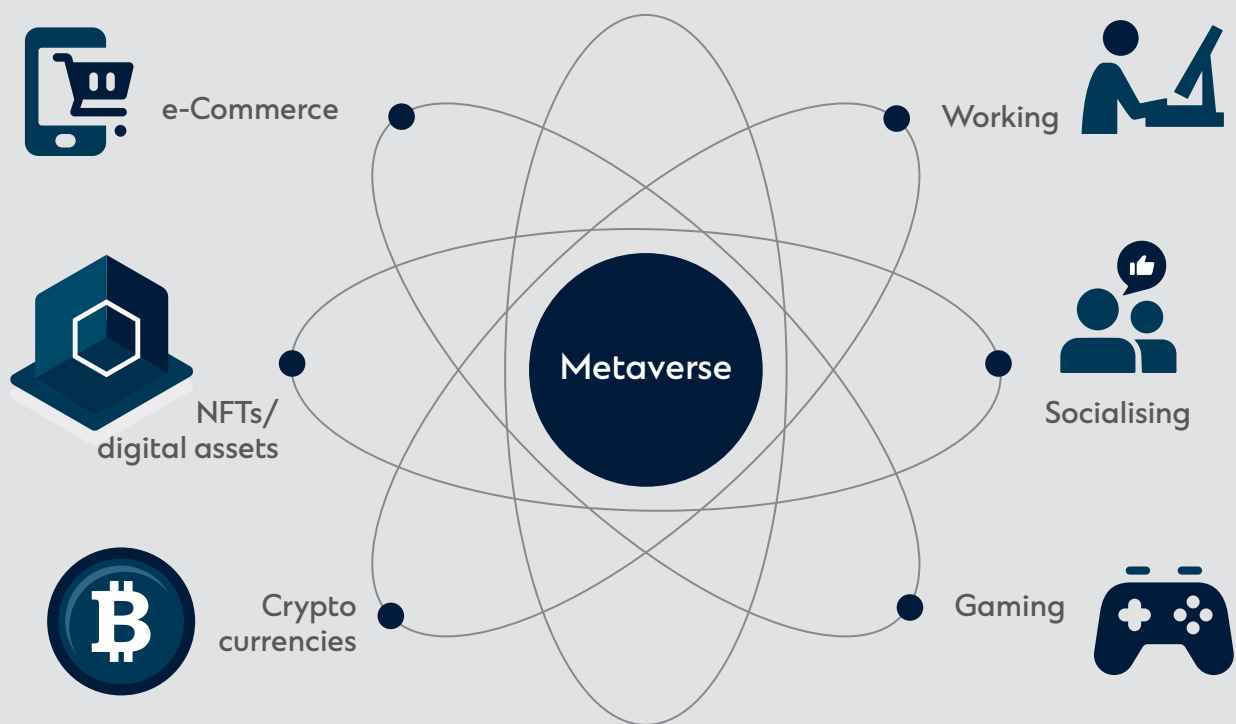
Source: Greyscale, Medium.com

<sup>2,3</sup>See endnotes

# Uses of Metaverse

The Web 2.0 that emerged in the previous decade has contributed to a rising online presence. Many retailers have shifted their business model from offline to online, to expand its customer base at lower acquisition cost. With the Metaverse, the marketplace for consumers and businesses to access goods and services will expand significantly.

## Key elements in the Metaverse



Source: Standard Chartered



# Commerce



Earlier last year, Gucci released their collection on Roblox, a leading Metaverse gaming platform, with avatars showcasing the latest sporting designs in a virtual “Gucci Garden”<sup>4</sup>. From a retailer’s perspective, virtual shopping not only provides convenience to consumers, but is also the most cost-effective sales channel, enabling branding opportunities without geographical or time barriers. With the Metaverse, users no longer appear as avatars in a virtual reality setting, but in a first-person perspective instead, akin to shopping in real-life. With initiatives such as AR fitting rooms and VR fashion events, the purchase experience can be brought to new heights.

# Social



Can you imagine attending concerts or watching movies with your friends in a virtual setting? This might be a wild idea under the current Web 2.0 technology. Yet, with the help of a VR headset, this may become a reality in the Metaverse. Under the concept of Game-as-a-platform, non-game social activities, including concerts, birthday parties or even weddings<sup>5</sup> can be carried out in various gaming platforms, such as Roblox and Sandbox. Earlier last year, singers like Ariana Grande and Travis Scott have performed in Fortnite, a renowned gaming platform in the Metaverse, and broke the record of having 12.3 million live viewers<sup>6</sup>. Following their success, Jennifer Lopez further started a promotional concert prior to releasing her new album. With social events hugely limited over the past years due to the pandemic, the Metaverse may appear as a new alternative for the socialising crowd.

<sup>4,5,6</sup>See endnotes





## Work



Since Covid-19 hit the global economy, the term “Work-From-Home” (WFH) has been exponentially more familiar to the working population. Despite the adoption of online meeting platforms, the Metaverse offers a new level of WFH experience by simulating an office setting in the virtual platform, where employees have their own work areas, and even meeting rooms for internal meetings, as if they are physically working together in office. For instance, Binance is creating a virtual office in the Metaverse to deliver the latest news and events virtually<sup>7</sup>. Under the new working ecosystem, a physical office location is no longer needed to carry out daily work tasks, tremendously reducing rental and other administration expenses from a corporation’s perspective.

## Gaming



Current VR gameplay can only be used as standalone applications through an installation on desktop or VR devices. Yet, gaming in the Metaverse will advance the current experience to a whole new level, offering a three-dimensional VR world where you can enjoy a vivid first-person perspective, almost “touching” through a realistic sense of perception<sup>8</sup>. For instance, Grand Theft Auto V (“GTA”) opened an in-game casino in the Metaverse, where players can purchase virtual tokens using real currencies and then convert them into gambling chips in the virtual casino, bringing in new gambling experiences to the industry<sup>9</sup>.

<sup>7,8,9</sup>See endnotes

# Development potential of the Metaverse

Despite its strong growth potential for wider use across industries, the Metaverse remains a work-in-progress. Further developments are needed to create a safe, vibrant and engaged virtual community. Below are some key areas where we expect to see further opportunities for development.



- **Infrastructure development:** High-speed broadband, advancements in chip and data storage capacity are needed to support the smooth rendering of 3D environments. The demand on networks can be significant in terms of processing data as well as the virtual environment itself. This requires high speed, low latency connectivity.
- **Hardware development:** External hardware devices such as VR headsets/AR glasses are key enablers in supporting the Metaverse platforms; development of interoperable devices are necessary to facilitate a seamless transition between virtual worlds.
- **Software development:** Platform content, such as the development of platform features and virtual-world architecture, should be seamless enough to support users' migration from the physical world to virtual ways of living.
- **Privacy and security:** Know-Your-Client ("KYC") and due diligence will likely need to be conducted to authenticate users' identity and safeguard personal data, especially when information is decentralised via blockchains. Credentials will also need to be verified to protect the individuals' assets.
- **Tax and regulation:** A continued evolution of rules and oversight, together with clear and consistent taxation and account<sup>10</sup> treatment, is likely to be needed on Metaverse participants as transactions increase across platforms.

<sup>10</sup>See endnotes





## Investment opportunity sets

As institutions adapt to the Metaverse, a whole new realm of ways to engage with customers is likely to open up, which will likely lead to new services and business models. We expect to see robust growth in areas supporting the build out of the Metaverse and highlight some select opportunities below. This is not an exhaustive list, as more unique opportunities will likely spring up as the Metaverse evolves.

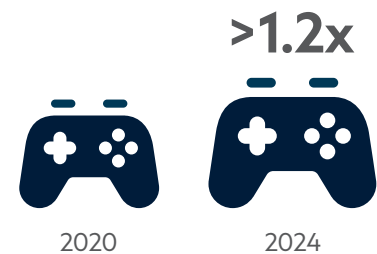
### Advertising, entertainment, and e-commerce

- **Live entertainment** including films, live music and sports events are likely to show exponential growth in the coming years with increasing significance in the Metaverse market.
- Revenue for the live entertainment sector in the Metaverse is expected to exceed USD 200bn in 2024, doubling its market size since 2019<sup>11</sup>.
- AR-/VR-compatible online retailing platforms provide an immersive virtual shopping experience to customers, and is likely to accelerate the share of revenue from the Metaverse for the e-commerce and social media advertising sectors.



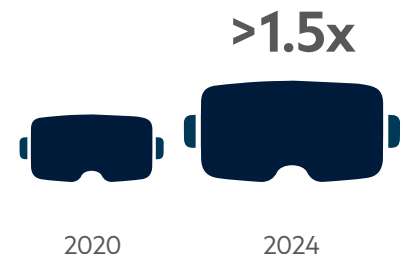
### Hardware

- **Metaverse-suited hardware**, such as AR headsets and devices, are critical as virtual platforms are heavily dependent on wearable display technologies to seamlessly combine live events with digital elements.
- **Gaming hardware** revenue is expected to reach USD 77.8bn in 2024 (from USD 63.5bn in 2020)<sup>11</sup>.
- **Internet infrastructure**, such as data centres, are essential to process the massive amount of real-time data required for virtual reality platforms, including blockchains.
- **Advanced chips and high-speed broadband** are necessary to ensure a seamless blend between virtual worlds and reality, without a lag.

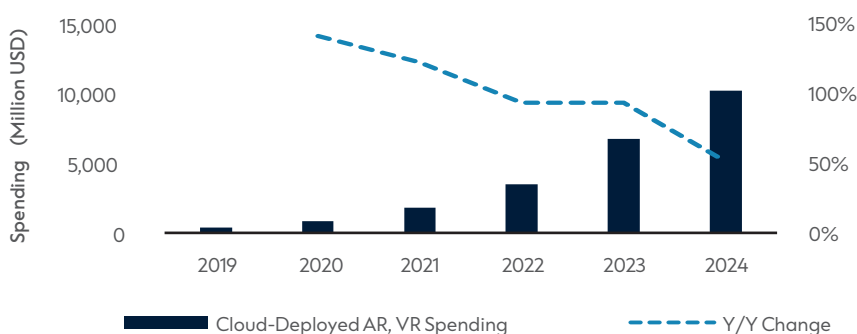


### Software

- **Development of blockchain** technology and the enhancement in storage capacity within each block to ensure a secure peer-to-peer payment system.
- **VR and AR Content** to improve users' experience. Gaming, AR and VR market opportunities are expected to reach USD 412.9bn in 2024 (vs. USD 274.9bn in 2020)<sup>11</sup>. Revenue from software and services, as well as in-game advertising, may account for 70% of the total AR, VR and gaming market size.
- **Surveillance monitoring system** to address privacy concerns of AR users, such as ensuring its camera and GPS function are tested against potential data leakage issues.



### Cloud-deployed AR, VR spending forecast



Source: Standard Chartered

<sup>11</sup>See endnotes

# What is the relationship between Crypto and Metaverse?

## Cryptocurrencies

The use of blockchain (a digital ledger that is distributed across the entire network of computer systems and without a centralised owner) has given rise to the adoption of digital currencies, acting as a medium of exchange through computer networks that is secured by cryptography.

One prominent example of cryptocurrencies is Bitcoin, with a market cap of over USD 800bn. With the gradual transition to Web 3.0, utilities of cryptocurrencies are expected to increase as a means-of-payment in a virtual metaverse world. Coins such as Bitcoin, Ether and Litecoin can act as money to purchase merchandises and services. Many corporations, such as Tesla and Amazon, also accept payment via crypto coins today. Similarly, one can also transact in the Metaverse using cryptocurrencies.

Each Metaverse platform has its own set of coins, which can be used to pay for things including NFTs, virtual land, avatars and more. The global cryptocurrency market size was valued at USD 1,782bn in 2021, and is expected to reach USD 32,420bn by 2027, with a cumulative annual growth rate of over 58%<sup>12</sup>. As the Metaverse gains popularity, we expect a rising need for digital currencies when virtual transactions are increasingly adopted as a payment method.

While crypto tokens in this context represent a form of digital money and are mainly used for trading and transactional purposes, Non-Fungible Tokens ('NFT') represent a way to confer and authenticate ownership of a unique digital item via a blockchain. It can be in the form of digital art pieces, fashion items or even virtual lands<sup>13</sup>. NFTs have gained huge traction in recent months, especially after Twitter CEO Jack Dorsey sold the first-ever tweet for USD 2.9m<sup>14</sup> and Beeple, a digital artist, sold his digital artwork at Christie's for USD 69m, making him one of the most valuable living artists<sup>15</sup>. The value of NFT sales rose dramatically to USD 2.5bn in first half of 2021, from just USD 13.7m in the first half of 2020<sup>16</sup>.

The utility of NFTs can vary massively. For example, there can be security tokens (which proves your identity) and even governance tokens (which indicates the right to a vote). One can buy a NFT with crypto coins and NFTs can also represent a store of value, with some tokens worth more than others.

In recent years, several governments have taken initiatives to embrace the usage of blockchain and cryptocurrencies. For instance, Japan and Singapore have been showing progressive measures to embracing the use of and implementing blockchain technologies<sup>17</sup>. The emergence of crypto exchanges, such as Binance and Coinbase, has even made the exchange of crypto more convenient than before.



<sup>12, 13, 14, 15, 16, 17</sup> See endnotes



## Top 10 digital currencies

Currencies		Market Capitalization	Hosted on
1	 <b>Bitcoin (BTC)</b>	USD 905 billion	Bitcoin blockchain
2	 <b>Ether (ETH)</b>	USD 410 billion	Ethereum blockchain
3	 <b>Tether (USDT)</b>	USD 82 billion	Ethereum and Bitcoin blockchain
4	 <b>Binance Coin (BNB)</b>	USD 72 billion	Binance blockchain
5	 <b>U.S. Dollar Coin (USDC)</b>	USD 52 billion	Ethereum blockchain
6	 <b>XRP (XRP)</b>	USD 43 billion	RippleNet
7	 <b>Cardano (ADA)</b>	USD 41 billion	Cardano blockchain
8	 <b>Terra (LUNA)</b>	USD 37 billion	Terra blockchain
9	 <b>Solana (SOL)</b>	USD 36 billion	Solana blockchain
10	 <b>Avalanche (AVAX)</b>	USD 25 billion	Avalanche blockchain

Source: CoinMarketCap<sup>18</sup>. Data as of 29 March 2022

<sup>18</sup>See endnotes

# Risks of investing in the Metaverse as a theme

Despite tremendous market potential and opportunities, there are risks to be cognizant as the Metaverse continues to evolve and develop.

## Cybersecurity

Cybersecurity issues remain as our top concern. With the rising use of AR/VR headsets that facilitates the tracking of personal, biometric, or even financial data, storage of confidential information and intellectual property will directly impact the Metaverse's future development. Without proper regulations on data privacy and secure data storage, a user's personal data may easily be exposed to 3rd parties or hijacked by hackers.

Moreover, the protection of intellectual property rights, especially related to digital art, is needed to keep up with the rising NFT demand and increasing crimes in the marketplace. For example, Lois van Baarle, a Dutch artist, found out that over 100 pieces of her artwork were sold on NFT marketplaces last year, yet none of them had been put up by her<sup>19</sup>. Verifying sellers' identity will have to become a priority to ensure a secure and open market in the Metaverse.

## Market volatility and dynamic transaction fee

Digital currencies offer several benefits such as low transaction fees and enabling clients to make lightning-fast transactions. However, it can also be an extremely volatile investment. For instance, Bitcoin approximately doubled in value in USD terms in the first 11 months of 2021, but subsequently fell back to its January 2021 level in just 1 month. Such high volatility can be a double edged sword, with potentially high returns as well the prospects for significant losses over a short period of time.

Meanwhile, transaction fees can also be unusually dynamic. Bitcoin's average transaction fee was as high as USD 62 per transaction in April 2021, amid heavy network traffic, or as low as USD 1.1 in late Feb 22<sup>20</sup>. Significantly varying, and often high, transaction costs may not be feasible for day-to-day small sized transactions, which may impede faster adoption of cryptocurrencies.

## Bitcoin prices fell approximately 50% between December 2021 and January 2022

Price of Bitcoin in USD



Source: Bloomberg, Standard Chartered

<sup>19, 20</sup>See endnotes



## Summary

As the Metaverse continues to evolve, significant developments in technology infrastructure and appropriate policymaking, including safety and privacy issues, will be needed to transform these aspirations into reality. Collaboration will be needed among various stakeholders given the interdependencies across the ecosystem. We believe the Metaverse will evolve over time as new

technologies, protocols, services and capabilities help build a seamless, rich, virtual manifestation of actual reality. This is expected to give rise to a wide range of opportunities ranging from content creation, developing the hardware and software to facilitate virtual spaces, as people increasingly spend large parts of their lives in digital environments.

## Endnotes:

- 1 <https://www.wired.com/story/what-is-the-metaverse/>
- 2 [https://grayscale.com/wp-content/uploads/2021/11/Grayscale\\_Metaverse\\_Report\\_Nov2021.pdf](https://grayscale.com/wp-content/uploads/2021/11/Grayscale_Metaverse_Report_Nov2021.pdf)
- 3 <https://medium.com/ontologynetwork/the-rise-of-an-identity-native-web-3-0-world-da577c4c4064>
- 4 <https://apnews.com/article/gucci-roblox-76339d10f139e9b0d39761bd8426c11e>
- 5 New Zoo – Intro to the Metaverse – Trend report 2021
- 6 <https://techcrunch.com/2021/08/09/fortnite-ariana-grande-concert-metaverse/>
- 7 <https://finance.yahoo.com/news/binance-us-building-office-solana-183024760.html>
- 8 <https://www.xrtoday.com/virtual-reality/gaming-in-the-metaverse-the-next-frontier/>
- 9 <https://www.bbc.com/news/technology-49084726>
- 10 JPM – Opportunities in the Metaverse
- 11 <https://www.bloomberg.com/professional/blog/metaverse-may-be-800-billion-market-next-tech-platform/>
- 12 Cryptocurrency Market: Global Industry Trends, Share, Size, Growth, Opportunity and Forecast 2022-2027
- 13 New Zoo – Intro to the Metaverse – Trend report 2021
- 14 <https://www.bbc.com/news/business-56492358#:~:text=Twitter%20founder%20Jack%20Dorsey's%20first,by%20Mr%20Dorsey%20for%20charity>
- 15 <https://www.theverge.com/2021/3/11/22325054/beeple-christies-nft-sale-cost-everydays-69-million>
- 16 <https://www.reuters.com/technology/nft-sales-volume-surges-25-bln-2021-first-half-2021-07-05/>
- 17 <https://www.cnbc.com/2021/07/05/cryptocurrency-adoption-time-to-say-yes-to-crypto-experts-discuss-growth-regulation-11289462.htm>
- 18 <https://coinmarketcap.com/>
- 19 <https://www.theguardian.com/global/2022/jan/29/huge-mess-of-theft-artists-sound-alarm-theft-nfts-proliferates>
- 20 <https://cointelegraph.com/news/bitcoin-transaction-fees-are-down-by-over-50-this-year>

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