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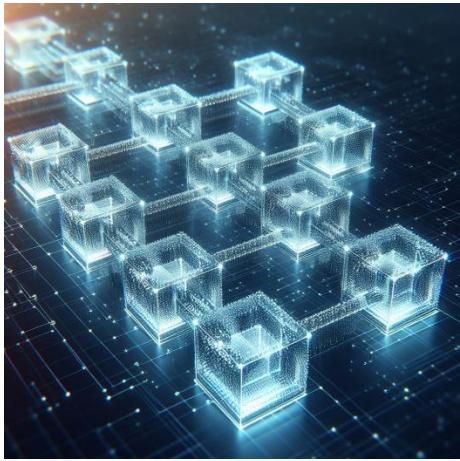
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## Introduction: Basic Concepts of Blockchain Technology.

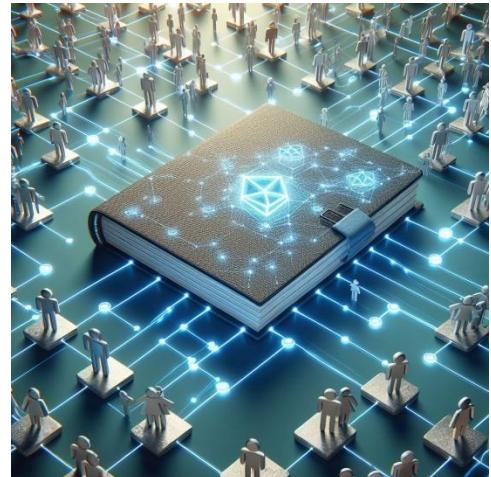


A blockchain is a decentralized and distributed digital ledger that records transactions or data across a network of computers in a secure and transparent manner. It consists of a series of connected "blocks," where each block contains a list of transactions or data, a timestamp, and a unique identifier (hash) linking it to the previous block, forming a chronological chain of blocks. This technology ensures the integrity, transparency, and security of data by creating an immutable record that is resistant to modification or tampering.

This technology was originally used for cryptocurrencies like Bitcoin, where every transaction is recorded in this unchangeable, secure way. But now, people are finding tons of other uses for it, like in tracking goods in a supply chain, voting systems, or even keeping medical records safe and private.

Let's imagine a blockchain is like a digital notebook that keeps track of important things, but this notebook isn't owned by anyone. Instead, it's shared among lots of people, and everyone has a copy of the same notebook.

Now, whenever something important happens, like a transaction (buying or selling something), it gets written down in this notebook as a block. Each block has info about the transaction, like who bought what and when. Once a block is written, it gets attached to the previous ones, making a chain of blocks — that's why it's called a blockchain!



Here's a simple real-life example: Imagine you and your friends have a notebook where you write down every time someone borrows or lends money. Let's say Sarah borrows \$10 from you on Monday, and then on Wednesday, she returns it. You write these transactions down in the notebook. Each time a new transaction happens, it's added to the previous ones, creating a chain of who owes what and when.

The cool thing about this digital notebook (the blockchain) is that because everyone has a copy and can see all the transactions, it's really hard for someone to change what's written without everyone noticing. This makes it super secure and trustworthy, just like

how you and your friends can trust the notebook you all share. That's basically how a blockchain works in simple terms!

So, a blockchain is basically a secure, unchangeable digital record-keeper spread across many computers, ensuring trust and reliability for all sorts of information and transactions.

Blockchain technology is a decentralized and distributed ledger system that securely records transactions across a network of computers. Here are some basic concepts:

- **Decentralization:** Unlike traditional systems where a central authority manages data, a blockchain operates on a decentralized network of computers (nodes). Each node holds a copy of the entire blockchain, ensuring transparency and reducing the risk of a single point of failure.
- **Blocks and Chains:** Transactions are grouped into "blocks" and added to the existing chain of blocks, forming a chronological record known as the blockchain. Each block contains a list of transactions, a timestamp, and a reference to the previous block, creating a continuous, tamper-evident record.
- **Consensus Mechanisms:** To validate and add new blocks, blockchain networks use consensus mechanisms. The most common is Proof of Work (PoW) or Proof of Stake (PoS), where participants (miners or validators) verify transactions, ensuring agreement across the network without the need for a central authority.
- **Immutability and Security:** Once a block is added to the blockchain, it becomes extremely difficult to alter because changing one block would require altering all subsequent blocks, which is computationally infeasible. This immutability and cryptographic security provide a high level of trust in the data stored on the blockchain.
- **Smart Contracts:** These are self-executing contracts with predefined rules written in code. They automatically execute and enforce agreements when certain conditions are met, eliminating the need for intermediaries and enhancing efficiency and transparency in various industries.
- **Cryptocurrency and Tokens:** Blockchain technology is often associated with cryptocurrencies like Bitcoin and Ethereum. These digital assets operate on their respective blockchains and can represent value, ownership, or access rights within the network. Additionally, tokens can be created to represent assets or utility within specific blockchain ecosystems.

Blockchain's potential extends beyond cryptocurrencies, with applications in finance, supply chain management, voting systems, healthcare, and more. Its core principles of decentralization, security, and transparency offer opportunities to revolutionize various industries by providing trust and efficiency in data management and transactions.



## What is the Metaverse?

The Metaverse is a concept that describes a collective virtual shared space, often envisioned as a convergence of physical reality, augmented reality, virtual reality, and other immersive technologies. It's a persistent digital universe where people can interact with each other, digital objects, and environments in real time. Think of it as a sort of interconnected network of 3D virtual worlds, allowing users to engage in various activities, socialize, work, play games, shop, attend events, and more.

Think of the Metaverse like a huge, super-fun internet world where you can do almost anything! It's like being in a video game but way bigger and more real.

Imagine putting on special glasses or using a device that makes you feel like you're inside your favorite game. But instead of just one game, it's a whole bunch of games, places, and activities all connected together. You can hang out with friends, play games, watch movies, shop, go to virtual concerts, and even work or learn in this digital world.



For example, you might wake up at home, put on your virtual reality headset, and suddenly you're in this amazing place where you can play games with friends who are actually miles away. Then, maybe you go to a virtual concert happening in the Metaverse with people from all over the world attending.

It's like living in a really cool dream world where you can do almost anything you can imagine, all using technology to make it feel super real, even though it's all happening online.

Absolutely! Imagine putting on special glasses or using a device that transports you into a digital world. In this world, you could:

- Hang Out with Friends: Meet up with friends from different parts of the world as if you're all in the same room, chatting, playing games, or watching movies together.
- Explore Different Places: Visit famous landmarks, historical sites, or even imaginary worlds, all from the comfort of your home.

- Work or Learn: Attend meetings, collaborate on projects, or even attend classes and workshops in a virtual environment.
- Attend Events: Join live concerts, conferences, or events happening in the digital space, where people from around the globe come together.
- Shop and Sell: Browse through virtual stores, buy items for your digital self, or even set up your own virtual shop to sell things.

Companies like Meta (formerly Facebook), Epic Games (makers of Fortnite), and others are working on creating these kinds of experiences, where you could use virtual reality or augmented reality devices to enter this shared digital universe, exploring, interacting, and doing all sorts of activities.

## History of Metaverse

The concept of the Metaverse has roots in science fiction, particularly in the novel "Snow Crash" by Neal Stephenson, published in 1992. Stephenson introduced the idea of a virtual reality-based universe where users interacted as avatars in a shared, immersive online space.

However, the term "Metaverse" gained more prominence and recognition through popular culture and media, especially with the growing advancement of technology. Over time, it became a conceptual space beyond just gaming or virtual reality, encompassing a broad, interconnected digital world where people could live, work, play, and socialize.



Early online communities and virtual worlds like Second Life, launched in 2003, offered a glimpse into this concept, allowing users to create avatars, socialize, build structures, and engage in various activities within a shared online environment. These platforms laid the groundwork for the idea of a Metaverse.

Fast-forward to the 2010s and beyond, advancements in virtual reality (VR), augmented reality (AR), and online connectivity spurred companies to explore the development of a more comprehensive and interconnected Metaverse. Gaming platforms like Fortnite and

Roblox began to integrate social experiences, entertainment, and user-generated content, moving closer to the vision of a shared digital space.

Companies such as Facebook (now Meta), with its Oculus VR division, have heavily invested in VR technologies and expressed ambitions to create a Metaverse-like experience. The term gained even more attention when Meta announced its rebranding and focused efforts on building the next-generation internet that revolves around the Metaverse concept.

The development and realization of a fully immersive and interconnected Metaverse were still in progress, with various tech companies, gaming platforms, and innovators contributing to its evolution. The idea continues to evolve, driven by advancements in technology and the desire to create a more immersive, interconnected digital world.

## Evaluations of Technology: Web, AR, VR, 3D Spaces

Evaluating technologies within the context of a Metaverse course involves assessing their capabilities, limitations, and potential contributions to building immersive digital environments where users can interact, work, play, and create. Let's delve into the evaluations of Web, AR (Augmented Reality), VR (Virtual Reality), and 3D spaces within the Metaverse framework:



- Web:

The Web serves as a foundational element in the Metaverse due to its ubiquity, accessibility, and interconnected nature. Evaluating the Web in the context of the Metaverse involves examining its role in enabling seamless connections between different virtual spaces, providing gateways for users to access and navigate various Metaverse experiences.

Examples:

Web3 Technologies: Technologies like blockchain and decentralized protocols are integrating with the web to create more open, secure, and interconnected Metaverse experiences.

Interoperability: Assessing how well the Web enables interoperability among various platforms and applications within the Metaverse.

- AR (Augmented Reality):

AR overlays digital content onto the physical world, enriching real-world experiences. In the Metaverse, AR contributes to blending physical and digital realms, enhancing user interactions and providing context-aware information.

Examples:

AR Social Interaction: Evaluating AR's potential for enabling social interactions by overlaying virtual avatars or information in real-world settings.

AR Commerce: Assessing how AR enhances shopping experiences by allowing users to visualize products in their environment before purchasing.

- VR (Virtual Reality):

VR immerses users in entirely virtual environments, offering a fully simulated experience. Evaluating VR within the Metaverse involves understanding its capacity to create immersive, interactive, and multi-sensory experiences.

Examples:

Virtual Meetings and Collaboration: Assessing VR's effectiveness in simulating real-world interactions for remote work or social gatherings.

VR Gaming: Evaluating how VR technology enhances gaming experiences by providing a deeper sense of presence and interaction.

- 3D Spaces:

In the Metaverse, 3D spaces serve as the canvas for virtual environments, allowing users to navigate, create, and interact within immersive settings.

Examples:

Virtual Real Estate: Evaluating the value and potential of owning and developing virtual properties within 3D spaces in the Metaverse.

User-Created Content: Assessing platforms that allow users to create and customize their 3D spaces, fostering creativity and engagement.

Evaluating these technologies involves considering their individual strengths, integration capabilities, user experiences, scalability, and potential challenges such as privacy, accessibility, and technological limitations. Understanding how these technologies complement each other and contribute to the overarching goal of creating a cohesive, interconnected, and immersive Metaverse experience is crucial within a Metaverse course.

## Immersive learning



Immersive learning is an educational approach that involves using technology to create a highly engaging and interactive environment for learning, where learners are deeply involved in the subject matter. In the context of the Metaverse, immersive learning leverages virtual and augmented reality (VR/AR), simulations, and interactive experiences to create an environment where learners feel fully immersed in the learning process.

Here's a breakdown of key components and examples of immersive learning in the Metaverse:

- **Virtual Reality (VR):** VR technology places learners in a completely simulated environment. For instance, imagine a history class where students use VR headsets to explore ancient civilizations. They can virtually walk through historical sites, interact with artifacts, and witness events as if they were there.
- **Augmented Reality (AR):** AR overlays digital information onto the real world. In an educational context, this might involve using AR apps to bring textbooks to life. For instance, students studying anatomy could use AR to visualize and interact with 3D models of the human body by scanning images in their textbooks.
- **Simulations and Scenarios:** Immersive learning often incorporates simulated environments or scenarios. For instance, in medical education, students might use VR simulations to practice surgeries or diagnose patients in a virtual hospital setting. These simulations provide a risk-free space for learners to experiment, make decisions, and learn from their mistakes.

- Interactive Experiences: Metaverse-based learning encourages interaction and collaboration among learners. For example, imagine a language learning platform in the Metaverse where students from around the world can meet in a virtual café to practice speaking in different languages. This interaction mimics real-world situations and enhances language acquisition.
- Personalized Learning: Immersive learning in the Metaverse can be tailored to individual learning styles and preferences. AI algorithms can track learner progress and adapt content to suit their needs. For instance, in a math class, the difficulty level of problems could adjust based on a student's performance, providing personalized challenges.
- Real-time Feedback and Assessment: Immersive learning platforms can offer immediate feedback to learners. In a coding class, for example, as students write code in a VR environment, they could instantly see errors highlighted, providing an opportunity for immediate correction and learning.
- Global Accessibility: The Metaverse breaks geographical barriers, allowing learners from different parts of the world to connect and learn together. This global accessibility fosters diverse perspectives and cultural exchange.

Immersive learning in the Metaverse aims to make education more engaging, memorable, and effective by creating experiences that cater to various learning styles and promote active participation. As technology continues to advance, the potential for immersive learning in the Metaverse is vast, offering innovative ways to enhance education across different fields and subjects.

## Decentralized commerce

Decentralized commerce, often referred to as decentralized e-commerce or DeCommerce, is a concept where buying and selling goods or services occurs without relying on traditional intermediaries like centralized platforms or institutions. Instead, it operates on decentralized networks, often facilitated by blockchain technology and smart contracts.

Here's a breakdown of key components:

- Blockchain and Decentralization:

Blockchain, a distributed ledger technology, forms the backbone of decentralized commerce. It's a secure, transparent, and immutable ledger that records



transactions across a network of computers. This decentralization removes the need for a central authority, enhancing security and transparency.

- Smart Contracts:

Smart contracts are self-executing contracts with the terms directly written into code. They automatically enforce and execute agreed-upon actions when predefined conditions are met. These contracts run on blockchain networks, enabling trustless transactions without intermediaries.

Examples:

1. Cryptocurrency Transactions:

In a decentralized commerce environment, individuals can transact directly using cryptocurrencies without the need for banks or financial institutions.

Example: Buying goods or services using Bitcoin or Ethereum without involving a bank or PayPal.

2. Decentralized Marketplaces:

Platforms like OpenBazaar and Origin Protocol enable peer-to-peer commerce without intermediaries. Users can buy/sell products directly with each other using cryptocurrencies or tokens.

Example: Selling digital art or handmade goods directly to buyers without platform fees.

3. Decentralized Finance (DeFi):

DeFi protocols provide financial services without traditional intermediaries. Users can lend, borrow, trade assets, and earn interest without banks.

Example: Using decentralized lending platforms like Compound or Aave to lend out cryptocurrency and earn interest.

Advantages of Decentralized Commerce:

- Censorship Resistance: Transactions are resistant to censorship since they're not controlled by a single entity.
- Lower Fees: By eliminating intermediaries, transaction fees can be significantly reduced.

- Increased Security: Blockchain's cryptographic security ensures the integrity of transactions.

### Challenges:

- Scalability: Current blockchain networks face scalability issues, limiting transaction speeds and efficiency.
- Regulatory Uncertainty: Regulations around decentralized commerce are still evolving, leading to uncertainty in some jurisdictions.
- User Experience: The user experience of decentralized platforms may not be as seamless as centralized ones, affecting adoption.

### Metaverse Integration:

In the context of the Metaverse, decentralized commerce could enable virtual economies where users can buy, sell, and trade digital assets, avatars, virtual real estate, or services within virtual worlds without relying on centralized platforms, fostering a more open and interconnected digital environment.

Overall, decentralized commerce revolutionizes the traditional e-commerce landscape by providing more autonomy, transparency, and efficiency in transactions while aligning with the principles of the Metaverse.

## **Challenges and opportunities of Metaverse**

The Metaverse presents a fascinating landscape filled with both challenges and opportunities.

### Challenges of the Metaverse:

#### 1. Technical Hurdles:

Interoperability: Ensuring different virtual worlds, platforms, and technologies can seamlessly interact poses a significant technical challenge.

Scalability and Infrastructure: Building an infrastructure that can handle a vast number of users concurrently is a considerable hurdle.

#### 2. Privacy and Security:

**Data Privacy:** With increased interaction and data exchange, safeguarding user information becomes crucial.

**Identity Protection:** Protecting identities and preventing fraud in a virtual space is a challenge.

### 3. Content Moderation:

**Regulating Content:** Maintaining appropriate content standards across diverse cultures and age groups within the Metaverse.

**Preventing Misuse:** Addressing issues like hate speech, harassment, or illegal activities within virtual environments.

### 4. Economic and Social Impact:

**Economic Disparity:** Ensuring equal access and opportunities for all socioeconomic groups in the Metaverse.

**Social Isolation:** Balancing immersive experiences with the risk of further disconnecting people from physical social interactions.

## Opportunities in the Metaverse:

### 1. New Economies and Industries:

**Virtual Real Estate:** Opportunities for buying, selling, and developing virtual properties.

**Digital Goods Market:** Creation and trade of digital assets like art, fashion, or unique in-game items.

### 2. Enhanced Experiences:

**Education and Training:** Immersive learning experiences and simulations.

**Remote Work and Collaboration:** Virtual office spaces facilitating global collaboration.

### 3. Innovation and Creativity:

**User-generated Content:** Platforms enabling users to create and share their content, fostering creativity.

Technological Advancements: Pushing boundaries in AR, VR, AI, and other tech fields.

#### 4. Social Interaction and Connectivity:

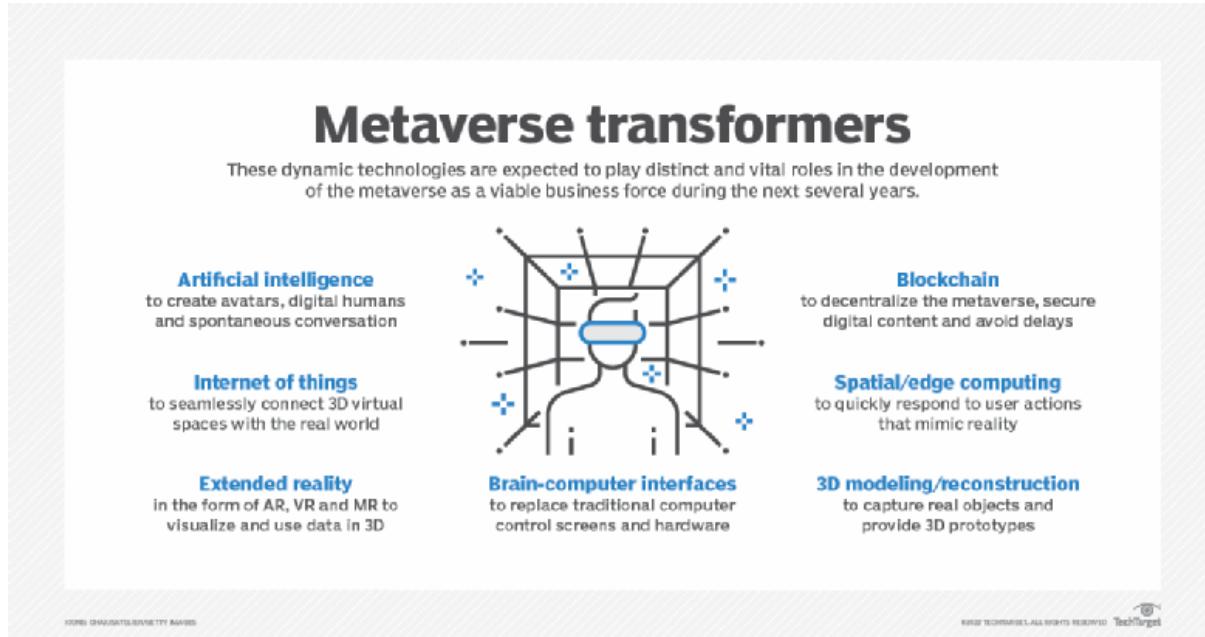
Expanded Social Connections: Creating new ways for people to interact, socialize, and build communities.

Inclusivity: Offering opportunities for people with disabilities to engage and interact more easily.

#### Examples:

- Roblox: Illustrates a platform where users can create, share, and play games, showcasing the potential for user-generated content and diverse experiences.
- Decentraland: An example of a virtual world where users own land and assets on a blockchain, indicating the emergence of virtual real estate and digital economies.
- Microsoft Mesh: Demonstrates the potential for collaborative and interactive experiences in virtual spaces, highlighting opportunities for remote work and social interaction.
- The Metaverse holds immense promise, but overcoming challenges around security, inclusivity, infrastructure, and regulation will be essential to realizing its full potential.

# the Key Building Blocks of Metaverse Technology



The metaverse is technically complex since it depends on many kinds of technology. It would be challenging to construct interactive virtual environments with such a high level of realism without these technological components.

Explore what kinds of technological infrastructure are needed for an effective metaverse deployment.

## **Virtual Reality and Augmented Reality**

Provide users with the experience of engaging with the metaverse in an immersive fashion. Virtual Reality (VR) technology, when paired with a headset, allows users to enter the virtual world, but Augmented Reality (AR) technology actually brings virtual objects into the real world. These two technologies are commonly employed in the gaming, education, retail, and healthcare industries.

## **Blockchain**

Blockchain paves the way for secure, decentralized transactions between users in the metaverse. The ability to create and own digital assets that can be traded and sold in the metaverse is another benefit of this technology. Some major players in the industry of real estate, for instance, are currently engaged in the trade of virtual real estate.

## **AI and Machine Learning**

Machine learning (ML) and other forms of artificial intelligence are rapidly gaining ground as critical tools for the development of intelligent and adaptive metaverse virtual environments. They can be utilized to make intelligent “characters” that interact with users, delivering a greater sense of life and personality to virtual environments, thanks to this brilliant technology.

### **Cloud Computing**

Cloud computing is just as vital as AI and ML for constructing the metaverse. Both the processing power and data storage for massive metaverses can be available in the cloud. In addition, consumers can use the metaverse from any device, thanks to cloud connectivity.

### **5G**

The 5G network enables real-time interactions in the metaverse by providing high-speed, low-latency connections. For the maximum extent of immersion in the metaverse, high-quality audio and video streaming is also made possible through this network.

### **Spatial Computing**

Furthermore, spatial computing allows for the creation of spatially virtualized environments in the metaverse. As an example of how this innovation might be put to use, think of the possibility of making a map that responds to the position and actions of the user within a virtual environment.

### **Natural Language Processing**

The term “Natural Language Processing” (NLP) refers to a set of tools that enables people to communicate with artificial systems in a natural way. In the metaverse, this tech can be utilized to construct intelligent chatbots and virtual assistants.

The metaverse relies on the aforementioned seven enabling technologies, but there is one more. Yet that’s a topic for its own discussion, which comes up next.

## **Web 3.0: The Key to Unlocking the Full Potential of the Metaverse?**

Web 3.0 is fast becoming a vital tool for the metaverse since it offers the backbone for decentralized, interoperable, and open virtual worlds. Web 3.0 is the most current version of the internet, containing technologies like blockchain and peer-to-peer networks. The metaverse’s deployment will be more trouble-free and safe for end users as a consequence of Web 3.0 improvements.

Web 3.0 makes the metaverse more accessible to all users by removing the requirement for a regulatory organization to oversee activity in the virtual world. Web 3.0 gives consumers complete ownership over their personal information and digital assets, making them more transparent and egalitarian in terms of virtual economic worth.

Metaverse-wide application and platform portability are another great benefit of Web 3.0. This implies that users are no longer restricted to any one platform but may instead freely travel between and engage with others in a variety of virtual environments. For instance, in the metaverse, a user can make a virtual object that can then be used in other virtual worlds without the requirement for a governing body to oversee their transfer.

Web 3.0 also makes using the metaverse safer and more discreet for its users. To reduce the possibility of fraud and to protect the virtual economy from corruption, blockchain, a decentralized technology, will make user transactions inside the metaverse safer and more verifiable.

Last but not least, Web 3.0 fosters a more public and communal setting for growing metaverses. Using decentralized technology, anybody may help construct the metaverse, contributing to a more diverse and unique digital environment.

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# Future Of Internet



It's difficult to predict exactly what the future internet will look like because new technology is evolving so quickly — but there is no doubt that the newest iteration of the web will transform virtually every part of our economy and society.

“future internet” is about the third evolution of the web, where life online will become more decentralized and immersive. This stage follows web1, which was based on static websites, and web2, which was characterized by user-generated content and driven by social media companies like Tencent and Facebook.

You can use the terms “web3” and “future internet” interchangeably.

While these terms may mean slightly different things to different people, there are predictions I can make as a futurist about how web3 technologies will play out and affect the way we live, work, and play.

Here are five trends that may influence the future internet:

- **The Metaverse and Immersive Experiences**

- In the future internet, digital (online) activities will merge with virtual and physical worlds to create realistic, immersive experiences. Brands, schools, employers, and individuals will all operate their own virtual worlds where people can gather to learn, game, work, or socialize.
  - The metaverse — a persistent, shared digital environment where we can move from activity to activity with the same avatar, digital assets, and preferences — brings together technologies like augmented reality (AR), virtual reality (VR), and digital twins to create a more immersive, realistic and engaging internet.
- **The Rise of Decentralization**
    - In the decentralized internet, power and control are distributed rather than centralized. In the future, the internet will increasingly be powered by decentralized technologies like blockchain and peer-to-peer networks rather than being controlled by a few government entities or large corporations. This would allow for greater privacy and security and will cut down on censorship. A decentralized internet will also enable new types of applications and services that are not possible on the current centralized internet.
    - Three concepts that play a central role in web3 are:
      - **Blockchain:** A method of storing information built around distributed computing, encryption, and transparency.
      - **Cryptocurrencies:** Digital currencies used for secure financial transactions that run on blockchain networks.
      - **Non-fungible tokens (NFTs):** Digital assets that represent ownership of a unique item or asset. NFTs can be securely bought, sold, and traded online, and each NFT represents a unique item or asset, like a piece of art, a collectible, or even a tweet.
      - **Decentralized applications (dApps):** Digital applications that run on a blockchain, outside the control of a single authority.
  - **Advanced Hardware**
    - Hardware innovations like goggles, glasses, and headsets will help speed up the next iteration of the future internet.
    - Big tech companies are not only creating cutting-edge VR headsets for when we want a fully immersive internet experience, but they're also working on devices like smart

glasses that we can comfortably wear while walking around and interacting in the real world.

- I recently tried out a prototype of smart glasses made by Viture. These glasses look just like regular sunglasses, but they display a 120-inch virtual screen in front of your face. With these glasses, I could block out the real world to play a game or watch a video, or look through them just like normal glasses.
- Smart glasses of the future will bring augmented reality to life by displaying digital images and information in front of our eyes as we move through our days. This will be one way we'll incorporate AR into the way we work, play, and live.
- It could be possible that with this new wearable technology, we may reach a point where we no longer need smartphones.

## 4. Body Augmentation

- Body augmentation is the use of technology to enhance or modify the human body. In our current society, we're already altering our bodies, including things like the implantation of devices like cochlear implants for hearing or pacemakers for controlling heart function.
- As part of the future internet, body augmentation will go further. Mojo Vision is developing AR contact lenses that position micro-LED displays inside the wearer's eyes. Imagine being able to put in these lenses, and see weather information, chat messages, or AR information about the world around you.
- Some companies are pushing body augmentation even further and trying to hook our brains directly to the internet. "Neural VR" combines virtual reality technology with brain-computer interfaces (BCIs) to create immersive, interactive experiences that are directly connected to an individual's nervous system.
- With neural VR, users can control and interact with virtual environments and objects using their thoughts rather than traditional input devices such as a keyboard or controller.
- Companies like Neurable, Meta, and Elon Musk's Neuralink project are all working on BCIs that have the potential to revolutionize the way we interact with the future internet.

## 5. Bringing the Touch and Sound to the Internet

- Developers are also hard at work on devices and wearables that allow us to experience the internet on deeper levels using a full range of senses.

- There are already haptic suits like the Teslasuit that can deliver a full-body experience that simulates actual touch, but they're not currently attainable for most VR users. In the future, haptic devices like gloves will become more accessible for everyday users, and lightweight, wearable haptic patches will deliver a sense of human touch across long distances.
- Sound will also play an incredibly important role in the Internet of the future. With spatial audio, we'll be able to enjoy 360-degree sound in our virtual experiences and communications. Companies will also need to give more thought to their sonic branding — the use of music or audio elements to create their own unique, consistent, and memorable audio identity.

# How metaverse is different from Internet?

## Metaverse VS Internet (a.k.a. World Wide Web)

### **Metaverse:**

In futurism and science fiction, the **metaverse** is a hypothetical iteration of the Internet as a single, universal and immersive virtual world that is facilitated by the use of virtual reality (VR) and augmented reality (AR) headsets. In colloquial use, a metaverse is a network of 3D virtual worlds focused on social connection.

### **Internet:**

The **Internet** (or **internet**) is the global system of interconnected computer networks that uses the Internet protocol suite (TCP/IP) to communicate between networks and devices. It is a **network of networks** that consists of private, public, academic, business, and government networks of local to global scope, linked by a broad array of electronic, wireless, and optical networking technologies. The Internet carries a vast range of information resources and services, such as the inter-linked hypertext (HTTP) documents and applications of the World Wide Web (WWW), electronic mail, telephony, and file sharing.

### **Difference between Metaverse and Internet:**



#### **Internet is and define as:**

"With the internet, people are always interacting with something — be it a website, a game, or a social media platform that connects us to our friends."

#### **Whereas Metaverse is and define as:**

"But the metaverse takes this one step further and puts the user in the middle of the action and that's one aspect that differentiates the metaverse from the internet."

The metaverse combines aspects of physical reality, virtual reality, augmented reality, artificial intelligence, social media, online gaming and cryptocurrencies, allowing users to interact virtually."

So what will be the impact to our daily life before Metaverse (the Internet world), during Metaverse (upcoming) and after Metaverse (if it really happens)?

To understand and define this, we have to look at the History of Internet and how did it impact us till to date. All upcoming Technological advancement will have to go through a similar roadmap in order to be matured and adopted widely.

The key factor is whether how beneficiary will this upcoming world of Metaverse impact the Individuals (general public like you and me), the Business organizations (companies, etc) and the Government Agencies around the globe.

## References

<https://www.linkedin.com/pulse/metaverse-vs-internet-aka-world-wide-web-richard-chong/>

# **Unit 2**

## **Potential of Metaverse:-**

### **The Potential of the Metaverse:**

'Metaverse' is the buzzword everyone's talking about. A new stage in the development of the internet, **the Metaverse will harness advanced technology to bridge the virtual and digital worlds.** With many developments and experiments currently being made in this area, what the Metaverse will look like and how it will affect everyday life is still up for debate.

This article will review all the evidence and expertise to consider what a future with the Metaverse may look like.

### **What is the Metaverse?**

As the name suggests, the Metaverse is a world beyond the physical and digital ones we already know. **Specifically, it's a constructed virtual reality which people can enter and interact with through an avatar they create to represent them.** This is in contrast to augmented reality, where technologies enhance how a human interacts with the real world.

**For example, a fantasy world might be created as part of a video game. To enter the game, a player will put on a headset and create an avatar of themselves. They will then interact in this fantasy world as this avatar. This means sensing, moving and experiencing the virtual world as they would the real one.**

While Web1 saw the launch of the internet and Web2 of social media, the creation of the Metaverse is considered to be the defining feature of Web3. Just like the other stages, Web3 and the Metaverse are expected to transform the way we interact with each other online and offline.

In fact, the consequences and potential of immersing people in a virtual environment are still to be fully realised.

### **What are the potential impacts of the Metaverse?**

Though the Metaverse is still in the experimental stages, experts have already started to consider what the positive impacts of these revolutionary technologies may be.

## **Connectivity**

**To work effectively, the Metaverse needs to use a network of different technologies and systems. A headset, the physical and virtual structures that will create the immersive environments and devices connected via the Internet of Things (IoT) are just some of the essential tools.**

To enhance the experience further, other systems will need to be added. For example, blockchain and cryptocurrency networks will need to be linked into environments where people are going to make purchases.

This will only be made possible by greater connectivity between different types of technologies. To create a seamless experience, advanced levels of digital communications, IoT and graphics will need to be developed and have fast, effective connections.

## **Gaming**

**The gaming and entertainment industry has been marked out as one which will be particularly impacted by Metaverse technologies.** By creating new worlds for players to physically interact with, game developers can take their experience of fantasy and fun to the next level.

Indeed, many of the earliest developments in the Metaverse are being made in the gaming world. **By combining consoles, headsets and hand controllers together, giants like Meta Platforms, Unity and Epic Games are already developing immersive environments for gamers to interact in.**

**With [59% of surveyed industry experts](#) believing that gaming will make the most investment into virtual reality technologies in the next few years, it's clear that stakeholders believe in the potential the Metaverse holds for the industry.**

## **Social interactions**

**The Metaverse will be marked apart from previous developments of the internet by people's ability to experience a virtual world as if in the real one. This means, unlike previous forms of internet communication, conversations between individuals will be more human-like in the Metaverse.**

It will also mean people can move away from text-based messages and use gestures, facial expressions and touch to talk to each other. Though these interactions will take place in a virtual world, this capability could help people to work, socialise and make purchases in a whole new way.

**Reducing incidents of loneliness and enabling effective international collaboration are just two of the potential benefits.**

## Digital worlds

**Metaverse technologies will enable people to experience digital worlds in a whole new way. From meeting the avatars of other [Twitter](#) users to being able to see, feel and look at products in more detail in an Amazon marketplace.**

All everyday online activities now have the potential to be experienced physically. For individuals and businesses, this raises many questions, including:

- How much crossover there should be between the real and digital worlds?
- How do we maintain cybersecurity in these new virtual environments?
- How could experiences be altered or enhanced in the digital world in a way they can't in real environments?

**Thoroughly considering the ethics and impacts of extending the real world digitally will be key to a successful and positive evolution of the Metaverse.**

## Marketing

**As brands look for new ways to get customers to interact with their products or services, [experiential marketing](#) is seeing rapid growth.** Even after the COVID-19 pandemic, investment in this area rebounded by [8.2% in 2021](#). It is also expected to outgrow investment in the rest of the marketing and advertising sector by between 3% to 6% up to 2026.

From developing environments and [delivering content that builds customer affiliation](#) to enabling buyers to interact with products before making the final purchase. Entire customer journeys have the potential to be extended into the digital world thanks to Metaverse technology.

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[https://www.linkedin.com/pulse/potential-metaverse-virtual-reality-revolution-become-skmktagency?utm\\_source=share&utm\\_medium=member\\_ios&utm\\_campaign=share\\_via](https://www.linkedin.com/pulse/potential-metaverse-virtual-reality-revolution-become-skmktagency?utm_source=share&utm_medium=member_ios&utm_campaign=share_via)



# **Unit 2**

## **Challenges to build these virtual environment**

### **How feasible is the Metaverse?**

Though excitement for the potential of the Metaverse is growing amongst technology experts, there are still some restrictions and challenges to building these virtual environments.

#### **Technological developments**

Some elements of Metaverse infrastructure are already being used fairly widely, such as augmented reality headsets and virtual reality environments. Yet there are questions about how quickly this will be able to be built into an effective immersive environment.

[\*\*McKinsey's recent report\*\*](#) into the Metaverse considers this in-depth. This includes identifying the four 'building blocks' required to make the development of these worlds possible:

- [\*\*Content and experiences\*\*](#)
- Platforms
- Infrastructure and hardware
- Enablers

For the Metaverse to work effectively, all these elements need to be connected so they can interact and operate together. Developing the technology to make this possible is a key barrier to the Metaverse's success, says McKinsey.

#### **Cybersecurity**

To enable people to interact freely with digital worlds, they need to be opened up. However, this risks the security of any individual and business details shared across physical and virtual environments. Putting safeguards in place to ensure that personal or confidential information can't be accessed openly is a key consideration for Metaverse experts.

There are also concerns over the increased accessibility of dark web and illegal activities as a result of Metaverse technologies. Putting the right legislation and controls in place to protect people from these is essential to making the Metaverse safe.

## **User ethics**

With digital and real worlds coming closer together, the potential physical, emotional and mental health impacts of interacting with the Metaverse are a major point of consideration. Interacting with avatars, separating fictional storylines from real-life facts and balancing escapism with responsible behaviours are just some issues individuals may experience in the Metaverse.

For businesses developing Metaverse environments, creating content and experiences that make the distinction between physical and virtual worlds clear while also being immersive is going to be an important ethical challenge to overcome.

## **Property rights**

Who owns what is going to be a major question for the Metaverse. From harmful or illegal content to digital financial assets, all intellectual and personal property needs to be protected and controlled.

As well as setting up necessary systems and legislations to maintain these rights, putting an independent regulatory body in place to oversee Metaverse conduct is also a challenge. Tracking ownership, establishing the limits of free speech and setting physical and digital consequences for those who breach the rules are just a few property rights considerations.

## **Accessibility**

In the initial stages of Metaverse development, the technologies required to access these worlds will be expensive and not widely available. This could lead to a widening gap in accessibility due to financial inequalities, with only those able to afford it benefiting from the Metaverse.

Similarly, designing Metaverse experiences and content that are accessible to people with physical or learning difficulties is also important. Indeed, the freedom and openness of the Metaverse hold huge potential for this. For example, people will be able to create avatars of any race, gender or ability.

# **What will be the economic impact of the Metaverse?**

Economies in the physical and virtual worlds will have to overlap and interconnect in the Metaverse. It's estimated that the opportunity these technologies create will [add up to \\$3 trillion to global GDP by 2031.](#)

However, this interlocking of real and digital economies will also present challenges to the operation of financial institutions and different countries' economies, including:

- Effective regulation: particularly in the fintech space, it's important that consumer rights are protected to ensure their money and assets aren't mismanaged in the Metaverse
- Protecting digital assets: from non-fungible tokens (NFTs) to cryptocurrencies, having systems in place to keep the ownership and transfer of these assets secure and efficient will be key
- Increased decentralisation: large areas of the digital economy are decentralised while much of the real-world economy isn't. Maintaining effective interactions between these two systems is essential for the Metaverse economy to work effectively

By considering these controls and being open-minded to the opportunities, businesses and individuals can tap into the full potential of the Metaverse economy.

## The future of the Metaverse

The exact impacts of the future technology of the Metaverse are yet to be fully realised. However, as the next stage of the internet's development, there's no doubt it will cause significant disruption to individuals, businesses and industries.

By bringing virtual and physical environments closer together, the way we perform everyday activities will be revolutionised. This includes the way we interact with brands, make decisions and purchases.

## References

[https://www.linkedin.com/pulse/potential-metaverse-virtual-reality-revolution-become-skmktgagency?utm\\_source=share&utm\\_medium=member\\_ios&utm\\_campaign=share\\_via](https://www.linkedin.com/pulse/potential-metaverse-virtual-reality-revolution-become-skmktgagency?utm_source=share&utm_medium=member_ios&utm_campaign=share_via)

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# Different shapes of Metaverse:- NFTs

**The metaverse.** This is a theoretical concept of a digital 3-D world that you enter via a virtual reality headset. In this virtual world, you have a "body" (avatar) that you can customize, a home to fill with the stuff you like and hundreds of spaces to visit. You can interact with other users, do work, play games and basically perform most of the activities that you do in everyday life.

The metaverse is useful because it greatly reduces our need to travel and use physical resources. In a 3-D world, we can visualize and interact with any object without putting in much effort and time. We can cycle between activities, chats, locations and data with a simple gesture. Instead of switching between apps and a web browser, everything is connected and accessible in this digital world.

- **NFTs.** These are nonfungible tokens — tokens that are 100% unique. You can think of them as certificates of ownership that exist on the blockchain. They are created when a digital file (commonly an image, video or GIF) is minted. This means that a certificate of ownership and originality is generated via cryptocurrency (usually Ethereum) and sold/granted to the new owner.

**NFTs are useful because digital art and assets are notorious for being easy to steal and copy. While NFTs cannot stop somebody from stealing digital assets, they provide a neutral and unbiased confirmation of the designated owner. If we ever see NFTs integrated into copyright law, they may also serve as evidence against the misuse of digital goods.**

## NFT Uses In The Metaverse

Because NFTs are generally associated with websites and transactions that occur through web browsers, and because the metaverse is mostly VR-based, there might be some confusion about what their common ground is — and whether there is any in the first place. Thankfully, despite the

relative novelty of both concepts, several companies have already found creative and fruitful ways to use both simultaneously.

**1. Virtual marketplace.** With apps like VRChat, spaces for communication in VR are [already thriving](#), and it is not a huge leap to assume that these spaces can also serve as a fertile trading ground for NFTs. Sellers can easily provide links and previews to assets on the web or mint assets directly in the VR landscape.

VR and NFT marketplaces can appeal to many brands in various industries, and Nike is a good example. It's already [dipping its toes](#) into the metaverse with its own virtual "Nikeland" and has now acquired a studio (RTFKT) known for making NFTs of products. Perhaps it is only a matter of time before we see the two concepts meet in "Nikeworld."

**2. Art gallery.** VR is perhaps the best possible platform (short of an actual brick-and-mortar building) for viewing art. You get to see it up close with every detail and from every angle. This type of solution differs from a marketplace because the prices are already set (and not negotiated), the assets are all of one type (art compositions) and the atmosphere is much more relaxed.

For example, many museums are currently placing NFT artwork in metaverses such as Cryptovoxels, powered by the Ethereum blockchain. According to The Art Newspaper, Cryptovoxels [hosts](#) "art galleries and museums, including San Francisco Museum of Modern Art and the FC Francisco Carolinum Linz, Austria."

**3. New frontiers.** Real estate can be a pretty lucrative industry to work in in the physical world, and the same could apply to the metaverse. We are not referring to real homes being sold digitally but rather digital land and territories being partially or completely sold for further user development.

This case is more easily illustrated with an example. Decentraland is a virtual territory where plots of land can be [sold as NFTs](#), and everything is represented in 3-D. This "country" has its own cryptocurrency and is slated to [enter the metaverse](#) (make the world accessible to VR users) later in 2022.

## How To Implement A Metaverse With NFTs

As you may have noticed, the metaverse is still a pretty new concept, and only a handful of companies have already built real solutions in this field that implement NFTs. Thus, if you see a use case for the combination in your business and have the resources to make it happen, you could be one

of the first companies in your industry to take advantage of these two trends.

Because most companies do not have any VR developers employed on their payroll full time, we might recommend looking to work with a company that has many years of experience in building immersive apps. Companies might consider going down this road even if they have a few local developers, as they might lack platform-specific knowledge of VR software such as building with Unity and Unreal or implementing movement tracking. Knowledge of blockchain and NFT minting will also be helpful unless you want to take on these technical aspects yourself.

Hopefully, now you know the main ideas behind the two concepts and have a sense of where the market is headed. If you choose to embrace the metaverse and NFTs in your business, it could be a great chance to break away from competitors and paint your business as a future-oriented one.

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<https://www.forbes.com/sites/forbestechcouncil/2022/03/11/what-is-the-role-of-nfts-in-the-metaverse/?sh=7e721f8f6bb8>

# **Blockchain's Crucial Role in Empowering the Metaverse**

The Metaverse, a captivating digital universe where people interact, socialize, and explore, is quickly becoming an essential part of our online lives. But what's powering this futuristic realm and making it truly exciting? Enter blockchain technology — the backbone of the Metaverse- transforming how we experience and engage with this virtual wonderland.

**Decentralization and Ownership:** In the Metaverse, true ownership matters. Blockchain's revolutionary principle of decentralization ensures that users hold the reins. Say goodbye to centralized authorities controlling your assets and data.

With Blockchain's secure and transparent system, you're the sole owner of your virtual goodies — unique digital assets and creations. No more restrictions on transferring them across platforms; you're free to explore, trade, and show off your prized possessions across the Metaverse.

**Interoperability and Seamless Experiences:** Imagine moving effortlessly between different metaverse platforms, carrying your digital identity and belongings. That's what Blockchain makes possible. By embracing blockchain protocols and smart contracts, the Metaverse breaks down barriers, letting you enjoy a smooth, interconnected experience. No more starting from scratch every time you step into a new virtual world. Your presence, belongings, and achievements stay with you, making your metaverse journey more vibrant and connected.

**Enhanced Security and Privacy:** Privacy and security are paramount in the Metaverse's bustling digital landscape. Enter Blockchain's top-notch security features. With its decentralized structure and advanced encryption, your data remains safeguarded from cyber threats and unauthorized eyes.

Say goodbye to privacy concerns and hello to a safe virtual environment. Blockchain's transparent ledger also ensures user trust, helping you easily verify transactions and track activities.

In a nutshell, blockchain technology empowers the Metaverse in ways we couldn't have imagined before. It hands over control to users through decentralization and ownership, revolutionizes experiences with interoperability, and provides top-notch security and privacy.

The Metaverse is set to redefine how we socialize, create, and explore the digital realm, and Blockchain is undoubtedly the superhero making it all possible. Embrace

the future of the Metaverse, where imagination knows no bounds, and Blockchain leads the way.

## **Tokenization of Metaverse**

Step into the Metaverse, where the virtual and Blockchain realms collide, crafting an exhilarating experience! At its core, tokenization, the secret sauce fueling this epic adventure, unlocks a world of endless possibilities and boundless rewards.

**a. Virtual Currency:** Picture a digital gold rush, where virtual currencies reign supreme! These digital assets, or tokens, are powered by blockchain technology and become your golden tickets to the Metaverse's bustling economy. Exchange them for exclusive in-game treasures, unique NFTs, or virtual real estate. With no borders to hold you back, you'll be immersed in a thrilling, decentralized world of trade and innovation!

**b. Incentives and Rewards:** Get ready to reap the rewards of your creativity and participation! The Metaverse showers you with tokens for your every contribution — whether you're a visionary developer, an artist, or an avid explorer. Smart contracts ensure that your efforts are recognized, driving a thriving ecosystem of talents and innovation. As your token stash grows, so does your reputation, shaping you into a true Metaverse trailblazer!

**c. Governance and Decisions:** The Metaverse puts you in the driver's seat! Join the democratic revolution as a token holder and have a say in shaping the virtual world's destiny. Vote on platform updates, content moderation, and economic policies with complete transparency. Your voice matters, and together, we'll build an inclusive, user-governed Metaverse where everyone's ideas matter!

Embrace the metamorphosis of digital existence as tokenization takes center stage in the Metaverse. From epic quests to bustling marketplaces, your journey awaits, so dive in and forge your destiny in this thrilling, limitless frontier!

## **Challenges and Considerations in Adopting Blockchain for Metaverse**

As the Metaverse rapidly evolves, the integration of blockchain technology presents exciting opportunities and groundbreaking possibilities. However, to fully harness its potential, we must address certain challenges and considerations that lie ahead.

**a. Scalability:** In the fast-paced and expansive Metaverse, ensuring blockchain technology can handle the ever-growing user base and data demands is critical. As

more users participate and generate vast amounts of data, traditional blockchain networks may need help maintaining efficiency and speed.

Scalability solutions such as sharding, layer 2 protocols like Lightning Network, and optimized consensus algorithms like Proof-of-Stake are being explored to enhance network capacity and transaction throughput. Striking the right balance between decentralization and scalability will be key to achieving a seamless metaverse experience.

**b. Energy Consumption:** The energy-intensive nature of blockchain operations has raised concerns about its environmental impact. With an increasing number of users and transactions, the energy consumption of blockchain networks may escalate significantly.

To overcome this challenge, developers are exploring eco-friendly alternatives, such as Proof-of-Stake (PoS) consensus mechanisms, which significantly reduce energy consumption compared to traditional Proof-of-Work (PoW) systems. Blockchain can pave the way for a greener metaverse by implementing sustainable and energy-efficient protocols.

**c. User Experience:** A smooth and immersive user experience is paramount for widespread metaverse adoption. While blockchain technology ensures digital asset transparency, security, and ownership, its complex user interfaces and transaction times can deter mainstream users. Simplifying blockchain interactions through user-friendly interfaces and optimizing transaction speeds are vital to enhancing user experience. Additionally, bridging the gap between Blockchain and traditional applications will encourage more users to embrace the Metaverse, making it an inclusive and user-centric space.

**D. Regulation and Legal Concerns:** The decentralized nature of the Metaverse raises several regulatory and legal challenges. As users engage in virtual economies, issues surrounding jurisdiction, taxation, intellectual property rights, and consumer protection become paramount. Collaborating with regulatory bodies to establish clear frameworks and guidelines for blockchain-based interactions will foster trust among users and stakeholders. Striking the right balance between innovation and compliance will create a secure and legally compliant metaverse ecosystem.

<https://www.linkedin.com/pulse/metaverse-blockchain-future-enhanced-user-experience/>

# Platforms involved in the Metaverse

## What is Metaverse Platform?

With over 200 million online users in the last month, digital and virtual spaces such as Roblox is teeming with activity and life.

Companies are experimenting with virtual storefronts, artists and communities are offering digital collectibles, and work on the [Metaverse development](#) is at full steam.

And yet, what is a Metaverse platform? Well, a Metaverse platform, for those who are yet to wrap their heads around this topic, is an all-encompassing virtual world.

Users from all over the globe can connect to this virtual world which is a shared space, and use the tools and options available to interact on it.

### ✓ It's persistent

One of the key features of what Metaverse platforms should exist as, or be in the online world is that they are persistent.

Persistent in that even when there are no users to use a platform, it should still be online and accessible all the same.

This means that people are able to join and leave the Metaverse when they want at any time, and also return to enjoying something on the platform – seamlessly.

### ✓ It's Immersive

The virtual world and much of setting the place inside a Metaverse platform should neatly fit the immersive experience it either offers, or will offer.

This means that when a person will join a platform while having equipped VR or AR headsets, they should be able to interact with everything as if they are really there.

The immersive experience of the platform can further be supplemented by different viewing options, digital avatars, spatial audio, etc.

### ✓ It's Interoperable

Interoperability in the Metaverse is a must and as more platforms evolve, users should have the capability to migrate between different platforms at their own wish.

Moreover, they will have the convenience to do so without losing or leaving behind any of their digital assets on a different Metaverse platform.

Many of the platforms, as they exist today, have their own established cryptocurrencies, tokens and ecosystems. But this will ensure a collective Metaverse space which brings together all the fragments.

### ✓ It's Extensive

Another salient feature of Metaverse platforms is that they are created in a manner that lets them scale. As it scales, it will have room to evolve and expand to include new settings, environments, assets and users.

Today, many Metaverses are limited by the number of users the platform's servers can host.

However, this is rapidly changing and the extensible design of the platforms ensures that it would later adapt to new features and more users when required.

These are some of the important features that define Metaverse platforms. Today, there exists several platforms and virtual worlds that operate on their own, consisting of unique features in addition to the ones listed above.

They also have their own ecosystems, marketplaces and support various activities for stakeholders or investors.

As the technologies evolve, it is also possible to see platforms co-exist in shared virtual spaces with shared economies and users – owing to these features.

## 15 Best Metaverse Platforms Powering Virtual Worlds

Today, anyone can start on building their own Metaverse platform, given the open-source tools that have sprung up in the community.

Or, even go for professional [Metaverse services](#) to help develop segments of their virtual space and bring alive their vision.

However, it's important to check and have a defined route or industry they would be creating a Metaverse platform for, as there are quite a few.

Here are some of the top Metaverse platforms that are shaping the future of these virtual spaces:

## 1. Roblox Metaverse



Roblox, is easily one of the most popular Metaverse platforms amongst online users and those in the circle of the virtual community.

It has seen years upon years of advancements and work, and still continues to implement new upgrades and features for its users.

Users, by the way, which number in the millions on a daily basis. And with over 200 million of these users clocking in, for hours every month, it's safe to say that this is one of the largest Metaverse platforms that one can join today.

### The Industry and Community

Much of the community that Roblox has garnered over the years revolves around people seeking games and social interactions on their Metaverse platform.

And that is exactly the industry Roblox has filled, settling into the entertainment sector with how the activities and opportunities on their poised for.

On their platform, you can expect to have your hands filled with games ranging from various genres. Whether you're into fighting games or RPGs and shooters, or even navigating through obstacles and races.

The emphasis on social interactions in Roblox is quite important and this lies in the fact that the platform hosts both single-player games and multiplayer ones.

Multiplayer games further the online experience of interacting with others on a Metaverse platform and it usually sees people inviting their friends to play with them.

In addition to the options made possible in multiplayer gaming, Roblox also boasts VR capabilities and cross-platform compatibility.

And this ensures a truly immersive experience for the users depending on the system and hardware they use to join up.

## **Technology and Features**

As a Metaverse platform, Roblox has a variety of technologies operating under the hood but one of them which stands out for its users is the Roblox Studio.

People navigating this platform can use the Studio to create games and virtual experiences of all sorts, even if they know nothing about coding and scripting.

That's because the engine offered by Roblox has an interactive and visual programming language.

Furthermore, people can create and sell different types of avatars for a user's profile which are present in the market.

1. Roblox Studio A proprietary game engine dedicated to enabling creators with the means to design, script, code and build their own 3D games.
2. Virtual Economy Users on the Metaverse platform can use the in-game currency to gain access to various items. Known as Robux, it helps in supporting the developers who make the digital assets, accessories and avatars, etc.
3. Customizable Profiles The people navigating Roblox can also use a variety of options to customize their final profiles. This includes swappable avatars, clothes, animations and accessories.

4. Cross-platform Compatibility More than just PC or being limited to just one OS is not a problem for Roblox as it is available for use across various platforms – including Macs, iOS, Android and even Xbox.

## 2. Decentraland



As a Metaverse platform, Decentraland is credited with enabling one of the crowning features of joining virtual worlds – buying virtual land or real estate.

Known as 'LAND' in the community, the platform sees users buy plots of virtual land which can then be further developed as per the wishes of the user.

The Metaverse platform also provides software development kits so that developers can create all sorts of games, applications and custom locations on it.

All the financial dealings that take part on Decentraland and its ecosystem, is powered by Ethereum.

As the platform is built in combination with blockchain technology and uses smart contracts for matters related to ownership of assets such as LAND.

## 3. Edverse



The [Edverse metaverse platform](#) provides a dynamic environment that transcends physical boundaries, allowing users to interact, collaborate, and create in a shared virtual world.

It is a pivotal centre for online learning that promotes immersive learning. Additionally, it acts as a flexible platform for online meetings, encouraging relationships and community development.

Edverse offers a scalable solution for organisations, whether they are giant corporations or fledgling startups, to improve cooperation and engagement.

It's where creative teaching techniques are unlocked by educators, where business aspirations may flourish, and where event hosts can create unforgettable experiences.

The Edverse metaverse, which promotes creativity, connectedness, and limitless possibilities, is the ideal location for anybody looking to harness the power of the virtual world.

### 3. Fortnite



Fortnite has been a massively popular title amongst gamers and in the entertainment industry but the inclusion of 'Metaverse' into the saga has further enhanced the experience for its players.

Fortnite as a Metaverse platform has many of the prerequisites one would expect in the virtual space.

Where its users can play through various game modes in the Fortnite Metaverse – and explore its immersive environments.

Similarly, the users on the now video game-platform allows people to meet new folks from different parts of the world by using the platform's social features.

And just like many important Metaverse platforms, it also lets its players to join as customizable avatars that connects seamlessly with the new locations and 'maps' that are rolled out periodically by the developers.

## 4. Somnium Space

Somnium Space is touted as having one of the best implementations of VR as a Metaverse platform. Built on the Unity engine, it also has support for tracking gestures, hand signals, limbs and the body while letting desktop users connect without hardware support.

Similar to Decentraland, Somnium Space also allows people to buy and own various virtual assets such as virtual real estate using Ethereum.

In addition to that, they can then create custom experiences on the platform using its 'Somnium Space World Builder.'

This is a tool offered by the developers of Somnium so that others from the community can come forward to further growing the Metaverse platform without having to perform any complex actions in doing so.

## 5. The Adidas Metaverse

Many popular brands have been in the que for joining the Metaverse and therefore, seeing Adidas with its own iteration of a Metaverse platform isn't a surprise.

It all began with their foray titled 'Into the Metaverse' which saw the launch of their virtual sneakers and other pieces of gear for avatars.

This virtual gear later appeared in a 'Fashion Week' event planned on Decentraland, which was a bit of a crossover.

Adidas has also worked with Bored Ape Yacht Club for producing collector's items to be offered on its [Metaverse virtual showrooms](#).

Apart from the immersive experiences and limited-edition wearables on their Metaverse platform, Adidas also aims to work together with Decentraland so that users can have virtual twins of their favorite gear.

## 6. Upland



Another Metaverse platform which, much like Decentraland, has made waves in the community for its focus on virtual real estate and virtual property, is Upland.

It allows users to purchase options from their favorite cities, and can be used from its smartphone app or web-browser version.

If and when a person wants to either sell their property or trade up, there's also the option of a marketplace for users to interact.

Aside from the main concept for commercializing virtual properties in a Metaverse setting, Upland also sees mini-games for its users to play.

These mini games are based around the virtual world on the platform and results in rewards and 'treasures' for explorers.

## 7. Sandbox Metaverse



Community-driven Metaverse platforms are quite important in the present scenario, as it reinforces the whole notion of decentralized platforms.

The Sandbox, is a Metaverse platform that is community-driven in that vein and uses blockchain technology to let users engage with the economy. It has a game mode, a 'builder' mode and even a marketplace.

And the users are given a free hand at creating new experiences, develop assets, etc. and also monetize them or sell them.

Their economy is run by their own crypto token called 'SAND' which is used for selling and purchasing on the marketplace.

A defining aspect of the Sandbox Metaverse is its 'VoxEdit' feature that lets people make use of the voxel-style of creating various assets for the platform.

## 8. Horizon Worlds



Created by Meta, Horizon Worlds is a Metaverse platform that has seen the use of VR headsets and authentic virtual experiences almost from the get-go.

That's because the Quest headsets by Facebook have been a popular method of experiencing Meta's platform, in all its graphical and audio fidelity on display.

As with many Metaverse experiences, Horizon Worlds doesn't shy away from offering users with creator mode options and be a part of the platform's economy.

People can attend events, play games, and use/view content created by other users like themselves.

There's a lot to do in Facebook's official take on the Metaverse, thanks to the increasing landscape and creative tools.

## 9. Illuvium



Making somewhat of a departure from Metaverse platforms having a focus on various projects and multiple games, Illuvium is an open-world RPG with a singular focus: Battle and capture all sorts of creatures which its community knows as 'Illuvials.'

It's been made using the Ethereum blockchain by the developers and has its own crypto token to boot called ILV. This token is used for all sorts of financial dealings on the platform, including buying and selling tokenized 'NFT' versions of the Illuvials on the game's marketplace.

## 10. The Nike Metaverse



Another popular fashion brand that's been making the rounds with their Metaverse platform is Nike. They have started this foray into the virtual spaces ever since they teamed up with RTFKT studios.

This enabled them to launch digital collections of their shoes. These digital versions of their limited shoes have different skins that can be customized.

Users who are up for some [shopping in Metaverse](#) can enter their platform and explore their products in its full virtual glory.

Their showroom also displays some of their other ventures – some of which include their AR Genesis Hoodie which works with the avatars of their audience.

They also receive an actual, physical hoodie from Nike – personifying the Metaverse in its truest sense – blending the real with the digital.

## 11. Axie Infinity

There are many Metaverse platforms that offer options to play full-fledged gaming titles or even mini games to its users. Axie Infinity is what someone on the block call the 'OG' of the Metaverse gaming scene.

The gameplay system is vast and varied, allowing players to breed and raise digital creatures known as 'Axies.'

These same creatures are then utilized by the players to use in battles and for other instances enabled by the game.

Coincidentally, this Metaverse platform is also one of the first platforms that began offering ownership of in-game assets to its players, which is important for a decentralized economy for such platforms.

## 12. Microsoft Mesh

Stepping up to the plate for people across various industries, Microsoft Mesh is an important Metaverse platform that enables virtual spaces for education and business.

The power of being able to collaborate and work together in real time, in the shared spaces of Microsoft's Mesh makes it good for various activities.

People can conduct their meetings in these virtual spaces. Students can undergo [Metaverse training](#) sessions for academic roles.

And healthcare personnel can use this virtual space to give care to patients from afar with a personal touch.

## 13. Nvidia Omniverse

Another Metaverse platform with a special focus on the manufacturing and work operations industry is Nvidia's entry titled the 'Omniverse platform.'

It operates by relying on cloud services and is a handy tool for businesses looking to both create and collaborate.

Companies involved in industries such as manufacturing, engineering, architecture, and more.

The Omniverse platform is being currently used for various requirements of businesses including those that can leverage 3D simulations of their work process.

It also holds massive potential in terms of letting businesses regardless of their industry – to train their employees, check out new prototypes and design their products with ease.

## 14. Metahero

Made by the ingenious minds at Wolf Digital World, Metahero is a top-notch Metaverse platform that utilizes 3D scanning and modeling.

By implementing the use of scanning technologies, it is able to create immersive environments in the virtual space, complete with in-game assets and avatars.

The platform also has its own crypto token called the 'HERO' token which is utilized for transactions, creation of avatars, collecting digital items, and more.

## 15. Star Atlas

If space-themed games and virtual worlds are your thing, and you want to explore planets and stars in the expanse of the universe, then Star Atlas is right up your alley.

This is a Metaverse platform that includes blockchain game for users to navigate while relying on the space designs and clues.

It has a large community of users as gaming Metaverse platforms go. And uses the Solana blockchain network for its financial processes.

Build your own Metaverse Platform for Business and Events

As we finish exploring some of the top Metaverse platforms for the online community and industries, it's clear that the Metaverse revolution is here to stay.

It's not a fad that's slipping from conversations anytime soon and the growing popularity of these platforms are testament to this fact.

At EDIIIE, we are experienced at working on [Metaverse for enterprise](#), for training, and for various events that can be imported into its virtual landscapes.

# **NFT based virtual assets in Metaverse**

The metaverse is a virtual shared space where users can interact with each other and digital objects in a seemingly real way. NFTs (non-fungible tokens) play a significant role in the metaverse by providing a way to represent unique digital assets, such as virtual real estate, in-game items and collectibles, on a blockchain. This allows for the creation of a digital economy in which these assets can be bought, sold, and traded as if they were physical assets. NFTs also enable creators to monetize(earn revenue) their digital content, such as artwork and music, in new ways.

The metaverse and NFTs are transforming the future of the internet. The major distinction between NFT and metaverse lies in their respective definitions. Non-fungible tokens are a form of virtual token, whereas the metaverse is its own virtual universe.

Non-fungible tokens are a vital component of cryptocurrencies and blockchains for Metaverses (NFTs). Art, sports trading cards, in-game goods, and a variety of other objects can be NFTs or metaverse NFTs. Essentially, they are one-of-a-kind digital objects whose ownership and other information are contained within the token.

In the metaverse, NFTs function as representations of asset ownership. For example, virtual land parcels are actually NFTs.

As the technology matures, the use cases of the metaverse are more likely to develop in the future. The following are a few instances of the role NFTs play in the Metaverse:

- 
1. **Virtual Real Estate:** NFTs can be used to represent ownership of virtual land or properties in the metaverse. Examples include Decentraland and Somnium Space, where users can purchase plots of land and build their own virtual worlds or experiences.
  2. **In-game items and collectibles:** NFTs can be used to represent unique items or collectibles in games and other virtual experiences. Examples include Axie Infinity, where players can breed and train creatures called Axies and own them as NFTs.
  3. **Art and collectibles:** NFTs can be used to represent ownership of digital art, music and other forms of digital collectibles. Examples include Rarible, a marketplace for digital art where artists can mint and sell their own NFTs, and SuperRare, a curated platform for digital art and collectibles.
  4. **Virtual characters and avatars:** NFTs can be used to represent ownership of virtual characters or avatars in the metaverse. An example includes Decentraland, where users can purchase and customize their own avatars and use them to interact with others in the virtual world.
  5. **Virtual ticketing and event management:** NFTs can be used to represent event tickets, passes and other types of access to virtual events and experiences. For example, a virtual music concert can mint NFTs as a ticket for the concert, and the ticket holder will have the right to watch the concert, meet the artist and have other perks.

These are just a few examples of the many potential use cases for NFTs in the metaverse, as the technology and the concept of metaverse are still evolving, new use cases will emerge in the future.

There are several ways to purchase a metaverse NFT:

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1. **On a marketplace:** There are various marketplaces that specialize in the sale of metaverse NFTs, such as Rarible, SuperRare and OpenSea. These marketplaces allow you to browse and purchase NFTs created by artists, game developers and other creators.
2. **On a metaverse platform:** Some metaverse platforms, such as Decentraland and Somnium Space, have built-in marketplaces where users can buy and sell virtual land and other NFTs.
3. **Directly from the creator:** Some creators may choose to sell their NFTs directly to buyers, without using a marketplace. This can be done through their website, social media or other channels.

4. **Through a metaverse wallet:** Some wallets now have the capability to buy and sell NFTs, like MetaMask, Trust Wallet and others, you can purchase NFTs directly from the wallet.

Keep in mind that to purchase an NFT you will need to have a cryptocurrency wallet with the appropriate cryptocurrency to purchase the NFT. Most NFTs are sold in Ethereum, but other cryptocurrencies such as Binance coin, Bitcoin, Litecoin and others are also used.

The relationship between the metaverse and NFTs is that NFTs provide a way for digital assets in the metaverse to have value and ownership, creating a digital economy. NFTs can be used in many use cases within the metaverse, for example, virtual real estate, in-game items, virtual ticketing, virtual characters and avatars, art and collectibles. With the use of NFTs, the metaverse allows creators to monetize their digital content, such as artwork and music, in new ways, and also allows users to own and trade digital assets as if they were physical assets.

# Role of Blockchain in Metaverse

We know **Metaverse** is a digital reality that combines aspects of social media, online gaming, augmented reality and virtual reality, and cryptocurrencies to allow users to interact virtually.

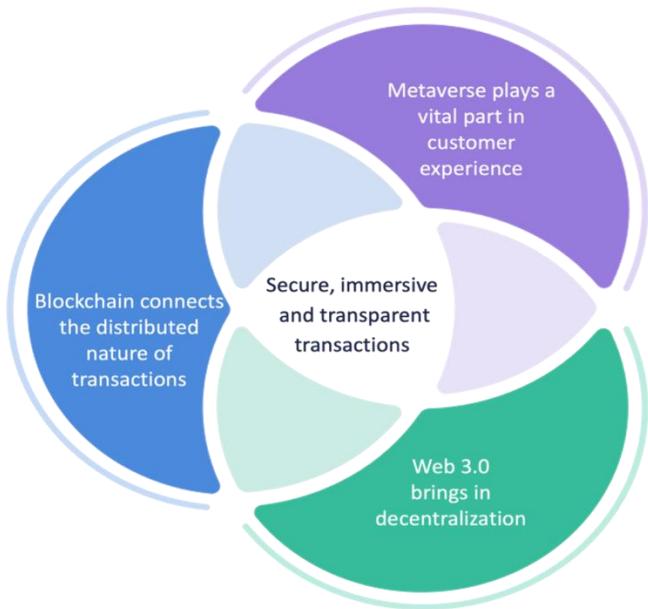
And **Blockchain** is a distributed database containing a digital ledger of transactions. These databases are spread over many individuals. It is the underlying technology for cryptocurrencies such as Bitcoin and Ethereum.

**Web 3.0**(World Wide Web's third generation) was developed using blockchain technology and is accessible to everyone. It is envisioned as the next generation of the internet and incorporate new concepts and technologies to improve user experiences, data ownership, and decentralisation.

## Role of Blockchain in Metaverse

Blockchain will provide the underlying technology for secure and transparent transactions, Metaverse provides the virtual world where these transactions can take place, and Web 3 provides the user-friendly interface that makes it all possible.

Below diagram depicts how Metaverse, Blockchain and Web 3.0 are interconnected to offer secure, immersive and transparent transactions



Here are some of the roles and benefits that blockchain brings to the Metaverse:

#### **Transparent and Trustworthy Transactions:**

Since the transactions is visible and immutable, it minimizes the risk of fraud. Ensures digital assets are secure and transactions are fair.

#### **Virtual Economy and Tokenization:**

The ability to tokenize Digital assets and in-game items opens new virtual economies. Users can buy, sell, trade, and even earn income within the metaverse through digital assets and tokens.

#### **Decentralization and Community Governance:**

Leveraging the consensus mechanisms and community voting, decisions can be made around the development, rules, and policies of the metaverse. This brings in more inclusiveness where users have a say in the evolution of the virtual world.

#### **User Empowerment and Identity:**

Through decentralized identity solutions, individuals can establish verifiable and portable identities across different metaverse applications. Provides security, and control over their personal data and virtual interactions.

#### **Ownership and interoperability of digital assets in the metaverse:**

Through non-fungible tokens (NFTs) and smart contracts, blockchain allows users to have verifiable ownership of virtual assets, such as virtual land, avatars etc. This ownership can be seamlessly transferred across different metaverse platforms, fostering a unified and interconnected virtual world.

#### **Scalability and Performance:**

Blockchain scalability solutions, such as layer 2 protocols and sidechains, can solve the scalability issues associated with processing a high number of transactions inside the metaverse resulting in a more smooth and immersive user experience.

In all of the key enabling technologies of Metaverse such as IoT, Digital twins, XR apps, Big data & AI, blockchain allows users to seamlessly perform their social and economic activities by providing the required Data Privacy, Security, and Integrity.

We conclude by saying that Web 3, blockchain, and the Metaverse can work together to create a future where people can have more control over their digital lives, enabling immersive experiences, economic possibilities, and a more inclusive digital environment.

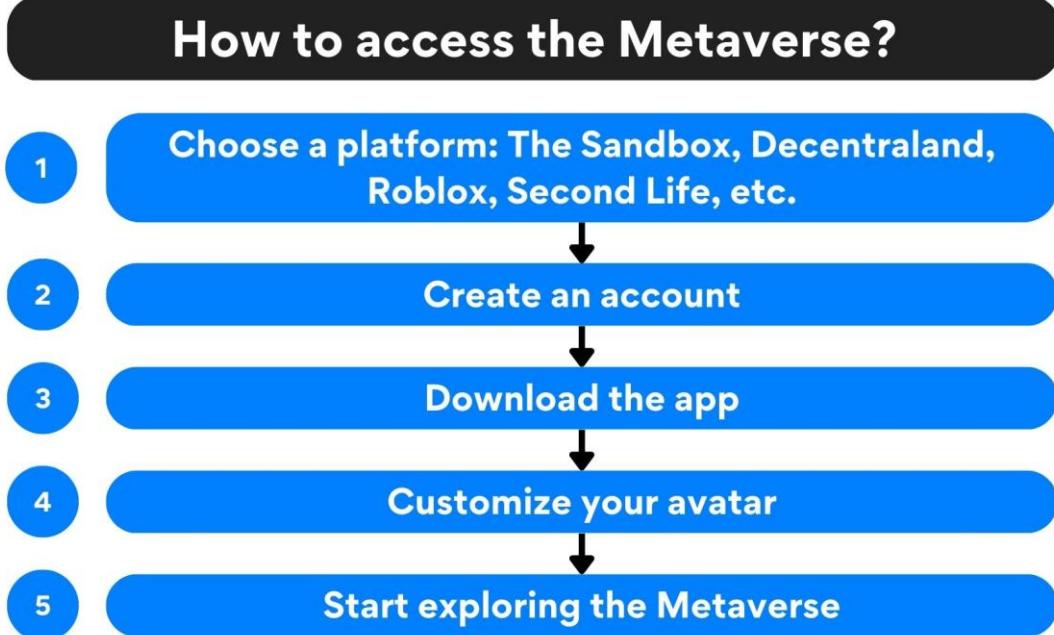
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## How to access the Metaverse?



While Metaverse is still in its early stages, users can access this immersive virtual world using specific steps and devices. Our detailed Metaverse guide covers both so you can easily access the Metaverse and enjoy the experience. Let's dive in!

### Devices to access the Metaverse

As of today, there isn't a singular entrance into the Metaverse as the idea of just one Metaverse is still theoretical. However, those who want to experience the Metaverse can do so by using the following devices.

- **VR headsets** – VR headsets are one of the most common devices today to access the Metaverse. Wearing it, you will receive a digital display of the Metaverse virtual world. A VR headset tracks your head positioning, meaning your POV will change in the virtual world whenever you look around, the same way it would in the real world. Oculus is a prominent player in this space, who had first launched their line of VR headsets in 2012. Their latest release, the Oculus Quest 2, is a major example of a Metaverse device as it boasts impressive VR tech with both PC and Android compatibility.
- **Gaming consoles** – Prominent gaming consoles like the PlayStation and Xbox already allow users to access the Metaverse in some way or the other. For instance, the Xbox, despite not having any AR or VR support, provides platforms such as an interactive “metaverse museum” and Roblox, where a virtual world can be entered. PlayStation also comes with a PlayStation VR

headset to access VR features, which has now become an intriguing platform to develop Metaverse features in.

- **Smartphones** – Just like gaming consoles, Roblox also works on iOS, Android, and other mobile platforms, allowing smartphone users to enter the virtual world. Roblox comes with VR support as well, meaning you can use your phone to access a virtual world, the same way others do with expensive PC setups.
- **AR gear** – Augmented reality gear is another way to access the Metaverse. It's similar to VR devices in that both put digital imagery to your point of view. However, a key difference is that AR gear overlays Metaverse elements on top of the real world you see, whereas VR entirely replaces your POV with a virtual landscape. Microsoft HoloLens and Google Glass are some of the most prominent AR gear examples that have been developed to access the Metaverse.
- **Computers** – While not the most user-friendly, computers are one of the most powerful options for accessing Metaverse systems. Most of the programs for accessing the Metaverse run on computers. However, your computer would require a good GPU and an accompanying VR/AR system to let you access the Metaverse.

## Steps to access the Metaverse

Accessing the Metaverse depends on the specific platform you want to enter. Here are the common steps to help you get started:

1. **Choose a platform:** Today, multiple Metaverse platforms are available out there, such as the ones we've mentioned above: The Sandbox and Decentraland. Plus, you can also experience the Metaverse through other platforms like Roblox, Second Life, and Axie Infinity.
2. **Create an account:** Once you choose a platform, you need to create an account. Provide your email address and create a username and password. Some platforms may ask for additional information, such as age or location.
3. **Download the app:** Depending on what platform you choose, you may need to download their app to access the Metaverse. Follow the instructions shared by the provider to install the necessary software.
4. **Customize your avatar:** Almost every Metaverse platform requires you to create an avatar that represents you in the virtual world. You can customize the avatar according to your appearance and personality.
5. **Start exploring the Metaverse:** Once you create your account and the avatar, you can access the Metaverse. You can interact with other users,

make friends, explore different virtual locations, shop, and discover everything Metaverse offers.

# Hardware Requirements for the Metaverse

To fully experience the metaverse, certain hardware is necessary. While basic requirements include a smartphone or tablet, a more immersive experience calls for a powerful laptop or desktop computer with a competent graphics card and a fast processor. Additionally, noise-cancelling headphones with an integrated microphone can enhance audio immersion. These hardware requirements are essential for hosting and participating in virtual events, including virtual event production and hybrid event solutions.

Table:

Hardware	Minimum Requirements	Recommended Requirements
Smartphone/Tablet	–	–
Laptop/Desktop	–	Powerful graphics card, fast processor
Noise-Cancelling Headphones	–	Integrated microphone

When it comes to **virtual event production**, having the right hardware is crucial for delivering a seamless and immersive experience to attendees. A powerful computer ensures smooth rendering of 3D visuals, while a fast processor enables real-time interactivity. These technological capabilities contribute to the overall success of virtual events by engaging participants and providing them with a sense of presence in the metaverse.

**Hybrid event solutions**, which combine physical and virtual elements, also require specific hardware to enable seamless integration and interaction between the two realms. This includes devices that can capture and stream live video, as well as **provide synchronized audio and visual experiences** for both in-person and virtual attendees. The use of

advanced hardware enhances the production value of hybrid events and creates a dynamic and engaging experience for all participants.

Overall, investing in the right hardware is essential for unlocking the full potential of the metaverse. Whether it's for hosting virtual events, producing immersive experiences, or facilitating hybrid gatherings, having the recommended hardware ensures a smooth and impactful metaverse experience for all involved.

In the most general sense, the metaverse represents all of the shared virtual environments that people access via the internet. Metaverse platforms combine technologies like augmented reality, virtual reality, and social media to create immersive digital worlds where users can interact with their environment, and each other, in new ways.

While “the metaverse” is often used as a singular term, there are many different platforms that allow you to access entirely different virtual environments. Many major companies, including Google, Meta, Microsoft, and Nike, have invested in the development of their own metaverse platforms.

## **Making the metaverse available to everyone**

While large-scale metaverse use can seem like a prospect for the distant future, it may be more feasible than many people think. To truly make the metaverse easily available and fully functional for everyone, several upgrades must be made to cellular networks and the computing devices people use.

### **Internet infrastructure**

To allow for widespread metaverse access without compromising performance, significant infrastructure advancements must be made to improve network speed, latency and symmetrical bandwidth.

One major advancement that is already underway is the expansion of 5G networks, which can reduce latency and increase bandwidth for many people. Additionally, tech giants like Meta and Google have begun investing in the creation of more subsea fiber optic cable networks, which are intended to help provide more people with faster internet speeds.

### **Computer systems**

Because most smartphones and personal computers aren't capable of supporting full metaverse platforms by themselves, manufacturers must significantly improve the processing power of these devices to make the metaverse available for everyone.

Higher capacity memory cards and graphics processors are already being developed for smartphones and computers, and would likely help to optimize the performance of metaverse platforms on these devices. However, more powerful hardware like this must become the new standard for phones and computers before large-scale metaverse use can become feasible.

## **Edge computing**

Virtual worlds require a lot of computational power to render and maintain the assets and rules that comprise them. This means the potential for latency among users is high and that quality of service (QoS) will be affected.

Fortunately, edge computing, or the use of cloud-based computing services closer to the user (rather than processing data on servers that are farther away from the user), is making a quality metaverse more available to everyone. So if you raise your hand in Montana, but you're connected to a data center in Oregon, edge computing strategies will help keep you in sync with the rest of the metaverse and be able to experience a low-latency and highly responsive virtual reality.

## **Supporting the metaverse in your home**

If you'd like to enjoy an immersive metaverse experience in your home, it's important to make sure you have the necessary internet access and computing power. To achieve optimal metaverse performance, you will likely need a connection with a minimum speed of 100Mb/s (megabits per second) for basic VR functionality. 225Mb/s allows HD VR streaming with no lag or latency.

If your current connection doesn't adequately support the metaverse platform you're using, you'll likely experience limited functionality and unacceptably high lag. If it's available in your area, switching to 5G Home Internet or Verizon Fios can provide a high-speed internet connection for your home.

Additionally, it's critical to make sure the computing device you're using has enough memory and processing power to support the metaverse. If it doesn't, you may need to upgrade to a new computer or incorporate specialized equipment like a VR headset.

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<https://www.verizon.com/about/blog/Infrastructure-for-supporting-the-metaverse>

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## Tokens in the Decentraland Ecosystem

Decentraland uses non-fungible tokens (NFTs) to represent unique digital assets like virtual land. It also uses fungible tokens, like MANA cryptocurrency, as a means of exchange and governance in the Decentraland Metaverse.

### What is MANA?

MANA is the native cryptocurrency of the Decentraland Metaverse. To explain, MANA is an ERC-20 token on the Ethereum blockchain. You can use MANA in-game to purchase virtual land, goods, and services within Decentraland. However, it's not just an in-game currency, it's also a governance token. To explain, it allows holders to participate in the decision-making process through the Decentraland DAO.

As of today, the value of MANA is subject to the usual market fluctuations. You can buy, sell, or trade MANA on trading platforms. To buy MANA securely with Ledger, start by installing the Ledger Live application and select the Ethereum app on your Ledger device. Then click on the “Buy” button on the Ethereum page and choose a MANA exchange that is compatible with Ledger. You can then transfer it to your Ledger wallet by sending it to your Ethereum address.

### What Is LAND?

LAND is a virtual plot in the Decentraland metaverse, with each one represented by a unique NFT. In total, there are 90,601 plots of LAND. If you own virtual land, you have full control over it, including the ability to develop, monetize and govern it. Then, the cost of different lands varies depending on their location and size, with some selling for millions of dollars.

You can use a Ledger hardware wallet to secure your Decentraland land and other NFTs. First, connect your Ledger device to your device and unlock it. Then, install an Ethereum wallet on your device if you haven't already via the Ledger Live application. From there, you can transfer your LAND to your secure Ledger wallet.

# How to create a metaverse avatar

Creating a metaverse avatar involves selecting a platform, tailoring appearance, choosing attire and accessories, working on features and deploying it.

The metaverse is a digital space connecting the internet, augmented reality, virtual worlds and blockchains to create immersive experiences and interactions between avatars representing humans. Like humans, avatars can communicate with digital objects and one another. The metaverse is gradually evolving into a dynamically networked digital cosmos that muddies the boundaries between the real and virtual worlds.

## Types of metaverse avatars

Depending on their preferences, users can choose from a range of metaverse avatars. To optimize experience in avatars, the player needs to understand the type of avatars they can create:

### Full-body VR avatars

Users can create a full-body VR avatar, which is a complete digital representation of a person, offering a greater sense of immersion in the metaverse. Sensors are used to capture the user's entire body movements and replicate them in virtual spaces.

### VR avatars

On older systems, these avatars don't provide users with a visual depiction; instead, they are used for virtual reality, allowing users to experience the virtual world in the "first-person" sense.

### 2D and 3D avatars

2D avatars are simple, cartoon-like representations confined to 2D environments. 3D avatars, on the other hand, facilitate customization of elements such as skin tone, body form and hair, giving the character a realistic multi-angle view.

### Humanoid avatars

A humanoid avatar reflects the physical appearance of its owner, creating a sense of familiarity and closeness. It is designed to resemble real humans and can even mimic

the user's exact appearance. A humanoid avatar facilitates seamless integration between the virtual and physical worlds.

## How to create metaverse avatar

The metaverse technology is still young, and few people know how to prop up an avatar. Here is the process users can follow to create a metaverse avatar:

### **Hop on the metaverse or an avatar creation application**

All metaverses enable their users to create an avatar to enter the digital realm. They can also choose an external avatar creation app, downloadable via Google Play or the Apple Store, to create personalized digital avatars that can be used across several platforms.

### **Create an avatar**

The system, whether on a metaverse or an avatar app, will usually ask the user about their gender to choose an appropriate style for the avatar. Anyone who wants the software to create an avatar that resembles their face can add an image. Most apps will offer an array of premade avatars from which users can select.

### **Customize avatar**

Users can customize features such as hair color, eye size, nose shape, lip shape and other attributes, allowing them to create an avatar that reflects their preferences. A well-created avatar can add a visually engaging element to interactions in the metaverse.

The following is an example of how users can create a custom avatar on the Decentraland metaverse to help understand the process better.

## How to create a custom avatar on Decentraland

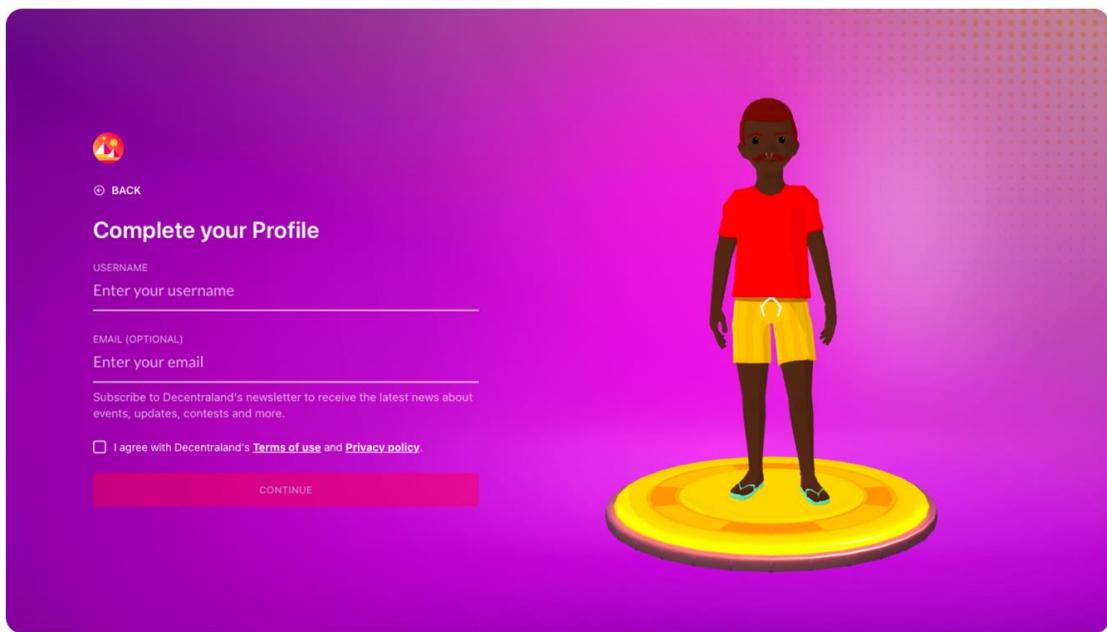
Decentraland enables users to explore a 3D dynamic universe and make their own avatars in the virtual world. They can travel, engage in various activities and make new friends. Making an avatar is the first step for users to enjoy Decentraland's rewards.

Here's the process of creating an avatar on Decentraland:

### **Step 1:**

Users need to log in to Decentraland and input the details in the window.

## Complete profile and login into Decentraland



 | cointelegraph.com

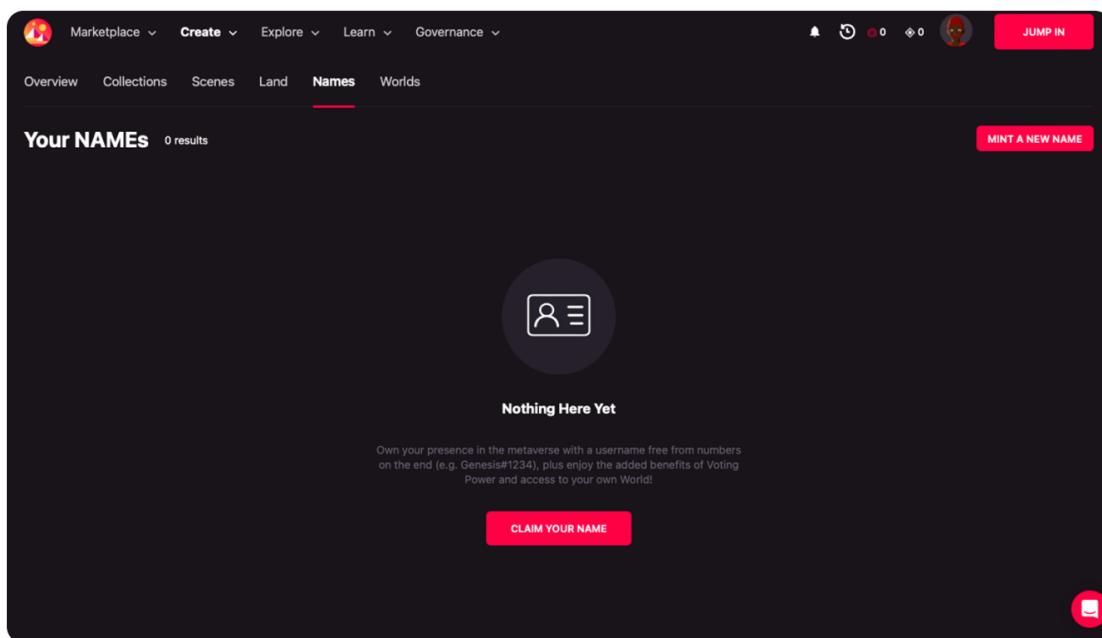
source: *Decentraland*

Depending on availability, the platform may accept or reject the username when they feed in the details. If the platform accepts the user name, the user must input their email ID to create an avatar, or else they must populate the user name again in the field.

### Step 2:

Decentraland will take the user to the next page upon the completion of the process.

## Mint a name ID and claim the name



 | cointelegraph.com

source: *Decentraland*

The user needs to mint a name ID to create an avatar. When they click on “Claim your name,” they are assigned a name for their avatar.

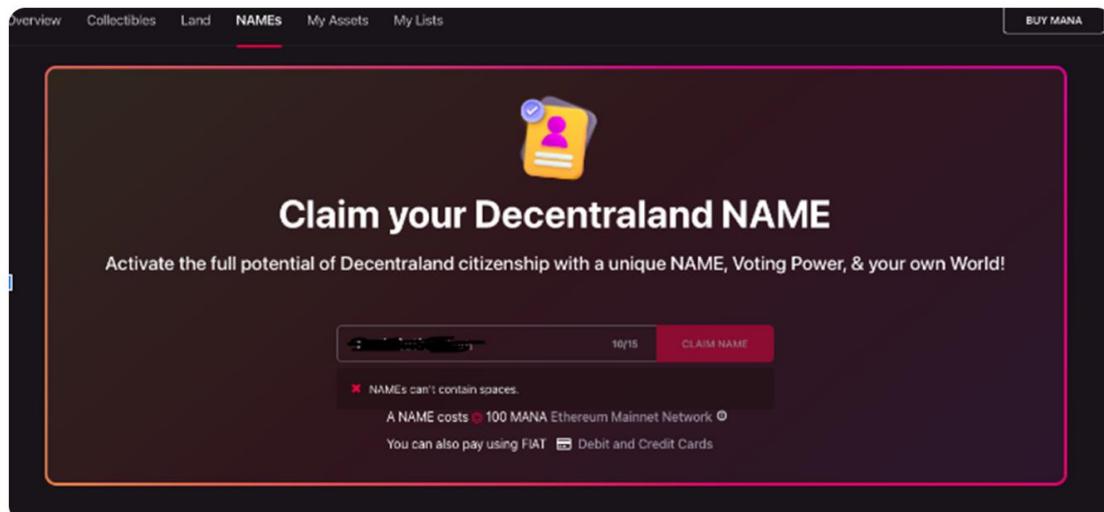
### Step 3:

The user needs to buy the Decentraland



**\$0.62** token at this stage. Click on “Buy MANA,” visible on the top right side of the screen, to trigger a mint executed by a smart contract. Users can buy MANA with fiat currency or other digital currencies.

## Buy MANA and claim Name



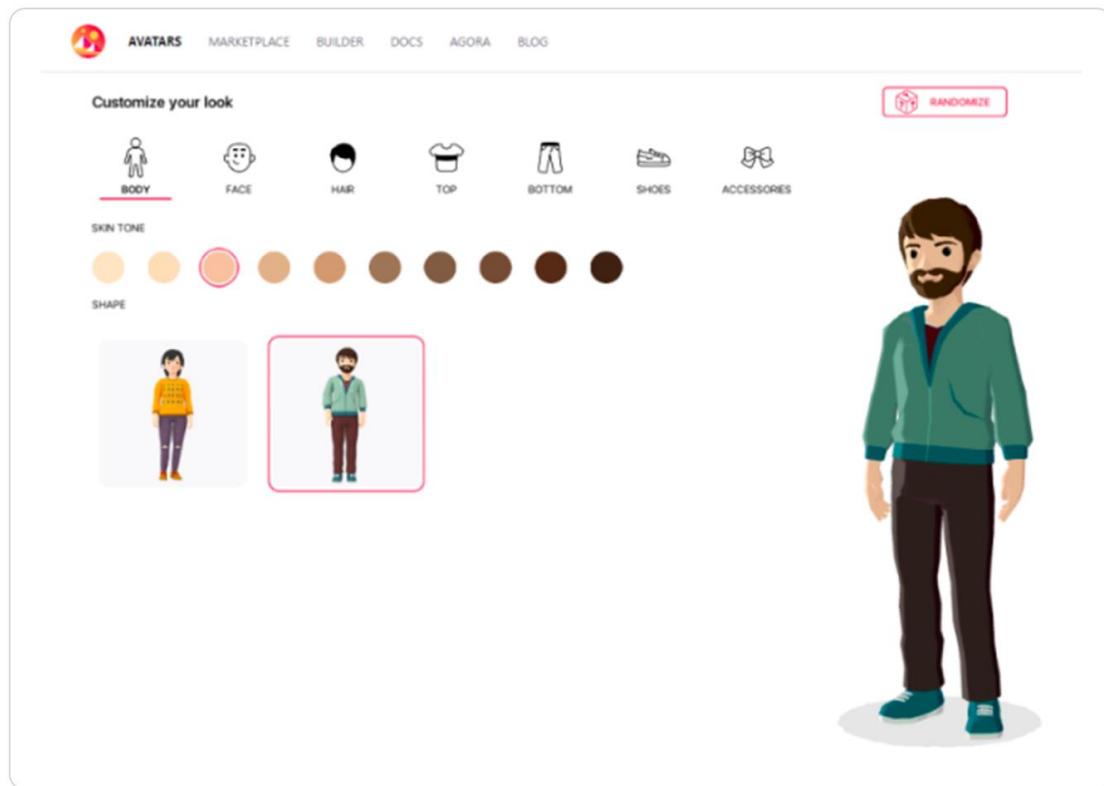
 cointelegraph.com

source: *Decentraland*

### Step 4:

One can pick from an array of avatars and customize its look based on body, face, hair, top, bottom, shoes and accessories. The user can also select the skin tone and shape of their avatar.

## Customize avatar's body, face, hair, etc.



cointelegraph.com

source: *Decentraland*

The avatar is now ready for use in the Decentraland metaverse. It can be used for gameplay and other activities.

## Cross-platform avatars

Anyone active on several metaverses will find creating an avatar on every platform they visit problematic and unnecessarily expensive, highlighting the need for a platform-agnostic solution. Thankfully, some apps enable users to conjure up an avatar and use it on any platform they visit. Users can update their clothes, hairstyles or accessories to suit different environments.

Users of these services usually need to create an account using connected services like Google, Microsoft or Slack. Users may also create an account using their email address. The system will then prompt them to make an avatar. Apart from using the array of avatars offered by these apps, users can also use their webcam or upload a photo of themselves. They can then use the photo-editing features of the app to create a customized avatar that closely resembles them. Some advanced avatar-creation solutions also use artificial intelligence to produce photorealistic 3D avatars from selfie photos.

## The future of avatars

According to research published by Exploding Topics, 68% of experts believe that the popularity of the metaverse will rise sharply in the next three to five years. A Pew Research Center report states that 54% of technology experts expect the metaverse to offer immersive experiences by 2040. Such an experience cannot be possible without better customized and engaging avatars representing the users themselves.

Due to evolving technologies, new possibilities have emerged in avatar creation, and the time of ugly, legless avatars is now gone. Users can now create highly personalized avatars with a few clicks or taps. As the apps develop further and more innovations emerge, the avatars can make the virtual world more realistic and engaging.

## References

<https://cointelegraph.com/news/how-to-create-a-metaverse-avatar>

# Building Metaverse Infrastructure

A tidal wave is coming called the Metaverse! But many are unsure what that actually means and how it will affect their everyday life in the future. Turns out, the tech industry itself doesn't fully know either. But what is clear, is that the Metaverse will require a massive investment in infrastructure, both physical and digital, to make it scalable.

The nature of building emerging technologies is siloed. Hardware and software compatibility, power, specialized skill, funding, and adoption are primary reasons these new technologies don't make it past just being a novelty. Believe it or not, even companies like Netflix were considered emerging technologies at some point. [They waited over 10 years to be taken seriously](#) after laying down the groundwork for all the new streaming services popping up these days, from Disney+ to HBO Max.

Infrastructure is critical here. Without a deeper understanding of HOW, it's hard to think, "What can we do?" Some of the pieces are there, they're just not assembled or built yet. Looking at the golden age of the Internet, one could notice that 2D-focused web & mobile services were able to scale only once key server-side cloud-based technologies were introduced. But these tools and infrastructure are

not a fit for a 3D world. 3D content offers unique challenges, as opposed to 2D content, such as images and videos. For example, there is no standard 3D file format and 3D content is fragmented and has multiple files representing a single asset. 3D content is also interactive and location-aware and can even be moved or changed. Finally, 3D assets are considerably larger in size.

So key tools and infrastructure are missing to empower developers to build better and more scalable 3D/AR/VR apps across different platforms and for any purpose. These are critical to the success of the Metaverse and would unlock the potential of 3D technology to benefit society in the areas such as virtual training, 3D-aided healthcare, augmented navigation, gaming, and more.

## **Strategic Partnerships Are Needed**

**Meta** (formerly Facebook) is pushing heavily on marketing and developing the “Metaverse”. The unique factor about the metaverse is that it’s shaping up to be an immersive world in real-time which allows for other technologies to operate within like blockchain, NFTs, AI and ecommerce. Meta made the metaverse more popular, jumping to [25x more searches](#) after announcing its name change. For big projects like this, companies need big partnerships.

Meta is partnering with **Nvidia** to help expand the technical infrastructure and components needed to sustain the immersive worlds. Nvidia’s AI conference was centered around discussions of the metaverse. Some of the planned features are [interactive avatars](#),

a synthetic data generator and a virtual model of the Earth to help forecast climate change. Companies like [Intel](#) and [echo3D](#) are also [working together](#) to explore 3D-first content management & delivery systems and building a backend for the Metaverse.

## Engineering Challenges

Many companies are trying to figure out their positioning for the new and very different form of technology. In order to sustain such a complex web of massive immersive activities (think the internet [thousand-fold](#)), significantly [more computing power](#) will be required. This infrastructure will not so much rely on the consumer-facing hardware like the cool VR headsets and AR glasses, but it'll be the computers, chips and servers behind them.

[Intel believes that computers](#) just can't keep up as it stands and there won't be enough supply to build the infrastructure needed. Many companies are hopeful that AI and machine learning will automate "bridging the gap" but Intel's primary concern is hardware infrastructure. Game engine Unity [announced its new simulation engine](#) that allow roboticists and engineers to train AI systems in the Metaverse. echo3D, a [Unity Verified Solutions Partner](#), is offering a 3D-first content management and delivery system and tools for compression, conversion, or optimized streaming of 3D assets. Together, more and more companies are working to build infrastructure suited for a 3D world.

On the engineering side, 3D developers constantly seek ways to minimize [latency](#) when using realistic 3D assets, sometimes compromising quality for performance. We can't tolerate lagging internet, why would we tolerate latency in a world that's intended to be real-time? Infrastructure for 3D Metaverse content requires built-in compression and poly-reduction algorithms that allows you to dynamically stream 3D assets in different network conditions.

5G is going to help the technologies we depend on improve in a significant way, including resolving latency issues. [Verizon](#) believes 5G is the main missing piece of the Metaverse. Meta is painting a picture of people that can drop into virtual worlds appearing as they are in the real world. These worlds take meticulous building that require time, money, and power.

The idea of building real-time peer-to-peer communication in real time sounds amazing, but existing digital and physical infrastructure were not built to sustain that type of 3D-based communication, making Intel's concerns certainly valid. Recreating a virtual environment where just two people are immersed in a Ready Play One-esque world would require "*much, much more computer power*" according to [Venture Beat](#).

## A 3D-First Approach

The Metaverse has a strong foundation and technology is improving at substantial rate. Are we looking at another Netflix decade-long pursuit? Probably not. With tech giants working together, there is a

lot of opportunity for innovation. New companies are also already working to building tools and cloud infrastructure that would allow for a way to build scalable and engaging 3D applications.

Given that current infrastructure does not natively support 3D content, it is painfully accepted that assets storage is local and 3D applications are huge (700MB+ on the Apple App Store or Google Play Store) with large periodic update bundles (“seasons” that require you to download an additional 1GB+ every couple of months). That should not be the case for the Metaverse being build. Today, many developers struggle to create scalable and dynamic 3D (for healthcare, education, commerce, training, etc.) and 3D apps remain single-user experiences with static and hard-to-update content. It’s difficult to update 3D content across different platforms (i.e. different mobile smartphones, headsets, and smart glasses, and devices) which often have platform-specific specifications.

Developers struggle to attract users since any change in the app results in endless development and redeployment cycles.

echo3D’s vision is different —Metaverse experiences and application builds should be tiny, updates packs should be small and frequent, and developers should expect user-generated content (UGC) through bi-directional content streaming. With 3D-first cloud infrastructure, 3D assets are stored, compressed, converted, and streamed from the cloud, allowing for a reduced app size, frequent updates, automatic analytics, and more. Editing, managing, and streaming new 3D assets into the Metaverse can happen with ease and in real-time, eliminating the need to account for engineering

challenges such as different 3D file formats for different end-use devices and operating systems.

# **3D Reconstruction will play a critical role in the creation of the Metaverse**

The evolution of the Metaverse, a virtual shared space that blends augmented reality, virtual reality, and the internet, is a complex undertaking that hinges on various technological components. One such critical component is the 3D reconstruction industry, which plays a fundamental role in shaping the development and success of the Metaverse. This article explores the metrics that highlight the importance of the 3D reconstruction industry in advancing the Metaverse and its various dimensions.

At the forefront of these metrics is the concept of realism and immersion. Realism is vital for enabling users to feel truly present in virtual environments, and 3D reconstruction holds the key to achieving this. By leveraging high-quality reconstruction techniques, the Metaverse can offer users experiences that closely mirror the real world, creating a strong sense of immersion that enhances engagement and connection.

The Metaverse's strength lies in its interconnectedness, and here, the metric of interoperability gains prominence. Seamless interactions between diverse virtual environments and platforms are essential to ensure that users can navigate between spaces without disruptions. The ability of 3D reconstruction methods to produce assets that can seamlessly interact with each other becomes a linchpin for maintaining a cohesive and interconnected Metaverse experience.

User interaction and navigation contribute significantly to user satisfaction within the Metaverse. 3D reconstruction technologies facilitate the creation of interactive objects and environments that respond to user gestures and interactions, enabling natural movement and exploration. An intuitive and user-friendly navigation system, made possible by these techniques, fosters a more enjoyable and accessible Metaverse.

Scalability of content creation is another metric that underscores the relevance of the 3D reconstruction industry. The Metaverse thrives on a diverse array of content to sustain engagement. Scalable 3D reconstruction methods automate the generation of virtual assets, alleviating the burden of content creation and enabling a dynamic Metaverse ecosystem with a wide variety of experiences.

Technological advancements are the backbone of any evolving digital landscape, and the Metaverse is no exception. The constant evolution of 3D reconstruction technologies, encompassing improved algorithms, hardware support, and integration with other technologies, ensures that the Metaverse remains at the forefront of

innovation. These advancements shape the Metaverse's capabilities and keep it competitive in an ever-evolving landscape.

Moreover, semantic understanding emerges as a metric of great significance. Beyond geometric accuracy, semantic information derived from 3D reconstruction enriches virtual spaces with the ability to understand and respond intelligently to objects. This dimension of understanding contributes to a more immersive and intelligent metaverse experience, enhancing interactions and user engagement.

Real-time rendering is an indispensable aspect of the Metaverse's success. The fluidity and responsiveness of interactions depend on effective integration between 3D reconstruction and real-time rendering technologies. This integration ensures that reconstructed scenes are not only accurate but also visually appealing and interactive, contributing to a seamless and enjoyable Metaverse experience.

Economic opportunities offered by the growth of the 3D reconstruction industry further underscore its significance. As the Metaverse expands, this industry generates jobs, stimulates economic development, and drives innovation. Companies specializing in 3D scanning, modeling, and rendering contribute to the Metaverse ecosystem by offering valuable services and fostering economic growth.

In the pursuit of a seamless Metaverse experience, the scalability of data storage and transmission gains importance. Efficient management of data storage and transmission ensures that users can access the Metaverse content seamlessly across various devices and network conditions. Optimized data handling minimizes latency and contributes to a consistent user experience.

However, this journey towards the Metaverse's development must navigate the challenges of data and privacy. The responsible handling of user data, even in the pursuit of accurate 3D reconstruction, is paramount. Striking a balance between data collection for accuracy and user privacy is essential for maintaining user trust and ensuring long-term engagement within the Metaverse.

Cross-platform compatibility addresses the Metaverse's accessibility and inclusivity. To achieve widespread adoption, 3D reconstructed assets must seamlessly integrate across different devices and platforms. This compatibility facilitates an inclusive Metaverse experience, where users can engage regardless of their preferred devices, fostering a diverse and interconnected community.

In maintaining a coherent Metaverse experience, quality consistency becomes a critical consideration. Users should not encounter abrupt quality disparities as they transition between different environments. Consistency in the quality of 3D reconstructed assets ensures a seamless and immersive Metaverse experience, contributing to user satisfaction.

The Metaverse's potential spans various domains, from education to healthcare, demanding cross-domain integration. The adaptability of 3D reconstructed assets in these contexts enhances the Metaverse's applicability and relevance, enabling it to extend beyond entertainment into areas with significant societal impact.

In conclusion, the metrics discussed above collectively underscore the critical role of the 3D reconstruction industry in shaping the development of the Metaverse. From realism and immersion to economic opportunities and cross-domain integration, the contributions of 3D reconstruction technologies are multifaceted and impactful. These metrics emphasize the need for continuous innovation, responsible data handling, and user-centered design to ensure that the Metaverse realizes its potential as a rich, immersive, and interconnected digital landscape.

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## **EXTENDED REALITY — THE VISIBLE FACE**

Layer 3, which we've named "extended reality" (XR), is the immersive representation that augments or replaces reality. It comprises a spectrum ranging from 100% real to 100% virtual. Extended reality combines the world and real objects with one or more layers of computer-generated virtual data, information, or presentation. Thus, XR may be thought of as the visible face of the Metaverse. XR includes AR, MR, augmented virtuality (AV), and VR, reflecting different mixes of real and virtual information along the spectrum (see Figure 13).

The technologies that comprise XR are at varying degrees of maturity. For example, VR today is much more mature than AR. As these technologies develop, the more they will converge and the more the Metaverse will be synonymous with continuity between the real and the virtual.

### **AUGMENTED REALITY**

Augmented reality enhances the real-world experience by superimposing on it computer-generated contextual data, information, and virtual experiences. AR software works in conjunction with devices such as tablets, phones, headsets, and more. These integrating devices contain sensors, digital projectors, and the appropriate software that enables these computer-generated objects to be projected into the real world. Once a model has been superimposed in the real world, users can interact with and manipulate it.

AR is commonly used for entertainment purposes (such as Niantic's *Pokémon Go* mobile game), but also increasingly in enterprise and industrial applications such as training, maintenance, construction, healthcare, and retail, where users can access contextual data superimposed on real-world objects. Although relatively mature, the technology faces challenges related to costs, accessibility, and education as well as potential privacy concerns since it depends on the ability of the device to record and analyze the environment in real time. Major players active in the AR space include Help Lightning, Niantic, Plattar, SightCall, and Streem.

### **MIXED REALITY**

Mixed reality refers to the intertwining of real and virtual worlds. In contrast to AR, in MR, digital objects are not just overlayed on but are anchored to the physical world, meaning they can be

interacted with. Green screen and video chat backgrounds are nonimmersive 2D examples of MR. However, some definitions of MR include both AR and AV.

Organizations across many industries have already begun developing MR applications to make certain processes safer, more efficient, or more collaborative. It is already used in sectors such as manufacturing, healthcare, and architecture for training and development, remote collaboration, and turning concepts into pre-production models. MR headsets like the Microsoft HoloLens allow for efficient sharing of information between doctors. Other players include the US Air Force Research Laboratory and Skywell Software.

## AUGMENTED VIRTUALITY

Augmented virtuality refers to predominantly virtual spaces into which physical elements (such as objects or people) are dynamically integrated. The objects or people can then interact with the virtual world in real time with the use of techniques such as streaming video from physical spaces (such as webcams) or the 3D digitalization of physical objects.

The use of real-world sensor information, such as gyroscopes, to control a virtual environment is an additional form of AV, in which external inputs provide context for the virtual view. Current use cases include gaming and design applications. For example, using a touchscreen, people can design their own kitchen or bathroom by selecting and moving virtual appliances and fixtures around a digitally created room. Blacksburg Tactical Research Center is a leading player in the AV space.

## VIRTUAL REALITY

Virtual reality refers to an entirely simulated experience that can be similar to, or completely different from, the real world. It uses VR headsets or multi-projected environments to generate realistic images, sounds, and other sensations that simulate a user's physical presence in a virtual environment, allowing for movement and interaction.

VR headsets commonly comprise a head-mounted display with a small screen in front of the eyes, but can also be created through specially designed rooms with multiple large screens. While seeing increasing adoption, there are health and safety concerns around VR's prolonged use, especially by children. Leading companies active in the market include Autodesk, France Immersive Learning, Google, SteamVR, and Threekit.

Overall, it is important to realize that the Metaverse is not all about interactions in a completely virtual world, which is typically the type of experience that many observers focus on and is often the source of skepticism about its likely level of adoption. As XR technologies mature, the Metaverse will offer seamless continuity between the real and virtual worlds.

# **MetaMetaverse Vs VR**

In today's rapidly evolving digital landscape, terms like "metaverse" and "virtual reality" are gaining significant attention. But what exactly do these terms mean, and how do they differ? In this blog post, we will explore the fundamental differences and overlap between the metaverse and virtual reality, shedding light on two fascinating concepts that are shaping the future of our digital experiences.

## **Defining the Metaverse**

The metaverse refers to a virtual universe, an interconnected network of digital spaces, where users can interact with each other and engage in various activities. It is a collective term for a vast, shared online space that combines elements of augmented reality (AR), virtual reality (VR), and the Internet. Think of it as a convergence of multiple virtual worlds where users can navigate, communicate, and explore limitless possibilities.

## **Understanding Virtual Reality**

Virtual reality (VR), on the other hand, is a technology that allows users to immerse themselves in a simulated environment, often through the use of headsets or other sensory devices. VR creates a sense of presence, transporting users to a computer-generated world that can replicate real-world experiences or offer entirely fictional environments. It is an individual experience that isolates users from the physical world, placing them fully within the confines of a virtual realm.

Read more: [What's the Future of the Metaverse](#)

## Key Differences

- **Scope and Interactivity:** The metaverse encompasses a broader concept than virtual reality. It extends beyond individual immersive experiences to include social interactions, economic activities, and content creation. In contrast, virtual reality primarily focuses on creating an immersive and solitary experience for the user, with limited interaction with others.
- **Connectivity and Sharing:** The metaverse emphasizes connectivity and collaboration among users. It aims to create a shared online space where people can engage, communicate, and interact with one another, transcending geographical boundaries. Virtual reality, while offering immersive experiences, often lacks the same level of interconnectedness and shared experiences that define the metaverse.
- **Real-World Integration:** The metaverse aims to bridge the virtual and physical worlds, blurring the lines between them. It envisions a seamless integration of digital and real-world elements, allowing users to access the metaverse through various devices and interact with the physical environment. In contrast, virtual reality is primarily focused on creating entirely simulated environments, often detached from the real world.

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# **IoT - Bridging the Gap between Virtual and Physical World**

The Internet of Things (IoT) and the Metaverse of Things (MoT) are two concepts that have gained significant attention in recent years. IoT refers to the network of physical objects, devices, and systems that are embedded with sensors, software, and connectivity. It enables them to exchange data and information with other devices and systems over the internet. On the other hand, MoT extends the concept of IoT to include virtual environments, such as online games, social media platforms, and other digital experiences. MoT involves the interconnectivity of virtual and physical objects, creating a seamless experience between the two. In a MoT environment, a user could, for example, use a physical object to control a virtual object or vice versa. IoT and MoT together have the potential to revolutionise many aspects of our lives and create a world where the physical and virtual are seamlessly integrated. In the development of the Metaverse, IoT is poised to play a significant role. It can bridge the gap between the physical and virtual worlds, and create smart environments that adapt to the needs and preferences of users in real-time. IoT devices can also enhance the security and privacy of the Metaverse and provide personalised experiences to users. Finally, IoT devices can create new business models and revenue streams in the Metaverse. However, there are also challenges that need to be addressed in order to fully realise the potential of IoT in the Metaverse, including the need for standardisation and interoperability across different devices and platforms. However, IoT is limited in that it focuses only on the physical world and the devices that inhabit it. It does not take into account the virtual world, which is becoming increasingly important as more of our lives are lived online. This is

where the concept of MoT comes in. MoT extends the concept of IoT to include virtual environments, such as online games, social media platforms, and other digital experiences. MoT involves the interconnectivity of virtual and physical objects, creating a seamless experience between the two. In a MoT environment, a user could, for example, use a physical object to control a virtual object or vice versa. The idea of MoT is to create a world where the physical and virtual worlds are indistinguishable, and users can seamlessly move between them. This could have significant implications for many areas of our lives, from entertainment and education to healthcare and business. For example, a user could use a physical device to control a virtual avatar in a game, or a doctor could use a virtual reality headset to perform surgery on a patient located on the other side of the world. One of the key challenges of MoT is developing the infrastructure and technology needed to support it. This will require the development of new communication protocols, software platforms, and hardware devices that can seamlessly integrate physical and virtual environments. It will also require new standards and regulations to ensure interoperability and security across different systems and environments. In conclusion, while IoT and MoT share many similarities, they are distinct concepts that address different aspects of our interconnected world. IoT focuses on the interconnectivity of physical devices, while MoT extends this concept to include virtual environments as well. Together, these two technologies have the potential to revolutionise many aspects of our lives and create a world where the physical and virtual are seamlessly integrated. However, significant challenges remain in developing the infrastructure and technology needed to make this vision a reality.

Role of IOT in Metaverse? The Internet of Things (IoT) is poised to play a significant role in the development and evolution of the Metaverse. The Metaverse is a virtual universe where users can interact with each

other and digital objects in a seamless, immersive experience. It is expected to transform many industries, from gaming and entertainment to education and healthcare. One of the key advantages of IoT in the Metaverse is its ability to bridge the gap between the physical and virtual worlds. IoT devices are capable of collecting data from the physical world and transmitting it to the Metaverse, where it can be used to create new experiences and services. For example, sensors embedded in real-world objects could be used to track the movement of those objects in the virtual world, enabling new forms of gameplay or simulation. Another important role for IoT in the Metaverse is in the creation of smart environments. Smart environments are spaces that are equipped with sensors, cameras, and other devices that can monitor and respond to the activities of users. In the Metaverse, smart environments could be used to create immersive experiences that adapt to the needs and preferences of users in real-time. For example, a smart environment could adjust lighting, sound, and other factors to create a more engaging and immersive experience for a user. IoT devices can also be used to enhance the security and privacy of the Metaverse. Security is a critical concern in the Metaverse, as users will be interacting with each other and exchanging sensitive information. IoT devices can be used to monitor and detect security breaches, as well as to implement security protocols to protect user data. In addition, IoT devices can be used to provide personalised experiences to users. By collecting data on user behaviour and preferences, IoT devices can create personalised experiences that are tailored to the individual needs and interests of each user. For example, a virtual shopping experience could be customised to each user based on their previous purchasing history and preferences. Finally, IoT devices can be used to create new business models and revenue streams in the Metaverse. For example, IoT devices could be used to collect data on user behaviour and

preferences, which could then be used to create targeted advertising campaigns or to develop new products and services. However, there are also challenges that need to be addressed in order to fully realise the potential of IoT in the Metaverse. These challenges include the need for standardisation and interoperability across different devices and platforms, as well as the need to address privacy and security concerns. In addition, there is a need for new business models and revenue streams that can support the development and deployment of IoT devices in the Metaverse....

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# The current and potential metaverse use cases

Companies in many sectors are already reaping the benefits of metaverse use cases, but even greater potential lies ahead. Here are some current and potential use cases a business can explore with metaverse technology.

## Remote virtual office

The workplace has changed a lot in the last few years, and the pandemic has only accelerated this trend. Many companies have allowed or even encouraged their employees to work from home. And while this has a lot of advantages, it also has some challenges.

One of the biggest challenges of remote work is staying connected with your team and maintaining productivity. Metaverse can help with both of these things. Metaverse can be used for various purposes, including virtual collaboration, team-building exercises, and much more.

Nowadays, work meetings are usually held online via Microsoft Teams or Zoom. However, metaverse technology can help create a virtual office space for your team so everyone can meet and work together in real-time, regardless of location. It can help to improve communication and collaboration and make it easier to stay on top of projects.

Because metaverse provides the 3D environment, it also could add some fun and excitement to employees' workday. With customisable digital avatars, employees could visit a virtual meeting room, walk up to a virtual help desk, have a digital water cooler chat, or relax with colleagues in a networking lounge.

For example, Vice Media Group has teamed up with Bjarke Ingels Group to create "[Viceverse](#)", a digital headquarters in the metaverse. This virtual office allows for meetings, briefings, presentations and demonstrations of metaworld experiments, as well as experimenting with NFTs and Web 3.0.

## Digital learning space

In the educational realm, metaverse can be used for distance learning and interactive educational experiences. Regarding professional training, metaverse can create an immersive learning environment to

help learners absorb information more effectively. In addition, metaverse-based learning can be accelerated since learners can explore virtual worlds at their own pace and revisit concepts as needed.

One of the benefits of using VR and metaverse for virtual training is that learners can be exposed to realistic scenarios. For example, in a healthcare simulation, learners can practise treating patients in a safe and controlled environment. Such exposure can help professionals become more comfortable with procedures and protocols before facing them in the real world.

Another benefit of using virtual space for learning is that learners can receive real-time feedback. This feedback can help learners improve their skills and make the most of their training time. Virtual learning can also help establish effective communication by eliminating the language barrier. It could help people from different countries to study in a single digital space without social or linguistic complications.

For instance, the Korea Advanced Institute of Science and Technology is planning to launch a [virtual campus](#) in September 2023. Metaverse presents the opportunity to make education more inclusive and the university's reach.

### **Virtual tourism**

The tourism industry has been one of the hardest-hit sectors during the COVID-19. However, there are other vulnerabilities besides physical restrictions imposed by the pandemic. For instance, as global warming worries rise and widen, and more action is required, people could focus on digital rather than real-world travel.

With VR headsets, virtual tours, and 360-degree videos, today's travel & tourism industry has already entered the digital space. Although people are unlikely to stop taking real trips, they will continue to enrich their in-real-life travels with virtual ones, and a metaverse will only enhance such experiences.

Metaverse not only provides virtual tours to real-world cities or digital representations of real estate but could be used to visit simulations of famous landmarks and buildings in their original condition. Moreover, digital avatars allow having a digital travelling experience in the metaverse as interactive as in the physical world. Users can form close

relationships in a virtual environment since they can talk, move together as a group, and enjoy a shared experience.

For example, South Korea will invest \$186.7 million into the development of the [metaverse ecosystem](#). Seoul will be the first city to enter the metaverse with their new project, "Metaverse Seoul". This project's virtual tourism services will let locals and international visitors pay a visit to current attractions and historical recreations from the comfort of their homes.

## **Metaverse entertainment**

Metaverse is the future of online entertainment. From concerts, shows and sports to online gaming and social media platforms, all of this is a part of your metaverse entertainment.

These events are often more immersive and interactive than real-world equivalents, giving fans a more personal experience. For example, at a digital concert, users could choose a view of the stage or even be allowed to meet the artist in person.

In a metaverse virtual sports arena, users can use digital avatars to buy and wear merchandise of favourite clubs and communicate and watch games and events together. With multi-view camera technology, users could enter the sports field, walk alongside the players, or join the football cheerleaders.

[Truist Park](#), the baseball stadium in Atlanta, opened in the metaverse and is ready to host events. With a sound system that reproduces sound from Hartsfield Airport and "Take Me Out to the Ball Game" playing in the background, users will feel like they are at the park.

## **Online gaming**

The gaming industry is one of the driving forces behind the development and implementation of the metaverse. Gaming companies are investing heavily in research and development to create new and innovative ways to bring games to the metaverse.

Metaverse games offer players a more immersive and realistic gaming experience, thus becoming increasingly popular. Metaverse projects are vital for the new generation of play-to-earn games. By playing metaverse

NFT or blockchain games, players can acquire different in-game collectables to trade with other participants or in external marketplaces.

Moreover, metaverse games' realistic content gives companies an additional platform for unlocking marketing prospects. Ads in the metaverse are unobtrusive, appearing in natural places like game billboards or character clothing. This offers brands excellent exposure and opportunities for product placement in the gaming environment.

### **Social media platforms**

The metaverse technology will change social networks as we know them. Social media platforms are evolving from a two-dimensional ecosystem into a metaverse digital world. Unlike other messaging platforms and social media, the metaverse offers users a much deeper level of immersion that feels almost like in-person communication.

Facebook and other social media companies are expanding into the metaverse. For example, [Tinder](#) has introduced new features, like "Swipe Night" and "Explore," developing its app with the metaverse's digital avatars. Users can find new friends and virtually dance using an avatar.

# **Virtual Business and market: Investing in the Metaverse and Profit.**

## **Ways to Make Money in the Metaverse**

There are several options for how to make money inside any, and/or all, of these platforms.

### **Virtual Real Estate Investment**

Like buying physical properties in the real world, you can buy virtual land and buildings in the metaverse. You can often keep and modify the property or hold and sell it, ideally with an [investment gain](#).<sup>4</sup>

For example, in the Decentraland metaverse, land holdings are bought and sold as [non-fungible tokens \(NFTs\)](#) using [cryptocurrency](#) for payment. Parcels and estates are bought and sold primarily through the Decentraland marketplace.<sup>5</sup> As of September 2023, the cheapest parcel would cost about \$730.

Other Decentraland assets include items your character can wear and character actions called emotes.<sup>6</sup> Landowners can customize their piece of the metaverse using a builder tool.

### **Content Creation and Monetization**

Like Decentraland, many metaverses offer options to buy and sell digital items, including character outfits and digital objects. Metaverse platforms feature the ability to own digital assets, but they have to be created by someone. Creators can include [platform owners](#) and participants looking to get more involved and potentially make money in the metaverse.

Once created, you can list them for sale to other users in an online marketplace. Some platforms operate their own marketplaces, while many also support generic NFT marketplaces like [OpenSea](#) or Rarible.<sup>89</sup>

### **Digital Assets Trading**

If you don't consider yourself creative, you can still make money in the metaverse by buying and selling digital assets. Similar to the stock market adage, if you can buy low and sell high, you could walk away with a profit.

[Digital artwork represented by NFTs](#) are among the most popular ways to trade online assets. Some metaverses enable you to use and display artwork NFTs on their platforms. Certain collections of NFTs, such as [Bored Ape](#) and [CryptoPunks](#), earned a reputation for quickly increasing (and sometimes decreasing) in value.<sup>10</sup> In the metaverse, [Axie Infinity Axies](#) are another example of an asset that you may be able to profit from buying or selling.

Cryptocurrency and NFT values can change quickly. Be careful to avoid scams, and only consider investing what you can afford to lose, should your plans with such metaverse assets not work out.

### Metaverse-Based Businesses

Most people think of businesses as being a place with a physical storefront, warehouse, or office. But companies can [operate digital storefronts](#) or offices in the metaverse as well. Some major companies with a metaverse presence include Nikeland on Roblox, a Samsung store in Decentraland, and Gucci locations in Roblox and The Sandbox.<sup>11121314</sup>

If you run a business or want to create one, then opening a metaverse branch where you sell digital goods or even link to real-world services like [banking](#)—as J.P. Morgan has done with its Onyx [blockchain](#) platform—can offer opportunities to make money in the metaverse.<sup>15</sup>

## Potential Risks and Challenges

Unlike most financial markets in the United States, there's relatively little [oversight](#) in the metaverse. There are certainly opportunities for savvy users, creators, and investors to profit in the metaverse. But just as easily, you could put in huge effort with no return, or even worse, you can experience significant losses.

Reality Labs is part of Mark Zuckerberg's Facebook empire; both are divisions of parent company Meta. In its most recently reported quarterly results, [Meta experienced \\$3.8 billion in losses](#) from its metaverse unit, and those losses are expected to increase, according to Meta's guidance for future earnings results.<sup>16</sup>

Most individuals are likely to lose far less if they experience losses related to the metaverse. Still, corporate losses can act as a warning for what's possible when trading and investing in a new digital world.

## Can You Make Real Money in the Metaverse?

It's possible to make money in the metaverse. In most cases, you'll [earn profits](#) in the form of cryptocurrency. You can convert cryptocurrency into [fiat currency](#) using a cryptocurrency exchange.

## How Can I Profit from the Metaverse?

You can make money in the metaverse in several ways. Popular methods include investing in digital real estate, creating digital objects, [trading](#) digital assets, and building metaverse-based businesses.

## Is the Metaverse Profitable?

The metaverse works somewhat like other [financial markets](#), where you can make money or lose money. Metaverse investments can be extremely volatile and risky, so it's best to take a careful approach and avoid investing more than you can afford to lose.

## The Bottom Line

Metaverse platforms offer an exciting opportunity to build digital estates and customize avatars representing you in the digital world. While you can make money in the metaverse, losses are also possible. Proceeding carefully can help you learn to navigate the metaverse and find the best path to potential profits.

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