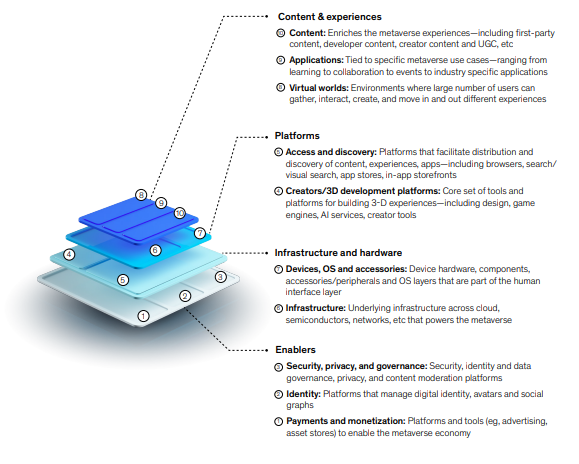
**“Layers of Architecture in Metaverse”**



**Enablers**

**1. Payments and Monetization**

Just as in the physical world, payments in the metaverse can be made in various ways, but the most common way is via blockchain and digital currencies, which users can utilize to purchase goods and services from merchants within the metaverse.

Cryptocurrencies represent the monetary connection between the physical and virtual worlds. Users wanting to purchase any goods in the metaverse can exchange their local fiat currencies into cryptocurrencies by setting up a crypto wallet and using an exchange like Coinbase or Binance to make the conversion.

However, each metaverse has its own set of accepted digital currencies, so users need to know the payment methods the platform accepts before making any exchanges. NFTs have become quite popular in the metaverse as a form of payment, as they can be easily transferred between users. Since they use blockchains like crypto, NFTs are a robust method to give owners proof of ownership, a way to transfer value securely, accessibility, and anonymity.

**2. Identity**

The metaverse is “an integrated network of 3D virtual worlds” where people can interact, do business, and forge social connections through their virtual avatars. The metaverse avatar is essentially a manifestation of a user within the metaverse. The avatar can look like almost anything you can imagine. It might look exactly like you do in the real world or your avatar might look different.

In the physical world, your identity reflects a host of characteristics from where you live and where you went to school to what you look like and how you interact with the world. In the same way, your online identity reflects your virtual address, or domain name, as well as your behaviours on the web. For individual users, this identity is based on information collected about you, including search history, past purchases or demographic information that form your online profile.

The definition of digital identity takes on a new meaning in the metaverse calling for a decentralized, open platform based on public blockchain technology that relies on digital identities linked to real-world identities.

In this virtual world, users have control over personal identification information and interactions with other users. Users can even selectively disclose information, according to their own comfort level.

This idea anticipates the need for an interoperable digital identity, or a digital passport of sorts, that individuals and organizations can use across digital environments to prove who they are and why they’re different.

**3. Security, privacy and governance**

What are metaverse cybersecurity concerns?

Along with extensive growth opportunities, the metaverse comes with legitimate concerns about privacy and data security. As everything is built virtually in the metaverse, cybercriminals have plenty of options to hack the data and misuse it for their personal gains.

Some of the risks that metaverse users face are similar to those raised by the users of the internet such as phishing emails, data hacking, and malware attacks among others. However, the unique architecture on which the metaverse is built brings additional challenges to the horizon. For example, digital currencies and non-fungible tokens (NFTs) are extensively used in the metaverse, and hackers might find these things interesting for hacking purposes.

Another cyber security concern unique to metaverse is the preservation of the virtual identity of users. Further, metaverse companies need to safeguard all the critical information related to the business transactions happening in the online space. This preservation is the most critical step in ensuring the long-term sustenance of metaverse as a separate business category.

How to handle Metaverse Cybersecurity Concerns?

First and foremost, the metaverse platforms have to adopt a Zero Trust policy – Trust Nothing, Validate Everything. This requires a solid framework for the preservation of the data and continuous verification of the third parties with which the exchange of the data takes place. Companies should strive to go beyond authentication and check all possible levels of digital interactions which are susceptible to the exfiltration of sensitive information.

The inclusion of Artificial Intelligence (AI) and machine learning can significantly improve the efficacy of cybersecurity solutions. By analysing the access patterns of users, both these new-age technologies can prevent data leakage, as well as prevent the dangers of cyber-attacks on metaverse platforms.

The Web 3.0 introduction will also help in creating an atmosphere of pro-privacy and anti-monopoly. Using the idea of decentralization, the new-age internet technology offers better protection against data fraud and hacking attempts. In fact, the use of digital currencies and blockchain technology in the metaverse offer innate data protection to users.

The metaverse cybersecurity concerns are critical and in the wake of rapidly evolving things, these issues need to be addressed with utmost sincerity and earnestness. As the entire concept of metaverse revolves around digital space, its growth prospects in future will depend upon the data protection companies are able to extend to users.

Compared to the existing threats faced by web 2.0, the metaverse platform on the 3.0 version of the web is less likely to face data breaches. This is because hack-proof technologies such as digital currencies and blockchain are parts of the metaverse economy. However, there are weak links such as wearable equipment and network connectivity which can be used by hackers to steal sensitive information related to users’ accounts and business transactions.

Therefore, it is important for all the stakeholders in the metaverse ecosystem to offer safe equipment while encouraging users to go for a secure internet to access the world of digitally connected universes.

**Platforms**

**4. Creators/3D development platform**

The architect is that person who has a creative mind and can come up with sketches about the vision. We use these sketches to sell the idea to our clients. Once an idea is sold the same architect or a 3D modeller is tasked with creating a low poly or voxel render for the project.

The model created here is simply an artistic rendition. It is usually expected that the architect has the skills to add colliders and ensure that the model is compatible with metaverse where it is to be uploaded.

Building 3-D experiences requires a very different set of developer tools and platforms than the current developer stack on web and mobile. This ranges from design tools (such as 3-D modelling, animation, and audio) to core engines and rendering to back-end services (for example, LiveOps, multiplayer services). AI will also play a critical role in the metaverse, from tracking and predicting motion to real-time rendering of worlds, content creation, and optimizing operations.

**5. Access and Discovery**

Jon Radoff describes the discovery layer as “the push and pull that introduces people to new experiences”. In the metaverse ecosystem, the discovery systems of inbound and outbound continue to exist. Inbound discovery occurs when people are actively looking for information. Meanwhile, outbound refers to the method of seeking to push messages out to people whether they asked for it.

Some of the aspects of information sharing will be crucial in the realm of Web 3.0. Radoff argues that community-driven content is crucial for metaverse marketing. The rise of content creation we are witnessing in the influencer era will be shared within the metaverse context more and more. Recently, we’ve seen its early examples in the forms of non-fungible tokens (NFTs). Becoming one of the hottest topics of 2021, these digital assets started being widely [used by the brands as a marketing tool](https://holonext.com/metaverse-strategies-for-brands/). This is a great way to boost community engagement and it will advance much more in the metaverse.

Real-time presence will also be central to discovery. Video game services such as Steam and Xbox are already allowing gamers to see what their counterparts are doing in real-time. Few years ago, the music streaming platform Spotify added a feature where the users can see what their friends are listening to at the moment. Most recently, Twitter has launched Spaces as a tool for live audio conversations.  These types of social interactions will be possible in the metaverse through various shared experiences.

**Infrastructure and Hardware**

**6. Infrastructure**

Financial institutions, especially more traditional ones, are uniquely positioned to bridge the trust gap that has traditionally held back wider adoption of services such as digital IDs, digital payments, or custody for NFTs, cryptocurrencies, or other digital assets.

The sixth layer includes the technology that makes everything that is mentioned above become real. Ultimately, for all outer layers to exist we need technological infrastructure consisting of 5G and 6G computing. These will massively improve bandwidth and reduce network contention and latency.

Moreover, for the devices mentioned in the human interference layer to work efficiently, we need tiny hardware that is powerful. According to Radoff, these include semiconductors that are approaching 3nm processes and beyond; microelectromechanical systems (MEMS) that facilitate tiny sensors; and compact, long-lasting batteries.

**7. Device OS and Accessories**

Rather than building more powerful GPUs into VR, Eye-tracking technology could help to reduce the demand placed on the hardware. This would use a camera to detect you were looking and then turn down the quality of the display in the areas surrounding it. On top of that, VR headsets are still much too heavy to wear for any extended periods of time. Gaming GPUs like that the upcoming RTX 3090 Ti are way too big to use in a device we strap to head, so VR headset manufacturers need to find ways to balance the needs for beefy hardware and a lightweight product.

Chips are the major parts to develop a metaverse system. NVIDIA released a major business update announcement to the market at its own global industry technology summit GTC conference, that is, NVIDIA will provide basic technologies such as chips for the Metaverse in the future. AMD, which is also engaged in the development of graphics cards (GPUs), has recently begun to serve the Metaverse Trailblazers. On November 9, AMD announced that Meta (formerly Facebook) has become its business partner. In the future, Meta will purchase AMD chips to meet the huge demand for data centres and computing power after Meta has transformed from a “social media” company to a “Metaverse” company.

Virtual reality is the technology that shows the Metaverse to people. As an important bridge connecting the real world and the Metaverse, virtual reality devices have now received the attention and entry of many institutions, including many well-known big technology companies.

Meta, the “All in” Metaverse, earlier launched its Oculus line-up. The Oculus Quest 2 launched in 2020 has been rated as the most worthwhile virtual reality device by many well-known technology websites. And its price is only $299, with a resolution of 1832×1920 per pair of glasses (roughly equivalent to 4K high definition). The Oculus Quest 2 is arguably the most affordable virtual reality device available today.

**Contents and Experiences**

**8. Virtual worlds**

Today, there are more than 100 virtual worlds, most of which are focused on gaming or social experiences and with wide variation in graphics fidelity, immersivity, and centralization. While a few major platforms will emerge, we expect continued fragmentation, with higher levels of interoperability. We also expect platforms attracting creators and optimizing creator economics will have a significant competitive advantage. On the content side, there will be at least three archetypes that will populate the metaverse first-party content, developer content, and user-generated or creator content. Brands are also likely to become creators and participate in the metaverse in a very different way from traditional advertising models.

It is one of the most important steps to deep dive in metaverse is to create virtual venues and spaces available as well as accessible in metaverse. Some of the earliest created websites managed to take their brand and business to the next level by just being there first. Brands today are being presented with the same opportunity but on a much grander scale. Using 3D virtual reality technology, brands now have the option to create fully immersive and interactive virtual venues, universes, locations from scratch. Brands can immediately take advantage of this in the metaverse to create virtual venues, worlds, and spaces in which to hold events and experiences.

**9. Application**

In application layer of metaverse architecture contains all the possibilities which will be the use cases in metaverse. It will consume many sectors in our day-to-day life. Some of the sectors are as follows.

1. **Work**: - The concept of work and workplace have drastically changed during the pandemic. Remote work became prevalent, and it made all of us get adapted to it. With the advent of metaverse, the concept of work and workplace got its meaning. Working in a virtual office, holding meetings, collaborating with teammates, etc became one of the most used applications of the metaverse.

1. **Microsoft Mesh: -** Microsoft Mesh brings your workplace into the metaverse. It is one the best example of real-life applications of the metaverse in work. Microsoft mesh is basically a collaborative platform that allows you to have shared virtual experiences. Microsoft Mesh enables presence and shared experiences on any device through mixed reality (MR) applications. As of now Mesh will import the virtual avatar from. AltspaceVR.

You can do the following things in Mesh at present

* Collaborate Virtually
* Train together anywhere
* Get Remote expertise
* Design together in 3D

1. **Education:**  Education has become one of the top applications of the metaverse. Many education institutes are created in many metaverse platforms. Digital twins of many universities are being built. Education in the metaverse will bring drastic change in the education scenario of today.

Students will have the option to be taught by the best teacher in the world. They can visit any place or see any documentary or animation to have a better understanding of the topic. They can collaborate in a project from anywhere and anyone in the world.

**D Healthcare: -** Virtual Hospitals are being created in the metaverse. The doctors and patients can meet in this virtual hospital through VR headset to provide telemedicine consultation.

Healthcare applications of the metaverse can significantly reduce hospital footfall, reducing patient waiting times and delivering system-based cost savings.

* Accessible healthcare to remote areas of the world
* Patient Visit and Support will improve
* Family Visit to patient through VR Headset
* Digital Therapeutic Therapy can be given
* Virtual Health Assistant or Virtual Nurse
* Medical Education and Training across the world.

**10. Content**

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We’ve already started witnessing the rise of the creator economy. Think about YouTube: In the early days, there were few big Youtubers getting millions of views. They generally created content such as sketch comedies, tutorials or vlogs. Now, millions of others can make videos about a variety of subjects, no matter what the size of their audience is. TikTok gave the same opportunity to an even larger population. “In this new market, the consumer can also easily become the creator”.