

Master in Innovation Management

Friday, 9th June 2023, 5 PM (CET)

Module IX: Cloud Manufacturing. The Evolution of Production Processes;

Module X: The Metaverse and The Disruption of Virtual Worlds.

- Robotics, 3D technologies and industrial internet of things (IoT). Flexibility, scalability, efficiency and reliability of manufacturing cloud computing;
- What is the metaverse? Business opportunities, applications and challenges.

SPEAKER



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University Researcher



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Welcome to the ninth and tenth lessons of the Master In Innovation Management of Ascheri Academy.



Module IX: Cloud Manufacturing. The Evolution of Production Processes.

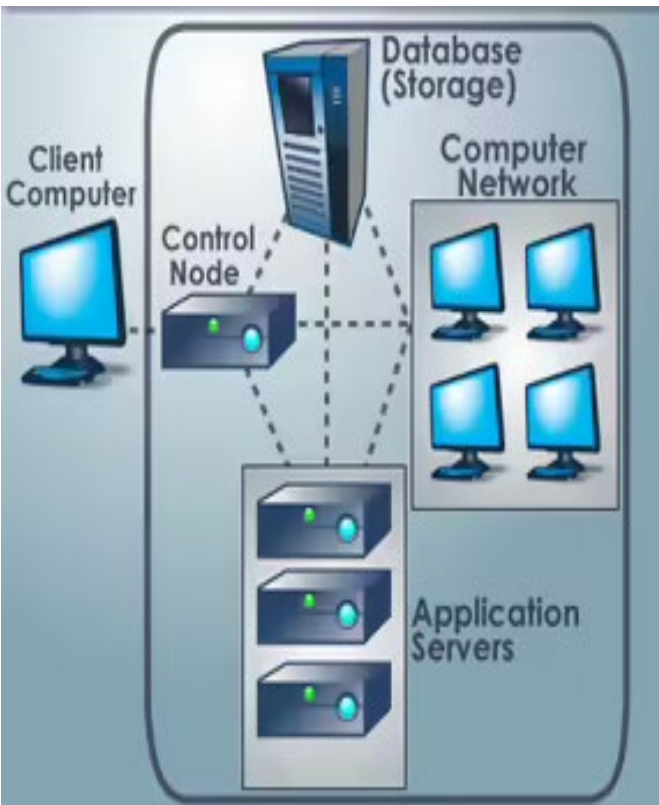


Introduction to Cloud Computing

Cloud Computing is the delivery of computing services such as servers, data storage, databases, networking, software, analytics, and intelligence over the internet (“cloud”) to offer flexible resources, faster innovation, and economies of scale. In simpler terms, instead of owning data centers, organizations can rent access to someone else’s infrastructure like storage, computing servers, and databases from a cloud computing service provider and only pay for resources that they use. Practically speaking, you only need to pay for the cloud services that you use, which helps lower your operating costs, run infrastructure more efficiently, and scale your applications as per business needs.



How Does Cloud Computing Work?



When talking about a cloud computing system, it's helpful to divide it into two sections: the **front end** and the **back end**. They connect to each other through a network, usually the Internet. The front end is the side the computer user, or client sees. The back end is the "cloud" section of the system.

The front end includes the client's computer (or computer network) and the application required to access the cloud computing system. Not all cloud computing systems have the same user interface. Services like Web-based e-mail programs leverage existing Web browsers like Internet Explorer or Firefox. Other systems have unique applications that provide network access to clients.

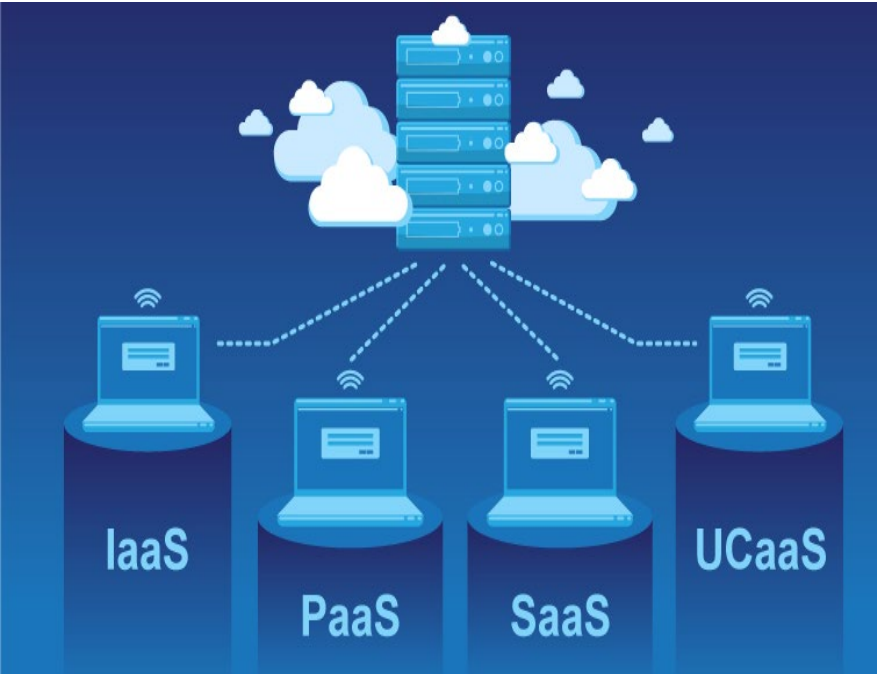
On the back end of the system, there are various computers, servers and data storage systems that create the "cloud" of computing services. In theory, a cloud computing system could include practically any computer program you can imagine, from data processing to video games. Usually, each application will have its own dedicated server.

A central server administers the system, monitoring traffic and client demands to ensure everything runs smoothly. It follows a set of rules called **protocols** and uses a special kind of software called **middleware**. Middleware allows networked computers to communicate with each other. Most of the time, servers don't run at full capacity. That means there's unused processing power going to waste. It's possible to fool a physical server into thinking it's actually multiple servers, each running with its own independent operating system. The technique is called **server virtualization**. By maximizing the output of individual servers, server virtualization reduces the need for more physical machines.



Cloud Computing Service Types

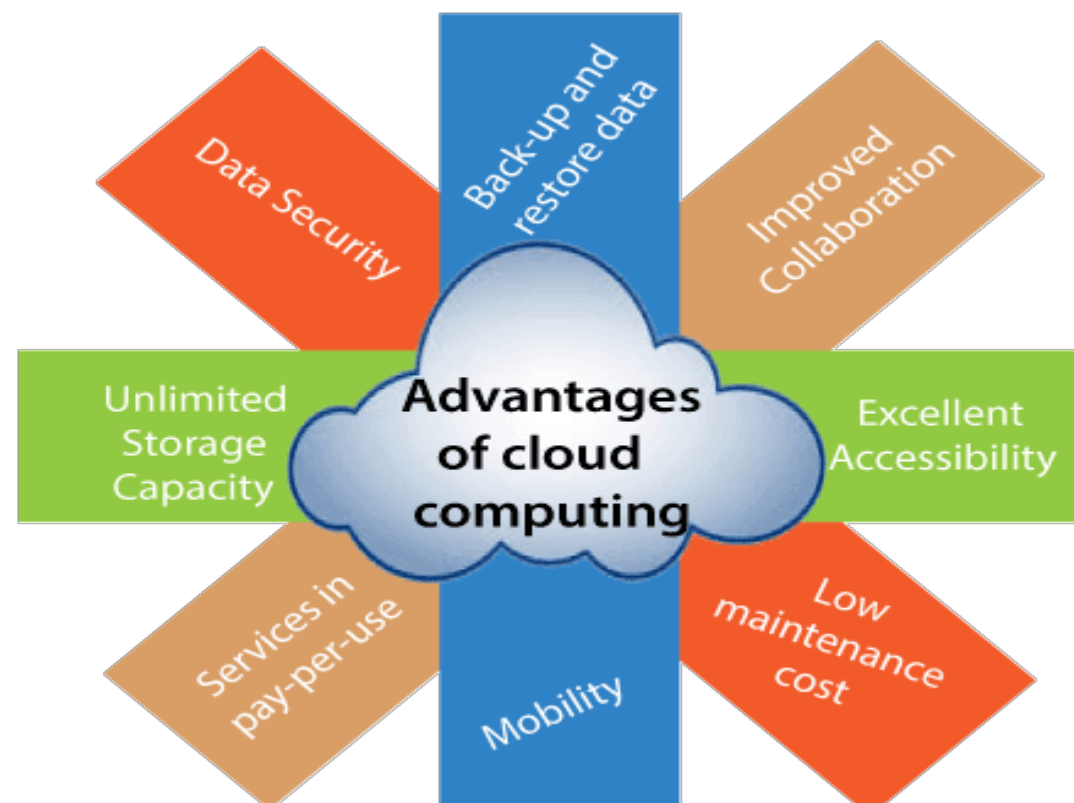
- 1. **Software-as-a-Service (SaaS);**
- 2. **Platform-as-a-Service (PaaS)**
- 3. **Infrastructure-as-a-Service (IaaS)**
- 4. **Unified Communications-as-a-Service (UCaaS)**



SaaS	PaaS	IaaS	UCaaS
Salesforce	Microsoft Azure	Amazon EC2	Zoom
Microsoft 365	Google App Engine	Microsoft Azure	Microsoft Teams
Pardot Marketing Automation	Windows Azure AppFabric	Google Cloud Platform	Fuze
JIRA	SQL Azure	Magento 1 Enterprise	Google Hangouts
Dropbox	AWS Elastic	Digital Ocean	Jive
Slack	Beanstalk		
Amazon Web Services	Force.com		



Advantages of Cloud Computing



Disadvantages of Cloud Computing





Let's watch this introductory video 📺





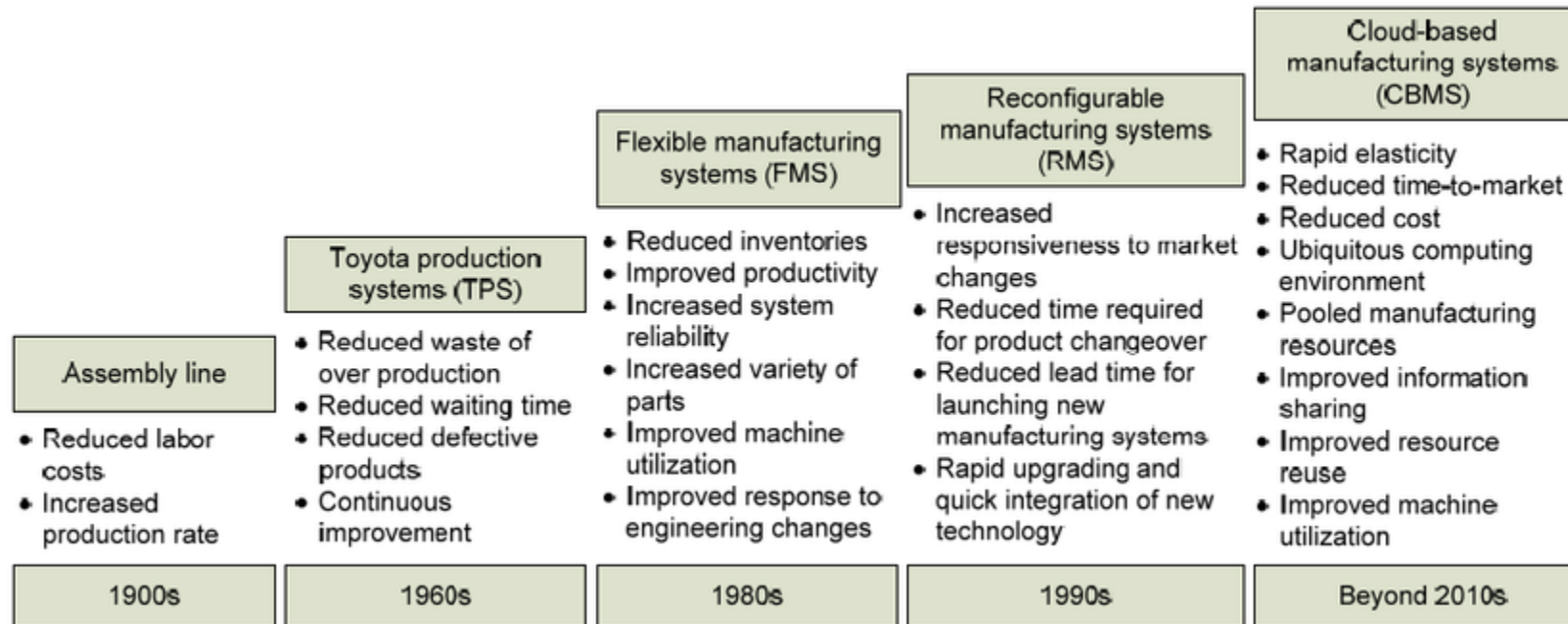
What Is Cloud Manufacturing?

Cloud manufacturing (CMfg) is the process of utilizing well established manufacturing resources, such as Enterprise Resource Planning (ERP), through the cloud. In this way, the information can be viewed, updated and applied at any time or place. Cloud manufacturing was intended to handle “big manufacturing” which means it follows the whole manufacturing process from the designing stage to production to maintenance.

Cloud manufacturing helps businesses unplug themselves so they can reach new heights and faster than ever. For some manufacturers the idea of “unplugging” makes them feel uneasy because if everyone in the organization can access data from anywhere then some unwanted eyes could be sneaking a peek at sensitive information. While this is a genuine concern, cloud experts are confident that **the cloud is just as safe as an on premise program.** Administrators still have complete control as to who can see what in the cloud, so everyone can see everything that are given permission to see. As for the greater concern that hackers could get in, many cloud service vendors provide 24-hour security to watch out for any potential security breaches and fraudulent code.

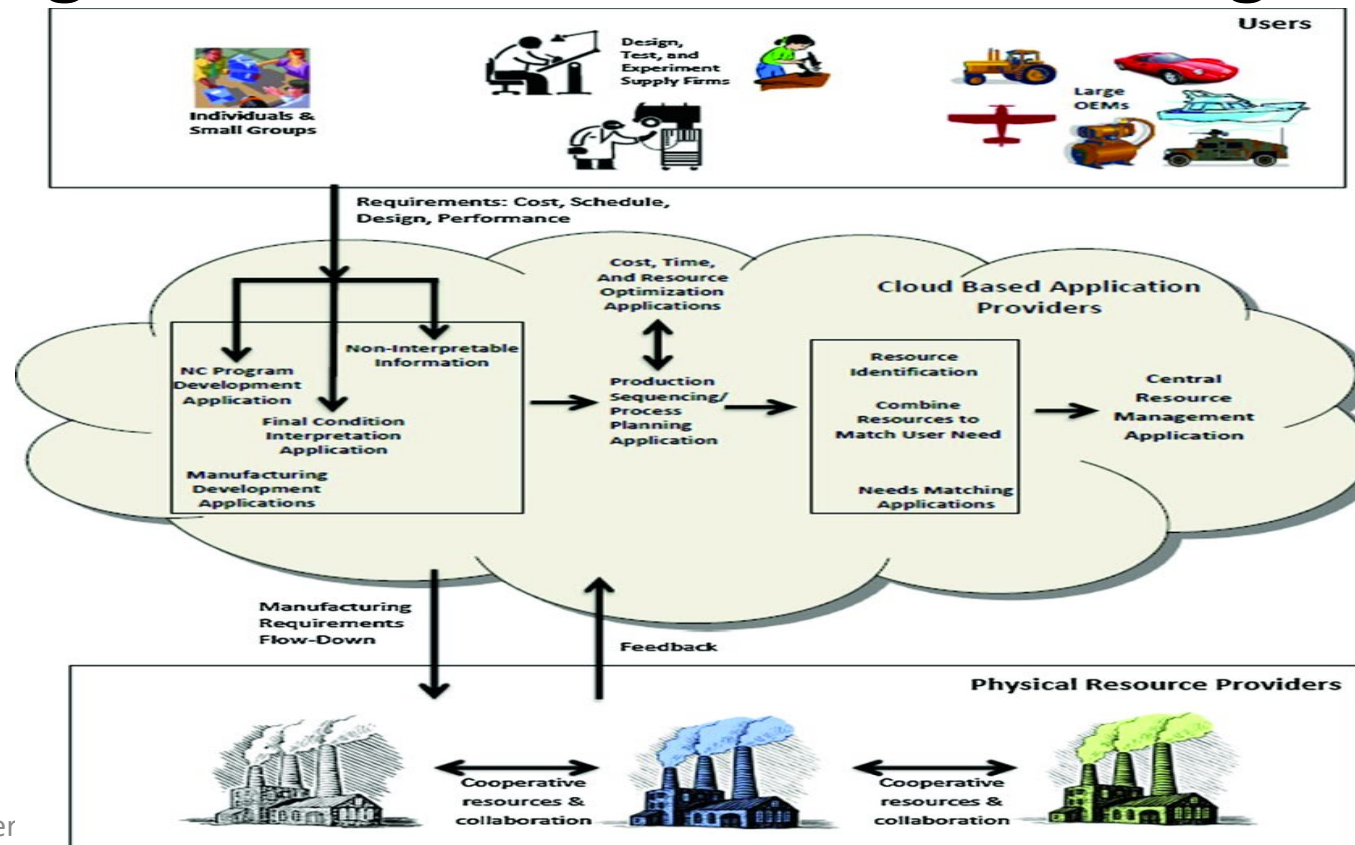


The Evolution of Manufacturing Systems



(Source: An Overview of Cloud Implementation in the Manufacturing Process Life Cycle - Scientific Figure on ResearchGate. Available from: <https://www.researchgate.net/figure/Evolution-of-Manufacturing-Systems>)

Strategic Vision for Cloud Manufacturing

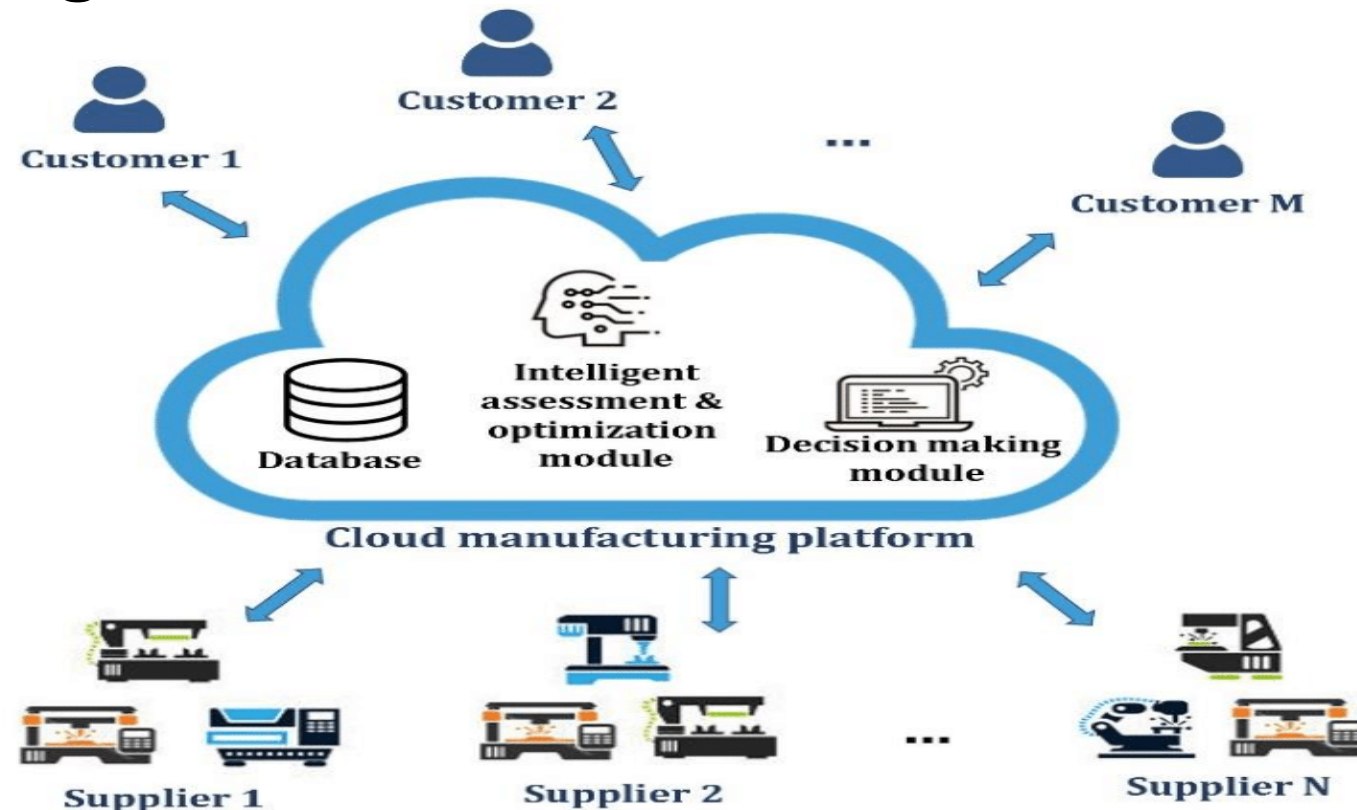


The Cloud Manufacturing Ecosystem



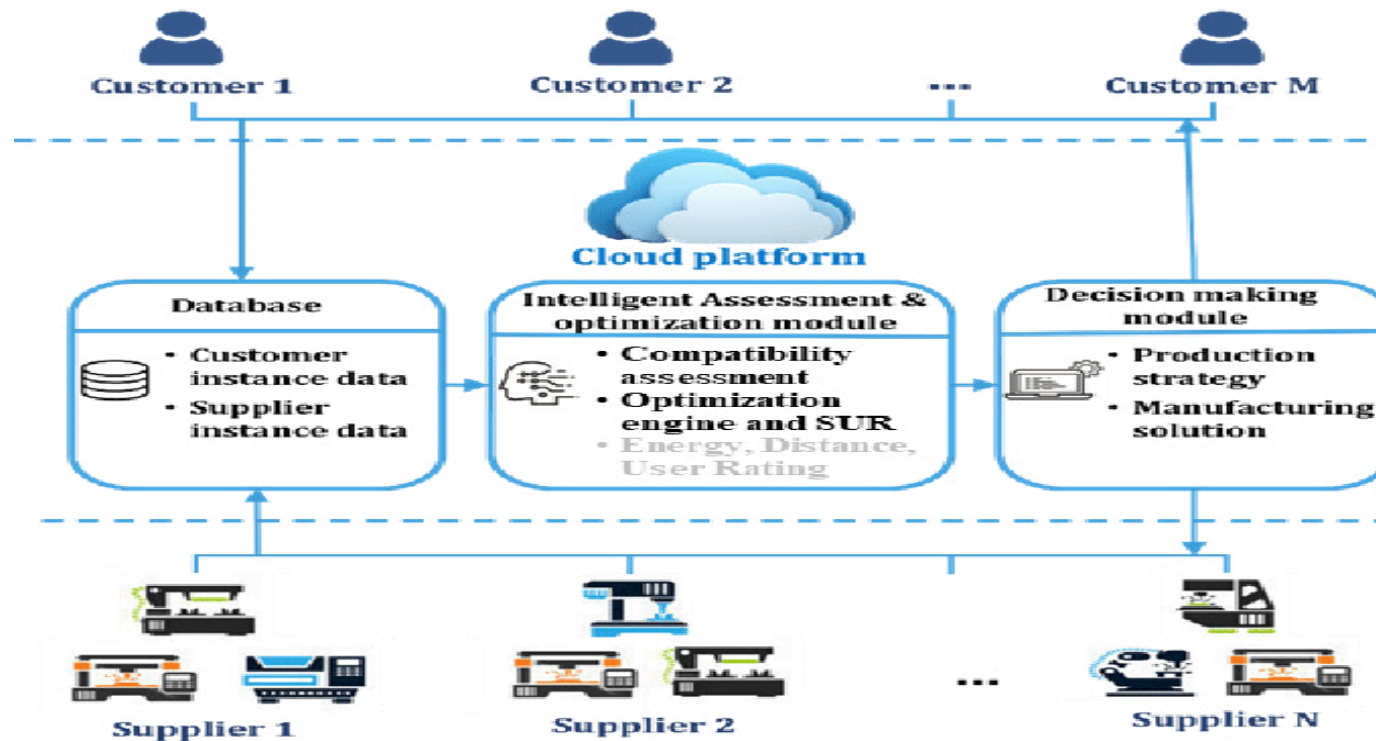
(Source: Industry 5.0: A Survey on Enabling Technologies and Potential Applications - Scientific Figure on ResearchGate.
Available from: <https://www.researchgate.net/figure/The-cloud-manufacturing-ecosystem>)

Cloud Manufacturing Framework for Smart Manufacturing Networks

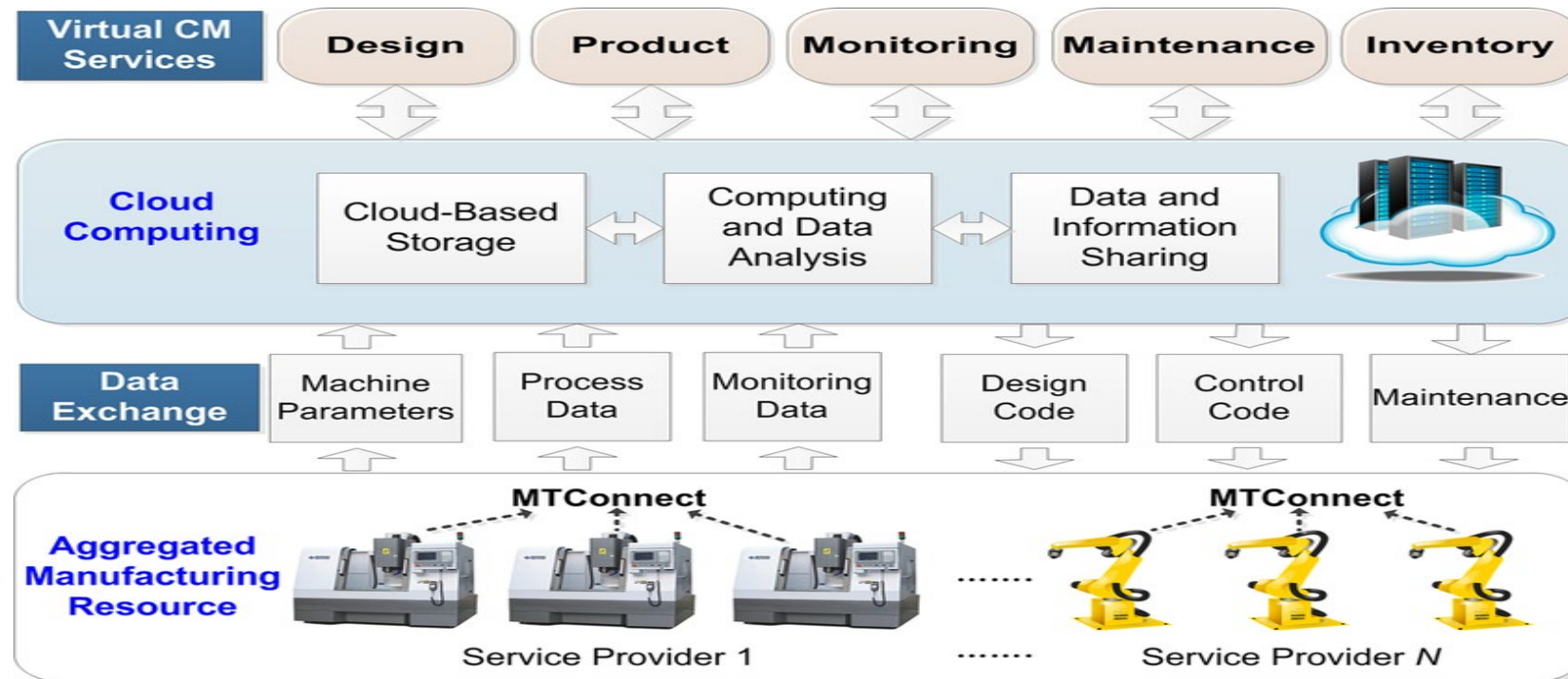


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Cloud Manufacturing Platform

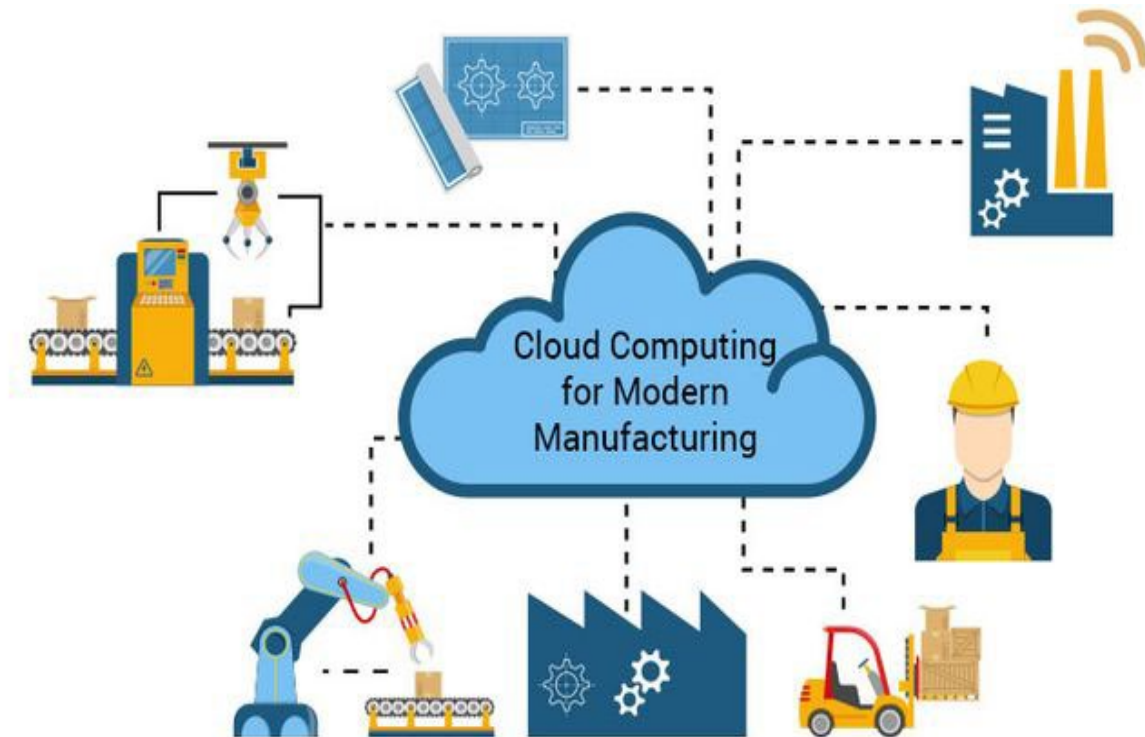


Cloud Manufacturing Enabled by Cloud Computing



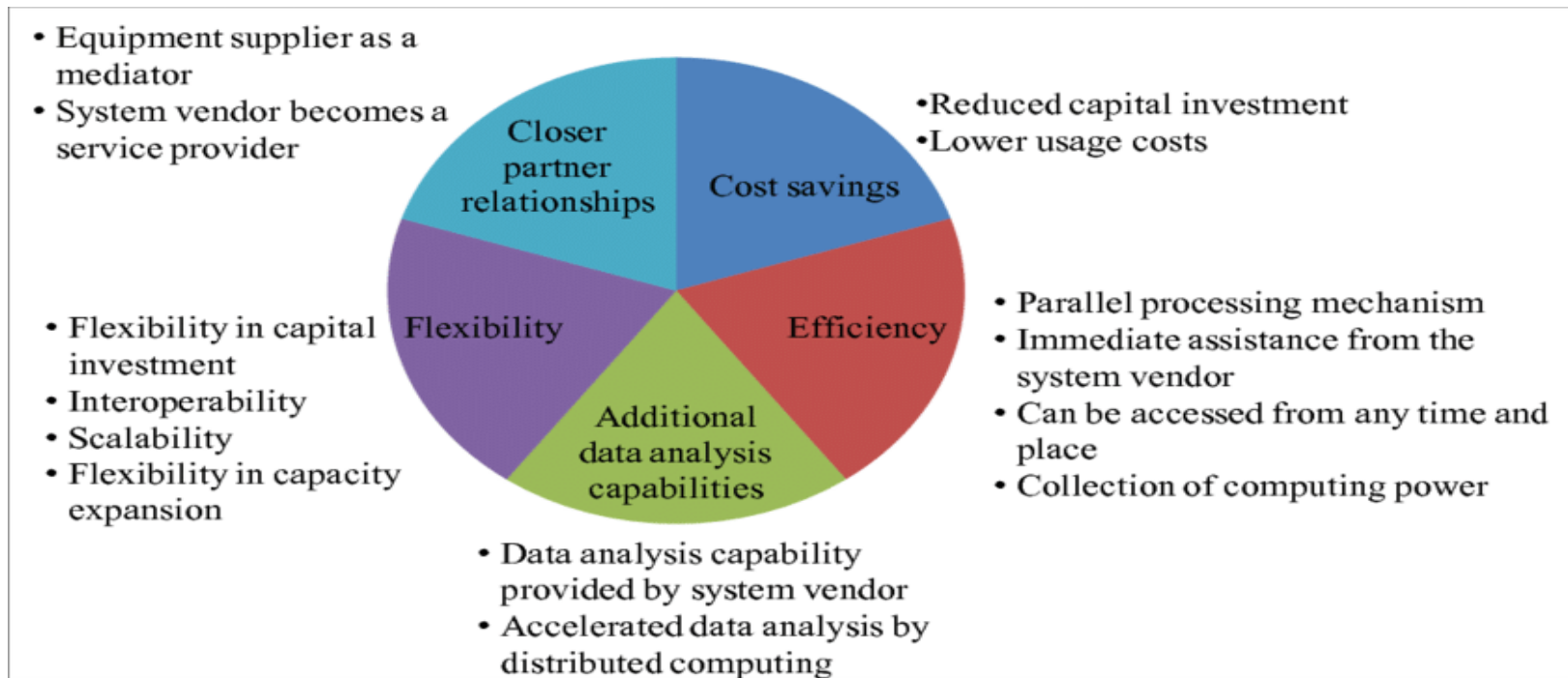
(Source: Cloud Computing for Cloud Manufacturing: Benefits and Limitations - Scientific Figure on ResearchGate. Available from: <https://www.researchgate.net/figure/CM-enabled-by-cloud-computing>)

Cloud Computing Services Benefits for Modern Manufacturing Practices



- It enables access to real-time information, anytime.
- It offers on-demand services that are highly flexible and scalable.
- Increases the ability to manage new customer demands, proactively.
- Facilitates easy integration with other applications, and offers seamless transmission of data between them.
- Helps managers and top leadership to connect across system boundaries and physical locations.

Cloud Manufacturing Benefits

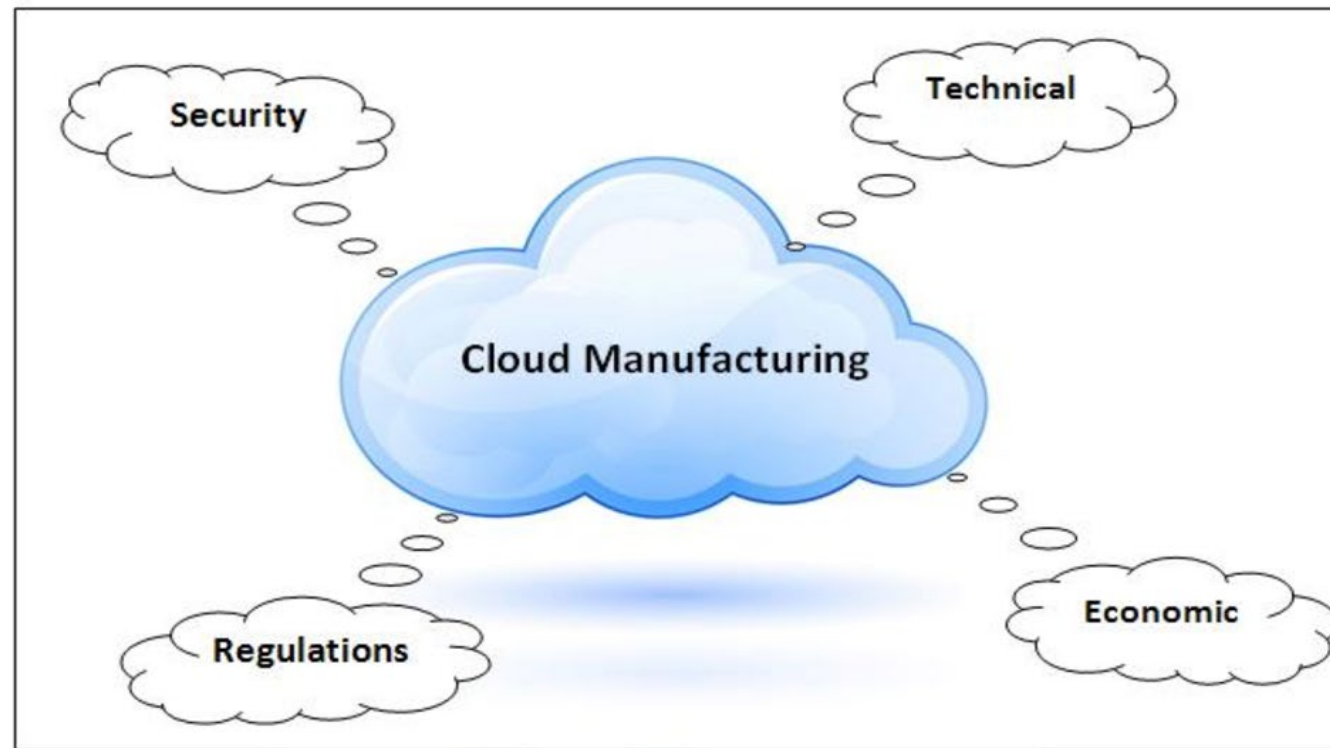


(Source: Strengthening the Competitiveness and Sustainability of a Semiconductor Manufacturer with Cloud Manufacturing - Scientific Figure on ResearchGate. Available from: <https://www.researchgate.net/figure/The-benefits-of-cloud-manufacturing-CMfg-Please-amend-the-typo-Cost-Savings>)



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Cloud Manufacturing Challenges



(Source: Yadekar, Y., Shehab, E., & Mehnen, J. (2013). Challenges of cloud technology in manufacturing environment.)

Module X: The Metaverse and The Disruption of The Virtual Worlds.



Introduction to The Metaverse

The metaverse is a concept of a persistent, online, 3D universe that combines multiple different virtual spaces. You can think of it as a future iteration of the Internet. The metaverse will allow users to work, meet, game, and socialize together in these 3D spaces.

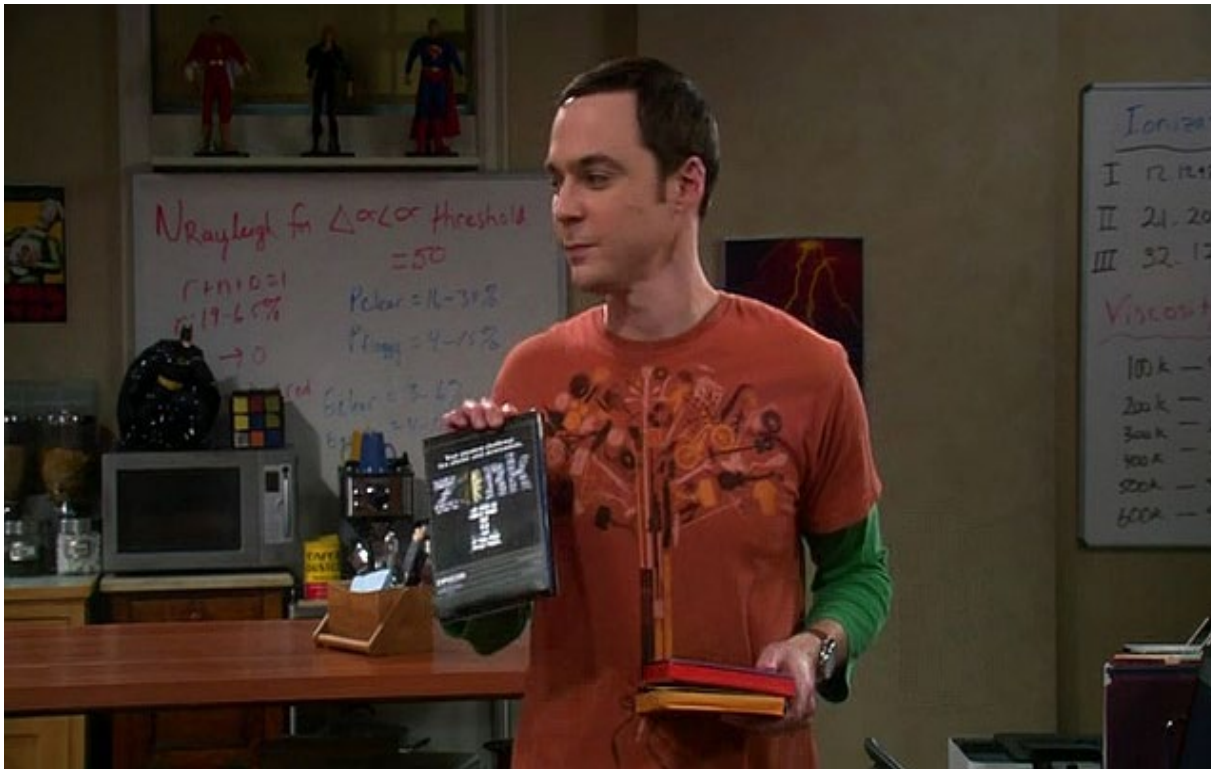
The metaverse isn't fully in existence, but some platforms contain metaverse-like elements. Video games currently provide the closest metaverse experience on offer. Developers have pushed the boundaries of what a game is, through hosting in-game events and creating virtual economies.

Although not required, cryptocurrencies can be a great fit for a metaverse. They allow for creating a digital economy with different types of utility tokens and virtual collectibles (NFTs). The metaverse would also benefit from the use of crypto wallets. Also, blockchain technology can provide transparent and reliable governance systems. When we look to the future, big tech giants are trying to lead the way. However, the decentralized aspects of the blockchain industry is letting smaller players participate in the metaverse's development as well.



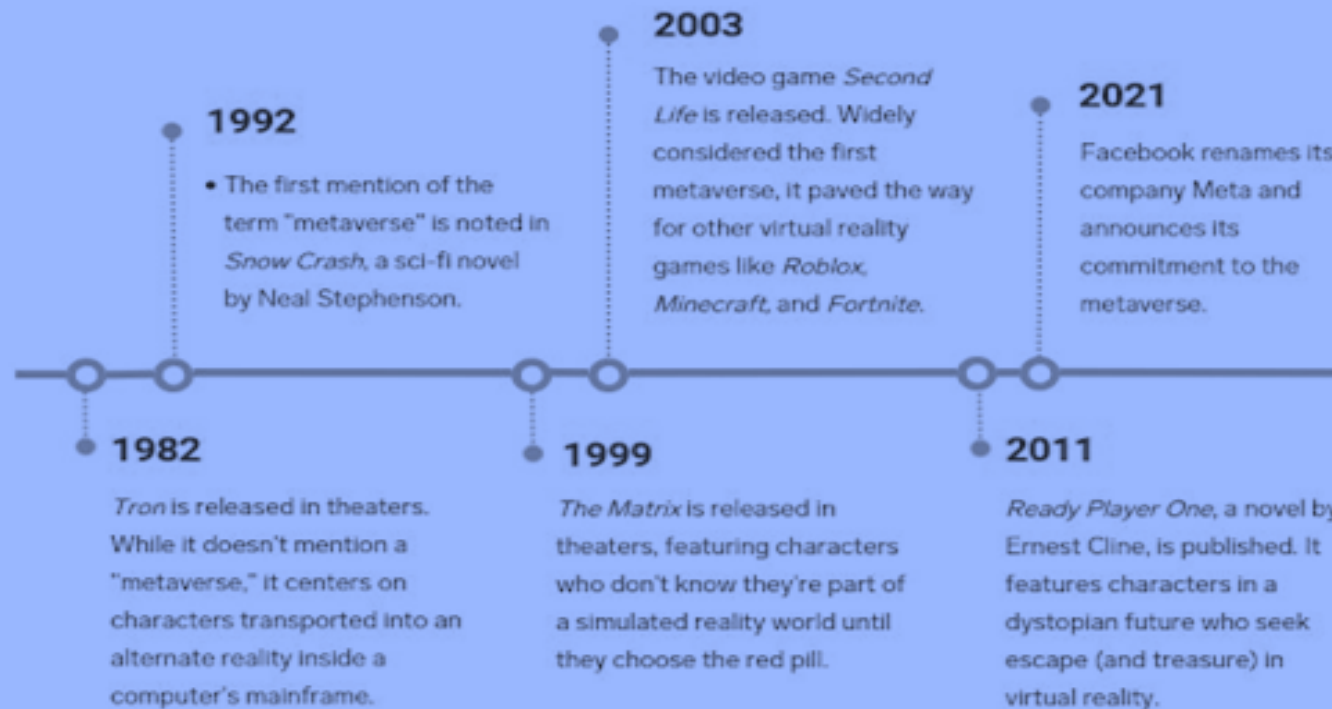


Brief History of Virtual Worlds



Text-based role-playing games that operated on timesharing systems prefigured the explosion of imaginative word-built worlds of Adventure, Avatar and other games on PLATO, the first MUDs (multi-user dungeons) and other online environments of the 1970s and 1980s. As the age of affordable graphical computing dawned in the mid-1980s, there was a natural instinct to create visual versions of these experiences (with the unintended forfeiture of the imaginative contribution of written language). The new-born medium of the graphical, digital and virtual world experienced a “Cambrian Explosion” of diversity in the 1980s and 1990s, with offspring species of many genres: first-person shooters, fantasy role-playing games, simulators, shared board and game tables, and social virtual worlds.

The beginnings of the metaverse



(Source: Insider Intelligence)



What Is The Metaverse?



The metaverse means different things to different people. Some believe it's a digital playground for friends. Others think it has the potential to be a commercial space for companies and customers. Both interpretations are correct. The metaverse is best characterized as an evolution of today's internet—something we are deeply immersed in, rather than something we primarily look at. **It represents a convergence of digital technology to combine and extend the reach and use of cryptocurrency, artificial intelligence (AI), augmented reality (AR) and virtual reality (VR), spatial computing, and more.** And the “enterprise metaverse” may coalesce in a way that unlocks even more opportunities, beyond simply serving as a virtual place where people interact.

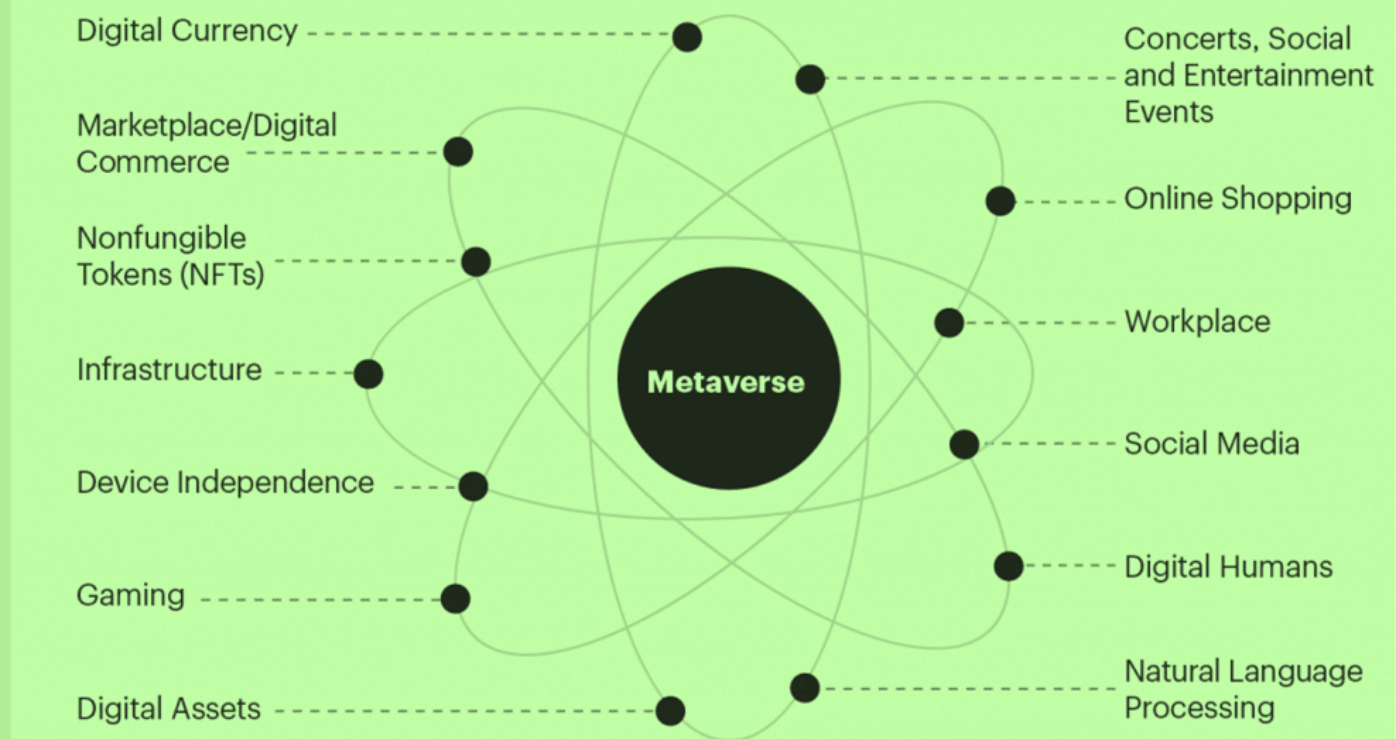


Let's watch this introductory video 👁👁



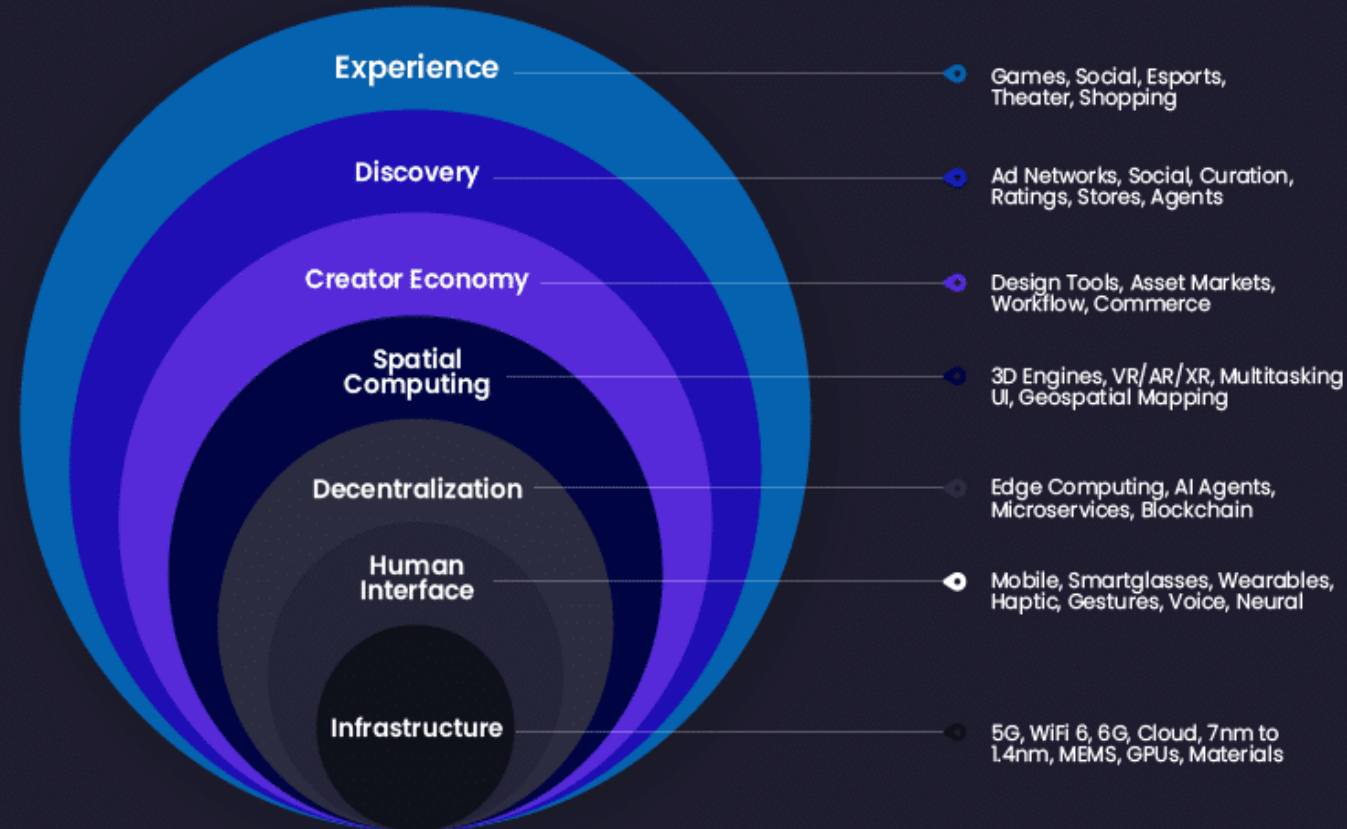


Elements of a Metaverse





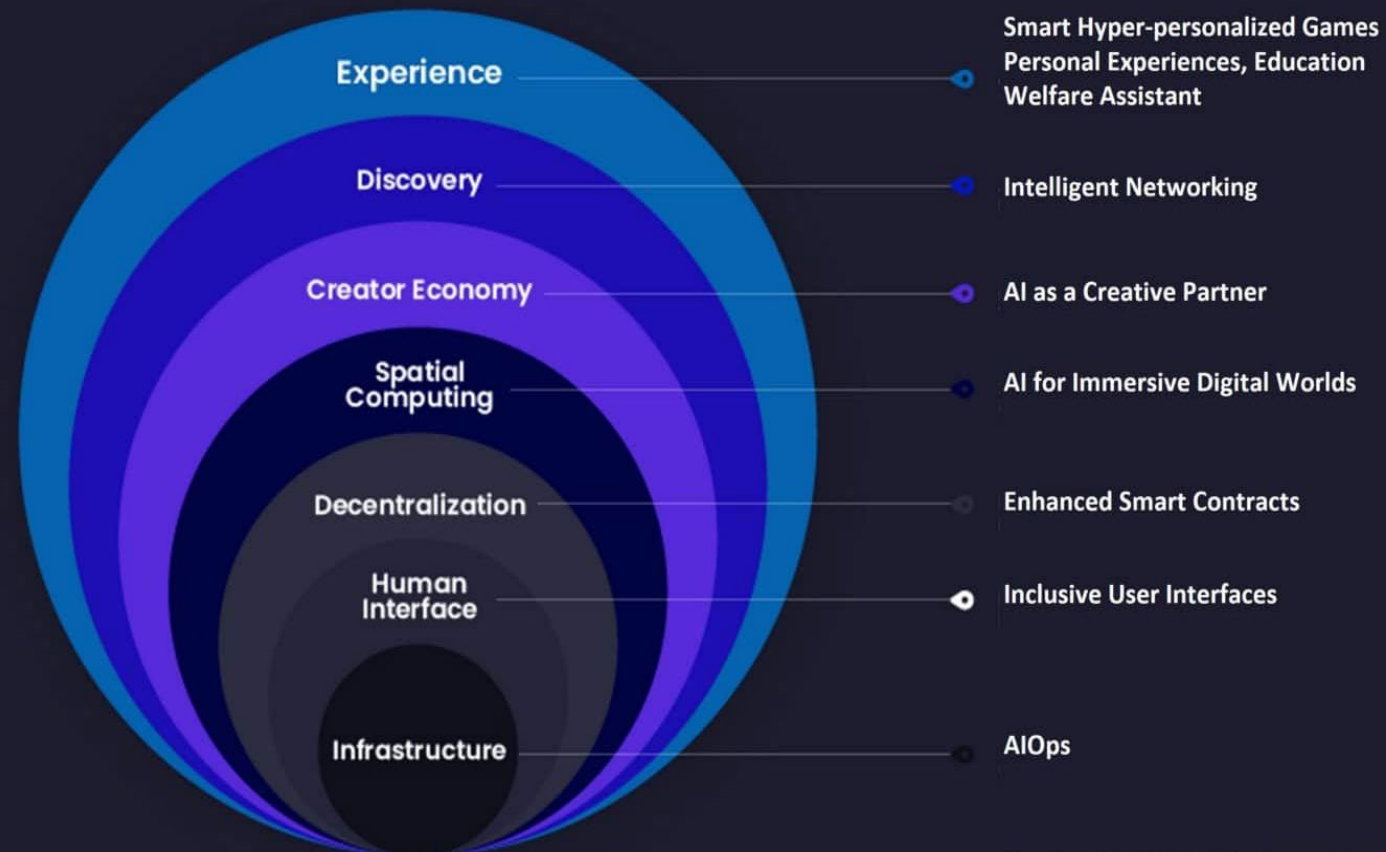
The Seven Layers of the Metaverse



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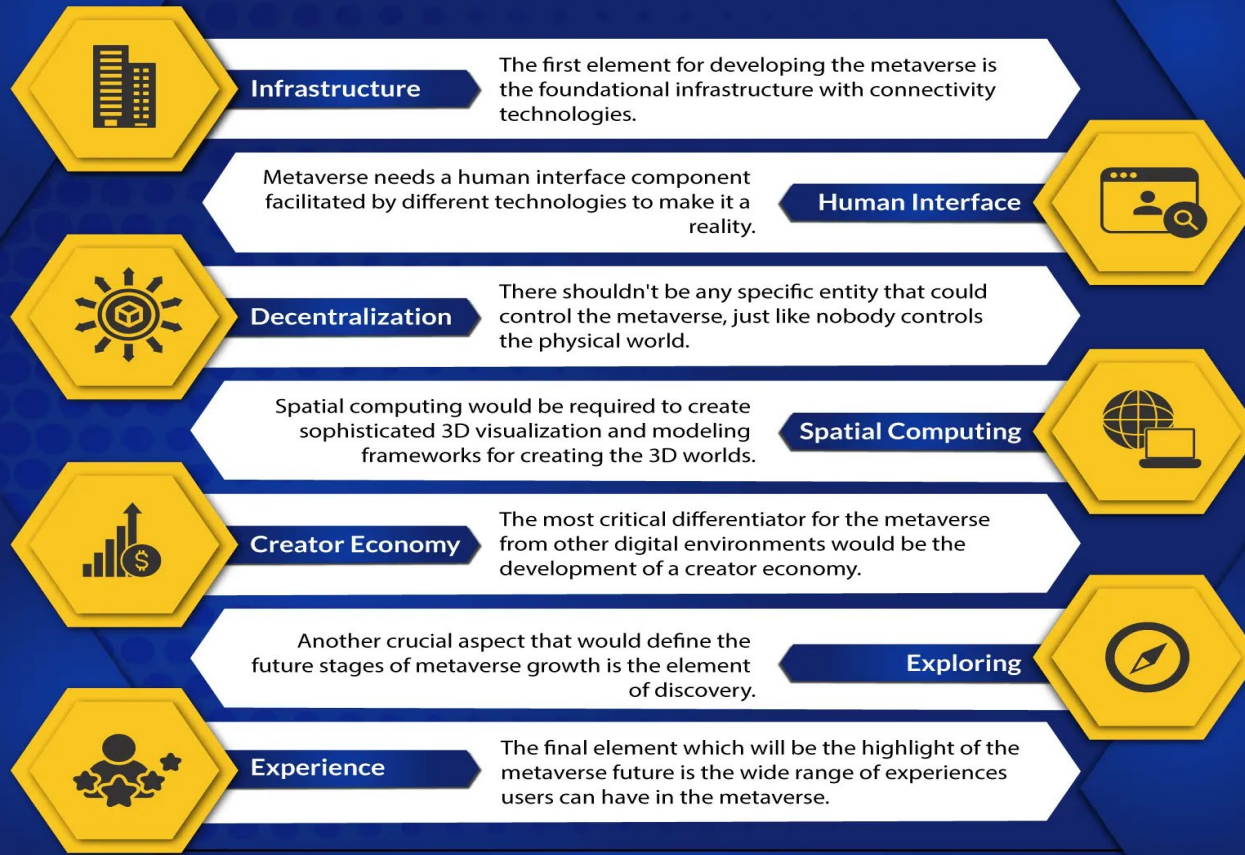


AI potential applications in the Metaverse

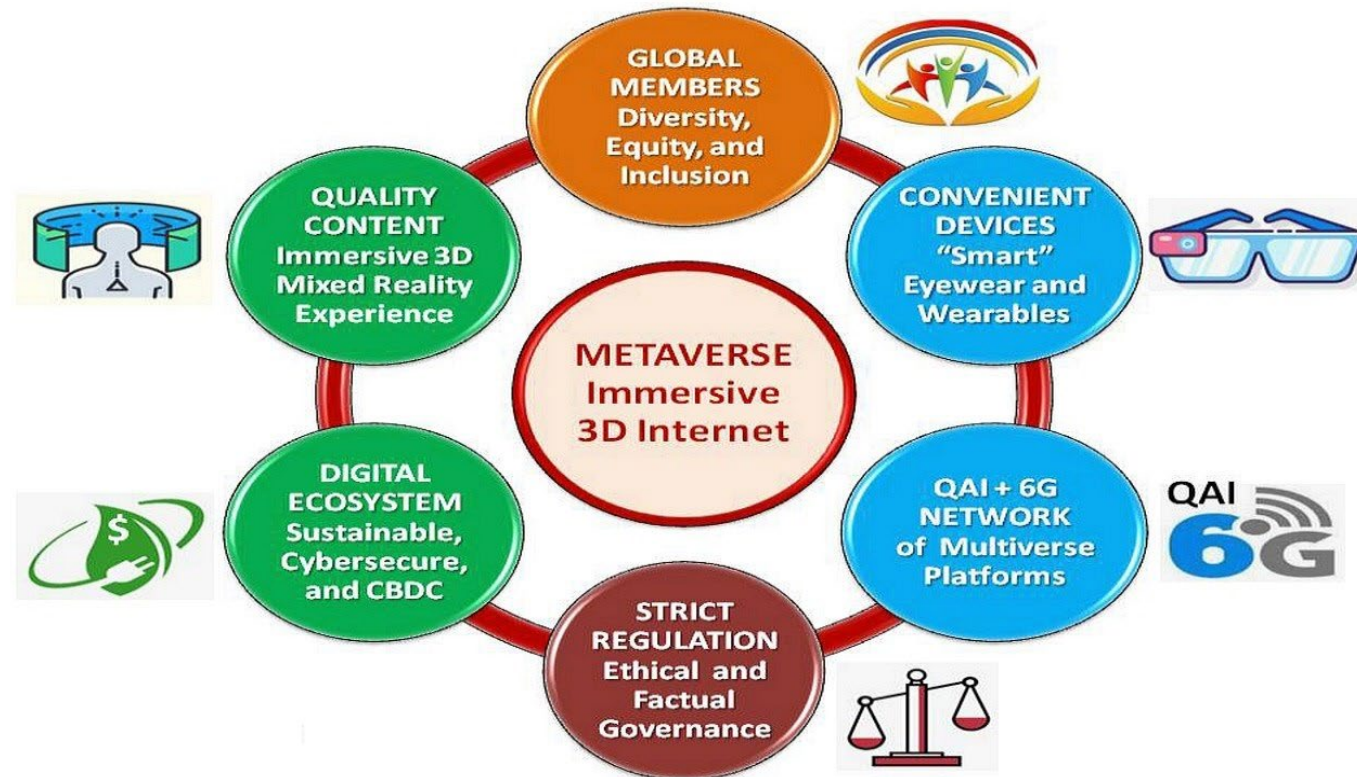


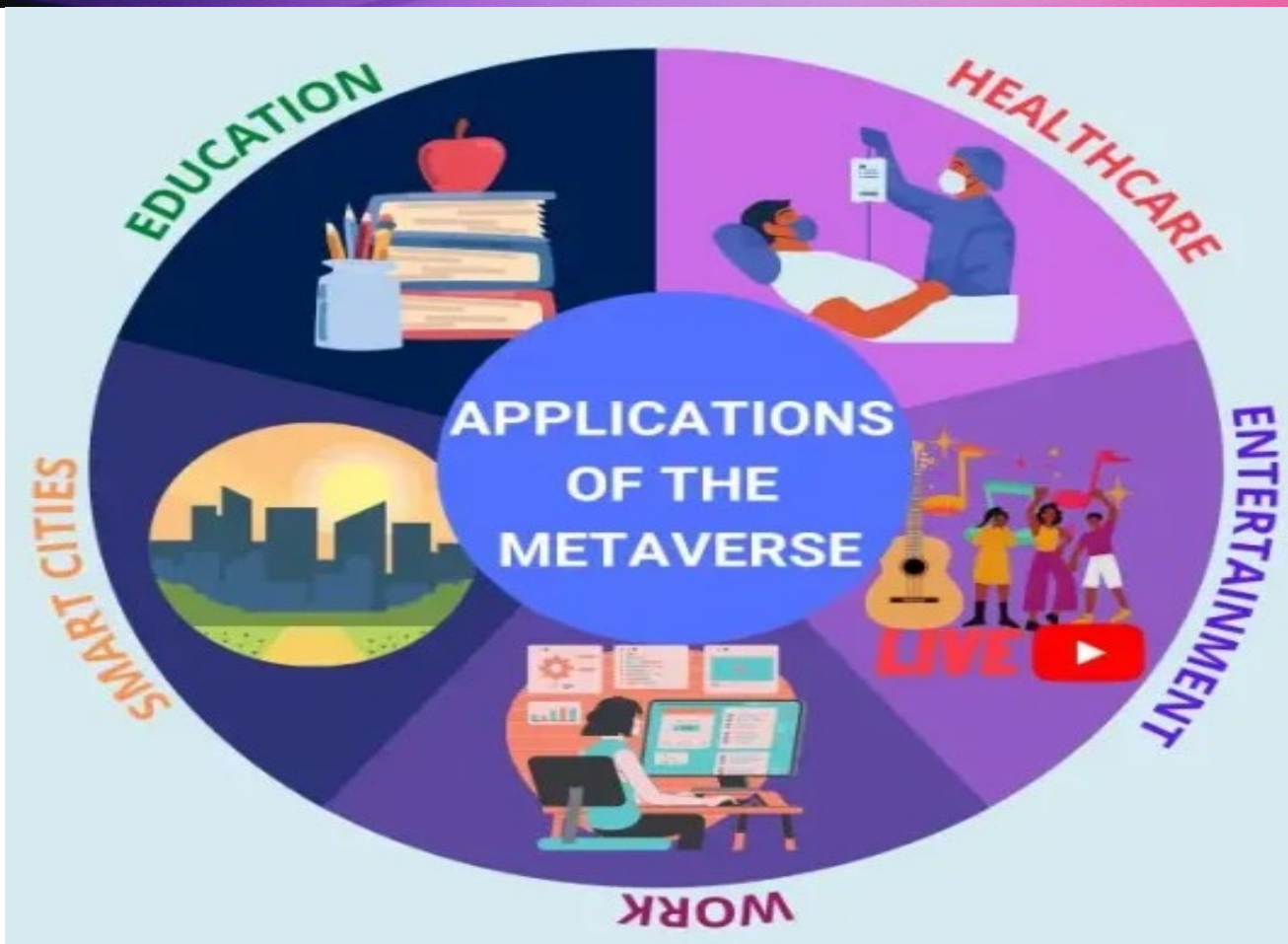
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IMPORTANT ELEMENTS IN DEVELOPING THE METAVERSE



Six Metaverse Components



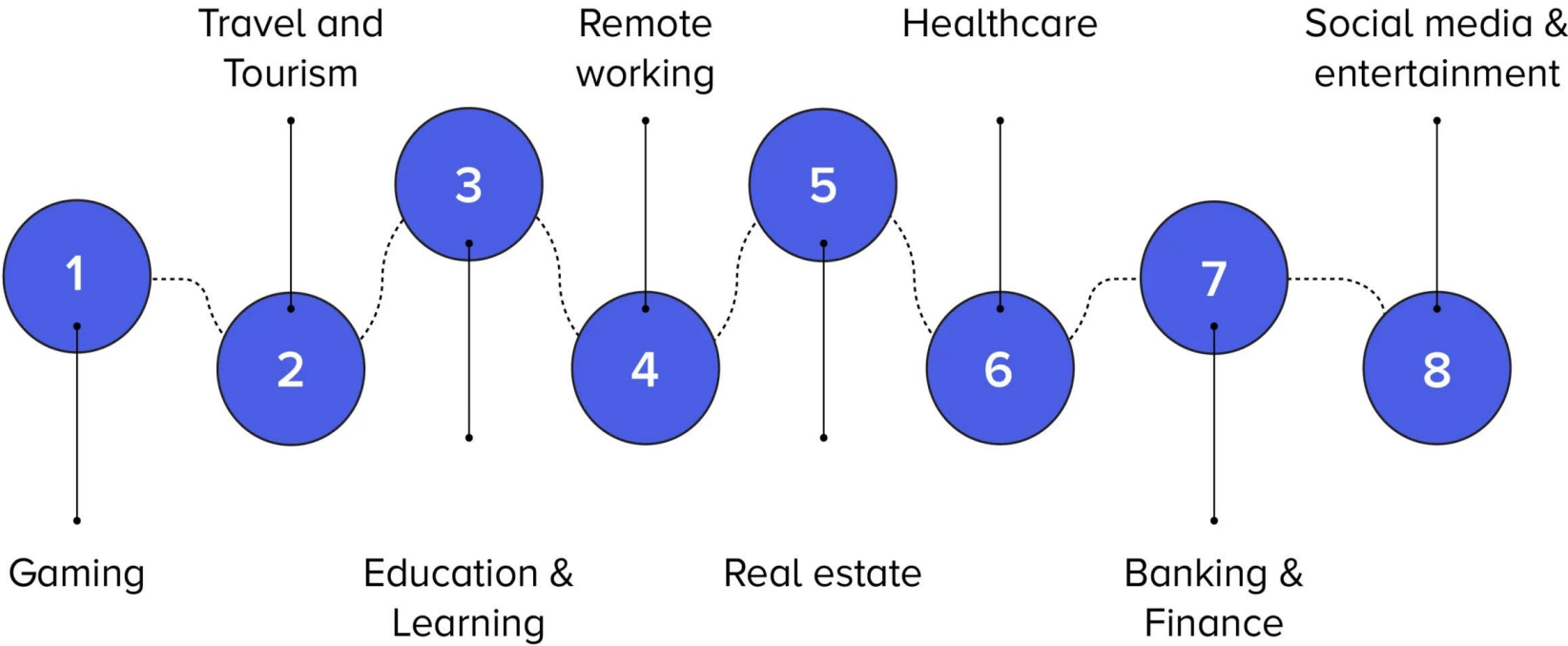


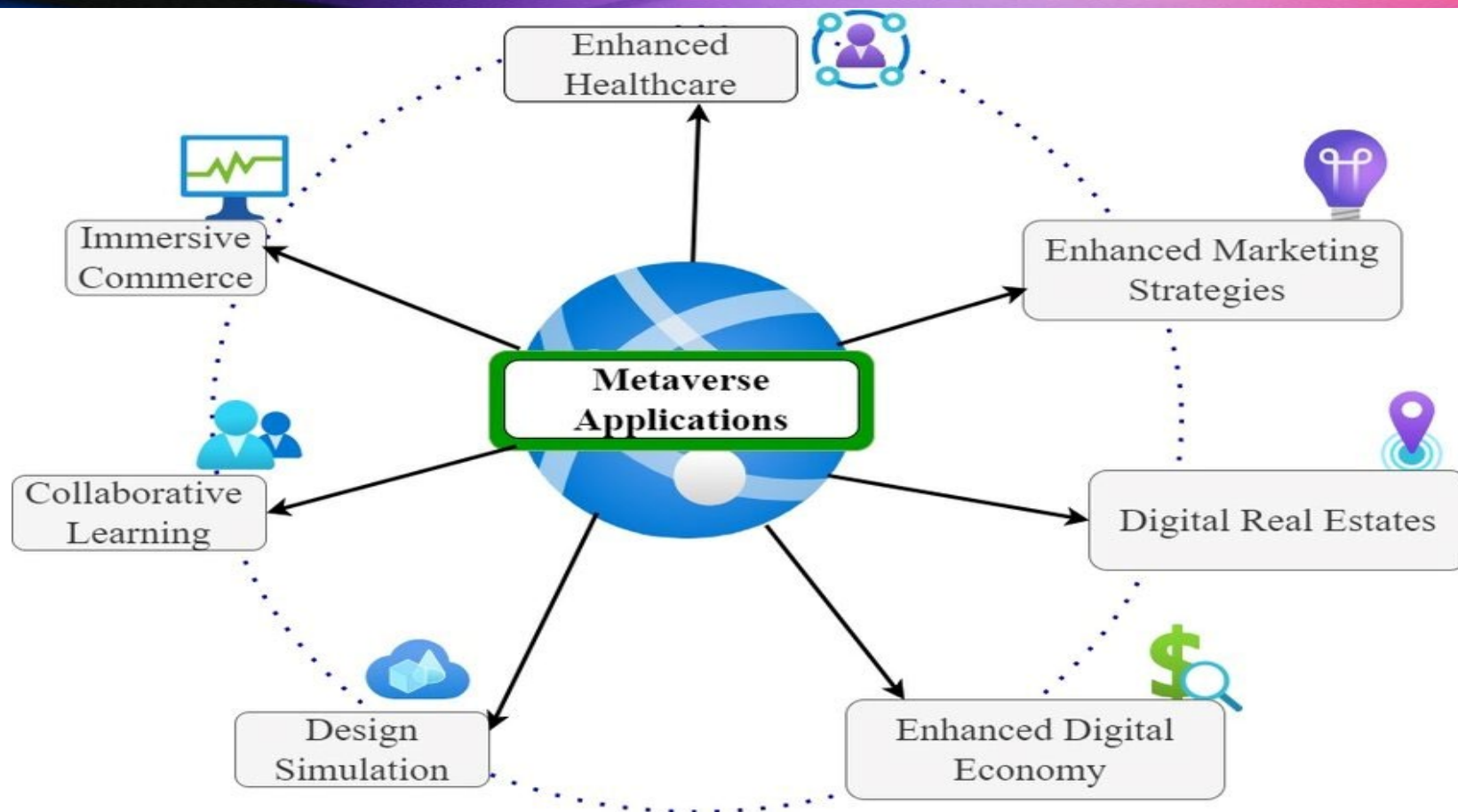
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(Source: www.metaversetroop.com)

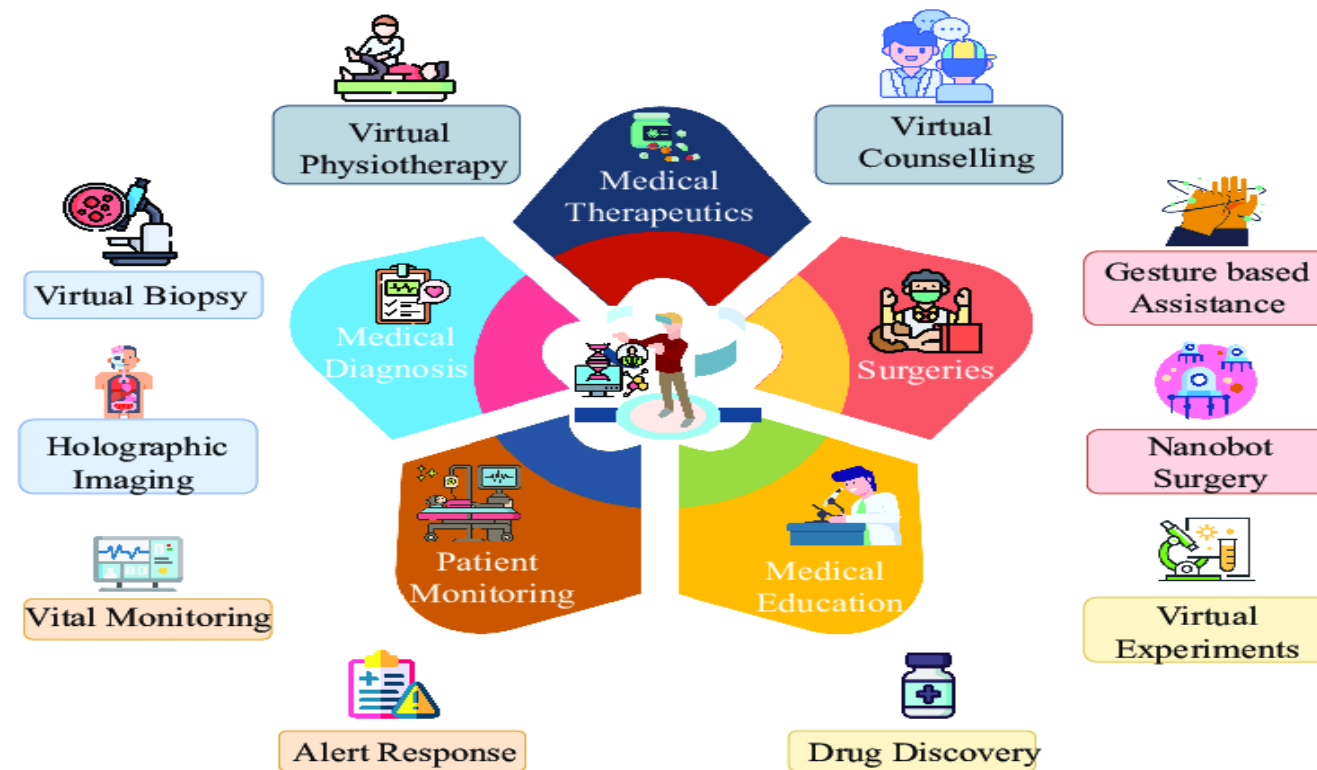


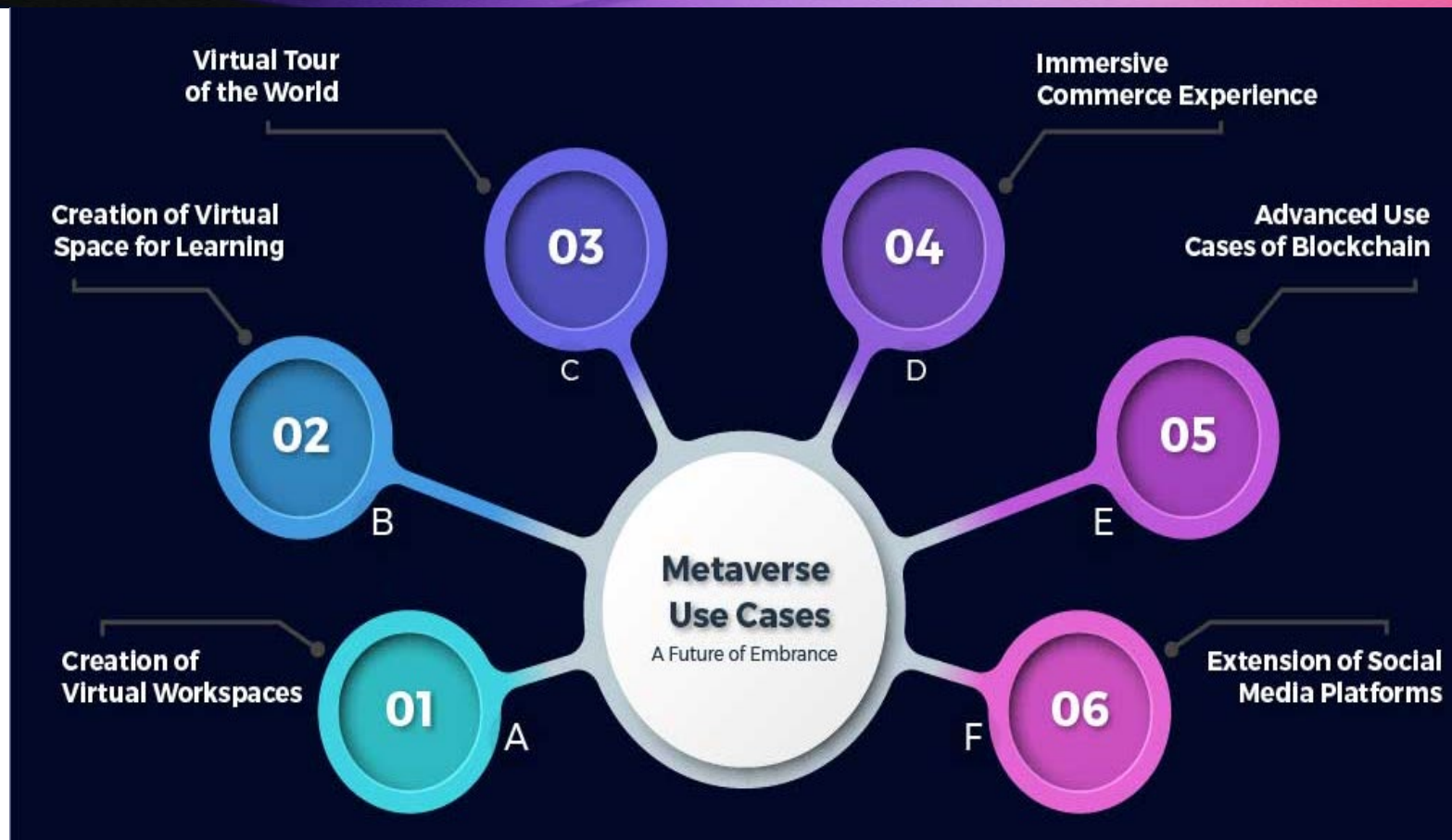
Metaverse Applications in Various Sectors



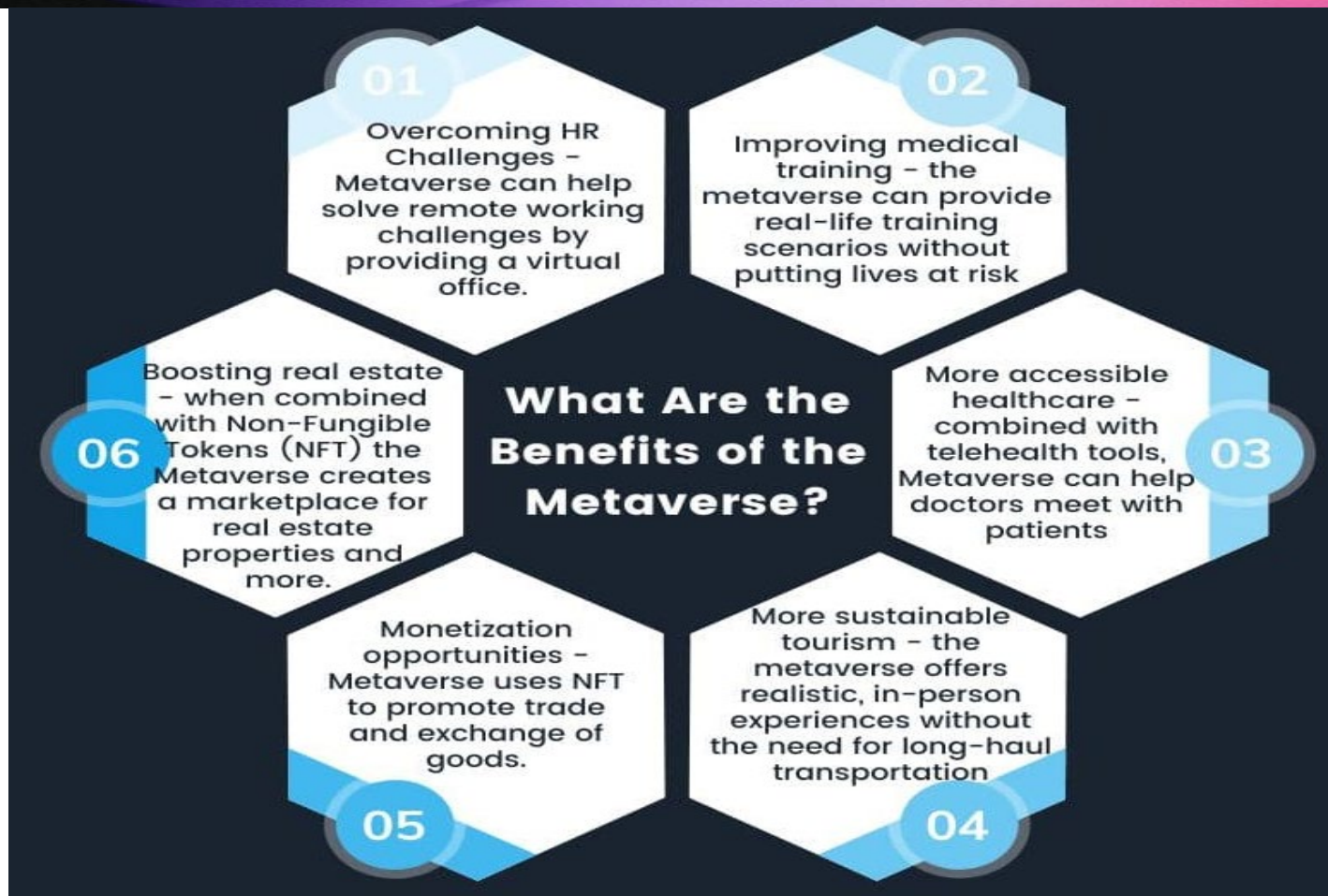


Potential Applications of The Metaverse in Healthcare



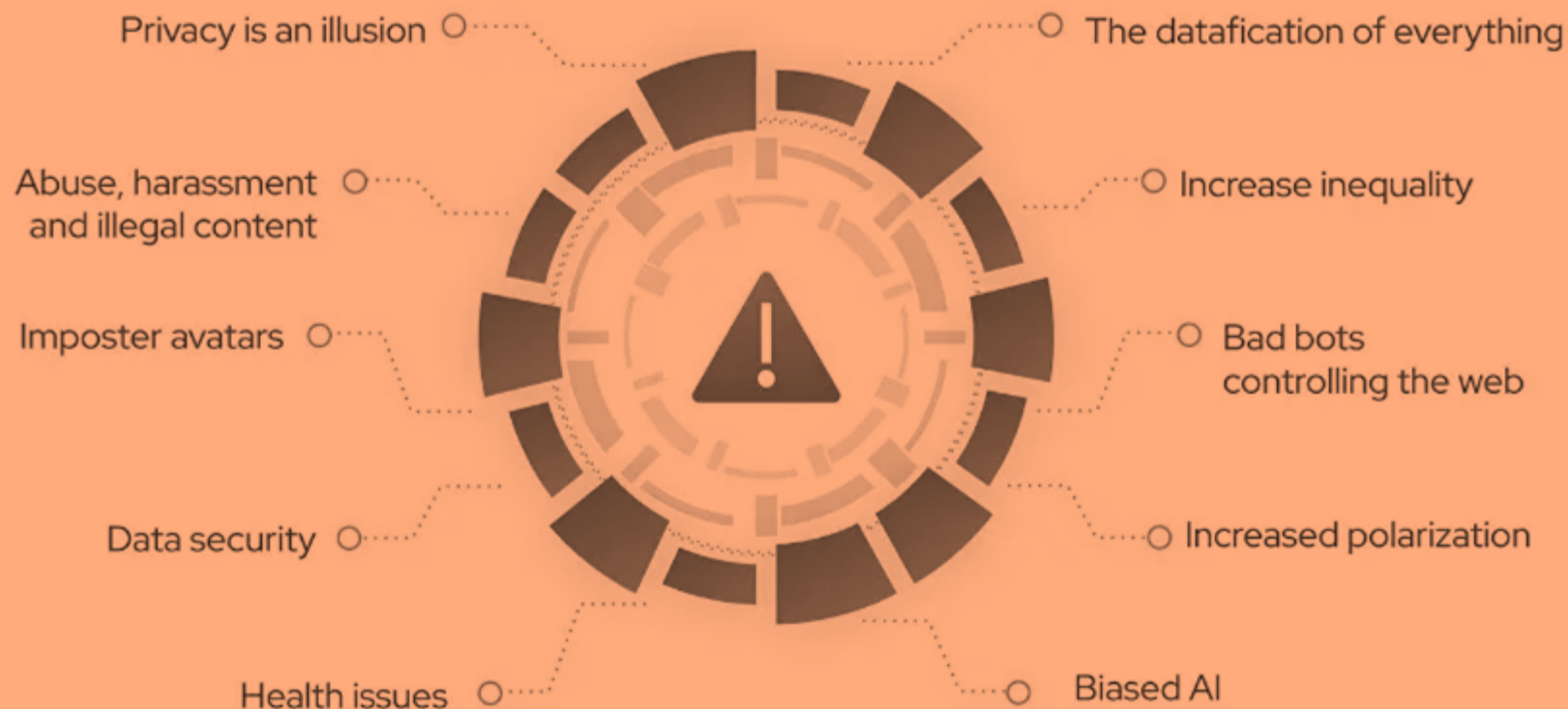


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The dangers of the metaverse

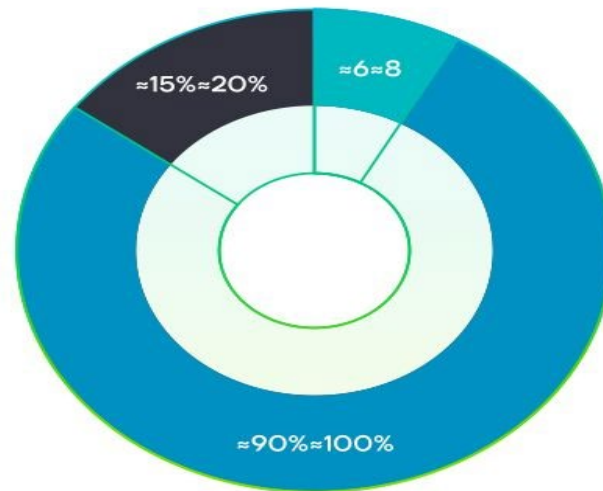


\$ 120 billion of investments raised by the industry

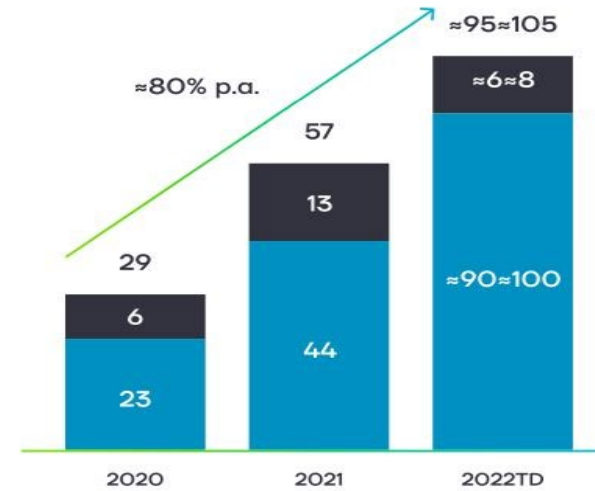
SUBSTANTIAL INVESTMENT SIGNALS CONFIDENCE IN THE POTENTIAL OF THE METAVERSE.

Value of metaverse-related investments, \$ billions

■ Venture capital (VC) & private equity (PE) ■ M&A ■ Internal corporate investment



Total investment,
\$ billions, 2022 to date



VC & PE funding and M&A,
\$ billions, 2020-2022 to date

Let's reflect by watching this explanatory video 00





Wrap-up

Module IX:

- Introduction to Cloud Computing;
- How Does Cloud Computing Work?
- Cloud Computing Service Types;
- Disadvantages of Cloud Computing;
- What Is Cloud Manufacturing?
- The Evolution of Manufacturing Systems;
- Strategic Vision for Cloud Manufacturing;
- The Cloud Manufacturing Ecosystem;
- Cloud Manufacturing Framework for Smart Manufacturing Networks;
- Cloud Manufacturing Platform;
- Cloud Manufacturing Enabled by Cloud Computing;
- Cloud Computing Services Benefits for Modern Manufacturing Practices;
- Cloud Manufacturing Benefits and Challenges.

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Module X:

- Introduction to The Metaverse;
- Brief History of Virtual Worlds;
- The Beginnings of The Metaverse;
- What Is The Metaverse?
- Elements of A Metaverse;
- The Seven Layers of The Metaverse;
- AI Potential Applications in The Metaverse;
- Important Elements in Developing The Metaverse;
- Six Metaverse Components;
- Applications of The Metaverse;
- Metaverse Applications in Various Sectors;
- Potential Applications of The Metaverse in Healthcare;
- Metaverse Use Cases;
- What Are The Benefits of The Metaverse?
- The Dangers of The Metaverse;
- \$ 120 billion of investments raised by the industry.



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- 4. IBM Cloud Training: <https://www.ibm.com/cloud/learn>
- 5. Cloud Academy: <https://cloudacademy.com/>
- 6. Coursera: <https://www.coursera.org/courses?query=cloud%20computing>
- 7. edX: <https://www.edx.org/learn/cloud-computing>
- 8. Udemy: <https://www.udemy.com/topic/cloud-computing/>
- 9. OpenStack: <https://www.openstack.org/>
- 10. Cloud Computing Basics: https://www.tutorialspoint.com/cloud_computing/cloud_computing_tutorial.pdf

Many thanks for
your attention.
See you at the
next Master 😊