



Technical Brief: Introducing the Metaverse

Background: Defining the Metaverse



The term “metaverse” originated in the 1992 novel *Snow Crash*, in which people use the metaverse as an escape from a dystopian world (an idea also later explored in the novel and film *Ready Player One*)

Metaverse and its concepts are continuously evolving:

- **Gartner** – “a collective virtual open space, created by the convergence of virtually enhanced physical and digital reality. It is physically persistent and provides enhanced immersive experiences.”
- **The Oxford Dictionary** – “A virtual-reality space in which users can interact with a computer-generated environment and other users.”
- **Meta** – “A persistent, synchronous environment where we can be together.”
- **Times Magazine** - “A virtual world where people can socialize in their digital avatar”
- **Investopedia** – “A digital reality that combines aspect of social media, online game, AR, VR and crypto to allow users to interact virtually”
- **New York Times** – “A variety of virtual experiences, environments and assets that gained momentum during the online-everything shift of the pandemic”



Background: the Metaverse Concept

The Metaverse is positioned as successor to today's internet, is a concept embodying a unified digital world that is tightly connected to the physical world. In Metaverse, people can interact without physical or geographic constraints and enjoy a compelling sense of social presence.

The Metaverse is envisioned by some to serve as a globally unified **economic system for digital content** that enables entities in different countries and entities to interact frictionlessly.

“While definitions vary, today the metaverse is often described by two key features: it is **persistent**, meaning its collective network of **3D-rendered virtual elements** and spaces is not turned on or off, but exists continuously and **shared**, meaning a vast number of users can access it **simultaneously** and interact within it. ”



[Can the metaverse offer benefits for developing countries?](https://www.worldbank.org)
([worldbank.org](https://www.worldbank.org))

[Future Today Institute Technology Trends 2022](https://www.futuretodayinstitute.com)
([futuretodayinstitute.com](https://www.futuretodayinstitute.com))



Metaverse Technology Drivers – Why Now?



AR/VR Maturity

[AR use cases gain ground due to COVID-19, maturing tech \(techtarget.com\)](https://www.techtarget.com)



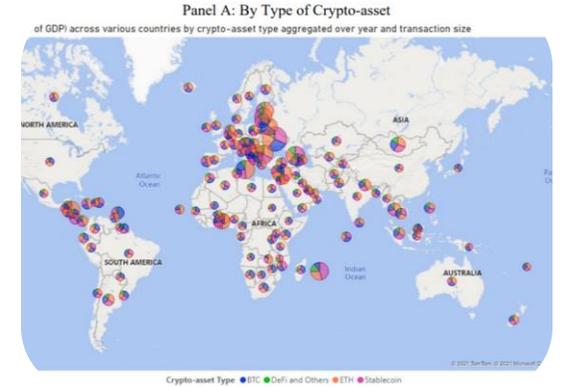
3D Modeling Verisimilitude & AI Methods

[Techniques - including AI-supported methods - support more realistic modeling of a 3D world \(mit.edu\)](https://www.mit.edu)



Edge Computing Capability Increases

[Increasing amount of data created and processed at the Edge; role of COVID-19 in accelerating remote operation \(lfedge.org\)](https://www.lfedge.org)

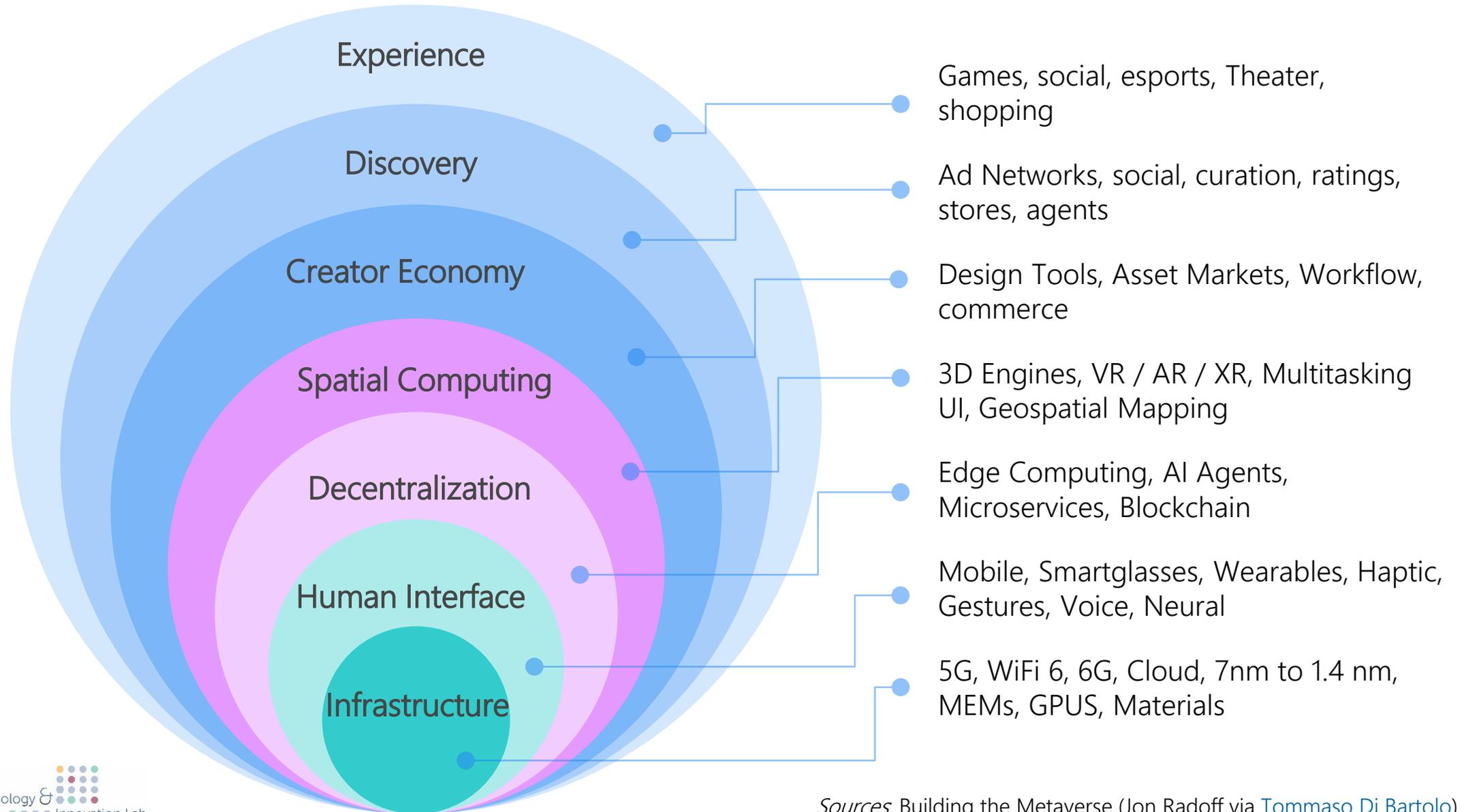


Increased interest in Decentralized Infrastructure, including Crypto-Assets

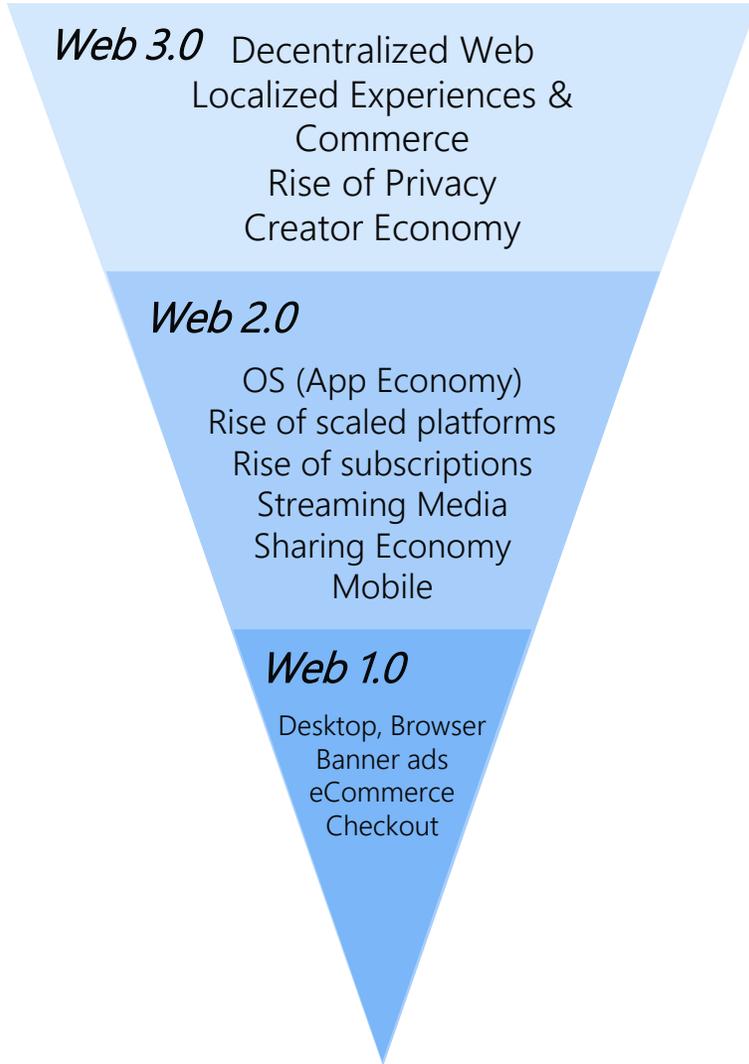
[Increasingly, crypto-assets are perceived as a risk asset, a potential macro hedge, and a potential tool to support cross-border transactions \(worldbank.org\)](https://www.worldbank.org)



Metaverse Technology & Business Layers



Metaverse Technology Components



	Web 2.0	Web 3.0	
Platform Characteristics	<i>Sample Virtual Worlds</i>	Second Life, Roblox, Fortnite	Decentraland, Somnium Space, Cryptovoxels, The Sandbox
	<i>Org. Structure</i>	Centrally owned	Community governed (e.g. via DAO); Decisions by user consensus
	<i>Data Storage</i>	Centralized	Decentralized (game assets)
	<i>Platform Format</i>	PC/Console, Virtual Reality / AR Hardware, Mobile / App	PC, Virtual Reality / AR Hardware, Mobile / App
User Interaction	<i>Payments infrastructure</i>	Traditional Payments	Crypto wallets
	<i>Digital Assets Ownership</i>	Leased within platform where purchased	Owned through NFTs
	<i>Digital Assets Portability</i>	Locked within platform	Transferable
	<i>Content Creators</i>	Game studios and / or developers	Community; Game studios and/or developers
	<i>Activities</i>	Socialization, multi-player games	More, including play-to-earn games
	<i>Identity</i>	In-platform avatar	Self-sovereign identity, etc.
	<i>Payments</i>	In-Platform virtual currency	Crypto-assets & tokens
Commercials	<i>Content Revenues</i>	Platform earns 30% of every game purchased	P2P; Royalties on secondary trades of NFTs to creators

Sources:
[JP Morgan](#)
[Goldman Sachs](#)

Metaverse Enablers

To take advantage of Metaverse will require a mature digital infrastructure powered by next generation networks, with robust cybersecurity and standards.

Hardware-Related Factors

Software-Related Factors

Hardware ⚠️

Physical hardware technologies and devices to enable and access the Metaverse (e.g. XR headsets with 120hz refresh rate – [Matthew Ball](#))

Network / Internet ⚠️

Real-time connections with high bandwidth, sustainable networks; low latency (e.g. sub 12ms – [Citi](#))

Computing Power ⚠️

Enough computing power (“a 1,000-times increase in computational efficiency from today’s state of the art”) - [Intel](#)



Tools and Standards ⚠️

Underlying tools and protocols for Metaverse operation including for privacy and cybersecurity

Virtual Platforms

Enabling Virtual Platforms to operate simulation and environment

Digital Content / Service

Design / creation of the content & service “tapping into a global workforce of...creators allowing seamless and decentralised collaboration” ([Outlier Ventures](#))

⚠️ Denotes area where significant advances are required to enable the Metaverse



Metaverse Reading List / Learning Resources

Quick Reads

- Time – [The Metaverse has already arrived. Here's what that actually means](#)
- The New York Times – [Are We in the Metaverse Yet?](#)
- Bloomberg – [What the Metaverse is, Who's In It and Why it Matters](#)
- Wired – [What is the Metaverse, Exactly?](#)
- Washington Post – [Mark Zuckerberg just laid out his vision for the metaverse. Five things you should know](#)
- Medium - [How should governments prepare for the metaverse? | by Randeep Sudan | Digital Diplomacy](#)

Reports

- [Grayscale: The Metaverse- Web 3.0 Virtual cloud Economies](#)
- [Goldman Sachs: Framing the Future of Web 3.0 Metaverse Edition](#)
- [JP Morgan: Opportunities in the metaverse \(jpmorgan.com\)](#)
- [Citi: Metaverse and Money - CitiGPS \(citivelocity.com\)](#)
- [Intro to the Metaverse – Newzoo TrendReport 2021](#)
- [FTI Tech Trends 2022 Book03.pdf \(futuretodayinstitute.com\)](#)

Classes / Trainings

- [Metaverse Masterclass: Udemy](#)
- [Introduction To Metaverse & How To Invest In It: Skillshare](#)
- [Start AR and VR Metaverse Business: Udemy](#)
- [Visions of the Future: Artificial Intelligence, Cryptocurrency, the Metaverse, and Beyond \(stanford.edu\)](#)
- [Smart Cities for Global Frontier Infrastructure \(Virtual Knowledge Exchange\) | World Bank Group](#)



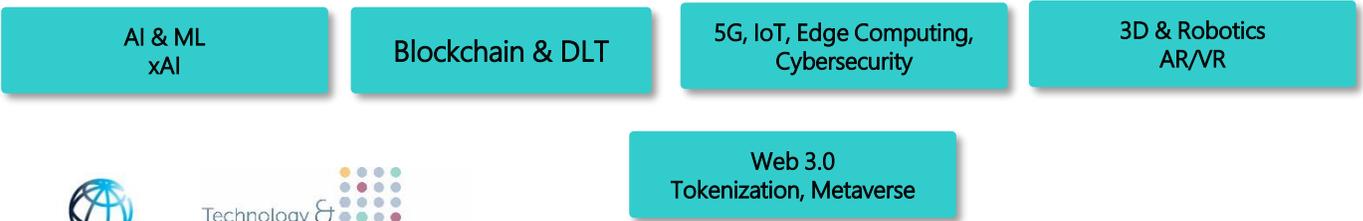
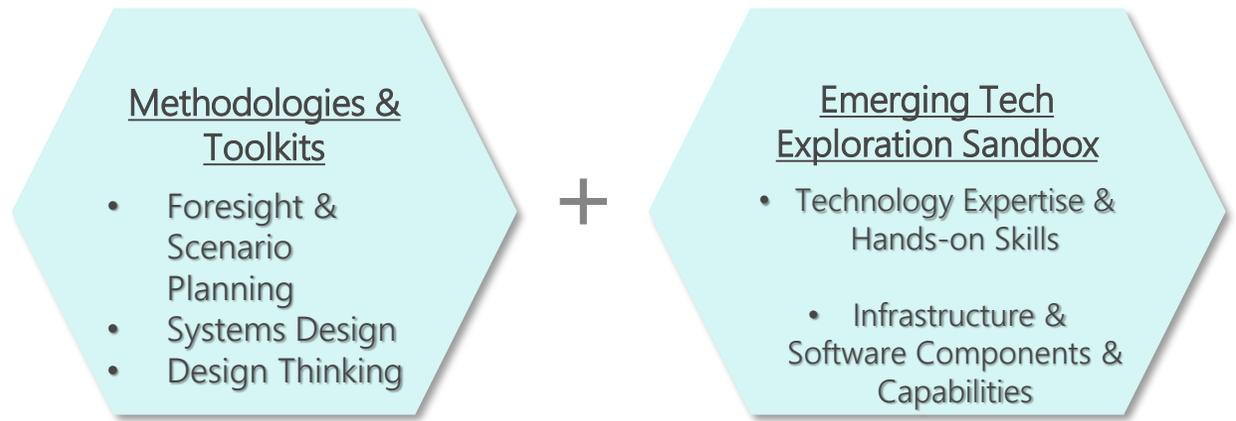
WBG Information Technology Solutions Vice Presidency/CIO

Technology & Innovation Unit/Lab



Exploration Sandbox & Technology Advisory on Emerging Technologies Operationalization

ITSTI Lab's Emerging Tech Exploration Sandbox provides a safe environment to design, do agile and rapid prototyping and test the viability and feasibility of emerging technologies' potential to solve development and operational problems, identify adoption risks and challenges, to be considered by the WBG and client countries.



Explore, Prototype & Experiment

- Blockchain for Transparent Tracking of Singh/Pakistan Agriculture Equipment
- AI for Post Procurement Reviews (PPR)
- AI for IBRD Treasury Green Bonds and Project Stories Reporting
- [Blockchain for WB Trust Funds' Disbursement & Traceability](#)
- AI & ML for South Africa Job Matching
- Bangladesh Land Resettlement
- AI for Legislation Screening (Romania Procurement Agency - RAS)
- AI for HR e-Performance
- Blockchain for Pharma Supply Chain
- Ethiopia Fintech for SMEs Growth
- Redesigning Social Service Delivery in Tunisia
- IFC Building Resilience Index
- AI for IFC Integrity Due Diligence
- AI to Safeguard IFC Investments
- Gaming technologies for Climate Resilience
- South Africa Psychometric Gaming Tool
- Emerging Tech for Decentralized Climate Markets (Paris Agreement Article 6.2)
- Sierra Leone Transit Fare
- Verifiable claims for Labor Mobility in Tonga

Technology Advisory for Operationalization

- AI for IFC ESG
- **Blockchain for Health Results Based Financing in Cote d'Ivoire**
- [Blockchain Interoperability](#)
- Blockchain for Haiti Agri Value-chain
- Emerging Tech for Kenya Micro-pension & Bonds System Innovation
- Iraq FCV Project Monitoring Digital Platform
- Blockchain for India Irrigation Performance Measurement

Technology Foresight & Scenario Planning

- Technology Foresight for Bangladesh Disruptive Technology Assessment
- Foresight & Scenario Planning for Accelerating Human Capital Development in SAR