On the yellow brick road to Web3 and the Metaverse

HSBC | Opening up a world of opportunity

Contents

Remember when you had to painstakingly create curated playlists of songs for your Walkman? Would you ever have envisioned the almost limitless access to music we have through streaming services today?

Imagining a radically different future is often difficult. In the 1950s, for example, the head of IBM believed just a few computers would be sufficient to cover global demand. Carlota Perez's ground-breaking work[1] on technological revolutions concludes that the possibilities of radical innovation are often difficult to envisage until the appropriate paradigm is in place. This rings true across many industries and innovations, and it will likely be no different for the next technological revolution – Web3.

Follow us along the yellow brick road as we delve into Web3, where we'll discover the inherent characteristics that make it a hotbed of innovation and learn more about its most popular applications, such as the Metaverse. We will investigate the hurdles to mass adoption and discover the role that financial institutions can play in this new economy whilst they straddle the traditional and decentralised world.

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[1] 2002. Technological Revolutions and Financial Capital: The Dynamics of Bubbles and Golden Ages, Carlota Perez

The journey to Web3

Before we dive into the technologies and applications that constitute Web3, it makes sense to understand what came before.

Web1 is referred to as the Syntactic Web or read-only web. This first iteration of the World Wide Web was largely a content delivery network that had minimal levels of user interaction.

This evolved into a network dominated by platforms such as YouTube, Facebook (now Meta), Amazon and Netflix. This Web2 era, also known as the Social Web or read-write web, redefined how we socialise, communicate, shop and share with one another online. Here, companies create centralised platforms that depend on user-generated content.

This network is now on the path to Web3. the Semantic Web or read-write-own web. Web3 is an internet that is open, trustless, in the sense that participants can interact publicly or privately without a trusted third party, and permissionless, in that anyone can participate.[2] Powered by emerging technologies such as distributed ledger technology (DLT), smart contracts, artificial intelligence (AI), machine learning (ML) and augmented reality (AR), this is the era where our digital presence is spatial, where all our devices are smart, and where we own our data and what we create.

	Web1	Web2	Web3
	Login User ID Bob Password ••••••••	Login Sign in to continue Continue with Google Continue with Facebook Continue with Apple Continue with email	Login Connect one of available wallet providers or create a new one. MetaMask Formatic Coinbase Wallet WalletConnect Show more options
Defining characteristics	◆ The beginning of the digital era ◆ Siloed digitisation	◆ Centralised digitisation ◆ Centralised data ◆ Value captured by platforms ◆ Siloed innovation	◆ Decentralised digitisation ◆ Distributed data ◆ Value captured by creators ◆ Incentivised Innovation
Examples of applications	◆ Static websites ◆ Voice over Internet Protocol (VoIP) ◆ Computer applications	◆ SaaS applications ◆ Social media ◆ Web and mobile apps ◆ Video conferencing ◆ Platform business models	◆ Decentralised finance (DeFi) ◆ Cryptoassets, tokens, NFTs ◆ Metaverse ◆ Decentralised social networks
Enabling technologies	HTML (HyperText Markup Language), HTTP (HyperText Transfer Protocol), URL (Uniform Resource Locator)	JavaScript, CSS, HTML5, Cloud computing	Blockchain, Artificial Intelligence (AI and Machine Learning (ML),Edge computing, Internet of Things, Augmented and Virtual Reality (AR & VR)
Examples of companies created	eBay, Netscape, MySpace	Facebook (Meta), Uber, Amazon	Coinbase, Metamask, Sandbox
Value Created	$1.1 trillion[2]	$5.9 trillion[2]	Estimated additional $4 trillion to global GDP[3]

[2] What Is Web 3.0 & Why It Matters. Written by Max Mersch and Richard… | by Fabric Ventures | Fabric Ventures | Medium

[3] Is the U.S. Losing the Race for Web 3.0? | by ConsenSys | ConsenSys Media

Innovation – the true heart of Web3

Beyond open source

Web3 takes the idea of open source beyond just open-source code to the data and even ideas behind the code. With public and shared databases,

> Web3 promises truly open backends. When an application built on blockchain is replicated, the underlying immutable dataset comes along with it.

This is opposed to Web2 applications, where we do not get access to the database even if we can use the application code.

Take open APIs in financial services, for example – although they enable controlled access to data, issues such as the lack of standardisation, legacy datasets, slow and inconsistent adoption, and significant integration requirements mean their benefits are not being fully realised.

In his 1990 paper discussing endogenous technological change, Paul M. Romer, a Nobel laureate in Economics, shared a key insight –

> Ideas and designs are non-rivalrous.

What this means is that ideas are not depleted by use, unlike most goods and commodities that are finite. Ideas can be used without limitation on the number of users or usage time. And there are increasing returns to scale as more people start to use an idea once it has been discovered, with growth following naturally from that.[4] Web3 seems to embody this philosophy.

As Web3 is intrinsically open source, designs and protocols are public, open and available for anyone to use. There are no limits or constraints to innovation.

As of January 2022, there are 18,000 monthly active developers in open source crypto and Web3 projects; and 34,000+ new developers committed code in 2021, which was the highest in history.[5]

The popular network Ethereum, besides giving rise to various tokenisation and decentralised apps (Dapps), has also spurred innovation in "Layer 2 solutions". Built on top of Ethereum, Layer 2 protocols such as Polygon and Polkadot aim to improve its scalability and efficiency by improving network transaction speed and throughput, which are argued drawbacks of Ethereum itself.

[4] Paul Romer: Ideas, Nonrivalry, and Endogenous Growth (stanford.edu)

[5] Electric Capital Developer Report (2021) | by Maria Shen | Electric Capital | Jan, 2022 | Medium

Reusable building blocks

The financial services industry has traditionally been bogged down by legacy IT systems that are typically unable to interact with one another. When new ideas come along, changes cannot be made easily without significant upgrades to the system. However, in recent years, a modular approach has increasingly been adopted, with channels for connectivity and interaction between systems via APIs to bring composability to products and services.

Web3 elevates this through smart contracts and tokens. Essentially, with smart contracts, processes and transactions can be turned into a few lines of code, and these repeatable building blocks can be constructed into a range of different applications.

We are also seeing standardisation emerge, a sign of maturity in the ecosystem. The ERC-20 token standard governs how Ethereum tokens behave, setting rules on functionality that apply across applications. This makes it easy for developers to support tokens that comply with this standard in their applications. Instead of being locked into a single protocol or system, tokens can be used across applications, and different programs can interface with each other, leading to interesting and complex use cases such as decentralised finance (DeFi).

Composability accelerates experimentation and innovation, providing opportunity for highly customisable financial services and products. There are many examples of completely new financial products that have emerged in the DeFi ecosystem, such as automated market making and even no-loss lotteries. These may only be the tip of the iceberg – there are **infinite possibilities in terms of new financial products and investment opportunities** that can be created in an economy powered by Web3.

Incentivised innovation

One lesser-discussed, but crucial positive externality of Web3 is incentivised innovation – enabled by Web3's inherent open-source and composable nature.

> Incentive encourages innovation. And there is no time in history where incentives have been so close to innovation and new ideas.

Owing to token economics, the idea of incentives is built into Web3. Because the network typically operates with its own token (the value of which increases with the network's utility), there is financial incentive for participants to drive the success of the network.

As more people use them (increased network size), more people build on top of it (increased developer community size) advancing the protocol, which boosts the utility of the network and hence the value of the network itself (and the network's token). The inclusive nature of Web3, the distributed innovation, its network effect and the in-built token economics, are all powerful drivers that have greatly accelerated its creative evolution thus far.

Reclaiming data, identity and control

Web2 saw the advent of social media networks, and also the eventual hyper-capitalisation of these platforms. User information and user-generated content are highly valuable assets that users have to sign away to the platform to enjoy its services. How the data is used and who it is further disseminated to are largely opaque to the user. This results in platforms whose interests may be misaligned with its users, developers and creator communities.

> Web3 aims to take us on a course-correction path where control is not centralised in the hands of a few but is instead democratised.

With decentralised internet and digital identity, we are moving towards a world where users will have control over their data and can choose what to "push" to trusted sources instead of applications "pulling" data indiscriminately from centralised platforms. Governance voting rights also allow participants to be able to influence major changes to the protocol.

Beyond speculation – seeking out the wizardry in Web3

Although the Web3 ecosystem is nascent, it is brimming with innovative applications and protocols that reimagine traditional business models at an unprecedented pace. Web3's approach to the creator economy favours value sharing with creators. For instance, it is reimagining music streaming by returning ownership rights to artists and removing intermediaries between artists and their audience. On the next page are some of the other innovations.

Categories	Protocols	Utility	On-chain transactions[6]
General Utility	Ethereum **ETH**	A decentralised, open-source blockchain with smart contract functionality, where developers can create their own smart contracts, dApps and tokens.	~1.5 billion transactions, ~14.3 million blocks
General Utility	Solana **SOL**	Competes with Ethereum by offering faster transaction speeds and lower fees.	~60.2 billion transactions
General Utility	Polygon **MATIC**	A Layer-2 solution for scaling Ethereum, with faster transaction speed and lower costs.	~3.4 billion transactions
Interoperability	Polkadot **DOT**	Connects blockchains, enables interoperability and cross-chain transfer of any data or assets.	~5.4 million transactions, ~9.2 million blocks
Data providers (Oracle)	Chainlink **LINK**	Feeds real-world data points into blockchain networks. (e.g., weather data).	~11.2 million transactions
Asset tokens	Moss Carbon Credit **MCO2**	Buy and trade carbon credits to offset carbon emissions.	~2.3 million transactions
Metaverse	Decentraland **MANA**	Virtual world where users can buy, develop and sell virtual plots of real estate.	~136 thousand NFT sales
Metaverse	The Sandbox **SAND**	Virtual world where users can buy land on which they can build virtual experiences.	~146 thousand NFT sales
Search & API	The Graph **GRT**	Indexes blockchain data and allows easy access to anyone via APIs.	~989 thousand transactions

[6] Based on latest available data as of 28 Feb 2022

Categories	Protocols	Utility	On-chain transactions[6]
Gaming	Axie Infinity **AXS**	Game where players earn through skilled gameplay.	~21.2 million NFT sales
File storage	Filecoin **FIL**	Decentralised storage marketplace, where users pay for peer-to-peer storage of their files.	~1.6 million blocks
Digital Identity	Civic **CVC**	Global identity verification support for 4,500 documents across 195 countries.	~869 thousand transactions
Browser	Brave **BAT**	Digital advertising platform that rewards users for their attention.	~3.6 million transactions
Music Streaming	Audius **AUDIO**	Return music ownership rights to artists and remove intermediaries between artists and their audience.	~114 thousand transactions, ~6 million active users
Video streaming	Livepeer **LPT**	Economically efficient alternative to centralised broadcasting companies.	~5.9 million transactions
Compute sharing	Render Token **RNDR**	Rent graphics processing power, allowing image rendering at higher speeds and lower costs.	~204 thousand transactions
Creator Economy	Rally **RLY**	Social tokens for creators to monetise and build a digital economy around their work.	~226 thousand transactions

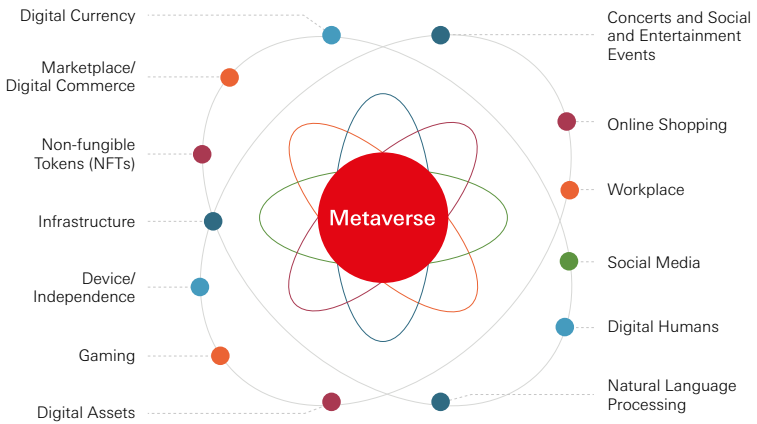
[6] Based on latest available data as of 28 Feb 2022

The Metaverse – enter the Emerald City

Can you get a Happy Meal in the Metaverse? It turns out, you can. McDonald's, the latest big name to join the Metaverse, filed a series of trademark applications to set up its golden arches in the virtual world. A future where people are immersed in the Metaverse means they may be less likely to go out to a restaurant in person, but McDonald's is not losing the opportunity to feed them.

Over the years, we thought we had digitised it all – paper became electronic records, photographs went digital, and customer journeys went from high-touch to digital journeys through apps and video calls. But the Metaverse is proof that we can imagine beyond the current applications of the internet. Metaverse is the immersive internet, imagining a virtual connectivity to people and products. You interact with the internet not through a keyboard or a touchscreen, but as a digital copy of yourself. It is the world where we digitise ourselves and experience all other 'digitised' things.

Elements of a Metaverse



Source: Gartner - https://blogs.gartner.com/beyond-supply-chain-blog/meta-meta-everywhere/?_ga=2.122326411.1069214766.1645688142-1457144729.1644830007

If you struggle to wrap your head around why spending time in a virtual world would appeal to anyone, take a step back and look at gaming. There are an estimated three billion gamers worldwide, with top companies, including Microsoft, Nintendo, and Rovio, to name a few, proactively investing in developing engaging online video games, in an industry worth north of USD200 billion in 2020.[7]

Popular games such as Fortnite are brimming with ancillary opportunities – real-world musicians like Ariana Grande and Marshmello have held live concerts through their virtual avatars in the game, and Samsung designed a Galaxy avatar skin to promote their Samsung Galaxy Note 9. There are already virtual worlds where possibilities are endless, and where people interact and trade items. To a gamer, the Metaverse is not an alien concept.

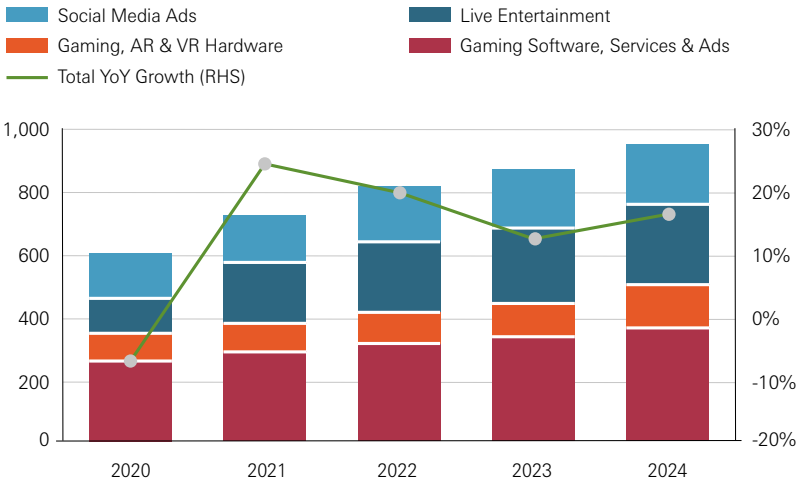
Stretch your imagination and the use cases go beyond games to virtual real estate, arts, entertainment, live events, education, travel, consumer goods, and more. At its build developers conference in May 2021, Microsoft introduced its Mesh mixed-reality collaboration platform, that will allow people in different locations to join collaborative and shared holographic experiences.[8] Decentraland, a 3D virtual world browser-based platform,

[7] Gaming Market Worth $545.98 Billion by [2021-2028] | (globenewswire.com)

[8] Microsoft to extend its 'enterprise metaverse' strategy with Mesh for Teams | ZDNet

hosted a four-day Metaverse festival in October 2021, that featured 80 artists and garnered 50,000 virtual attendees.[9] Analysts predict that the Metaverse market may reach $800 billion by 2024.[10]

How it may play out exactly, no one can say for sure. What is certain, however, is that where there is an economy, there will be intermediaries providing services – and financial services are a necessity. There will be financial transactions, a universe that requires a registrar who can securely keep ownership records and preserve its integrity in an unbiased manner, a virtual land where financial institutions can sell financial products and provide advisory services virtually, and several other opportunities and roles for the financial services industry to tap into. For example, HSBC became the first global bank to enter The Sandbox in March 2022 and is acquiring a 3x3 LAND site in the Metaverse.[11] The intention is to engage and connect with sports, e-sports and gaming enthusiasts, marking a new chapter in creating innovative brand experiences for customers.



Sourse: Bloomberg intelligence, Newzoo, IDC, PWC, Two Circles, Statista

[9] Decentraland Says Its Metaverse Festival Is Happening Again Next Year (businessinsider.com)

[10] Metaverse may be $800 billion market, next tech platform | Bloomberg Professional Services

[11] HSBC to become first global financial services provider to enter The Sandbox (animocabrands.com)

Challenges to adoption – crossing the river

Web3, and its building blocks such as DLT and smart contracts, are expected to send ripples across many industry verticals including financial services. As with most new technologies and concepts, there are hurdles to cross before they define the future.

Regulatory and legal uncertainty

If Web1 was about technology risk (can we build it?), and Web2 was about market risk[12] (will people adopt it?), Web3 is certainly about regulatory risk (how will it be governed?). Uncertainty about intellectual property (IP) protection, application of accounting standards, tax treatment on gains, antitrust violations, anti-money laundering (AML) and know-your-customer (KYC) data privacy risks are just some of the challenges.

Take the example of ConstitutionDAO, an organisation that crowdfunded $47 million to bid for a first-edition printing of the U.S. Constitution[13] but eventually lost the auction. Who would have "owned" the copy of the Constitution if ConstitutionDAO had succeeded? Although donors would be granted governance tokens giving them rights to vote on certain decisions, the actual legal ownership of the copy would have instead belonged to the LLC set up by the people who started the project.[14] The legal status of smart contracts, NFTs[15] and Decentralised Autonomous Organisations (DAOs) are still to be defined in most countries,[16] raising enforceability and financial protection issues for investors.

Taxes are another wild card. The current Web2-based financial system is centred around "accounts" tied to our real-world identity, which allows our taxes to be calculated. In a Web3 world with pseudo-anonymous "wallets", how could taxes be collected? What transactions should be taxed (e.g., capital gains from buying and selling, tokens from airdrops, earnings from mining, lending and staking), and how can information be gathered to ensure compliance? Can digital identity help resolve this conundrum?

And while there has been growing clarity in recent years from regulators in several jurisdictions, such as Germany, Switzerland, Luxembourg,

[12] Asymetric: The Crypto Plan for World Domination. An Interview with Balaji Srinivasan – Asymco

[13] Crypto Investors Wanted To Buy The Constitution. Instead, They Birthed Another Hyped-Up Meme Coin (forbes.com)

[14] From a meme to $47 million: ConstitutionDAO, crypto, and crowdfunding - The Verge A comparison of regulations surrounding NFTs | Asia Business Law Journal

[15] A comparison of regulations surrounding NFTs | Asia Business Law Journal

[16] OECD (2020), The Tokenisation of Assets and Potential Implications for Financial Markets, OECD Blockchain Policy Series, The Tokenisation of Assets and Potential Implications for Financial Markets - OECD.

Singapore, and the UK, on certain aspects of Web3 (such as cryptocurrencies and security tokens), variations in regulatory positions and requirements across the world present complexity. International alignment is critical to bring maturity to this space.

Technological maturity & industry readiness

Web3 is being born out of a natural evolution of older-generation web tools combined with emerging technologies such as DLT and AI, and the increasing connection between individuals and the internet.[17] Several technological and human-centric challenges have to be overcome for adoption of Web3 on a larger scale.

Scalability of DLT-enabled networks is one, both in terms of being able to add more users without slowing down the network and having a minimum-viable ecosystem of participants. A "chicken and egg" dilemma exists with this however – participants are needed to test and achieve scale, but it is difficult to attract them without this scale to begin with.

Information security in Web3 demands a lot of attention as well, just as in the early days of Web2. Vulnerabilities in code led to hackers stealing $30 million from Crypto.com early this year,[18] and more than $102 million was drained from a faulty Compound contract last year.[19]

An argument can be made, however, that demystifying Web3 for a broader audience is an equally difficult challenge. Enterprises must invest time and effort in educating stakeholders so as to foster greater familiarity, leadership buy-in and quicker transition to the new economy. Technology has adapted. Now humans must adapt too.

[17] What Is Web 3.0? | Alexandria (coinmarketcap.com)

[18] Crypto.com Says 'Incident' Was Actually $30 Million Hack (vice.com)

[19] $22M Drained From Compound Contract That Was Hit for $80M Last Week (coindesk.com)

Interoperability

> Web3's massive potential for connectivity hinges on the extent to which different DLT networks can integrate with one another, as well as with legacy technology and data platforms.

A fragmented landscape where different platforms have their own standards, smart contracts and tokens will result in inefficiencies as users struggle to navigate these silos. This is to be expected in the early days of any technology and is already being addressed through standard governance and a universal suite of protocols between DLT networks. Blockchain bridges such as Polkadot and Cosmos are already connecting various blockchains with distinct mechanisms together, to form a multi-chain network, and we envisage this hurdle will be crossed in the near future.

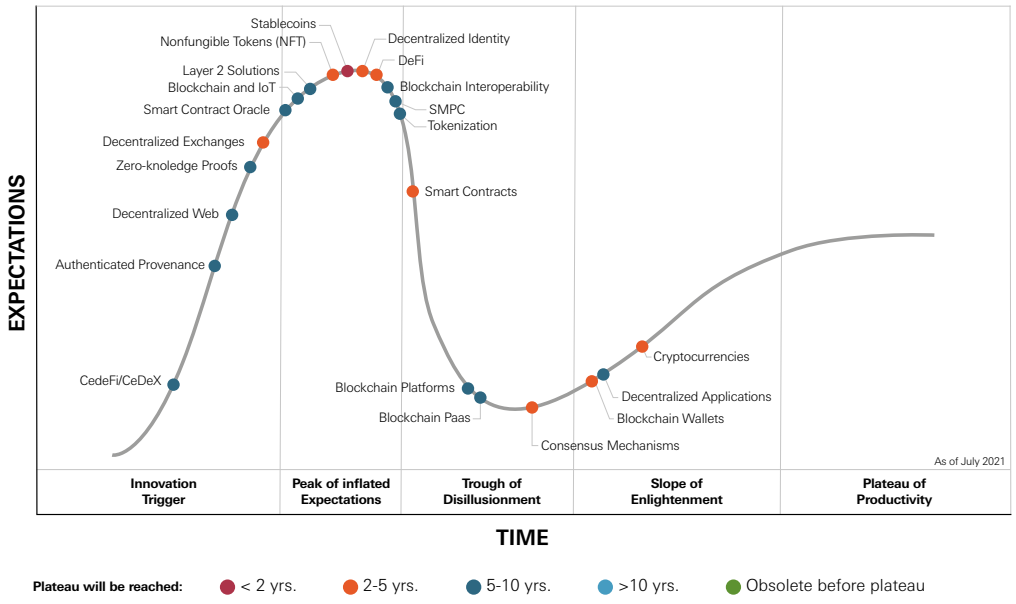
Getting ready for Web3 – arriving at the gates

So, when is Web3 coming? Or is it already here? We seem to be in the first phase of this technological revolution, as we see a plethora of early applications emerging, which are rapidly growing in market size and adoption. Two key questions for existing financial institutions to consider as this space progresses are – when to enter, and what role to play?

Commercial benefits and opportunities of participating in the Web3 ecosystem are starting to crystallise. Applications such as Blockchain platforms, and cryptocurrencies have passed the stage of "peak of inflated expectations" as seen in the Gartner Hype cycle.[20]

> We can see that financial institutions are starting to dip their toes in these areas, with projects around tokenisation, central bank digital currencies (CBDCs), and services around digital assets springing up.

Hype Circle for Blockchain, 2021



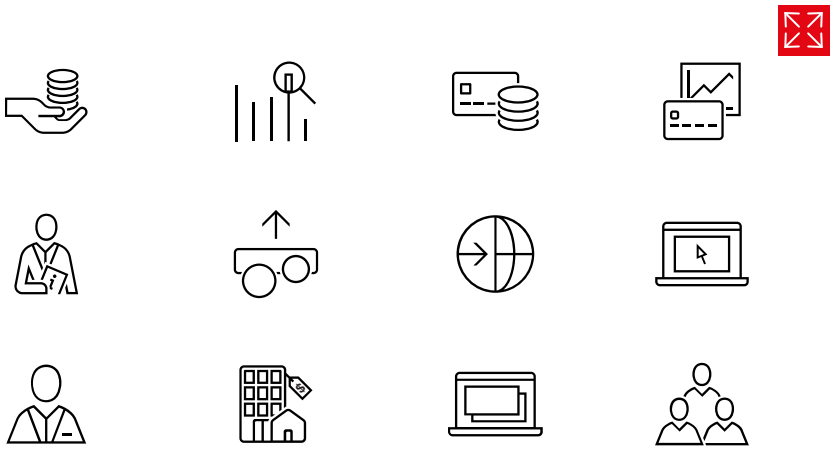
[20] https://blogs.gartner.com/avivah-litan/2021/07/14/hype-cycle-for-blockchain-2021-more-action-than-hype

Opportunities for financial services in the Web3 world

Should financial institutions dive headfirst into an ecosystem that some may argue is driven largely by speculation?

> Yet, in many cases, "speculation is installation."[21]

Speculation on commercial value leads to investment dollars and this funding drives adoption. Speculation drove the dot.com bubble in the 1990s, but when the bubble burst, it did not lead to the demise of the internet. In fact, it ushered in a new era of growth and development of applications that would change everyday life for millions. We are at a similar stage of adoption for Web3. This is a critical juncture for existing financial institutions to explore, experiment, take calculated risks, fail fast and learn faster to understand what it takes to offer services in this space that have the potential to provide value for clients.



Custody

Web3 is likely to see an explosion of new assets due to smart contracts and composability. The rapid growth of non-fungible tokens (NFTs) is an early example of this. Secure custody of these assets will be critical to drive adoption and build investor confidence in the ecosystem.

The infrastructure and capabilities needed to custody tokenised assets (such as wallet and private key management) are vastly different from that needed to safe-keep traditional securities. Existing custodians should explore how to provide a seamless experience for clients in asset servicing across traditional and digital securities. This may also be an opportunity to leap from existing operationally intensive systems and processes to cutting-edge technology. Custodians have always played a key role in keeping financial markets humming, and now is the time to identify what roles they will play in this new ecosystem.

DLT Bridge

Today, tokens, DeFi and the Metaverse are uncharted territory for many investors – whether they are ordinary individuals or global asset management firms. Financial institutions can play a key role in easing the transition, providing infrastructure and seamless connectivity to the Web3 ecosystem for their clients.

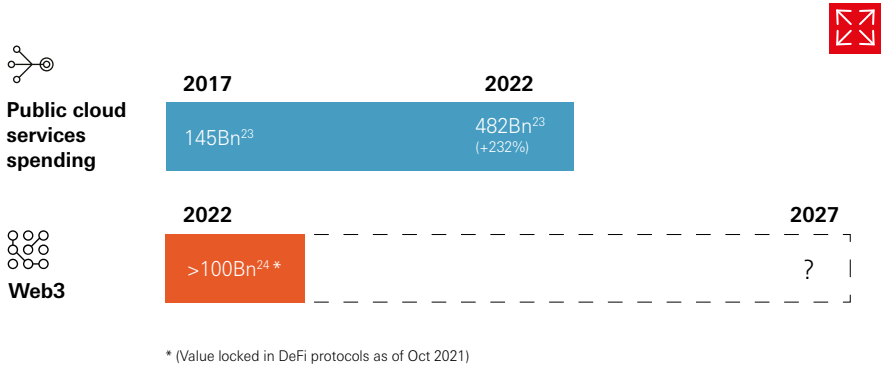
Simplifying the customer journey is an essential role in this space – and one that financial institutions are already accustomed to. As asset networks become mature and regulatory clarity emerges, banks can explore playing a universal adaptor role, simplifying a client's connectivity to the Web3 ecosystem.

[21] Asymetric: The Crypto Plan for World Domination. An Interview with Balaji Srinivasan – Asymco Who Coined 'Cloud Computing'? | MIT Technology Review

Conclusion – the journey is just beginning

> Web3's most ardent supporters predict that it will mean the emergence of an entirely new economic system run by decentralised finance; that it will disrupt existing business models, giving rise to new ones. At the very least, Web3 will be a technological evolution that leads to a new compute environment.

New constructs need time to diffuse through the economy. Google and Amazon started using the term "cloud" in 2006,[22] for example, and some thought then that all applications would be hosted on the cloud within a few years. Cloud adoption actually took another decade, but it resulted in a huge amount of value for firms and end users. The size of the cloud industry has tripled over the last five years to almost half a trillion USD.



Today, a hybrid between private and public cloud is becoming the default standard for institutions as it allows them to leverage essential components of both to meet business needs. Similarly, we are likely to see a world driven by both centralised and decentralised systems and business models.

Regardless how Web3 evolves, it is clear that there is a role for financial institutions to play. Now is the time put on our silver shoes and start the journey – to innovate and experiment and create products and services that truly bring value to customers in the new world.

[22] Who Coined 'Cloud Computing'? | MIT Technology Review

[23] https://www.statista.com/statistics/273818/global-revenue-generated-with-cloud-computing-since-2009/

[24] https://www.bloomberg.com/news/articles/2021-10-20/defi-tops-100-billion-for-first-time-as-cryptocurrencies-surge