

Management Report

DEC 2021



Web3



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“As smartphones have matured and become boring, people who spend time thinking about the future wonder what’s next. For the last couple of years there were a dozen or more ideas floating around, but now all the excitement has coalesced around Web3, a reconceptualisation of crypto, and metaverse, a reconceptualisation of VR & AR.”

Ben Evans

Our biggest investments today are in technology companies. Over the past two decades, we have dedicated ourselves intensively to understanding these businesses. We believe that, despite the industry’s reputation for high risk, it is possible to identify some of the key dynamics underway and invest with confidence in great opportunities.

Companies from the internet era have matured and consolidated some of the most exceptional business models ever seen. Their advantages over traditional models are widely known - with near-zero marginal cost to replicate and distribute their products and services, they can grow at unprecedented rates with minimal capital, in a global and automated way.

From a competitive perspective, the most relevant attribute is probably the creation of network effects, in their various forms. Such phenomenon occurs when a platform improves as it attracts more participants. The classic example is Facebook - since the network caters to almost half the global population, it is unlikely that a competitor will attract users to a similar¹ but subscale network, no matter how good its product is.

Network effects tend to lead to winner-takes-all/most competitive dynamics, where the mature stage of the market is a monopoly or oligopoly. On reaching this stage, firms are virtually shielded from competition due to the simple fact that they own the network. They enjoy high profitability and low competitive risk - the holy grail of the fundamental investor.

Today we are able to invest in some of the best-established network effect companies in the market at attractive valuations. It is hard to pinpoint the exact reasons for this, but we suspect it is a mix of fears of growth saturation (some of them are already trillion-dollar businesses) and regulation (global governments are actively prosecuting these oligopolies, for a variety of reasons). We have been following these risks closely for years and, so far, consider them tolerable for the chosen

1 It is important to stress the question of purpose. Today there is a big debate around TikTok as a competitor to Facebook. Note that TikTok does not compete with Facebook in its game of social connections - it has created a content discovery game of its own.

companies, given the margin of safety in prices. We have positioned ourselves accordingly, and the decisions have borne fruit so far.

What could go wrong, then? If history serves as an example, the biggest risk for highly dominant businesses is neither macroeconomic nor regulatory, but technological. This applies especially to this technology sector, but not exclusively - most companies today must deal with so-called digital transformation and with technological risks. For this reason, we are keeping a close eye on what is happening at the frontier of innovation.

In the opening quote, British analyst Benedict Evans correctly puts forward the current stage of discussions about the future of technology. A certain consensus has formed around two mega trends: Web3 and the Metaverse. The concepts are related: while the Metaverse idealizes a three-dimensional digital universe that is immersive, synchronous, persistent, and interoperable, Web3 proposes a modernization of the internet's architecture to sustain these characteristics.

Of the two, Web3 presents a more direct threat to the dominant business models we mentioned above, by proposing breaks in the exclusivity over network effects. As such, we decided to dive deeply into the topic. Our impressions so far follow below.

How did we get here?

The first generation of the Internet², now known as Web 1.0 (c. 1990-2005), was built on open protocols that determined concepts such as the computer's address (IP) and the logic used to transport information (TCP) and return requests (HTTP), etc. These protocols allowed the users' computers to connect directly to the computers of those publishing content.

To consume content, the experience was simple: just enter the address of the desired site in the browser and the pages are loaded. This allowed the Internet, even in its earliest form, to expand rapidly to hundreds of millions of users.

But, to publish content, it was necessary to deal with the complexity of creating a site and solving issues such as hosting and domains, which limited who could publish. Furthermore, the pages were static, allowing little interaction and personalization of the content. Thus, most users in Web 1.0 were only consumers of content.

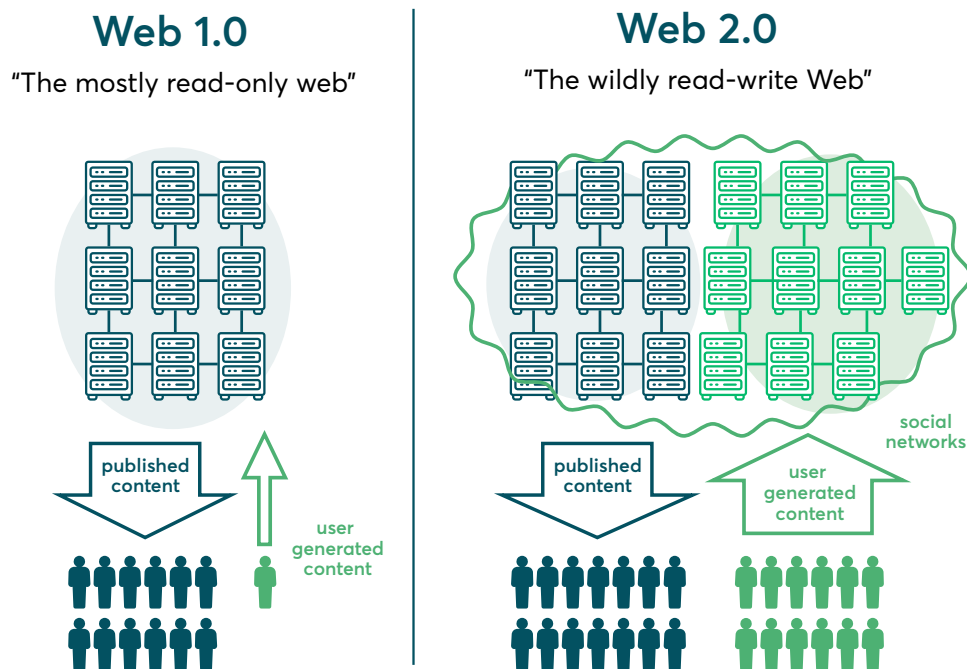
Faced with the exponential increase in the relevance of the internet, entrepreneurs identified great opportunities to create businesses by facilitating and enhancing the features available at the time. These businesses led to the second generation, Web 2.0 (c. 2005-present), whose hallmarks are platforms and interactivity between users.

2 There is a technical difference between web and internet, but we will ignore it in the text to make the message easier. Simplistically, the web is what we access through a browser, using the HTTP protocol. Emails (SMTP), for example, are part of the internet, but not of the web.

Platforms became the intermediaries of the Internet. Rather than content creators having to deal with the complexity of managing a page, platforms introduced simple, intuitive interfaces so that any user could publish to their servers, in a variety of formats, and other users could discover, access, and interact with the content in the same place. In addition, the platforms addressed shortcomings in open protocol functionality, such as identity verification and payment processing³.

The laborious creation and hosting of websites independently has been mostly replaced by the creation of personalized pages on platforms, such as Facebook profiles, YouTube channels, or Wordpress sites. And with a noticeable reduction in publishing friction, coupled with an immediate increase in reach, the volume of online content exploded.

Thus, in Web 2.0 many users have also become content creators:



Source: "Web 2.0", presentation of Ola Sayed Ahmed

In addition to the increased volume of content, the introduction of the intermediary has enabled new types of interaction between participants. The most popular example is social networks, but we can also cite product or service marketplaces, such as e-commerce with third-party products (eBay) or hotel booking services (Booking) and transportation (Uber). In common, these platforms centrally and efficiently store information about supply and demand and process the best match for participants in real time.

³ Writer and investor Packy McCormick has published great texts on the subject. Regarding the evolution of Internet generations, we recommend the following reading: <https://www.notboring.co/p/the-value-chain-of-the-open-metaverse>

With this evolution, the Internet has evolved from a collection of libraries, catalogues, and corporate websites into a great orchestrator of markets.

By offering products that are more sophisticated and at the same time simpler to use than those available only through open protocols, the platforms have absorbed the bulk of Internet traffic. And with the presence of network effects, this traffic has been concentrated on a few big winners - which has brought new issues. If, on the one hand, it is unquestionable that the winning platforms generate a lot of value for their users, on the other hand, they have assumed unprecedented power over their ecosystems, with important impacts on the competitive dynamics.

Criticism of centralization

The concept of a third-generation internet emerged in the mid-2010s, with the discussion becoming especially popular in the last year. Perhaps the most iconic part of this debate was the article "Why Decentralization Matters"⁴, written in 2018 by venture capitalist Chris Dixon from Andreessen Horowitz⁵. In it, he argues that centralization limits innovation in the industry, and that a new network architecture presents itself as a credible alternative to the current structure.

Dixon draws the dynamics of a centralized platform as a predictable cycle, where incentives naturally lead to an open and collaborative start with the ecosystem, but which evolves into a closed stage of maturity.

At the beginning, platforms are willing to do everything to attract users and creators (demand and supply, respectively) to establish network effects. They often operate with substantial losses at this stage, subsidizing their products and services for users and promoting partnerships on exceptional terms for complementary third parties such as developers, creators, or companies.

The reverse incentives when network growth begins to saturate. At this point, the market is already dominated, with established network effects, and the addition of new participants becomes less relevant to platform leadership. With the risk of competition all but eliminated, subsidies and concessions no longer make sense. Revenue growth comes mainly from increased monetization of the ecosystem.

In practice, this manifests itself in several ways. In a beneficial case, a mature platform can work to introduce new features that generate value for both the network participants and the network itself. Examples are Uber's creation of the Eats service, Mercado Libre's offering of credit, Facebook's marketplace, and the Stores tab on Instagram.

⁴ <https://cdixon.org/2018/02/18/why-decentralization-matters>.

⁵ It's probably no coincidence that the text came from the group of Marc Andreessen, creator of the first widely used web browser (Netscape) and a vocal blockchain networking enthusiast since before the topic became popular.

But the news is not always positive. For example, users of YouTube and Instagram must have noticed a considerable increase in the frequency of advertisements in recent years - an indirect way of capturing value. The networks could hardly have started out this way, as attrition would have made them vulnerable to ad-free competitors. At the current stage, with well-established networks, they can afford to shift the balance in their favor. The services have worsened in this respect, but they remain firm thanks to the built-in network effects.

Changes can also affect the participants who develop on the platforms. One example is the case of Twitter, which in its formative years allowed other companies to create their own apps with which people could access the network. The logic was that third-party apps could innovate the user experience, accelerating the growth of the network. In return, the implicit agreement was that these apps could monetize their customers in alternative ways. It worked well, until the growth of the network slowed down and Twitter reached the mature stage of the cycle. At this point, seeing that third-party apps were no longer strategic and limited monetization mechanisms, Twitter cut off third-party access to key functionality, effectively crippling these apps and capturing their users.

Dixon points out that this type of behavior is no exception - other examples are Microsoft vs. Netscape, Google vs. Yelp, Facebook vs. Zynga - and that it directly impacts innovation. Because of this dynamic, entrepreneurs, developers, and investors have become sceptical about creating products on platforms, for fear of having their users and profits captured further down the line.

As a result, innovation on the established networks was mainly restricted to the dominant platforms' own initiative.

It should be noted that this analysis is the flip side of the strength of these businesses presented in the introduction. While we value the opportunity to be shareholders in companies with strong competitive moats and high profitability, Dixon criticizes them for the negative externalities and pressures they can generate on participants⁶. For many of these reasons, they are being investigated by regulators around the world - so far without much success in structurally altering the competitive issue.

Would it be possible to attack them in any other way? Dixon points out that the intangible nature of digital platforms leaves space for a technological response. Unlike traditional natural monopolies, it is possible to re-architect the Internet without having to physically install railroad tracks or power lines. Web3 is an attempt to build new digital rails, alternatives to those of platforms, so that the internet can empower participants in new ways.

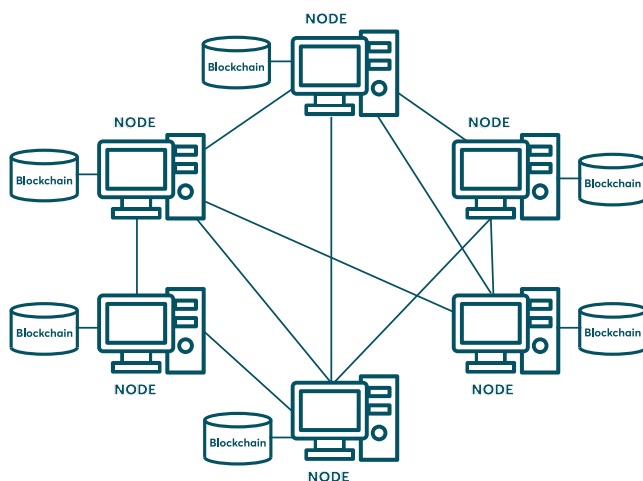
⁶ It's worth mentioning the conflict of interest that exists for Dixon: his firm is deeply invested in decentralized solutions to many of the functions that platforms perform today. A narrative that casts platforms as villains is powerful marketing for his ventures.

Sovereign networks

What would it be like if we could have the capabilities of platforms - processing and storing data at the network level, facilitating interactions between participants efficiently - without having to delegate control to a central authority (subject to self-interest)?

This has been a famous problem⁷ among computing academics since the 1980s. Building on decades of advances in the fields of cryptography and game theory, a practical solution finally emerged with blockchain networks, introduced by Bitcoin in 2009.

Complexities aside, what Bitcoin did is openly recruit (i.e., anyone can participate) a network of computers distributed around the world to store and process a single database of transactions. Each computer participating in the network holds a complete replica of the data, processes and verifies the legitimacy (via a digital signature) of all transactions independently and is compensated for this effort in a network currency of its own (via primary issues and transaction fees). To deal with the ambiguity between multiple replicas of the data being modified at the same time, the computers run an intelligent mechanism⁸ that always follows the truth according to the majority of participants. Altering the data illegitimately requires a dishonest, coordinated majority - something with no economic rationale, no logistical feasibility, and no historical precedent for a well distributed and established network. It has been proven secure - Bitcoin has been around for 13 years, is the most interesting target for hackers in history (the market value of the network is close to \$1 trillion today) and has never been hacked⁹



Source: Blockchain Implementation Quality Challenges: A Literature Review

Latest Transactions

1sA21Xgj7Uw	→	1l62Tqm53p5	0.011 BTC
1B0B13hEMr4_	→	1ANNABc1x37_	3.000 BTC
1r6q8G84kt5_	→	1b93ljfV2aQ2_	12.345 BTC
1s62Tqn53p9_	→	1p12qo29w83_	0.639 BTC
1bF90Se24Ti_	→	1k43Of2jCG5_	0.730 BTC
17aS3nef317e_	→	1S4nf7a9471_	0.067 BTC

⁷ The Byzantine Generals Problem, Leslie Lamport, 1982 <https://lamport.azurewebsites.net/pubs/byz.pdf>

⁸ For those who want to explore more about how the network works, we suggest the following video: <https://youtube.com/watch?v=BBC-nXj3Ng4>

⁹ There are frequent headlines about cryptocurrency hacks. These hacks generally refer to users or brokerages having their passwords stolen and funds transferred. The major blockchain networks have never been hacked.

In other words, Bitcoin invented an open protocol that stores and processes data in a secure and distributed way. It took years for the tech community to realize the real relevance of this invention. Please note that it is not essentially financial, but computational. From it, any user can access a computer network that is not controlled by any individual, company, or government and that will always perform its computational tasks precisely as agreed.

Bitcoin was designed for a specific purpose - to send, receive and store bitcoins - but new blockchains emerged in the aftermath to extend the concept of sovereign networks to more generic applications. The most famous of these, Ethereum, was officially launched in 2015.

Ethereum's main innovation was that it went beyond sending transactions in a digital currency by allowing users to also transfer computer programs (so-called "smart contracts") to be executed on the network. While Bitcoin provided access to a public but very specific database, Ethereum allowed people to create their own databases with their own rules on the network¹⁰, and other users to freely interact with all these databases and programs while respecting each other's rules.

The advantages of using blockchains instead of centralized databases and programs are the guaranteed characteristics such as transparency, integrity, and perennity. Both the source code (the logic) of the programs and their data are public and unchangeable¹¹. For the participants, this means that all the rules are explicit and that no one, not even the program's creator, has the power to change them or interfere with the data in unforeseen ways. For all intents and purposes, once a program is released on blockchain, it belongs to the world.

These capabilities have allowed us, for the first time, to imagine the creation of autonomous networks - databases shared between participants and entrepreneurs, which store data and perform functions according to pre-established rules. Because they are in blockchain, the rules cannot be changed unilaterally, requiring consensus of the participants to become effective. With this guarantee, entrepreneurs can build on these networks confident that they will not be pressured in the future, as was the case with platforms.

Redundancies and the need for consensus make such networks far less computationally capable than the centralized networks we know today. Despite this, some interesting uses are already emerging. Extending this concept a few years, we can imagine a technological evolution that will enable alternatives to the networks we use in everyday life - transportation, rental, social and others.

¹⁰ Technically, Bitcoin allows a certain level of programmability, but the limitations are considerable, and few applications have been developed. The use of the network is still predominantly the fundamental functionality of sending, receiving, and storing bitcoins. Therefore, we have simplified the explanation.

¹¹ Throughout the text, we will only refer to public blockchains. Private blockchains exist, designed for specific purposes, but they go beyond the scope of this analysis.

But what could these networks offer users in order to compete with incumbent platforms with well-established network effects and highly sophisticated products?

The Web3 Vision

Web3 is the promise of a new generation of the Internet based on blockchain infrastructure. It would return to the decentralized roots of the first generation, marked by the openness of protocols, while carrying with it the functionalities of the second generation that were previously only possible through centralized platforms.

In Web3, users data, possessions, and contributions are no longer restricted to the source platforms, but are open on the Internet via secure, global public networks. In this way, network effects are shared, and participants are not tied to specific entities.

Let's look at some key differentials.

#1: Money on the Internet

Money today is pretty much digital - we use bank apps and can pay for products and services using credit or debit cards. But from a structural point of view, money is still a private record in each user's bank. The money is therefore not on the internet, but in digital silos that rely on trust both for custody and for transactions (facilitated by banking and card networks).

This implies considerable friction. An international bank remittance usually costs dozens of dollars just to initiate, plus a variable percentage and exchange fees. A card payment costs around 2-3% of the amount transacted, plus about \$0.10 of fixed fees, may have minimum value limits, and in the case of an international transaction also includes fees such as foreign exchange and taxes. In addition, each purchase on a different site requires the payment data to be filled in completely, which favors centralizing transactions on platforms that already have the customer's data.

The variable fee may seem small, but for the many digital businesses with single-digit net margins, 2-3% over revenue can mean a significant profit.

Perhaps more important are the fixed fees and minimum values, which make microtransactions impossible. This category is especially relevant in the case of the Internet, given the sheer volume of small interactions we have with many different

participants. For example, most Internet users are not willing to pay \$17/month for a subscription to the New York Times just to read a few stories but would probably pay a few cents for each story individually. Not surprisingly, business models on the Internet have resorted mostly to advertising and/or subscriptions of reasonable value.

With blockchain networks, alternatives to the traditional payment system are already in place, with some important advantages: i) the networks are natively global, breaking the concept of cross-border fees; ii) the expensive chain of trusted intermediaries can be replaced by these networks, reducing fees to close to the operating cost over the long-term¹²; and iii) the systems are open and programmable - any person or company can connect to the network to send and receive payments, manually or via code, without the need for prior approval or formal integration, and without the risk of having payments intercepted or blocked.

In practice, on Web3 participants can receive instant global payments from any other participant by simply providing their blockchain address. Content or experience creators can add links on their pages that, with just one click from the user, charge any amount, no matter how small. And users need only link a digital wallet to their browsers or phones to participate in this system. The promise, at a mature stage of the technology, is that they will eliminate transaction fees and registration friction, making digital microtransactions trivial.

#2: Digital Ownership

Before blockchains, any local digital record could be copied (Ctrl+C, Ctrl+V), and any external digital record was under the control of an authority - which could interfere with the data by duplicating, deleting, altering it, etc. With blockchains, it was possible to create reliable, public digital records of who owns what on the Internet.

For the first time it was possible for the world to agree on digital property without having to rely on a middleman. This is crucial - Chinese, Russians, and Americans may not fully trust credits in a centralized bank on the other side, but they know mathematically (by cryptographic security) that if they receive a digital asset on a robust blockchain, that settlement is firm and final.

With the ability to customize their own databases on networks like Ethereum, new digital assets have begun to emerge beyond the network's original currency. These assets, called tokens, follow the same rules of transparency and perpetuity as any program on the network. For example, if a token is created with explicit provision for only 100 units, all participants are assured that there will never be a hundred and

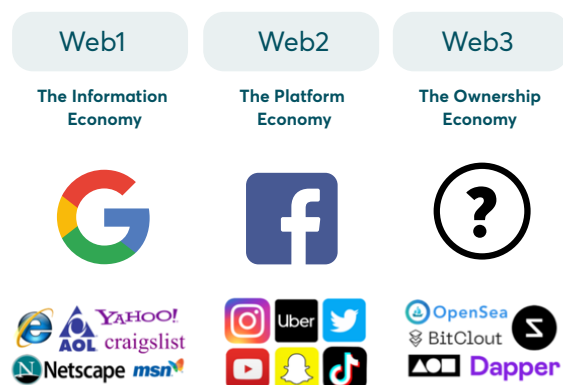
12. Anyone who has ever studied or used cryptocurrencies might argue that the major blockchain networks today charge even higher fees per transaction than traditional channels. It's true - Bitcoin and Ethereum today are not viable alternatives for payments. However, second-tier scalability solutions like Lightning, or high-performance networks like Solana, are establishing themselves as viable alternatives. Technological evolution should move towards lower fees and higher processing power.

one. Each token holder is certain that no one else can claim ownership of that particular asset - only he, with his unique digital signature, can prove his ownership or transfer the asset freely to anyone he wants. Everyone, on the other hand, can verify that he is the rightful owner of the asset.

Of course, tokens need to be tied to something to have real value. This relationship can be based purely on trust that a commitment will be fulfilled - for example, NBA tokens that give access to exclusive events with players - or it can be guaranteed in code - for example, a program on the network that charges a fee for its services and reverts this revenue programmatically to the holders of a certain token.

It is intuitive to imagine this functionality generating a wide diversity of experiments. It is as if everyone has been given the power to make frictionless public offerings, selling "securities" created out of thin air and promising that they will have some kind of backing or compensation. It should surprise no one that most of them are either jokes (e.g. dog tokens) or frauds. But when used well, the tool is powerful - it allows anyone to access a global and immediate funding mechanism to finance their ideas and provides "tangible" proof of that investment to the backers. In a utopian scenario where this mechanism would become the standard funding mechanism, every business idea could come about as a type of publicly traded company.

Via tokens, Web3 allows users to create, own, and transfer scarce digital assets that represent ownership or the right to something arbitrary in the digital or physical world. These assets are public on the web, secure, predictable, and easily auditable, and anyone can incorporate them into any process at any point in time.



Source: Rex Woodbury

#3: Governance and Incentives

The ability to create and distribute digital assets, coupled with the development of programs that confer rights to these assets, has opened up new possibilities for incentivizing participants.

The traditional playbook for building new networks is to run at a loss initially to attract participants. It turns out that this game is not viable when there is already an incumbent with an established network - it can simply match (and copy) the new entrant's offer with more scale, therefore suffering less, and then drive it out of business.

Via tokens and public networks, a new playbook on blockchain emerges as an alternative. As they launch open programs and databases that will underpin the new network, creators can also launch tokens with equity features over that network. The program code provides governance rights to the holders of these tokens. Proposals can be made by "shareholders" and go to a vote, in a process very similar to shareholders' meetings. They can involve issues such as the strategic direction of the network's development, the adjustment of any fees charged for the service to benefit a network's own treasury (often used to finance development), and even control these treasury resources (to determine, for example, the payment of dividends).

So far nothing new, just a replica in blockchain of what we already have in the traditional system. The interesting thing is this: thanks to the global and frictionless nature of transfer in these systems, the new networks can distribute these equity tokens to attract participants. The rationale is to give a piece of the network to those who help grow and maintain it in the early stage, leading to long-term governance distributed not only among entrepreneurs and investors, but also among the network participants themselves. For example, creators of a new network might determine that the program retains only 20% of the tokens for them and distributes the remaining 80% to the pioneering participants as they adopt the network. Generally, the earlier they arrive, the better they are rewarded, generating a sense of urgency that accelerates adoption. The more generous and dispersed the grants, the stronger the incentive to adopt the new network.

This creates a unique sense of belonging. Since tokens are born openly traded and networks grow quickly, the participants' sense of opportunity is heightened by seeing the market price respond to the evolution of the network. Participants feel encouraged not only to use the product more, but also to introduce it to their friends or even help with its development. Most of the Web3 networks that have been successful so far have not spent anything on advertising - the incentives themselves have taken care of the promotion.

This tool becomes even more powerful when combined with the concept of collaborative networks. Let's imagine a company that wanted to compete with Airbnb. Before Web3, the company would have had to create its own network from scratch and convince landlords and renters to transact on a platform with less liquidity and have a worse experience. Without scale and a unique features, it probably wouldn't succeed. Even if it tried to collaborate with other networks, it would face considerable friction related to manual coordination and governance resolution. At the end of the day, with this market structure, Airbnb would retain the privilege of competing against each of its competitors individually.

Compare the previous case with an open network of rental property registries on blockchain. This network could be independent of any specific entity, governed by tokens that would be distributed to encourage businesses, landlords, and users to use it. Companies creating rental property apps could contribute together to the same database (that forms the network), with direct economic participation in the success of the network. Such companies would know that the rules would be maintained and that the network would have no unforeseen power over them. In this structure, the Airbnb network would compete against the pool of competitors contributing to this open network, in a very different dynamic - one that could lead to Airbnb having to adapt.

The reader may wonder if, in the long run, the governance of this network would not end up equally concentrated in the hands of a few, who would vote for choices that suit their interests, in a scenario not unlike the one we had before. This would not work, because all programs and data are open. If a large enough set of participants became dissatisfied with the rules, they could copy the existing network (and its data) and launch an alternative with rules they thought were fair. The networks that best balance the interests of the participants win.

By connecting tokens to open, public networks, Web3 opens up a potentially viable path to compete with the networks of the big platforms. It does this by organizing incentives and governance among numerous participants to form a single front.

#4: Composability

Developing open-source software collaboratively has been a practice since the early days of the Internet. The community of programmers joins forces in pursuit of common goals - and it is one of the few situations in which the technology giants genuinely collaborate. One successful example is Linux, the operating system used in most cloud servers.

The clear advantages of open source are the elimination of redundant work and the use of more robust and efficient solutions. When one company solves a problem with a proprietary system, all others that run into the same problem need to spend unnecessary time creating their own solutions. When the community solves a problem openly and together, no one needs to reinvent the wheel - everyone already starts from the best available solution, helps identify errors and proposes improvements, and thus can focus their time on the unsolved problems. From a systemic point of view, the gain is enormous.

Open source was seen as the future of software development between the first and second generation of the web, but it did not take off as predicted.

Perhaps its key limitation was the inability of contributors to monetize their contributions. The story of Tim Berners Lee, the inventor of the Web (i.e. the open HTTP protocol), who accumulated something like \$10 million in assets throughout his career, mostly through speaking engagements - a fraction of the value of an average Internet startup - is well known. In practice, the lack of a financial compensation mechanism encouraged new software developments to remain closed so that they could be monetized.

In Web3, the association of tokens with open-source code allows open-source network development to be well compensated. In it, programmers have the incentive to release open rather than closed solutions to maximize user reach and establish themselves as the standard.

The trust conveyed by open-source makes it more attractive for developers to build on other developers' code - this is called composability.

For example, Uniswap created an autonomous exchange for trading digital assets. The initial program was launched in 2018 by a former Siemens mechanical engineer, who did it pretty much on his own even though he hadn't known how to program until a few months before. The company had fewer than 10 employees until 2020, when it began to grow. By May 2021, it reached close to \$5 billion a day in traded volume, comparable to the volume of B3, the Brazilian exchange - but with only 32 employees¹³. B3 has more than 2,000 employees.

This was only possible because of the phenomenon of composability. Uniswap's code relies on the custody and settlement systems of the blockchain itself, and on the token creation system already present on the network. None of these systems had to be recreated and none of them will change their rules or stop working in the future.

Similarly, a new generation of programs and applications can leverage the existence of Uniswap. For example, a financial application on Web3 can allow its users to buy and sell digital assets on the market simply by integrating Uniswap, with all the guarantees mentioned above. In a non-financial example, a video game studio can integrate Uniswap to allow its users to trade in-game tokens without having to create their own marketplace and accessing a liquidity pool shared with a third party.

Also, nobody needs to ask Uniswap (or any other code) for permission to integrate Uniswap into their apps, and Uniswap can't stop anyone from using their program.

With this incentive structure for open development, Web3 makes a wide range of cutting-edge services available to its developers, with established networks for them

13 According to LinkedIn data, the actual number may be slightly different, but it probably does not deviate too much from this reality.

to build on confidently. This considerably speeds up the development of new services. The starting point is still rudimentary today, but the pace of evolution is rapid.



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Composability is to software as compounding interest is to finance. 

#5: Interoperability

Today's Internet experience is compartmentalized. On each platform we visit, we have a set of data that is restricted to that universe only. Followers and posts on Instagram, videos on YouTube, playlists on Spotify - none of that exists outside the domain of each platform. We are used to this, but it could be different.

The proposal of Web3 is that, with program data open in blockchain and amenable to integration by any third party, we can converge on digital asset standards that will work on multiple occasions.

An early example of this is Reddit. The social network is testing a blockchain reputation points model for its users, using an open database on Ethereum. The idea is that these points could transcend Reddit and also be valid for other social networks that adopt the system. Users earn points by contributing to discussions in online communities and receiving "likes" from other users. This makes their profile more recognizable - for example, the points appear next to the user's name on Reddit, making it easier for them to stand out in a discussion. And because the dots are on the blockchain, users can "carry their reputation" into discussions on other networks as well.

In the same way, we could imagine similar examples for a video game. A user could purchase items in a game that are registered in an open bank, and these items could be integrated at will by other games. It's noteworthy that by the mere acceptance of the item in other experiences, its utility and potential value goes up.

This ability to co-develop digital assets that are common across experiences is a fundamental pillar of establishing a true digital economy. Today, the vast majority of digital assets we own are like vouchers at amusement parks - we buy them at the entrance and need to spend them there. Interoperability is what allows vouchers to be converted into assets or cash and taken to other places. This is the main link between Web3 and Metaverse that was pointed out in the introduction.

It is still too early to guess what possible structures will emerge from these capabilities and which will emerge as winners in the process. For now, what we should recognize is that interoperability generates significant value for the ecosystem and is something that stakeholders want. With blockchains, we have a workable tech-

nological solution to implement it. Recently, Facebook's own group (now Meta) mentioned that they are looking into this and intend to adopt open standards for assets on their platforms - it makes sense, given that they are investing heavily in Metaverse related technologies. If these standards take hold, the current platforms will have to adapt to a new reality

#6: Exclusivity

We could not fail to mention the controversial NFTs. The term refers to unique tokens that represent unique assets. They can be associated, by code or by trust, with anything - an image, a song, a text, or even an apartment in the physical world. The most common usage today is for digital works of art, but the concept is broad.

Essentially, NFTs are unique records of ownership on a blockchain, with all the features we have mentioned so far. Simply put, any user can create an NFT at any time by entering a row into a public database that says a particular asset belongs to someone. What guarantees the legitimacy of the NFT is precisely the account that created it and the transaction history, which are saved permanently on the network. In other words, if Pablo Picasso created an NFT for one of his works, several other illegitimate NFTs could appear claiming to be of the same work, but it would be possible to reliably distinguish the original.

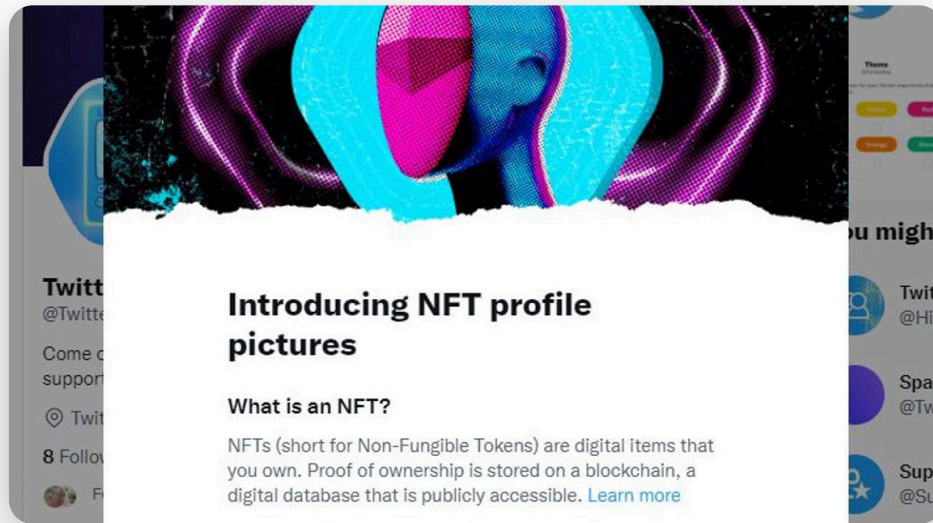


"So you can't own the precious physically, but you can pay to have your name listed as its owner in an online distributed database."

Note that NFT is only the record of ownership. For physical assets, the owner can usually restrict access to the asset - if I have an apartment, I can decide who can or cannot use it. But for digital assets there is no such limit because they can be freely copied at no cost - if I buy a digital image, there is nothing to prevent someone else from copying it.

What makes someone buy an NFT of a digital asset then? Let's consider a few reasons.

The first is status. NFTs are often used as a kind of digital Rolex. Blockchains have allowed us to publicly prove that we have something scarce on the internet and have even given complete transparency to the price of that scarcity. As life gets more online, more people are willing to spend to stand out on the internet. And platforms are already adapting to this. For example, Twitter recently made it possible to post authenticated NFTs as profile pictures. The owner of an NFT can not only prove his ownership but also use it as his face to the world, appearing on the Web "wearing" a million-dollar NFT.



The second is sponsorship. With NFTs, collectors have gained a tool to fund artists globally for works in the most diverse digital formats (for example, for video art, where previously it was difficult to assign ownership). In exchange for the funding, they receive a public title proving their contribution. The title can also increase in value if the artist becomes recognized and their works become status symbols, in a very similar way to that of traditional works. In addition, the technology allows NFTs to have special terms - such as royalties on any secondary transaction of the work, allowing the artist to continue to earn from their works while they appreciate in the hands of collectors.

The third is access. Because they are active on public networks that are easily verified via programming, developers and creators can launch exclusive experiences for holders of certain NFTs. For example, some series of NFTs today give exclusive access to certain online forums or real-life events, functioning like membership of a club. There are also writers who are restricting exclusive texts to holders of their NFTs. The possibilities are immense.

Finally, the fourth is utility. There are many games exploring this concept. For example, collectible card games can rely on NFTs to name each card, with unique attributes representing different abilities in the game.

Scarce unique digital assets - which can be traded openly on a public network and integrated freely across many different platforms - may change the way creators monetize their work on the Internet. In turn, current platforms will need to integrate new capabilities, which will prove to be an opportunity for some and a risk for others.

Tying the concepts together

"It's the financial internet. It's literally on that level. Because what has the internet done? It's digitized books, movies, music, all forms of media, right? Crypto went and digitized everything that is scarce. Equities, bonds, commodities, and of course gold and other things."

- Balaji Srinivasann

There is still no formal definition as to what exactly Web3 is. However, there is a consensus that it involves a set of features whereby the internet ceases to be a mere communication channel and starts storing and processing information autonomously and securely through blockchain networks.

For businesses in general, Web3 probably implies that they will have more openness to innovate and compete. With more open programs, networks, and data to integrate, they will start from a more advanced point than before. They will be able to focus on marginal innovation and launch better products with less time and effort, impacting even well-established segments.

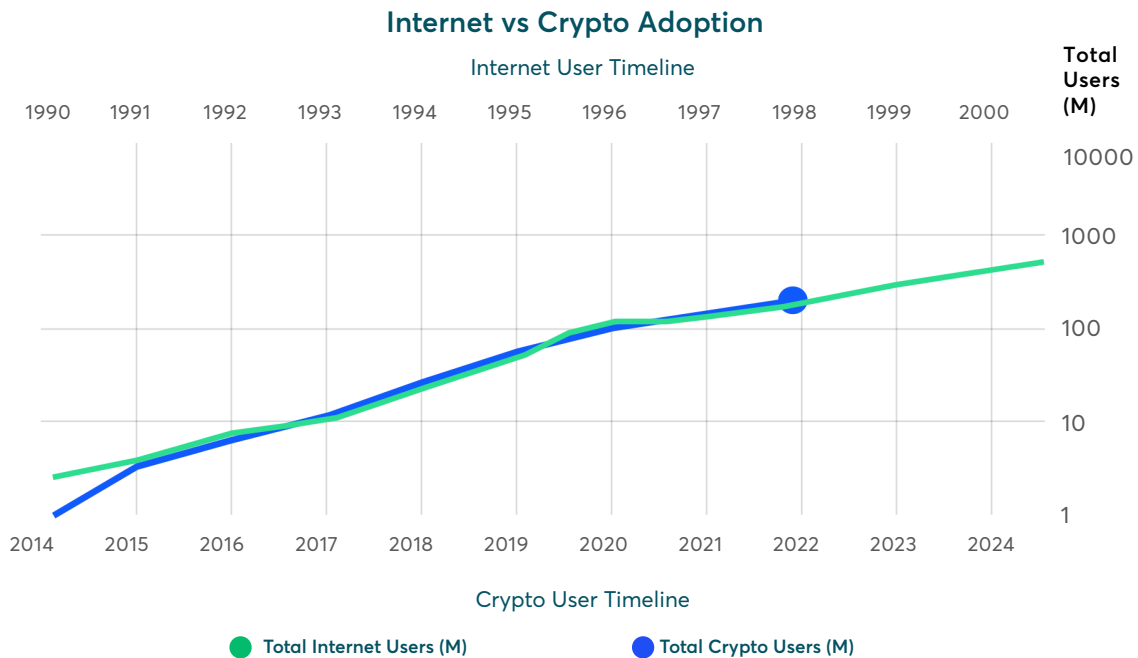
For us users, it probably implies that we will have digital wallets in the browser, cell phone and other devices that access the internet. These wallets will contain cash and digital assets of value that can be used interoperably in a variety of experiences in the digital and physical world, and that can be traded openly on the Internet or transferred to whomever we want at low cost.

Where is this future?

We have raised many possibilities so far. Of course, we often wonder about the conversion of this theory into practice. In other words, how feasible are the promises of Web3 and at what point will we see these changes in everyday life. A few metrics will help us make the potential answers tangible.

Starting with user adoption. To participate in Web3, one must have an account on the network to store data and assets. This account needs to be loaded, like a prepaid card, with original network currencies (so-called cryptocurrencies) to pay for services and assets. The most common way to load an account is by using a

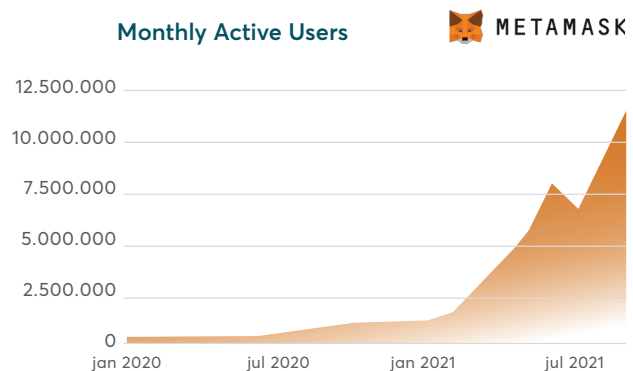
brokerage company. Coinbase, the largest cryptoassets broker in the US, presented the following chart to investors estimating the adoption of the technology in its Q3 2021 letter:



Source: World Bank, Crypto.com

The data show that we have something like 200 million people already participating in this world. They also make a comparison with internet user adoption, suggesting that crypto is growing at a similar rate and would match that of the internet of 1998. However, the data indicate the number of people who hold cryptoassets - which is not the same as the number of people who use these assets when surfing the web. A person may, for example, buy digital assets just for potential appreciation, sometimes leaving them in their own brokerage account and never interacting with them.

A more relevant metric to measure the actual use of Web3 seems to us to be the number of active users in digital wallets - the software that people install to manage their accounts and assets on these networks. Metamask, the most widely used wallet on Ethereum, which in turn is the most popular programmable network today, recently reported that it has breached the 10 million monthly users mark (growing at an incredible 19x year on year).



If we add the other programmable network wallets and still partially count the Bitcoin wallet users (who are limited in functionality), we estimate a few dozen million digital wallet users - which would correspond better to the number of internet users of 1994. In other words, there's probably an order of magnitude more people investing in digital assets than there are people using them today, which makes one wonder if the narrative hasn't moved too far ahead of the product.



Matt Huang ✓ @matthuang · 5 de jan

Early days of Web2: "these apps have users, but will they ever make money?"

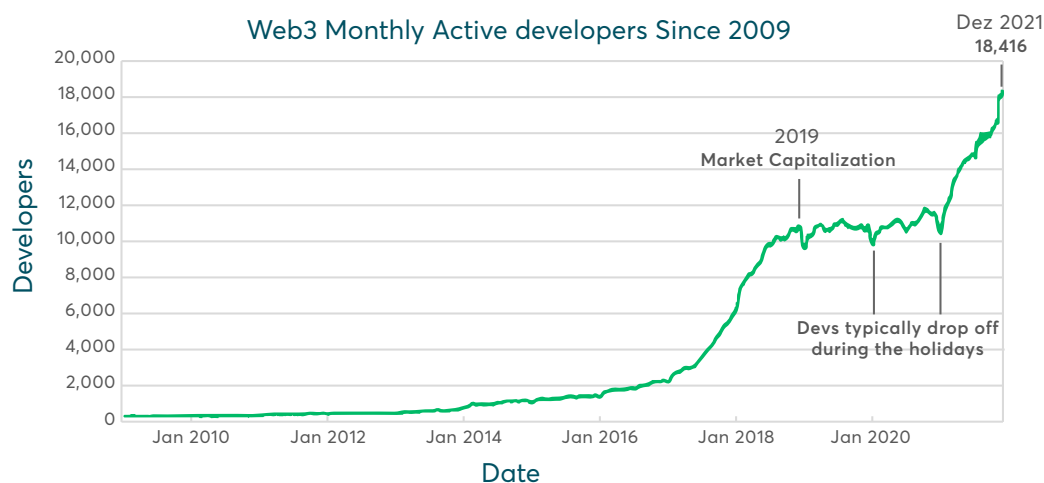
Early days of Web3: "these apps make money, but will they ever have users"

Beyond the natural time it takes for users to adopt a new technology, what else is holding Web3 back? We believe at least 3 issues: the lack of consumer-grade experiences, infrastructure bottlenecks, and regulatory and legal uncertainties.

Regarding experiences, it is remarkable how few and rudimentary they still are. Participating in them requires you to know what you are looking for, understand industry-specific terms, deal with a complex interface, and ever so frequently run into errors or even fraud. This is for the experiments that already exist - many of the ideas we have raised have not even begun to be developed. In other words, even though the technology exists, we will have to wait until the products are built and refined for the average citizen to be able to use them.

And you can't expect this to happen overnight, as the number of developers in the ecosystem is as low as the number of users. The team at Electric Capital tracks this metric by looking at contributions to open-source code - adding up the developers

There are now **18.416** monthly active developers in Web3



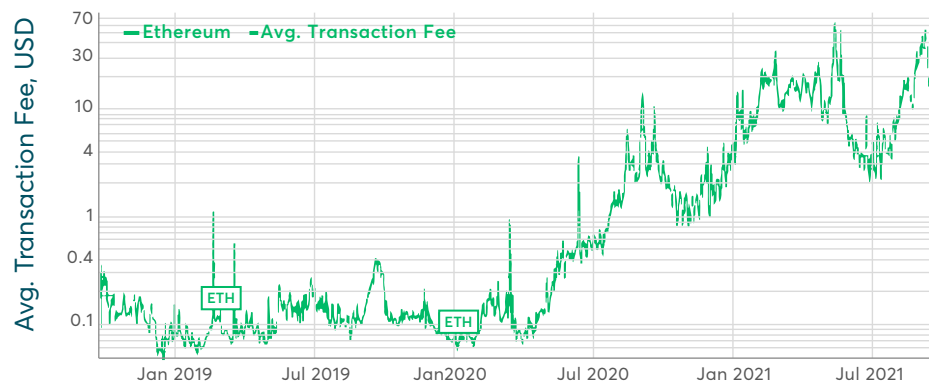
Source: Electric Capital

of blockchains and the developers of applications integrated with them. In their most recent report, they estimate that there are around 18,000 such developers in the world. For reference, Amazon alone employs twice that many developers.

As for infrastructure bottlenecks, probably the worst of them today is the cost of operations in the best-established networks. For technical reasons involving system security, the networks limit the volume of operations that can be processed per time interval. When congested, there is an auction to decide which will or will not be processed in that batch. With the popularity of the major networks, congestion has reached extreme levels. Today, an average transaction on Ethereum costs dozens of dollars.

Ethereum Avg. Transaction Fee historical chart

Average transaction fee, USD | 0.0066 ETH (\$19,21)



Source: bitinfocharts.com

Of course, no system that intends to be used in everyday life can afford to cost ten dollars or more per transaction. The developers in the Ethereum ecosystem are working hard to increase the capacity of the systems and consequently lower the fees, but the solution is taking longer than expected. In parallel, other networks with different technologies are popping up as alternatives - they already process many more transactions per second at much lower costs, but generally achieve this by reducing levels of security and/or decentralization, as well as requiring users to employ different tools, lacking features that Ethereum has already developed. The result has been more complex navigation in an industry that was already not at all simple. In other words, in addition to the products not being ready, there is uncertainty for developers as to what infrastructure will be able to adequately support their products.

Concerning the regulatory and legal environment, it simply hasn't kept up. People and companies are not sure what they can and cannot do in this environment. There is not even legal consensus on how to categorize assets: Which ones are securities?

Which are currencies? Will some assets be prohibited? Who can provide each type of service? How to deal with international clients? How to avoid illicit counterparties? Some actions are being taken even with the rules still undefined - for example, the founder of Uniswap had his bank accounts closed¹⁴ in the United States without justification or warning. As long as questions like these remain, there must be a reasonable number of potential participants who will not participate in this world until the rules are established.

With limited and complex user experiences, expensive transactions, and legal uncertainties, it is natural that Web3 is still mostly restricted to a select group of early adopters. The technology and the ecosystem still need to mature and surpass major challenges to make many of the ideas we considered earlier viable.

In other words, digital scarcity has been proven to work, but the infrastructure and products required to process high-value digital transactions and assets for a small group of technically sophisticated and price-insensitive users are quite different from those needed to run standalone platforms providing pervasive services for hundreds of millions of everyday users.

Finally, even if these challenges are overcome, it is possible to imagine scenarios where a new generation of platforms emerge from this architecture and recentralize the industry. Recently, cryptographer Matthew Rosenfeld, founder of Signal, reported on his blog his experience with the technology¹⁵. He argues that the increased agility of platform development has already led us to points of centralization in Web3 (such as OpenSea for NFTs), and that we need to be careful about where the architecture is going so that we don't end up with a Web3 that is actually a "Web2x2". There is an interesting analogy with email - decentralized from a protocol standpoint (SMTP) but centralized in practice because the practicality of Gmail won, meaning that Google is almost always at least on one end of every email.

The hypothesis is just one of several, with good logic for other paths as well. Entrepreneur Balaji Srinivasan argues that this current centralization is necessary precisely because of infrastructure bottlenecks - if storing data in the protocol is still expensive, we need to keep the relevant part of the data centralized to run efficiently. Once the network capacity bottleneck is solved, Srinivasan argues that we should converge to truly decentralized solutions in cases where they are advantageous. In another analogy, he compares the problem to that of the lack of internet bandwidth in the early 2000s, when companies like Netflix had already foreseen trends like streaming but still had to make do with traditional business models (in Netflix's case, renting DVDs by mail) until internet speeds evolved.

¹⁴ <https://twitter.com/haydenzadams/status/1485294362657443842>

¹⁵ <https://moxie.org/2022/01/07/web3-first-impressions.html>

Conclusion

Considering the futurism of the topic, the most conservative way to close this report would be to acknowledge the difficulty of predicting any outcome and to ponder possible scenarios without issuing any opinions. In consideration of readers who have made it this far, we will take a slightly different route and post some of our impressions - with the caveat that the topic is not consensual even within our own team.

First, if blockchain networks can overcome the bottlenecks we've mentioned, we believe there are good reasons for them to be adopted as natively digital and global financial systems. The form this will take will depend a lot on how far networks and governments go, but the possible improvements in cost, performance, transparency, and security are remarkable. The long-awaited internet money seems to be on the verge of happening at scale – be it via cryptocurrencies, tokens backed by fiat currencies ("stablecoins"), central bank digital currencies (CBDCs), or even a combination of solutions.

Second, with the ability to program these networks for other purposes, digital assets and businesses have already begun to emerge. The ability to create, transfer, and automate records and organizations (and their revenues, expenses, dividends, etc.) without the friction we are used to (cost, bureaucracy, compatibility, etc.) promises to generate major efficiency gains, enabling new types of businesses and greater global collaboration between individuals. With an increasingly digital economy, we believe that structures such as these can prevail in certain cases over traditional instruments. It will be interesting to see how regulation will react to these structures - a potential lack of integration or blocking by a country would restrict its population's access to a valuable channel to the world, in addition to the gains mentioned.

Third, the eventual success of these networks does not seem to us to eliminate the need for platforms that are centralized in some respects. Convergence to single standards for key information and functionality (payments, identity, ownership, etc.) is a largely desirable development, but marginal innovation often benefits from centralized development where the innovator can create with greater agility. We believe that there will continue to be room for large platforms on the innovation frontier, even if they must adapt to new structures and live with a certain level of openness, and if the competitive barrier is theoretically lower in some cases. Much of the Web3 narrative has become a rivalry between decentralization and centralization, on the premise that one eliminates the other. The reality will probably be somewhere in the middle.

Fourth, we explicitly avoided mentioning cryptocurrencies and specific assets in this report. We have done a deep study to try to understand these assets from an investment perspective, but we are not yet convinced about the fundamentals of specific networks. For example, the debate about which blockchain network will become the standard (if we ever converge on one) seems to us to be far from a clear dispute, with exceptional people at different ends making great arguments without much in the way of conclusions. Moreover, even for networks that have already gained some traction, such as Ethereum, a relevant part of the transaction volume seems to be linked to speculation about the future value of the network and its programs, with still few practical uses for the average citizen.

What interests us most about this topic is precisely the impact of this technology on entrepreneurship. It will be interesting to see how these services evolve in the coming years. We have already identified practical uses appearing mostly in the segments of finance (securities, loans, insurance, etc.) and NFTs (art, music, games, etc.). Interestingly, at least at first, is that it is the traditional platforms that are bringing them to a wider audience because they already own the distribution. For example, on NFTs, besides Twitter which has already integrated them for profile pictures, Meta is apparently doing the same on Facebook and Instagram while also exploring launching its own NFT marketplace. YouTube, meanwhile, has published a letter¹⁶ suggesting integrating NFTs as an additional monetization tool for its creators. We believe that steps like these will be crucial in proving the validity of Web3 by testing the concept with practical applications for hundreds of millions of people.

Currently, we believe that our investments are fully able to adapt to the updates that are being proposed, but the evolution of the industry may surprise us. On the plus side, if companies with non-speculative practical uses consolidate in these networks - with clear value generation for users and shareholders - we will be open to include them as investment possibilities for the funds.

Random quotes

“

I've come up with a set of rules that describe our reactions to technologies:

1- Anything that is in the world when you're born is normal and ordinary and is just a natural part of the way the world works.

2- Anything that's invented between when you're fifteen and thirty-five is new and exciting and revolutionary and you can probably get a career in it.

3- Anything invented after you're thirty-five is against the natural order of things.”

—Douglas Adams, *The Salmon of Doubt*

“

There are 3 eras of currency: Commodity-based, politically-based, and now, math-based.”

— Chris Dixon

“

I think the internet is going to be one of the major forces for reducing the role of government. The one thing that's missing but that will soon be developed is a reliable e-cash.”

— Milton Friedman, 1999

“

The internet is programmable information. The blockchain is programmable scarcity.”

— Balaji Srinivasan

“

"I am very intrigued by Bitcoin. It has all the signs. Paradigm shift, hackers love it, yet it is described as a toy. Just like microcomputers.”

— Paul Graham

“

If you asked people in 1989 what they needed to make their life better, it was unlikely that they would have said a decentralized network of information nodes that are linked using hypertext.”

— Farmer & Farmer

“

What is perhaps the crucial role of the financial bubble is to facilitate the unavoidable over-investment in the new infrastructures. The nature of these networks is such that they cannot provide enough service to be profitable unless they reach enough coverage for widespread usage. The bubble provides the necessary asset inflation for investors to expect capital gains, even if there are no profits or dividends yet.”

— Carlota Perez

“

Whereas most technologies tend to automate workers on the periphery doing menial tasks, blockchains automate away the center. Instead of putting the taxi driver out of a job, blockchain puts Uber out of a job and lets the taxi drivers work with the customer directly.”

— Vitalik Buterin, co-founder of Ethereum

“

[Bitcoin] is a remarkable cryptographic achievement... The ability to create something which is not duplicable in the digital world has enormous value... Lot's of people will build businesses on top of that.”

— Eric Schmidt, former CEO of Google

“

Given the history of why web1 became web2, what seems strange to me about web3 is that technologies like ethereum have been built with many of the same implicit trappings as web1. To make these technologies usable, the space is consolidating around... platforms. (...) My sense and concern, though, is that the web3 community expects some other outcome than what we're already seeing.”

— Matthew Rosenfeld, a.k.a. Moxie Marlinspike

“

At its core, web3 is a vapid marketing campaign that attempts to reframe the public's negative associations of crypto assets into a false narrative about disruption of legacy tech company hegemony.”

— **Stephen Diehl**

“

One of the easiest pitfalls in tech is accidentally losing sight of the customer problem. Just figure out the customer problem and build the best solution. That's it!”

— **Aaron Levie**

“

Fintech is a frontend, blockchain is a backend. Fintech is this shiny frontend, but on the backend you're dealing with pre-internet mechanisms of settlement. It wasn't designed for the workload we have, like the RobinHood issue with GameStop.”

— **Balaji Srinivasan**

“

You have to think of the blockchain as a new utility. It is a new utility network for moving value, moving assets.”

— **William Mougayar**

“

Crypto tokens are an innovation akin to that of data packets. We can now move bits of value in the way we move bits of information: using an open standard, in very granular transmissions, instantly, to anyone, anywhere in the world. This means that valuable crypto services now have the unique opportunity to redistribute that value directly to the users who generate it.”

— **Jesse Walden**

“

You can't stop it. It's ultimately code and code is just speech and speech is just ideas. You can't stop ideas.”

— Naval Ravikant

“

You're going to start seeing open-source, self-executing contracts gradually improve over time. What the Internet did to publishing, blockchain will do to about 160 different industries. It's crazy.”

— Patrick M. Byrne

“

Crypto represents an architectural shift in how technology works and therefore how the world works. That architectural shift is called distributed consensus -- the ability for many untrusted participants in a network to establish consistency and trust. This is something the Internet has never had, but now it does, and I think it will take 30 years to work through all of the things we can do as a result. Money is the easiest application of this idea, but think more broadly -- we can now, in theory, build Internet native contracts, loans, insurance, title to real world assets, unique digital goods (known as non-fungible tokens or NFTs), online corporate structures (such as digital autonomous organizations or DAOs), and on and on”

— Marc Andreessen

“

Unlike other hyped tech, web3 is entirely in software, requires new engineering but not new science, iterates quickly, and attracts brilliant people with immediate incentives.”

— Naval Ravikant

“

The real problem of humanity is the following: we have Paleolithic emotions, medieval institutions and god-like technology.”

— E.O. Wilson

“

It's very common to be utterly brilliant and still think you're way smarter than you actually are.”

—Charlie Munger

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