#Web3for2030

How can Web3 help achieve the Sustainable Development Goals

UNDP Regional Bureau for Asia and the Pacific

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Executive Summary

The global community is not on track to achieve the Sustainable Development Goals.[1] To achieve the Goals, we need to accelerate our current progress and to add fundamentally different ways of operating to our toolkit. Web3 is a suite of technologies and trends that open new possibilities for how we can achieve the global goals.

Although Web3 is often referred to as a group of technologies such as Blockchain, Decentralised Finance, Cryptocurrency and NFTs – **ultimately Web3 is about changing our financial, economic, governance and innovation systems through "openness" and decentralisation.**

For people and organisations working to achieve the SDGs, be it eliminating poverty, tackling the climate crisis, building more and better infrastructure or protecting human rights and advancing good governance then Web3 will change the nature of this work and can enable powerful new solutions.

Web1 promised a decentralised internet, but it was only useful for consuming information, Web2 allowed people become creators but has become highly centralised in a few large technology companies. Web3 offers a decentralised web run on systems secured by cryptography that spans geographical borders. This promises to change the power structures of the current web and put powerful tools in the hands of individuals and communities to give them control of their digital lives.

We are still early in Web3's development, and its futures state is by no means certain, but we can gain insights into how it will unfold by mapping it against the predictable patterns that most

most major technological paradigms follow. Understanding this can help us make better decisions about the opportunities and risks these technologies present. This can also help us take an active role in directing these new technologies towards driving more innovation for impact.

There are already some interesting examples and use cases of people and organisations using Web3 for impact and achieving the SDGs. If impact organisations like UNDP and other UN agencies develop the skillsets, mindsets, partnerships, and resources to harness the potential of Web3 there is significant potential to accelerate progress toward the goals. **Organisations like UNDP can shape the development of Web3 by supporting innovation ecosystems, acting as connective tissue between organisations, developing research and advocacy, supporting governments to engage in Web3 opportunities and potentially to change ourselves and how we work, but to do all this we must be proactive.**

Web3 is not without its risks both structural and technological and we must be aware of these challenges and risks and work to mitigate them. However, as Web3 evolves, impact organisations have a vital role to play in its inclusive development.

Introduction

Web3 can be a polarizing term. Either someone is proclaiming "Web3 is the future of the internet and will solve all our problems" or they are denouncing it as nothing more than greed and hype. Web3, however, is a complex emergent space that spans several different distinct disciplines – computer science, finance, economics, governance design and more. The field is evolving at a rapid pace with new innovations and projects launching daily, gaining a foothold of solid understanding can be frustratingly difficult.

It is possible, however, to chart a course through this emergent complexity. While much of Web3 looks new, the predictable patterns of emerging technology thinking, testing and development are not. If we are equipped with frames of reference and the right mental models (thought processes), we can build an understanding of Web3 that is useful, predictive and does not require years of hard study and immersion to achieve.

This report is written for international development and impact practitioners, and not Web3 experts, to help them to understand Web3 and its possibilities for their work. It seeks to answer the questions:

- New technology trends tend to be either over hyped or overly criticised, depending on context. How might we understand Web3 on a first principles basis so that we do not fall into one of these polar extremes?

- If Web3 is the "next evolution of the internet", it will create powerful new dynamics in our society. How can we understand what is coming and how it might shape society, especially in a development context?

- New technology is morally agnostic, it won't improve society on its own. How can we leverage the tools Web3 is making available to create positive impact? How can the tools of Web3 support progress on the Sustainable Development Goals (SDGs)?[2]

The report is in two parts, firstly it introduces the fundamentals of Web3, written for a non-expert audience. Then we outline a core set of mental models needed to understand the progression of new technology paradigms. This will support the reader to map and analyse any major technology trend, and in this instance to understand and assess the progress of Web3 and to integrate these new ideas into programming.

Secondly, the report outlines some of the potential opportunity spaces for international development and how Web3 can support achieving the SDGs, what might be required to take advantage of this new space, what the UNDP could do and finally the report outlines some risks and challenges that Web3 poses. This is not exhaustive, and we hope to build on this in the coming months and years.

We appreciate it's ironic that this report is written in a static, report type way, but it is purposefully written for the audience this way. We do, however, very much encourage readers to find out more via our programme page [3] (db.team/undp/web3) which has more information about Web3, development, impact, and this emerging space.

We see this report as a start, a work in progress and we appreciate any feedback and input from readers.

Web3 Explainer 03

1990 - 2005   2005 - 2020   2020...

Web 1.0 → Web 2.0 → Web 3.0

the **read**-only web

the **read** / **write** web

the **read** / **write** / **own** web

"Web3" is a collection of emerging technology trends that stem from new digital tools that relate to decentralization, digital identity, open protocols, and participatory governance, and not any one clear quantifiable thing.

It is, however, a good name to describe the collection of technology trends. We will use the term Web3 throughout this report to describe these technologies

A brief history of the Web

"Web1" (1990–2005) was the era of the web page and the read only web. People with technical skills would make web pages and everyone else would read them to share information. During this time, one needed to be technically proficient to create a webpage (the age of the "Webmaster"), you also needed to be able to host your website on a server.

Web1 championed the idea of a decentralized web, where individuals could interact independently on "credibly neutral"[4] protocols. Someone could put up a website, others could view it, and no one sat in between mediating those interactions.

The technology of the early web was slow and hard to use. As a result, companies evolved to remove the burden of needing to programme websites just to put content online. They also hosted websites in "the cloud" to spare people from having to own and manage their own servers, this led to more centralisation.

"Web2" (2005–2020) was the era of the read/write web, often known as the participatory or social web. It became easy for people to contribute to the web. By 2005, with the development of the first blogging platforms[5], it became possible for regular people to post content online. The rise of social media including Myspace, Twitter, Facebook etc ushered in Web2. Also platforms that leverage user generated information, for example Google Maps, which relies on users inputting location information, plus the users' real-time location data, to

4 https://nakamoto.com/credible-neutrality/
5 https://online.ndm.edu/news/communication/history-of-blogging/

map traffic conditions. Google maps then builds vast databases of information backed up by massive amounts of processing power to serve their customers with maps. Web2 also introduced the "sharing economy" where people contributed to services like UBER or Airbnb as consumers, but also as drivers and landlords.

Web2 unlocked incredible value and allowed participation on the web to scale massively. But for this convenience, users gave up the decentralized sovereignty of operating on credibly neutral protocols and moved onto proprietary platforms owned by large companies. This allowed companies like Facebook and Google, to harness powerful network effects to create giant commercial walled gardens, where they claim ownership of all the content produced by users, as well as all the data that flows from their interactions.

A key driver of these centralizing Web2 dynamics was the early Web's lack of digital money. Transacting with money was illegal on the early web. This left advertising as the only viable business model for most web companies, which contributed in a major way to the dominance of the winner-take-all business models of Web2.

Democratizing access to powerful tools

Web3 promises to break the strangle-hold that the Web2 tech giants have on the web and to some extent, society in general. The Web3 thesis holds that these new technologies can deliver the decentralized, peer-to-peer, self-sovereign future of promised by Web1, but with the scalability and ease of use of Web2. This promise is backed up by a novel technological innovation – cryptographic trust on the internet.

This ethos of empowering individuals and communities is in direct opposition to the centralization of money and power that Web2 brought. For many, Web3 is the attempt to move us back on the path of technology being an empowering and democratizing force.

Web3 began as an explicit movement to put powerful tools in the hands of ordinary people. The early community of computer science and cryptography enthusiasts, whose efforts culminated in the birth of Bitcoin in 2009 were known as the Cypherpunks. From the very outset their agenda in trying to invent a digital trust mechanism was deeply rooted in a desire for societal change[6]. They intended this technology to transform society by redistributing power from the traditional, top down, power structure to individuals and communities.

Going from a "read, write" Web2 to "read, write, own**",** Web3, has profound implications that are not immediately obvious. At the highest level these implications stem from the invention of cryptographic trust on the internet and the concept of decentralization that makes it possible. Understanding these dynamics shows the potential that Web3 has to become a democratizing force across society.

6 https://www.fwb.help/editorial/cypherpunks-to-social-daos

Cryptographic trust on the internet
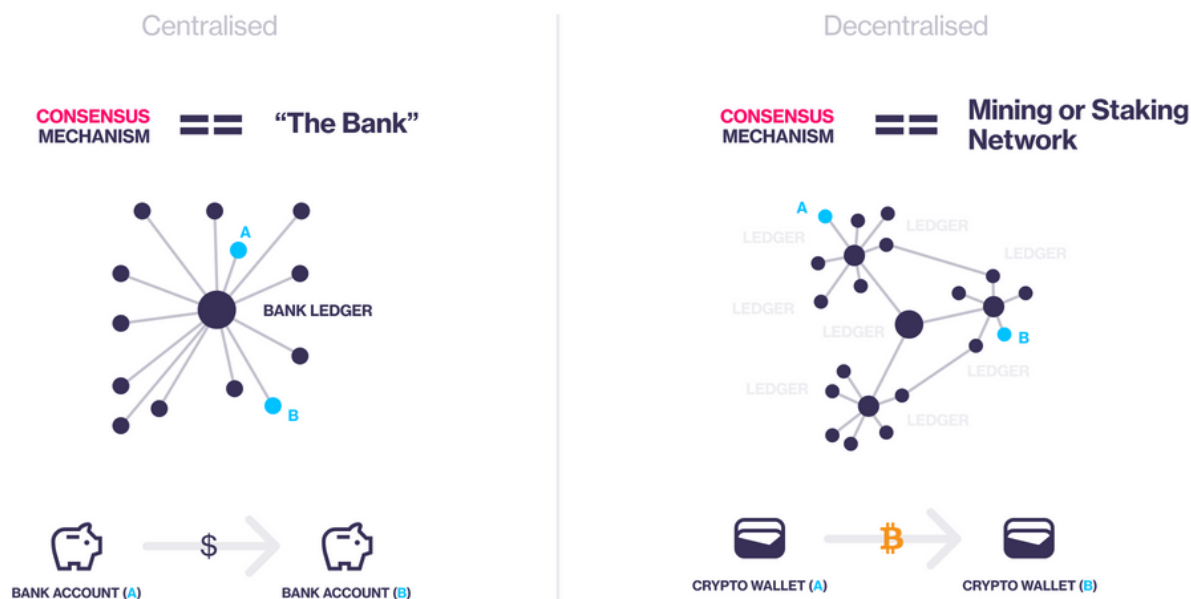
cryptographic trust on the internet

The fundamental innovation that underpins Web3 can be described as "cryptographic trust on the internet". Before blockchain technology was invented there was no way to trust anything on the internet without the intervention of a "trusted third party", for example a bank, where a bank customer could trust that a payment would go through, but only because the bank was trusted to ensure it did.

The first example of cryptographic trust on the internet is Bitcoin, with the creation of the Bitcoin blockchain in 2009, for the first-time people could trust that a payment would go through because of the math that ran the computer system.

In the above diagram, the bank operates a centralized ledger. This records how much money is in each account at any time. The bank is the trusted third party who verifies that the ledger is correct and can make changes if it thinks that the ledger is incorrect (for example if a transfer is sent to the wrong account, it might undo the transaction and start again). The bank controls who can have a bank account, it can freeze accounts if it chooses to or is instructed to by authorities and all of this happens mostly out of view of the public.

In the Bitcoin example, the ledger, which records how many Bitcoin are in each wallet (account), is decentralized, meaning that copies of it are spread across many thousands of different computers around the world. These computers use complex cryptography to collectively reach consensus on the accuracy of the ledger at any point in time. This is the Bitcoin Blockchain.

The result of this decentralized mechanism is that no person, organization or government has centralized control of the ledger, no one can roll back a transaction, no one can freeze accounts, no one can deny anyone access to the network, and anyone at any point can look at the entire Bitcoin transaction history. It is open, transparent, censorship resistant and permissionless.

Web3 is the unfolding of this decentralized trust, and the qualities it engenders in systems, into more and more sophisticated use-cases. As the technology develops it is moving from early obvious use-cases, like money, through to things will profoundly transform society.

Early landscape

As we have read, the first use-case for cryptographic trust on the internet was crypto currencies. Beginning with Bitcoin in 2009 and then proliferating with hundreds of copycat currencies that followed. These gave people the ability to buy and sell crypto currencies, speculate on their value, and in some limited cases, spend them to buy goods. The next big technological step was the development of smart contracts. These came with the launch of the Ethereum blockchain in 2015. Where Bitcoin allows for money in the form of Bitcoin (BTC) to be recorded on its digital ledger (an online logbook that cannot be changed), the Ethereum blockchain allows for computer code to be run in the same trust-free way ("trust-free" meaning that no trusted third parties, for examples governments or banks, are relied on in a transaction). A computer programme (in the form of a smart contract) can be guaranteed to run in a specific way. This took Bitcoin's trust-free money on the internet and exploded it into trust-free anything you could conceivably get a computer to do.

This led to a whole host of innovations that collectively form the foundations of Web3. Being familiar with these, at least at a high level, is necessary to have practical understanding of Web3. These include:

- **Blockchains** – following the Bitcoin and Ethereum blockchains (see above for explainer on Blockchain), there have followed many credible competing or complementary blockchains, each are developed for different reasons and use cases. For example, the Solana blockchain[7] is more scalable than Bitcoin but less secure. Whereas the Binance Smart Chain[8] is much faster than both Bitcoin and Solana, but less decentralized.

- **Decentralized Finance (Defi)** – the process and, innovations of the financial industry executed in a decentralized way. At current estimates Defi is a US$100 billion industry[9], led by protocols like Uniswap[10] and Curve Finance[11].

- **Stable coins** - crypto tokens that are pegged to traditional world currencies like the US dollar. The current US dollar stable coin market is about US$ 150 billion[12]. Stable coins allow people to transact or hold money in Web3 without taking the risk of the value of the token changing wildly. These make it possible for people to use crypto currencies for everyday transactions such as receiving salaries and household spending.

- **Non-Fungible Tokens (NFTs)** - unlike crypto currencies and stable coins, which are known as "fungible tokens", NFTs are non-fungible meaning that they are unique and unlike dollars or Bitcoin are not interchangeable. NFTs became popular as a way of owning one-off pieces of digital art, but the concept is rapidly evolving to serve many different use-cases such as the music industry, gaming, virtual world ownership, tokenized physical assets and managing memberships for Web3 governance. The NFT market for art in 2021 grew to US$41 billion[13].

7 https://solana.com/
8 https://101blockchains.com/binance-smart-chain/
9 https://www.statista.com/statistics/1237821/defi-market-size-value-crypto-locked-usd/
10 https://uniswap.org/
11 https://curve.fi/
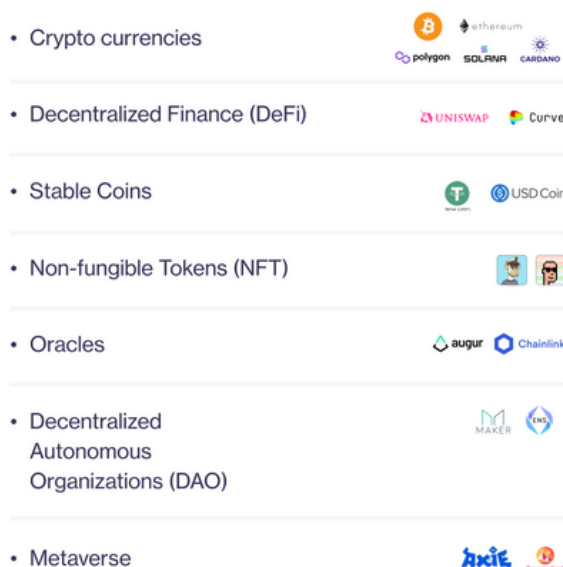12 https://www.statista.com/statistics/1255835/stablecoin-market-capitalization/
13 https://markets.businessinsider.com/news/currencies/nft-market-41-billion-nearing-fine-art-market-size-2022-1

- **Oracles** – these are the cryptographically secure mechanisms for bringing trusted data from the real world into the Web3 world. When a smart contract needs some data to run e.g., a crop insurance contract that pays out if a region receives below a certain amount of rainfall over a period of time. An oracle is the mechanism by which the contract gets this information. It uses cryptographic methods to guarantee the correctness of the data it is providing to a smart contract. A good example of an oracle protocol being ChainLink.[14]

- **Decentralized Autonomous Organizations (DAOs)** – these are a new form of collective governance that leverage tokenized funding and governance mechanisms. They are a way for a community to come together to jointly collaborate on something and have collective ownership and governance of a shared treasury. DAOs are a very broad category but many are engaged in building the technical infrastructure of Web3. By the end of 2021 four thousand DAOs collectively held more than US$ 16 billion under management in their treasuries[15].

- **Metaverse** – Metaverse is a term often used in relation to Web3, but we would distinguish it from the core Web3 elements listed above and describe it more as a trend that will likely leverage Web3 tools. Metaverse describes a future state of technology where we spend a significant amount of our time in virtual worlds. This is a very broad and much hyped area and while some Metaverse projects will use Web3 tools to manage things like ownership in and access to metaverse worlds, others may not be decentralized at all, or may not employ self-sovereign identity etc. It is possible that we end up with versions of a Metaverse that very much resemble our current Web2 social media just with new VR interfaces.

The above elements of the Web3 landscape have been growing at an incredible pace fuelled by investment capital and talent. Venture capital investors poured US$ 33 billion into Web3 projects in 2021[16]. This, in turn, has been driving an influx of talent to the space. The number of people working in Web3 increased by 76% year on year in 2022.[17]

Early Landscape (Web3)

14 https://chain.link/
15 https://www.forbes.com/sites/forbesfinancecouncil/2022/10/14/the-state-of-daos-and-what-that-can-mean-for-web3/?sh=7a8ef16f7f37
16 https://www.entrepreneur.com/money-finance/venture-capitalists-are-pouring-money-into-web3-heres-why/433195
17 https://www.okx.com/academy/en/global-blockchain-industry-talent-insights-okx-linkedin-report

How to think about technological change 04

What does this mean for the impact sector, for development practitioners and other non – tech experts besides some buzzwords and noise? This section outlines how to think about technology and technological change to understand what impact it will have on the impact sectors (or any sectors) work.

As outlined above we can see Web3 as a next evolution of the internet; based on decentralized systems that are open, transparent, censorship resistant and permissionless. To have informed opinions about Web3 that are predictive and useful, we need to ground ourselves in the historic patters that reliably show up with the emergence of new technology paradigms.

This is the key to understanding, not just what the current state of Web3 development is, but the direction the technology is traveling in. This is what will unlock what might be relevant in a UNDP context.

How new technology paradigms unfold

Thus far the overwhelming perspective across the UNDP (and UN in general) has been to focus on the specific technologies and what they can do in specific use cases, for example, running pilots and writing reports about Blockchain[18] or experimenting with virtual reality[19], and there is no problem with this per se, but if it continues it risks missing the opportunities that are now emerging as Web3 becomes an enabling context. It can also take a "technology first" rather than "problem first" or "people first" approach to the area. This can unlock some novel use cases, but for these enabling technologies to be used to achieve the SDGs, we need to integrate them into programmatic thinking rather than seeing this as a space for "tech heads" or "pet projects".

Web3 is rapidly moving from being specific tools to becoming an enabling context and the thought process outlined below can help professionals adapt in a time of rapid technological change.

The path to mass adoption

As Web1 was emerging in the early 1990s, it was being created by a relatively small group of people who toiled in obscurity. They could see its potential but were generally unable to

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18 https://www.un.org/en/un-chronicle/blockchain-and-sustainable-growth
19 https://news.un.org/en/story/2016/05/529752-feature-un-uses-virtual-reality-inspire-humanitarian-empathy

convince others of the web's potential. The important thing to remember is that detractors were right to be sceptical of the web in its early days. It was technically limited (slow, insecure and had minimal functionality), difficult to use (expensive and hard to programme) and mostly useless (it had limited mainstream use-cases). But as early problems were solved Web1 progressed.

A simple heuristic for predicting whether an early technology paradigm shift like the early web will make the curve to mass adoption, is to ask four key questions:

1. **Is it powerful?** Does the new technology have the potential to fundamentally shift something important in society?
2. **Is it popular?** Are there large numbers of talented people migrating to the new technology?
3. **Is it valuable?** Are there large amounts of capital pouring into the new space?
4. **Is it happening at scale?** Is innovation happening broadly and at pace? Are there many different players taking different approaches to developing aspects of this new technology?

This can give some concrete insight into whether the technology is likely to develop into a new paradigm and therefore whether to invest in understanding and using the technology.

From technological shift to solved problems
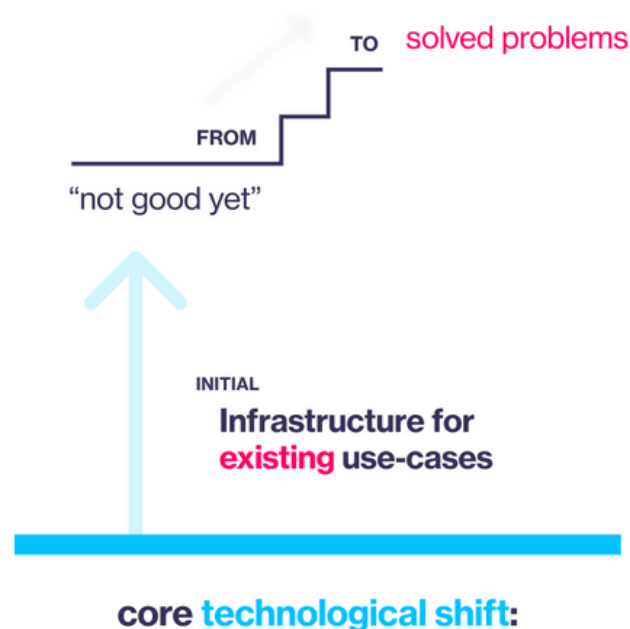
All major technology paradigms unfold in a similar way. They start with a core technology shift, an invention that has great potential. This new technology gets applied to existing use-cases. In these early uses of the technology, it is generally underdeveloped and only marginally better than the existing solutions that it is replacing. However, as it starts to gain adoption its early problems are overcome, and the technology improves.

From novel use-cases to enabling context
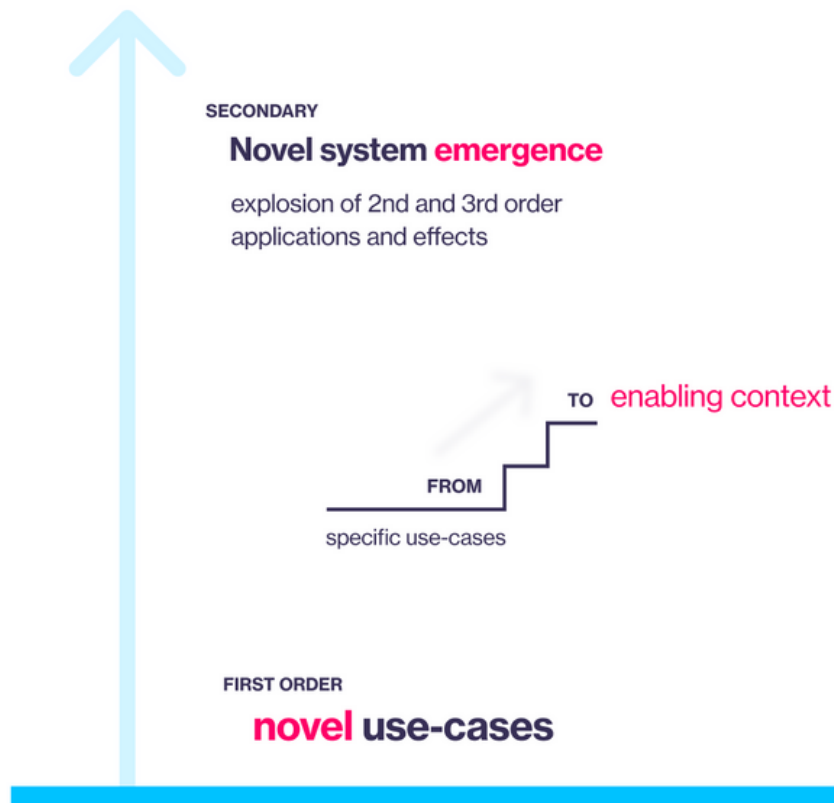
This improvement in the technology allows for the development of novel use-cases, applications of the technology that were not immediately predictable. As these applications of the technology grow more and more commonplace, the technology goes from being a tool applied in specific use-cases to becoming an enabling context where it influences many aspects of everyday life.

When this happens an explosion of novel innovation can take place. This brings with it a set of effects that fundamentally shift what is possible and consequently, change parts of the broader society that the technology inhabits. To understand the potential of Web3 for societal change we need to understand this process.

An example of this layering of enabling infrastructure was the development of the steam engine. In the early days of steam power innovation, there were only a few very specific applications of the technology. Pumping water out of flooded mines was the main one. Even though the steam engine was unreliable, dangerous, and inefficient, in this narrow use-case it was still more effective than having workers or horses operating the pumps.

But as steam power technology improved, it went from being a discrete solution added to existing infrastructure (like replacing water wheel power in mills and factories), and it started driving the development of the next layers of infrastructure above it. New larger factories and machines were designed to leverage the power of the steam engine. New transport paradigms evolved in shipping and railways.

At the time a future shaped by the steam engine was unimaginable in a world driven by the power of horses and humans but it fundamentally changed the organization of society. Likewise, we can see the same transition from discrete solution to new paradigm as it played

out in the early web. In the late 1990s businesses would say they were "building an internet business" or they are "using the web to do xyz". The web was a novel technology to add to a specific use case that a traditional business might already have.

But by the mid-2010s it had become the water in which we all swim. Almost all modern businesses have become significantly enabled by the web, even if their product isn't a digital product. From their online marketing, Software-As-A-Service accounting providers, Customer Relationship Management tools, Cloud infrastructure, Human Resources tools, video conferencing, to reading this very report, the modern web has evolved into the enabling context that makes most modern businesses possible.

Paradigm shifts like the steam engine and the early web seemingly evolve slowly until they cross a threshold of enabling infrastructure, at this point an explosion of unexpected innovation and progress occurs across many domains of society.

Where is Web3 on this journey?

Web3 is following this pattern, building towards becoming an enabling environment that will yield unexpected and broad change in society.

Across the UNDP, other UN agencies and the impact sector more broadly, however, the view of Web3 seems to be mostly an early paradigm view that misses most of the potential that is already here. Many agencies are paying very little attention to Web3 while others are highly critical. Of the groups who are working with Web3 tools and concepts, the commentary is mostly in this early paradigm mode... "we are using blockchain to do x", "we use crypto currencies to do y". This is natural given how novel and unexplored Web3 feels. However, Web3 is developing at an incredible pace. Because of this, it is important that we have eyes to see this progress to ensure that we don't miss harnessing its potential.

It is time to move beyond asking "what can I do with a blockchain" and start asking "what new paradigms and use cases are emerging on top of blockchains that can be used to have a positive impact on the world?" Or "what Web3 tools can add to the suite of solutions we are developing to solve our problem?"

Web3
Opportunities

Financial

Access to new ways of:
- giving and receiving money
- storing, protecting and moving money
- purchasing things
- transacting across borders

Economic

Access to new ways of:
- designing incentives
- creating markets
- generating and accounting for value
- coordinating labour and capital

Governance

Access to new ways of:
- representing and sharing identity
- making democratic decisions
- distributing resources and wealth
- building shared solutions
- managing shared assets and data

Innovation

Access to new ways of:
- generating and sharing ideas
- experimenting with new ideas
- rapidly building on the ideas of others

Progress in Web3 over the last few years has led to the evolution of new tools and practices across the domains of finance, economics, governance, and innovation. These tools and practices create opportunities for development.

Financial paradigm

Bitcoin, as the first crypto currency, introduced a fundamentally new financial paradigm – cryptographic money. Bitcoin introduced the notion of a credibly neutral money system that has an entirely predictable issuance that can never be altered. There will only ever be a total of 21 million Bitcoin. 91.4% of these have already been created with the remaining 8.6% to be minted over the next 120 years[20] Having a money system that is not subject to national government or central bank manipulation and money supply induced inflation is a fundamental innovation with far reaching consequences as we will see below.

Following Bitcoin, and numerous other copycat crypto currencies, the next big advance in the financial paradigm was Defi. Crypto currencies have given people the ability to own and transact digital money. With the development of the Ethereum blockchain in 2015 and the introduction of smart contracts, decentralized finance became possible and has grown

quickly, it is essentially a re-creation of all the tools available in the traditional financial world but built on Web3 infrastructure (crypto currencies, stored on blockchains and financial services build on smart contracts). Experimentation is possible at an incredibly fast pace, with security being provided by cryptography and most applications being built as open-source projects, as a result, they are accessible to anyone with a smart phone, un-censorable by governments and vastly cheaper to use compared with traditional financial services[21].

Despite Defi still being in the realm of early adopters (there are currently only 4.4million Defi wallets in existence), Defi acts as the highly innovative backbone for a lot of other developments in Web3. Having a constant flow of innovation on money and finance in Defi acts as the raw material for people experimenting with other aspects of Web3 as we will see below.

Economic paradigm

In a traditional economy, parameters like money supply, interest rates and exchange mechanisms are managed at the national level. This means that everyone in the economy operates within the same economic model. In Web3, discrete economic systems can be designed that incentivise specific activities that drive impact in specific ways. For example, tokens that represent carbon sequestration or other kinds of ecological value can be used in an economic system to incentivise positive environmental action[22].

Anyone with a computer and modest ability to operate it (with no ability to program) can very easily create a digital wallet and mint a crypto token. These cryptographically secured tokens are the basis for Web3 economic experimentation. The ability to design systems that have their own "programmable" money is a fundamentally new capability.

This capability makes it possible to design new economic models that attempt to solve intrenched coordination problems like climate change. Our current economic system can incentivize individuals, organisations, and nation states to knowingly act in ways that cause negative outcomes for society and the planet. Web3 creates the ability to design and test alternative economic systems that could move society in positive new directions. An early example of one such experiment is Seeds[23], a regenerative economic system based around a crypto token.

Governance paradigm

Hand in hand with new economic models to solve coordination problems goes experimentation in governance design. DAOs (Decentralized Autonomous Organizations) have become the main vehicle for experiments in new forms of decentralized governance.
Core to the emerging governance paradigm is reframing how we think about organizations. Thinking about them less like we do companies, where there is a fixed structure and governance that comes via a top-down hierarchy with capital holders reigning supreme and thinking of them more like we do organic networks, that can engage in decision-making in much more complex ways. These mechanisms also distribute authority in more diverse and inclusive ways.

21 https://www.weforum.org/agenda/2022/01/how-blockchain-accelerates-small-business-growth-and-development/
22 https://www.klimadao.finance/
23 https://joinseeds.earth/

DAOs cover a wide spectrum of contexts and use-cases. From well-established protocol DAOs like MakerDAO[24] – operator of the Dai stablecoin, with currently over US$ 10 billion locked in its smart contracts – to highly experimental DAOs like NounsDAO[25] which produces and sells a single NFT every day and then experiments with how to govern the funds collected from the sales. NounsDAO currently has approximately US$40 million[26] in its treasury to deploy for interesting projects.

DAOs all rest on some mechanism of decentralized community ownership and governance to determine important decisions about the DAO. The sophistication of this decentralized governance is evolving rapidly. From its most basic starting point of tokenized ownership and simple token voting (so called "one token one vote" governance), to an explosion of experimentation in governance mechanisms. Thousands of governance experiments are underway across the more than 4000 DAOs[27] currently operating. This rich experimental space will continue to produce novel governance innovation[28].

Case Study: Web3 Governance – Optimism DAO

The Optimism blockchain generates revenue from fees paid by people and businesses that use the blockchain. The Optimism Collective is the governance mechanism for deciding how these revenues are spent (currently about US$ 40 million per year)[29].

The Optimism Collective is broken up into two "houses", the Token House and the Citizens' House. The Token House – looks after the economic viability of the blockchain. It is made up of Optimism token holders (those who have an economic interest in the Optimism protocol). These token holders vote on proposals for things like technical upgrades and spending. The token house is funded by a portion of Optimism's revenues. The Citizens' House – looks after the long-term mission alignment of the protocol. It is made up of a different group of stakeholders who are responsible for allocating the other portion of blockchain revenues towards the development of public goods over a longer time horizon and it has irrevocable rights to these revenues to carry out its long-term responsibilities.

Innovation paradigm

In our current commercial environment, the tendency for capitalism to concentrate wealth and power has been exaggerated by the centralizing dynamics of Web2. Here, a handful of mega tech companies have managed to harness the power of network effects to gain seemingly unassailable advantages. The emerging paradigms listed above have the potential to support the development of a profoundly innovative landscape driven by three major innovation sources Open Source, Open Protocols and Open Networks.

24 https://makerdao.com/en/
25 https://nouns.wtf/
26 https://etherscan.io/tokenholdings?a=0x0BC3807Ec262cB779b38D65b38158acC3bfedE10
27 https://www.forbes.com/sites/forbesfinancecouncil/2022/10/14/the-state-of-daos-and-what-that-can-mean-for-web3/?sh=3d90381a7f37
28 Some good examples of experimental governance design are being done by Radical Xchange. https://www.radicalxchange.org/ and This report from the World Economic Forum gives a good breakdown of the potential of DAOs. https://www3.weforum.org/docs/WEF_Decentralized_Autonomous_Organizations_Beyond_the_Hype_2022.pdf
29 https://www.optimism.io/

Open Source, as both an ethos and as a legal framework for managing intellectual property creates a powerful innovation dynamic in Web3. With many of the biggest innovations able to be copied in their entirety and new versions of them implemented quickly buy other people, the speed of innovation is greatly enhanced. An example of this is Uniswap [30] a large decentralised financial exchange that has processed more than USD$1.2tn in transactions to date. Uniswap's code, governance processes and strategy are all open, anyone can simply copy everything they are doing. This has happened multiple times [31], leading to a thriving ecosystem of competing exchanges.

Open Protocols are deeply rooted in Web3. Decentralized protocols tend to be open by design, meaning that anyone can interact with them without having to go through a third-party gatekeeper. Most blockchains are public, meaning that anyone can freely look at the entire record of the chain's activity. While there is generally no personal information on-chain (usually just a wallet address for each user), the on-chain data means that anyone can map all the commercial activities, taking place and identify the wallet addresses of the most active users. This creates the opportunity for new competitors to innovate much quicker than in a traditional commercial context where this kind of data would be well hidden. If open source is like saying all the software patents are open, then open protocols mean that all the data on interactions is open.

Open Networks mean that the organizations that build and run the above open-source open protocols are themselves open. People from all over the world can, without requiring permission, see into the inner workings of their decision-making. Join conversations about the future of the protocols, find ways to participate in their operations or governance. This leads to learning, community building and potentially employment and other official roles. Open Networks democratize access to organisations (usually DAOs), while providing the DAOs with large, engaged networks of people who can contribute time, expertise, and capital to the DAO's mission. This has the potential to create innovation ecosystems that transcend the barriers that have traditionally stifled innovation, outside of highly concentrated areas like Silicon Valley.

30 https://uniswap.org/
31 https://defillama.com/forks/Uniswap

Web3 and achieving the SDGs

As development or impact professionals each day we are looking for ways to change the financial, economic, governance and innovation paradigms that currently exist to drive inclusion and achieve the Sustainable Development Goals. How money is shared and transacted, how decisions are made by groups of people, how people and organisations are incentivised within markets, all of this is changing through the evolution of Web3. Web3 provides new ways to support the SDG agenda.

The purpose of this report is not to cover all of the SDGs but to provide examples of how Web3 can be an enabler. To follow are some real examples of Web3 technologies enabling systems change to achieve the Goals.

Achieving Goal 1: No Poverty through a Universal Basic Income

A Universal Basic Income has been advocated by the UNDP[32] but how will it be achieved if governments won't adopt the policy? Or if they do how will it be effectively administered? There are several examples of Universal Basic Income (UBI) experiments happening to try and alleviate poverty including GoodDollar[33], more about this below, Rightful Share[34] a segmented UBI experiment focused on a single town in South Africa which is built on a copy of the GoodDollar open source approach, Impact market[35] who are currently supporting 46,000 people in 30 countries and Circles, supporting people in Berlin.[36] These live experiments are putting money in the hands of people but also changing the way supporters engage with charitable giving and give power to beneficiaries (see GoodDollar case study).

Case Study: Good Dollar Universal Basic Income

GoodDollar is a Universal Basic Income (UBI) experiment, anyone can sign up and receive small UBI payments in the form of the GoodDollar token G$. This can then be spent at merchants who accept G$ or exchanged for other crypto currencies and Defi tokens. This has the effect of providing small amounts of UBI to support daily purchases of goods and services but also on-boards people to the opportunities available in Defi (and the wider Web3 world). The UBI payments are funded through income generated by crypto currencies that are locked by supporters into yield generating Defi protocols. Because of this GoodDollar does not rely on charitable contributions from Its supporters.

32 https://www.undp.org/blog/need-universal-basic-income
33 https://www.gooddollar.org/
34 https://rightfulshare.org/
35 https://www.impactmarket.com/
36 https://joincircles.net/

While GoodDollar is interesting in and of itself, as a potential UBI solution, the more interesting thing to recognise is that as the G$ token and the supporting infrastructure around it becomes established, it creates an enabling environment for grass roots innovation to emerge.

The GoodDollar protocol is making available the following enabling infrastructure to people for free including:

- A secure digital wallet that they own and control - banking services
- Regular funds to put in the wallet – capital
- A network of others to transact with – market
- Access to Defi protocols and services – financial services
- A self-sovereign digital identity solution – verified identity

GoodDollar currently has 450,000 members receiving small UBI payments across 181 countries. In communities where the G$ token is seeing concentrated adoption, like in Nigeria, the GoodDollar protocol is enabling local businesses and projects to innovate on top of the token. Businesses are being built that would not have been possible before GoodDollar, initiatives like community lending groups are getting established to pool financial resources. Beyond providing the infrastructure, GoodDollar supports this dynamic via a micro-grants program that provides start-up financing for new businesses built on GoodDollar.

Achieving Goal 4: Quality Education through Decentralized Credentialling

Decentralized credentialling is driving a wave of innovation in education which is relevant to a development context. The web made information more freely available. This included moving educational content online in the form of things like massive open online courses (MOOCs). But because the internet does not have an identity layer[37] there has been little innovation around academic credentialling. It remains a fragmented system with each provider controlling the records of who achieved credentials. It also remains an exclusive system where only those with wealth and opportunity have access to the most valuable credentials, with most requiring in person attendance.

Novel credentialling systems based on decentralized identity allow for individuals to collect verifiable credentials to prove their educational achievements to potential employers. Examples like Web3 University[38], who provide training for aspiring Web3 developers, provide Proof of Knowledge (POK) NFTs as credentials. These provide a means for students to build a portfolio of verifiable educational credentials.

We are even seeing this innovation in more traditional educational contexts. The Maharashtra State Board of Skill Development is issuing 100,000 digital diplomas on the Polygon blockchain[39] giving graduates the ability to prove their credentials in more efficient and trusted ways.

This "unbundling" of educational credentials creates the opportunity for much greater access to education. Being able to access global providers and build a portfolio of verifiable educational credentials can help create more inclusive access to quality education for those who need it most.

37 https://www.identityblog.com/stories/2005/05/13/TheLawsOfIdentity.pdf
38 https://www.web3.university/
39 https://indianexpress.com/article/technology/crypto/msbsd-issues-100000-plus-verifiable-digital-diplomas-on-polygon-blockchain-8068644/

Achieving: Goal 8: Decent Work and Economic Growth & Goal 9: Industry, Innovation and Infrastructure

Web3 can help build stable, resilient economies in places where financial systems, rule of law and infrastructure are lacking. Globally, 1.4bn people do not have access to banking, money transfer and basic payment infrastructure[40].

Still more people are tied into money systems and local currencies that are unstable and expose people to high inflation and other financial shocks[41].

The first adoption of Web3 technologies in emerging economies has been the use of Bitcoin as a money system in places where the existing financial infrastructure is lacking or is otherwise inaccessible. Although the price of Bitcoin can be volatile, it represents a store of value and a means of exchange that is immune to local economic conditions, giving users a way of opting out of dysfunctional or oppressive economic systems. This is a fundamentally new capability.

Subsequently, Defi has massively expanded the range of financial tools that can be accessed by those financially marginalised (the requirement for basic digital infrastructure and education notwithstanding, which we will discuss below). This includes innovations like stable coins that remove the risk of market volatility that comes with "floating" currencies like Bitcoin, crypto loan mechanisms and investment products that can support local innovation and economic growth (see GoodDollar case study).

The ability for a population to operate on global financial standards and infrastructure, despite their local contexts, can present a big step forward for inclusive economic participation, economic development and innovation. Functioning Web3 financial infrastructure can also provide an onramp for development organisations to direct funding into local economies, to better support locally driven economic development.

These dynamics can be seen in the adoption of Bitcoin in countries like Nigeria, where 33.4 million people (35% of the population aged 18–60) have owned or traded crypto currencies in the past 6 months. Many of whom state high inflation as their rationale for using crypto currencies[42].

Achieving Goal 13: Climate Action through New Climate Financing and Systems Design

The opportunities for climate action using Web3 as an enabler are very exciting, notwithstanding the challenges with regards to Bitcoin's energy usage (more on this later). Carbon-backed currencies, like Klima (see case study below), have the potential to provide the economic incentive mechanisms needed to make a real impact on climate change through carbon positive transactions[43]. Networks like Kolektivo[44], who are piloting their approach in Curacao are driving a Web3 systems approach to building local regenerative

40 https://www.worldbank.org/en/news/feature/2022/07/21/covid-19-boosted-the-adoption-of-digital-financial-services
41 https://worldpopulationreview.com/country-rankings/inflation-rate-by-country
42 https://www.businesswire.com/news/home/20220412005033/en/KuCoins-Into-The-Cryptoverse-Report-Reveals-35-of-Nigerian-Adults-are-Crypto-Investors
43 https://www.morganstanley.com/im/publication/insights/articles/article_cryptoandcarbon_us.pdf?1667848657982
44 https://assets.website-files.com/5fcaa3a6fcb269f7778d1f87/63297723f700491a0698ab5a_Kolektivo%20Bluepaper.pdf

economies built on a series of Web3 infrastructures. Regen Network[45] are also exploring different ecological asset classes and their potential to support the development of regenerative finance. These on-chain ecological asset classes create the economic drivers for local regenerative economies around climate action as well as other environmental regeneration projects and could fundamentally change climate financing.

Or there are opportunities like ReSeed[46] which is a scalable experiment in rural farmer carbon protection. The network is currently working with over 8000 small holder framers around the world who collectively manage over two million metric tons of carbon stock. ReSeed supports farmers to capture data about the carbon stocks that their farms protect. These stocks are recorded on-chain and turned into carbon protection credits that can be sold. 70% of the farmer partners earned less than US$6 per day prior to engaging with ReSeed and have, on average, seen their incomes double through using the protocol.

KlimaDAO Accelerating Climate Finance

KlimaDAO[47] is creating a digital currency based on carbon credit reserves. Klima incentivizes people to add capital to the Klima protocol through providing investment returns. Klima then uses this capital to purchase verified on-chain carbon credits. The protocol then mints (creates) one Klima token for every one-tonne carbon credit that it purchases and deposits the credits into its treasury.

These carbon credits, as treasury assets, act as the capital reserves that underpin the value of the Klima token. As a result, people and organizations can choose to hold some of their assets in Klima tokens, or use the token as an exchangeable currency, knowing that the more adoption the token gets, the greater the pool of carbon credit reserve assets will be being locked away in Klima's treasury. The goal of this is to bolster demand in the carbon markets. KlimaDAO's treasury balance currently stands at 17,401,123, meaning that credits to the value of 17,401,123 tonnes of CO_2 have been bought in the carbon credit markets and permanently stored inside the Klima protocol. Removing them from the market, boosting carbon prices and carbon sequestration.

Already Klima are developing new projects that sit on top of the Klima protocol and token infrastructure. They have launched a tokenized carbon retirement mechanism[48] (how carbon credits are purchased and removed from the market). They have built a carbon offsetting front end for businesses[49]. Klima's code is also open-source, and anyone can make their own version of Klima to experiment with different economic mechanisms or build projects that utilize the Klima token.

45 https://www.regen.network/
46 https://www.reseed.farm/
47 https://www.klimadao.finance/
48 https://carbon.klimadao.finance/
49 https://www.klimadao.finance/infinity

Achieving Goal 16: Peace, Justice, and Strong Institutions through Safe Money and Participatory Governance

53% of the world's population live under authoritarianism[50]. Having access to a money system that cannot be subjected to state control protects dissidents from having their bank accounts frozen by authoritarian governments and corrupt state actors, Bitcoin can be used as a tool for financial inclusion and protection against persecution[51]. It also protects the ability for people to donate to human rights causes, without risking sanction from governments. The Human Rights foundation have invested US$ 1.5 million through their Bitcoin Development Fund[52] into twenty projects that are working to add things like privacy protecting features to Bitcoin, to enhance its use as a human rights tool.

Web3 also offers opportunities for the advancement of participatory governance models. Building new kinds of institutions with more equitable and inclusive governance. This is the case for the example of GoodDollar above. Instead of traditional corporate or non-profit governance, they distribute governance tokens evenly throughout their stakeholder groups, both to the users receiving UBI payments and to supporters contributing funds to the protocol[53]. These governance tokens then give holders (including GoodDollar's most marginalised recipients) full democratic rights to both make proposals and vote on GoodDollar's governance and future direction.

Achieving Goal 17: Partnership for the Goals through New SDG Financing, New Governance, and New Partnership Mechanisms

There are already crypto millionaires and those earning cryptocurrency who wish to donate to impact causes, to support this there are companies like the Giving Block[54] helping organisations like World Vision to accept donations in cryptocurrency[55] so there is new money in the system to support organisations to achieve the SDGs. Crypto offers itself as a new form of SDG financing as do the climate financing examples in the section above.

Web3 also offers new forms of partnering to achieve the goals through new forms of organisation and decision making, DAOs create new opportunities to bring different actors into working towards the SDGs. New ways of innovating for impact require "traditional" development actors, like the UNDP, to partner with new organisations.

Another example of new forms or partnership is quadratic funding, a novel Web3 enabled method for allocating grant funding for public goods, where pools of donor funds are[56] allocated to projects on a matching basis with community donations. The quadratic formula prioritizes the number of community contributors, over the amounts contributed, which allows for small community donations to be matched with larger contributions from donor pools in a way that uses grassroots community support as the signal to identify the worthiest projects. GitCoin Grants[57] has pioneered this method for funding Web3 digital public goods and to date have facilitated over US$50m in grant funding to 3401 projects many with an environmental sustainability focus.

50 https://hrf.org/authoritarianism-rising-on-international-day-of-democracy/
51 https://reason.com/video/2021/02/05/bitcoin-is-protecting-human-rights-around-the-world/
52 https://hrf.org/devfund
53 https://www.gooddollar.org/introducing-the-gooddao-gooddollar-governance/
54 https://thegivingblock.com/
55 https://www.worldvision.org/donate/donate-cryptocurrency
56 https://www.radicalxchange.org/concepts/plural-funding/
57 https://gitcoin.co/grants/

What is needed to make Web3 work for development and impact?

It is very important that impact organisations like the UNDP ensure that the development of Web3 has impact at its heart or at least is being used for positive impact. To ensure that impact is embedded there are several areas for development within the impact space that we feel are required.

Skillsets, mindsets, partnerships, and resources must be developed alongside the technology so that the technology can be leveraged for impact. Ecosystems that support innovation for impact built on the technology are important as this technology evolves and becomes more mainstream.

In the diagram below we have outlined, a start, of what skillsets, mindsets, partnerships, and resources are needed to ensure that this new technology development doesn't just benefit the few, the wealthy and those with special knowledge. A specific set of capabilities needs to be developed for government actors but would broadly mirror this list. Organisations like the UNDP and other development agencies, funders and donors can build an enabling ecosystem to support meaningful, ethical experimentation and scaling in this space.

What is additionally important is the key feature of Web3 being the ability to build on top of someone else's open work. The UNDP and other UN or impact organisations can and should build on top of others work, not create their own infrastructure. This is a fundamental shift in thinking for an organisation like the UNDP.

What is needed to make Web3 work for development and impact?

Skillsets

- Ability to partner and collaborate with others in experimental way
- Basic working knowledge of Web3 technologies and trends
- General working knowledge of how new finance, economics, governance, innovation paradigms and new technology can enable systems change

Partnerships

- Collaborative partnerships across disciplines
- Partnerships between donors, governments and other organisations to support achieving the SDGs using this technology
- Partnerships that can explore and experiment with novel use-cases in a safe way
- Partnerships that empower local ecosystem experimentation including funding projects

Mindsets

- An experimental and systems thinking mindset
- Ability to operate in an uncertain emerging context
- Ability to let go of power and control to build solutions for a greater good
- Ability to learn and re-learn, letting go of rapidly outdating assumptions

Resources

- Access to funding and support to build the infrastructure to test and scale Web3 for impact
- Building of infrastructure to ensure inclusion and empower more people to engage in Web3 development
- Access to networks of experts in technical fields where examples, code, best practice etc can be shared and built upon
- Funding that can support local ecosystems of innovation to surface opportunities

The role of the UNDP in Web3 for Impact

What does the rapid development of Web3 mean for organisations like the UNDP? It certainly opens discussion for development and impact organisations around how they are organised and governed but also questions about how to ensure people come first not technology, how to ensure inclusion, how to decide what the right level of tech optimism is and even practical questions about who to engage with in developing SDG solutions using Web3. Also, a very live concern is, should impact organisations care about this at all?

Through our research and engagement, many leaders saw Web3 as potentially significant and curious or interesting but felt under very real pressure to mobilise resources immediately and deliver projects today. The see it as a struggle to focus on any new areas that could potentially accelerate achieving the SDGs.

What is clear is that if donors are interested in the application of Web3 in development then many development organisations will certainly find a way to test, learn and scale in this space. Therefore there is, as always, a call for donors to have foresight and be future focussed with funding.

Plenty of ground has already been covered with organisations like the IMF providing advice to governments on the regulation of crypto currency[58]. There have also been some great papers outlining use cases for blockchain[59] and blockchain experiments by UNICEF, UNEP, the World Food Programme and others which are worth building on. One of the main criticisms of standalone blockchain projects however has been their relatively siloed nature and not being seen as part of systems change and an enabler of other kinds of development responses.

We argue that Web3 is very much an enabler in the financial, economic, governance and innovation systems change which cross cuts the SDGs and all of the development areas for the UNDP however, more work needs to be done on convincing development professionals of the opportunities and the "how" of integrating Web3 into systems portfolios and integrated programming (we suspect that this is where donors come in). The UNDP and other development organisations can play a role to ensure ethical, inclusive Web3 development in the following areas:

Supporting innovation ecosystems

Anyone with a smart phone can access all the infrastructure and resources of Web3, if they have access to affordable, reliable data etc. The UNDP and other agencies can support Web3

development and access to these tools through digital inclusion (which is also inclusion for Web2). Beyond this there is a strong argument to be made for the UNDP to focus its efforts on supporting local grass-roots entrepreneurs to utilise these tools to solve local problems through, for example:

- Partnering to develop education, training, networking, acceleration, and incubation support programmes.
- Capitalizing local ecosystems – funding core ecosystem activities and organizations.
- Supporting experimentation in this space to add Web3 solutions to a portfolio of solutions towards a key development mission.
- Developing specific high leverage infrastructure. This could mean translating key tools to make them more accessible. But it could also be core physical infrastructure needed for the ecosystem to function successfully, such as installing Starlink [60] style broadband infrastructure.

Act as the connective tissue

If local innovation ecosystems are going to thrive in a Web3 context, all the organizations that currently support local communities in a development context are going to need to engage with them in new ways.

This local ecosystem centred approach flips the current models of most in the development space; where governments, corporations, NGOs, and donors make decisions about how funding is allocated, based on their own methodologies and heuristics. If innovation is going to be led at the local ecosystem level, then the UNDP can play a key role in facilitating this transition and supporting these stakeholders to engage in new ways, that fit a more decentralized context.

Research and advocacy

Leading research on the development of Web3 and ensuring, where possible, the development and diffusion of the technology is done in an ethical, inclusive way that ensures everyone can have the benefits of the system is an important role for impact organisations. To track and measure the progress of Web3, to highlight interesting use cases and to develop research that can support governments (see next point) is a useful role. Advocacy around inclusive Web3 is an important role for impact organisations to play.

Support for governments to understand and engage with Web3 opportunities and risks

Currently almost every government in the world is wrestling with how to regulate crypto currencies, Defi tokens and DAOs. This is a complex and difficult task and the consequences of getting it wrong could have lasting impacts. Support will be required to ensure legislation is

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60 https://www.starlink.com/

robust and the enabling environment is ethical, ensures inclusion and equality. Organisations like the World Economic Forum are sharing opportunities regarding Web3[61] which is very useful however, governments are going to need more support, especially from organisations that can put inclusion at the centre of this work.

Across the governments the UNDP supports there is a huge variance in attitudes to Web3, how to regulate it and if/how the government might encourage or discourage its use. Some governments have outlawed the use of crypto currencies[62] and many governments tend to be hindered by several factors including a lack of access to relevant Web3 expertise, influence by incumbent industry lobbying from the likes of the banking industry, competing priorities such as financial crises, internal conflict etc. As a result, many countries have very little useful policy or foresight about positively regulating Web3.

Several nations have taken a proactive approach to Web3. Japan has developed an experimental space and government department to ensure they can adequately innovate, capture value, and regulate in this space[63] but overall, these tend to be smaller, often island nations with smaller established industrial bases and more flexibility, but also pressing needs for example The Bahamas was one of the first countries to launch its own Central Bank Digital Currency (CBDC)[64] and Barbados has opened a metaverse diplomatic mission.[65]

Across the Pacific several island nations are experimenting with Web3 projects including Palau which is to offer digital citizenship and currency using Web3[66], Digital identity projects in Tuvalu using Web3 tools[67], and the Marshall Islands where they are trying to create a legal mechanism for DAOs.[68]

All Governments will need to legislate and regulate in this area and the question will be, will the government want to enable and capture value (through taxes etc, notwithstanding how challenging this is) or disable the use of the technology?

Legislation also needs to be anticipatory in the sense that the technology and its use cases and applications is moving more rapidly than specific legislation or regulation could account for. It is also challenging when the civil servants/policy makers, politicians and public have little information to base their assessment of the benefits (or otherwise) of the technologies. This can lead to capture by experts who may not have impact at the centre of their agenda.

It's likely that the population will innovate in Web3 and therefore governments will need to work out both how to ensure they can collect some tax revenue from this innovation, but also provide some ability to support this innovation within the realms of what their state view on innovation is. They will also need to ensure that the use of the technology does not exacerbate current inequalities. What is different about Web3 compared to Web2 is that governments will have seen how a centralised Web2 has the tendency to remove value from their local ecosystems. There is hope that they can see and engage with Web3's potential to foster local innovation and value creation.

6 1https://www3.weforum.org/docs/WEF_Decentralized_Autonomous_Organizations_Beyond_the_Hype_2022.pdf
62 https://money.com/cryptocurrency-legal-status-by-country/
63 https://www.coindesk.com/web3/2022/10/04/japan-to-invest-in-metaverse-and-nft-expansion/
64 https://www.sanddollar.bs/
65 https://www.bloomberg.com/news/articles/2021-12-14/barbados-tries-digital-diplomacy-with-planned-metaverse-embassy
66 https://www.ifcreview.com/news/2022/january/citizenship-and-residency-palau-to-offer-digital-residency-worldwide
67 https://www.discovermagazine.com/environment/can-the-blockchain-give-this-island-nation-threatened-by-climate-change-a
68 https://www.coindesk.com/policy/2022/02/15/how-the-marshall-islands-is-trying-to-become-a-global-hub-for-dao-incorporation/

Web3 has decentralisation at its heart. Although most governments struggle with the massive power and control of the Web2 companies they may also struggle with the concept of decentralised innovation and its cross-border nature. The role of government as a platform for innovation is often seen as an ideal state but ignores the dynamics of power, authority, and centralisation that many governments are used to working with and within. There are many governments who are moving towards decentralisation and working to achieve the SDGs through local government. However, some of the same challenges around authority remain if solutions are built outside the official frameworks of government. Web3 decentralisation does, however, build on a trend towards localisation of change and impact.

At this stage, as we can see above, there are projects underway, and some are well designed, but some are risky for governments as well. There is a lack of reliable expertise that these governments can call on for the design and implementation of these projects. Advice is often ad hoc and often from people and organizations who are pushing a particular solution, that may not be appropriate. Governments need support to understand the risks associated with Web3.

Changing our practice at the UNDP

There are plenty of opportunities that Web3 can create for organisations like the UNDP and its operations. The Web3 community opens a new suite of unusual stakeholders, that never thought of UN/UNDP as a part of their ecosystem. These groups of people can bring new thinking to help achieve the SDGs.

On a very basic level, the UNDP regularly takes part in activities that could be supported by Web3, and we specify technology and outcomes in our work. Web3 can be useful in solving regular problems that the UNDP routinely addresses. As such building a registry of Web3 solutions, could be very impactful or building capacity for NGOs to fundraise using cryptocurrency and NFTs as an addition to traditional fundraising and there are partners that already exist to support with this.

Web3 technologies could also underpin beneficiary tracking or improved Official Development Assistance and DAOs could solve some of the challenges UNDP (and other UN agencies have) around procurement and staffing by bringing a diverse set of stakeholders around a problem rather than the siloed and slow mechanisms that are currently available. The potential is great and more investigation in this area would be meaningful.

Web3 Risks and Mitigation Strategies

08

The 2022 Edelman Trust in Technology barometer says that technology is one of the most trusted sectors (76% trusted), more trusted than governments. However, the report says that people are fearful about foreign technology, technology they don't understand and the lack of focus on social issues and impact[69]. With any technology, there are very real concerns about its development and of course there are risks associated with Web3 technologies and its impact on people and the environment. The discussion can become polarized very quickly, with one side insisting that the risks vastly outweigh the benefits (or that no benefits exist at all) and the other side pushing a naive techno-utopianism that glosses over very real concerns.

Risks and challenges in Web3 fall into two categories. "Structural", risks and challenges that will always be present and need to be constantly managed, and "Technology", risks and challenges that may diminish over time.

Structural risks

Systemic risk – Exclusion

There is already exclusion in the digital space. Exclusion due to lack of infrastructure and cost of that infrastructure, lack of connectivity and costs of connectivity, lack of skills and knowledge and many other barriers to participation in the digital economy and in digital life. There is also exclusion on who designs, owns, and operates Web2 and digital products and services. The exclusion regarding infrastructure and usage could be exacerbated in Web3. In theory the decentralised and more democratic nature of Web3 should make access etc cheaper but these promises were made by Web1 and Web2 advocates.

The promise of Web3 and those designing the systems, products and services, is that these will be more inclusive and empowering. However, the enabling ecosystem needs to ensure that this happens.

With any technology development when thinking about impact, there is also an element of "is this the right solution for the problem?" there is a chance that those using Web3 tools will just be the same people building the same products and services and not making an impact, not achieving the SDGs, or continuing to solve for the wrong problems, these risks are real and require consideration. This can be mitigated by engaging in the development of the technology and solutions early.

Systemic Risk – underlying systems

Decentralised finance in theory, makes it much easier to do risk assessment, because all the contracts and assets are on-chain. This means that they should be easily auditable by

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69 https://www.edelman.com/sites/g/files/aatuss191/files/2022-10/Trust%20in%20Tech_Top10_onepager.pdf

algorithms, in comparison to traditional financial products. However, decentralised finance provides for more efficient financial mechanisms and the development of complex economic systems, this in turn, allows for the possibility of systems failing in unexpected ways.

The recent market crash of crypto projects like Terra[70], show that it is possible for crypto projects to fail in ways that can significantly impact people's lives. It also points to the fact that most people actively using some of these protocols have very little ability to assess the risks of the stability of some of these systems. National and international financial markets are already big and connected systems, we see through global financial crashes how precarious the system can be, however, if Web3 makes these systems more interconnected this precariousness could be exacerbated. It is important to design intelligent regulation to protect against this happening.

Re-centralization

Just as the decentralized dream of Web1 became centralized Web2, there are risks that centralization will derail the ethos of Web3[71]. There are already numerous DAOs that are just centralized companies in disguise, where despite their DAO-like rhetoric, a few individuals hold almost all the governance power and gain all the economic benefits[72].

Centralization brings with it advantages in terms of the scalability, speed, and cost of systems. This is why centralized platforms came to dominate Web2. The risk of key parts of Web3 becoming overly centralized is that it removes many of the key positive benefits for society that the ethos of Web3 is trying to promote. The possibility of individuals and communities experimenting with open systems to solve local problems will be significantly curtailed if these systems become dominated by large Web2 style gatekeepers. But there are ways to protect against this possibility. Web3 is, in theory, much more transparent than the traditional world. We can learn to analyse Web3 projects and understand the mechanisms they are using. We can determine whether they are building centralizing mechanisms or not and have some influence over how Web3 evolves.

Technological risks

Technology risks are often a question of timing. A particular criticism of an aspect of Web3 might currently be valid, however, as the technology improves the problem may be resolved. Being able to anticipate this technological progress is an important part of understanding the possibilities of Web3.

Energy usage

Blockchain technologies, starting with Bitcoin and then Ethereum, employed a system called Proof of Work (POW), a novel consensus mechanism to secure the ledger. This was the big breakthrough that made cryptographic trust on the internet possible. But it is also massively energy intensive. As these technologies have scaled so have their energy usage. Rampant

70 https://www.cnet.com/personal-finance/crypto/luna-crypto-crash-how-ust-broke-and-whats-next-for-terra/
71 https://www.fastcompany.com/90716841/tim-oreilly-on-web3
72 https://blog.chainalysis.com/reports/web3-daos-2022/

energy usage is one of the most levelled criticisms of Web3 technologies. Bitcoin is currently firmly committed to POW mining to provide its security. This means that it currently has equivalent electricity consumption of the country of Argentina.[73]

However, for four years the Ethereum foundation have been working towards moving the Ethereum blockchain from POW to a much more efficient Proof of Stake system (POS). On September 15, 2022, this new system went live taking Ethereum's annual energy usage from 77 TWH (equivalent to a country the size of Chile) and reducing it by 99.8% to 0.01 TWH.[74] Since most of Defi is built on top of Ethereum (and non–Ethereum Defi was already running on POS systems), this solved the proof of work energy usage problem for Ethereum and for all the layers of infrastructure that are built upon it, including for NFTs. Outside of Bitcoin there are no major Blockchains that are still using proof of work, meaning the energy usage problem for Web3 (which mostly does not require bitcoin) has largely been solved. At this stage however, there are no credible plans to move Bitcoin off the proof of work system, as a result it will continue to require large amounts of electricity to operate. The cost/benefit analysis of this energy usage for Bitcoin is still a hotly debated topic between[75].

Privacy, security, and ethics

The risk that technology will be released, especially to vulnerable people, and their privacy and security will be at risk is a real and live risk. The openness of Web3 is how innovation is created but this openness of data could be very dangerous for many communities.

For example, if public ledger blockchains are used to store identity information about potentially vulnerable people such as refugees, which could be useful in that it would be a transparent way to map populations and provide them vital services, this information could be used in other negative ways, one example of a solution using existing technology is GoodDollar[76] (mentioned above), which uses a face scan ID system[77] to verify users of the protocol. The system can verify the user but does not keep an image of the user's face, or any other identifying information about them. It just keeps a set of data points that it can use to regularly check against the user's live image. This way a user can be verified in the system without any identifiable information about them being held on a public ledger (or on any servers).

Performance & cost

If the technology isn't good enough, or the enabling infrastructure isn't fully built out, then it is important that we are not convinced to use technology for the sake of using it. If results matter, then we must be able to do a proper assessment of the capabilities of Web3 approaches and not use them if they are lacking. However, given the speed at which the technology is evolving we should not fall into the trap of expecting that it will not quickly improve and close the gaps to existing technologies.

73 https://digiconomist.net/bitcoin-energy-consumption
74 https://digiconomist.net/ethereum-energy-consumption
75 https://www.coindesk.com/business/2021/03/05/the-frustrating-maddening-all-consuming-bitcoin-energy-debate/ https://www.afr.com/markets/currencies/academics-debate-bitcoin-as-environmental-calamity-20221005-p5bnce
76 https://www.gooddollar.org/
77 https://www.facetec.com/

Hacks, scams & terrorism

US$ 3 billion has been stolen in hacks in 2022[78] and having money on the internet obviously creates many opportunities for people to engage in illicit activities.

There are new norms and tools that are yet to be properly established regarding custodianship of assets, as well as usability issues to be resolved. Over time we should see things like user friendly digital wallets, recovery mechanisms for lost private keys, reversible transactions, and digital asset insurance. As these features mature and are combined with more effective methods of tracking and apprehending bad actors, we should see the ratio of hacks and scams to productive use of Web3 tools fall.

The same dynamic is true for claims that tools like Tornado Cash[79] are allegedly being used to fund terrorism. This mirrors criticisms of the early web before mainstream use-cases were established. One could still level the same criticism of the web today but the amount of illicit activity and terrorism on the web is tiny by comparison to the legitimate use-cases, and the value created by them. We can expect that a similar dynamic will play out with Web3 as it achieves wider adoption.

78 https://www.moneycontrol.com/news/business/cryptocurrency/crypto-hackers-steal-3-billion-in-2022-set-to-be-biggest-year-for-digital-asset-heists-9347301.html
79 https://en.wikipedia.org/wiki/Tornado_Cash

Conclusion

As Web3 gains traction, and if we are optimistic about its development, there are many opportunities to leverage its features to achieve impact. However, to do this there needs to be an effort from the impact community to ensure this happens, as often in technology, impact comes later or not at all.

Despite its progress, the Web3 markets have more recently pulled back considerably. Following the excessive hype of late 2021 and influenced by global macro trends (stock market declines, inflation etc) many projects that had experienced meteoric rises have fallen back to earth. While a disaster for those over exposed to these markets, this reality check is seen by many who are deeply involved in Web3 as a necessary deflating of unrealistic expectations so that the real work of developing valuable technologies can continue.

Even with this pullback, innovation in Web3 continues at a rapid pace and as capital and talent continues to flow into the space, it seems inevitable that these technologies will become part of our daily lives and more importantly, become the enabling context for larger change in our society. Impact organisations need to respond to this, and where possible, work to shape this exciting space to support achieving the SDGs.

By the time this report is published some of it will already be outdated, this is the nature of operating in a rapidly evolving space. To account for this, we have created an online programme[80] (db.team/undp/web3) which will update as the Web3 landscape evolves. We hope readers will engage with this and in ensuring this powerful new set of technologies and tools are used to achieve impact and the SDGs.

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80 https://db.team/undp/web3/

Appendix i

This graphic captures the overarching structure of this report including the major mental models outlined in it. It shows, on the left, how new technology paradigms unfold from an initial core technological shift, through to influencing broad changes across society.

The right side of the graphic plots Web3 as it evolves through this process, from its most basic starting point, through to opportunities to further the SDG and create impact.

Broad changes across human society

Emergent solutions to systemic problems

Enabling ecosystems
- Active local innovation ecosystems
- Inclusive access to infrastructure
- Supportive governments/regulation
- Aligned stakeholder networks
- Systems capital funding

SECONDARY
Novel system emergence

explosion of 2nd and 3rd order applications and effects

SUSTAINABLE DEVELOPMENT G❍ALS

TO enabling context

FROM

specific use-cases

NEW OPPORTUNITIES

NEW PARADIGMS
- Financial
- Economic
- Governance
- Innovation

FIRST ORDER
Infrastructure for novel use-cases

EARLY LANDSCAPE
- Oracles
- NFTs, Defi, DAOs
- Stable coins
- Cryprocurrencies

TO solved problems

FROM

"not good yet"

- blockchains
- smart-contracts

INITIAL
Infrastructure for existing use-cases

cryptographic **trust** on the internet

core technological shift:

Technology paradigms unfold upwards from a technological shift to become the enabling infrastructure.

"Web3"

An evolving bias toward placing more power into the hands of individuals and local communities.