

WEB 3.0: Emergence of a Decentralized Network

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Abstract— Web is known to be the best futuristic and implicit way of communication in the present day of the connected world. It was hypothesized in the early development of the internet that the web would greatly affect the working of the internet. Web 2.0, and now Web 3.0, may bring immense prosperity to the Internet sector in such a short time. For almost a decade, the transition from Web 1.0 to Web 2.0 has been completed. In any case, not long after Web 2.0, another Web 3.0 arose, raising fervor as well as many inquiries among pioneers, users, and regulators. Is it actually necessary at this point, what could be the driving forces, and how does it vary from Web 2.0?

I. INTRODUCTION

The present web is commonly referred to as the social web. Because it transformed the internet into a platform for individuals to interact, communicate, and make content. The evolution of web 2.0 has tremendous benefits, but it has also created a slew of issues that needed to be addressed, such as the loss of democracy due to data centralization, security problems and the lack of privacy. There were no protocols that supported data decentralization prior to the blockchain networks. As a result, mega- platforms are able to acquire and own all of our data. This issue will be solved by the decentralized web

3.0. Decentralized applications provide users complete authority over their own data, income opportunities through token models and users get a say in the protocols of this new web. In short, giving back power to the people.

A. WEB 1.0

It's where the internet began, built by Tim Berners- Lee, and it would allow only to read the web in which a small number of producers generate pages on the web (interconnected) and huge number of customers visit those websites through a browser or through the internet. The users are allowed to simply read the content on these pages and cannot interact with the material (like comment, answers etc.)

URL, HTTP, and HTML are Web 1.0's essential web protocols, but additional protocols such as CSS, XHTML, and XML are now in use. Scripting is utilized both on the server and on the client in web 1.0, such as CGI, PERL, JSP, ASP, and PHP for JavaScript and server side scripting, VB script, and for scripting on the client side flash is used.

B. WEB 2.0

Web 2.0 came into picture in the year 2004. During this time the web evolved a lot but one of the biggest changes was the interactivity of the internet. This meant that users not only got data from the websites but information started getting

received from the users on the websites. While the web had advanced from web 1.0 to web 2.0, web 2.0 opened more opportunities for users as well as developers when it came to creating content. This characteristic of web

2.0 made it attractive and had hence lead to it being termed as a people centric web or better known as read/write web. The gradual incline of this web was fueled by three principal components namely cellular, cloud and networking platforms. The applications that are being used in present day are actually a huge security threat for users. Due to web 2.0's open accessibility feature, it provides large companies an easy path to store user's data. One of the main downfalls of this phase of the web is the concept of Centralization. For example, as users view Facebook and YouTube and perform Google searches these centralized companies start collecting data about the users so that they can serve better content which in turn would make the users stay on their websites longer which means more money for them. Not only is data being collected but these centralized companies package the user's data and sell it to various advertising companies. This purely leads to a complete violation of one's own privacy. To put it succinctly, Web 2.0 is the age of targeted advertising and lack of privacy. Apart from invasion of privacy, another disadvantage of web 2.0 is its cost of centralizing or housing user's information into a large number of hosts often used to create a powerful virtual center, called a data center and assigning them by using IP addresses.

II. WEB 3.0

Tim Berners Lee, the author of the World Wide Web WWW, formerly said, "The offer is, also, to bring back the idea of a decentralized web. To bring back power to people". Now, this whole idea of giving back the power to the users is setting to change the future of the web. Removing any centralized form of decision making via some agreement algorithm. Algorithms similar to: Intricate Fault Tolerance, Proof of Work and Delegated Proof of Stake Etc. Web3 aims

to produce a decentralized internet with open, connected, intelligent websites and web operations. It's the coming replication of the internet. It heavily relies on blockchain technology, machine literacy, and artificial intelligence (AI). Web3.0 is a collection of protocols that serve as structure blocks for operation inventors. Traditional web technologies similar as MYSQL, AJAX, and HTTP are replaced by these structure blocks, which present a fully new approach to developing apps. These technologies give users with strong and empirical pledges regarding the information they admit, the information they give up, and the freights and benefits they admit in return.

TABLE I

SL. NO	Differences between web 1.0 , web 2.0 and web 3.0		
	WEB 1.0	WEB 2.0	WEB 3.0
1	1996-2004	2004-2016	2016 onwards
2	READ ONLY	READ AND WRITE	PORTABLE AND PERSONAL
3	Banner Advertising	Interactive Advertising	Behavioral Advertising
4	OWING CONTENT	SHARING CONTENT	CONSOLIDATING CONTENT
5	COMPANY FOCUS	COMMUNITY FOCUS	INDIVIDUAL FOCUS

A. Decentralized Applications

Digital applications, often known as "d-Apps" or "d- apps" execute on a computer network called the blockchain rather than on a single computer. D-Apps run on a blockchain network in a public, open-source, decentralized environment, free of any one authority's control or intervention. There are several decentralized, open source blockchains existing today for instance Ethereum with its own cryptocurrency called Ether (ETH). Platforms like these offer developers a platform to build d-Apps with their own programming language "Solidity". One of the most intriguing aspects of d-Apps is "Smart contract". Smart contracts are computer programmes that run when certain criteria are satisfied and are kept on a blockchain. They're typically used to automate the signing of a contract so that the outcome is certain for all parties, without the need for any intermediaries or time loss. D-apps promise greater security against cyber-attacks, as there's no central place to „hack.“ They can't be shut down or censored, as no single institution owns them. Offers ownership and income opportunities through crypto tokens. Allow users to retain control of their

data.

Between different devices like IOT and blockchain technology. Moving further we talk about the third type of smart contract DAO in detail.

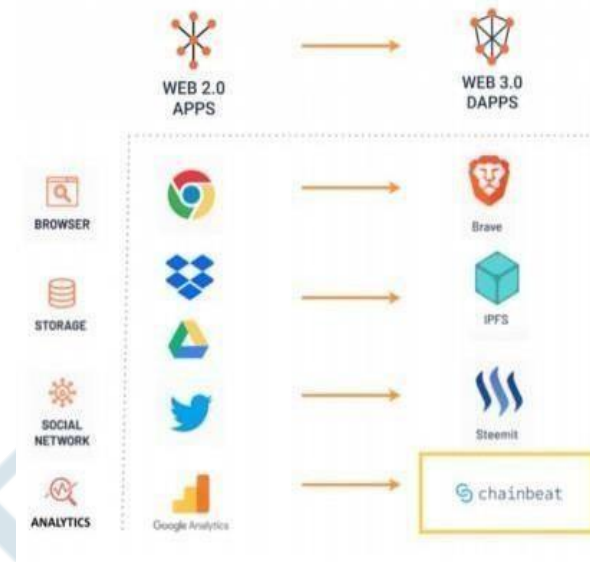


Fig. 1. Comparing web 2.0 and web 3.0

B. Smart Contract

Nick Szabo, a computer scientist from America who designed the virtual currency "Bit Gold" in 1998, first advocated smart contracts in 1994. Szabo also recommended the implementation of a contract for artificial assets like derivatives and bonds in his paper. Szabo stated: To put it another way, smart contracts are created by writing basic "if/when...then..." lines into code on a blockchain. When the predetermined conditions are met and verified. Transferring money to the relevant parties, registering a car, delivering notices, or issuing a ticket are examples of these tasks. The blockchain is updated once the transaction is completed. That implies the transaction can't be changed and the results are only available to those with permission. A smart contract can have as many parameters as necessary to persuade participants that the activity will be completed appropriately. Participants must agree on how transactions and data are stored on the blockchain, as well as the "if/when...then..." rules that will govern those transactions, as well as any exceptions and a dispute resolution structure. Smart contracts can further be divided into three types namely: Smart legal contracts, Decentralized Autonomous Organizations and lastly Application logic contracts. A smart legal contract is a particular application of code which is executable and sits on top of the blockchain. Most importantly this type of contract is used to facilitate an enforceable binding legal contract between two parties.



Fig. 3 Working of smart contract

Application logic contracts hold application specific code that links with other programs or contracts on the blockchain. They play a pivotal role in communication

C. Decentralized Autonomous Organization (DAO)

The decentralization of crypto currencies motivated a group of developers to create the notion of a decentralized autonomous organization in 2016. DAO makes the whole idea of decentralized web 3.0 even more engaging. The developers of DAOs sought to limit human error and exploitation of investor funds by putting decision-making authority in the control of an automated system and a crowdsourcing process. The ether-based DAO was developed to enable investors to make payments anonymously from anywhere on the planet. The DAO then would give those owners tokens, allowing them to vote on new projects.

To summarize, every DAO requires the following components: A collection of operating regulations as well as funds for the organization in the form of Tokens that the institution can deploy to award members for certain actions and to offer voting rights in the development of operating regulations. Furthermore, a well-designed and secure structure that allows any investor to personalize the business. Even if a security weakness is detected in the voting mechanism's preliminary code, it cannot be rectified until the majority agrees. While the voting process is in action, hackers can exploit a weakness in the system. While there are numerous unanswered questions about structure, security, and legality, some investors and analysts predict that this sort of organization could eventually gain traction, possibly even replacing traditionally structured businesses likely to benefit us.

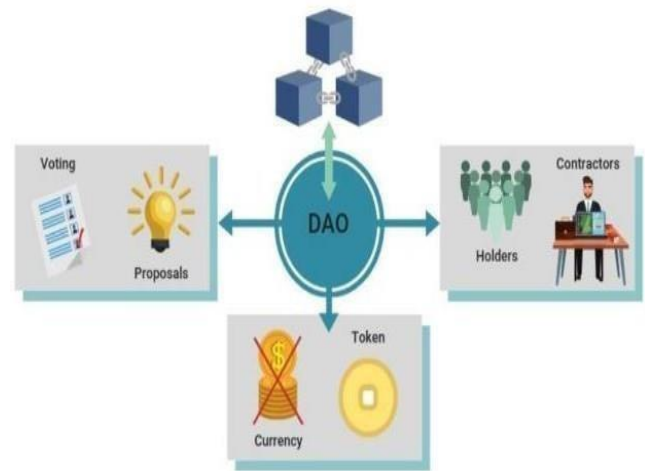


Fig. 4: Properties of DAO

D. Advantages of Web 3.0

- Each person will be self-contained and have their own decentralized identity (DID). We shall all control our own data, wealth, and other digital assets in a genuinely decentralized future. We don't need 100 distinct passwords and log-in credentials; instead, we'll be able to engage with any page on the decentralized Smart Web using just one decentralized identity.
- To take down a distributed network, massive amounts of power would be required. Each node in the network would have to be targeted individually. Because each node only carries a portion of the data, stealing someone's personal information would necessitate bringing down the entire network. Ensuring greater data security.
- Decentralization fosters diversification in the corporate world. Basically, if decision-making authority is divided, it becomes easier to branch out into other areas and diversify a company's product lines. On a decentralized internet, this would allow the great majority, if not all, of the many aspects of web 2 to be revolutionized. Multiple organizations working on their own unique niches within the overarching universe of web 3.0 are preferable than one organization working on everything.
- With the use of Web 3.0's artificial intelligence, sellers can understand our purchasing demands and present us products and services that we are interested in acquiring. This helps us to see more relevant and better adverts that are more

E. Disadvantages of Web 3.0

As any technology, web 3.0 comes with its set of pros and cons. Some of them being:

- Devices that are not advanced will not be able to handle web 3.0. Users will need a device that has above average specifications to use web 3.0.
- It may be challenging and difficult for newcomers to understand the concept of a new web. Getting people to transition to d- Apps or websites will require developers to create an end-user-experience that is a user friendly interface.
- Because the use of d-Apps is still in its early phases, it is experimental and subject to a variety of issues and unknowns. There are concerns about the applications' ability to scale properly, particularly if an app requires a lot of computations and overloads a network, producing network congestion.
- The webpages that are in existence will need to update itself, this is because established businesses will be forced to adapt to the web 3.0 approach as these types of websites and apps will become more relevant. Hence to retain their market share they must modify their automated products.
- And lastly when it comes to implementing a decentralized web, the blockchain protocol faces a storage problem. But this limitation can be overcome by using the Inter Planetary File System IPFS protocol.

III. CONCLUSIONS

Despite all these limitations, we find that semantic technologies have hastened the web's evolution. Web 3.0 has its fair share of critics, for a variety of reasons covered across this paper. Furthermore, the advent of true Web 3.0 seems at once a distant aspiration and a proximate eventuality, depending on the audience and on the futurist orator. The work that is required to launch such a broad-based, decentralized web architecture is considerable, but this does not mean to dispel the buzz. Particularly among futurists, crypto anarchists and blockchain enthusiasts who yearn for something beyond Web

2.0. With the power of decentralized identities, we will be able to contribute to an online realm that is both equal and shared, a Metaverse. What blockchain technologies have taught us this far is that, for all its promise, there are many worrisome elements that cease upon it with zeal to advance nefarious agendas. No caution raised against such threats would be enough. However, what blockchain technologies have also taught us is that the possibilities that lie ahead are many. Web 3.0 may appear to be a very bold example of what blockchain possibilities might offer, but it may hardly be the boldest example yet, and the brightest innovations are likely yet to come. Web 3.0 adoption will not be quick or clean.

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