# Navigating from Web 1.0 to the latest Web 5.0 to 'The Future Unseen Web'

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## ABSTRACT
The current era of internet that has been continually getting updates, that leads to web technologies from 1.0 to 4.0 and currently 5.0, with data being a combined product of distributed clouds for storage, enterprise wide and social where the data needs to be delivered at the edge with proper authentication and validated at the right time, right location, to right person along with security and machine learning mechanisms to detect unlawful actions. This paper aims in providing a detailed understanding of the current internet version that has evolved till the current 5.0 and the future expected 7.0.

## General Terms
World Wide Web, Block Chain, Decentralized Systems, Internet X.0

## Keywords
Web 4.0, Web 5.0, Blockchain, Semantic Web

## 1. INTRODUCTION
The goal of the World Wide Web's creation was to make it possible to access data in the form of interconnected hypertext language from anywhere at any time. Known as the "web," the World Wide Web is the most invasive part of the internet, a techno-social system that facilitates communication between human networks and technology. Systems that improve human perception, verbalization, attachment, and integration are known as techno-social systems. To put it another way, verbalization requires perception to be connected with attachment [1]. Largest transformable-information constructs was first introduced to Web introduce by Tim Burners-Lee in 1989 at first [2][3]. Immense progress had been made about web and related technologies since then. The terms "web 1.0," "web 2.0," "web of verbalization," "web 3.0," and "web 4.0" and "web 5.0" allude to a network of decentralized smart communicators and integration, respectively.

## 2. WEB X.0 ENHANCEMENT
### 2.1 Web 1.0
The original version of the web, known as Web 1.0, was developed in 1989 by Tim Berners-Lee when he was employed at the European Organization for Nuclear Research (CERN) in Geneva, Switzerland. The initial iteration of the web, that ran between 1989 to 2005 was termed as Web 1.0. It was defined as a network of links between information or a network of perception and thought. Web 1.0 was regarded as a read-only website with minimal interaction, allowing users to share content but preventing them from interacting with the site. The initial version of the World Wide Web, known as Web 1.0, was essentially defined as "an information space in which the items of interest, referred to as resources, are identified by global identifiers called Uniform Resource Identifiers (URIs)" [9]. The initial version of the web is referred to as web 1.0, which, as Berners-Lee states, might be seen as the "read-only web". In other words, we were able to read and search for information thanks to the early web.

However, this is exactly what most website owners wanted: Online Establishing an online existence and making their information accessible to everybody at any time was their aim for the websites [10] and included in the websites published during the period between 1994 to 2004 which was not possible without the knowledge of HTML and the content of the web was merely static. Web 1.0 Technologies includes core web protocols: HTML, HTTP and URI Newer Protocols:XML, XHTML, CSS Server-Side Scripting: ASP, PHP, JSP, CGI and PERL Client-Side Scripting : JavaScript, VBScript and Flash.[1]

The characteristics for the Web 1.0 pages is jotted below as

- It includes static web pages and uses basic HTML (Hypertext Markup Language).
- They have read only content.
- The web master is solely responsible for updating users and managing the content of website.
- They do not support mass-publishing.
- Webmaster manually assigns all the hyperlinks to the content of the web page.
- The contact information provided by the Web 1.0 is email, fax, phone number and address.
- They use Frameset.
- The Web 1.0 pages can only be understood by humans (web readers) they do not have machine compatible content [11].

Limitations of Web 1.0

Web pages in Web1.0 can be understood by humans only not machine compatible.

Web master is totally responsible for in addition,deletion and edition of content. Very slow, limited connectivity and provides basic search operations

### 2.2 Web 2.0
Industry 2.0 was the name given to the subsequent transition to the manufacturing sector between 1871 and 1914, which facilitated the quicker exchange of people and creative ideas. Economic expansion during this revolution led to a rise in company productivity, which in turn caused a surge in unemployment as manufacturing workers were replaced by machines [7] .

Table 1 shown below summarizes the difference between both Web 1.0 and Web 2.0 evidently Industry 1.0 and further versions of industry also took its shape accordingly.

**Table1. Comparison of Web 1.0 and Web 2.0**

| Web 1.0 | Web 2.0 |
|---|---|
| Reading | Reading/Writing |
| Companies | Communites |
| Communites | Peer to Peer |
| Client-Server | XML, RSS |
| HTML, Portals | Tags |
| Taxonomy | Sharing IPOs |
| Owning | Trade Sales |
| Netscape | Google |
| Web forms | Web applications |
| Dialup | Broadband |
| Hardware Costs | Bandwidth Costs |
| Lectures | Conversation |
| Advertising | Word of mouth |
| Service sold over the web | Web Services<br>Information portals<br>Platforms |
| Information Portals | Platforms |

Limitations of Web 2.0

- Cyber threats
- privacy concerns
- and information overload.

'Industry 3.0' also known as Digital Revolution began in the 1970s when memory – programmable controls and computers were automated. Mass production and the utilization of integrated circuit chips and digital logic are at the heart of this era; derivative technologies include computers, digital cell phones, and the internet. [2][3]. The technological innovations are redefining traditional products, approached as well as business methodologies. Indeed, the next generation of Web evolution (i.e., Web 5.0) is already coming and shaping our lives.

The main technologies and services of web 2.0 are included blogs, really simple syndication (RSS), wikis, mashups, tags, folksonomy, and tag clouds that some of them described as follows in briefly:

1. Blogs Jorn Barger coined the term "weblog" (or "blog") in 1997. In journal style, the blog contains web pages called posts that are published chronologically, starting with the most recent. Below a blog post, readers have the option to leave a comment. Although most blogs are text-based, there are other types as well, including podcasts, videoblogs, vlogs, and photoblogs [5] [6]. Keywords can used to tag the posts of blogs in order to categorize the subjects of the posts. For instance when the post becomes old, it can be filed into a standard, theme-based menu system. Linking is another important aspect of blogging. Linking enhances the blogosphere's conversational and immediate aspects while making it easier to retrieve and refer to content from many blogs [5].

2. RSS stands for Really Simple Syndication, a family of web feed formats that are used to syndicate content from websites or blogs. An XML file called an RSS contains links to the information sources and a summary of the information items. Users can utilize RSS to stay up to date on the blogs or websites that interest them. Another syndication format called Atom was created to address the problem of numerous incompatible RSS versions [6].

3. Wikis- Any web page (or collection of web pages) that is easily editable by anybody with access is called a wiki. In contrast to blogs, wikis provide a history capability that allows you to view and restore earlier versions.

4. Wiki features included are wiki markup language, basic site navigation and structure, a basic template, multi-user support, an integrated search function, and an easy-to-use workflow. [5], [6].

## 2.3 Web 3.0

Compared to Web 2.0, Web 3.0 is a more intelligent and secure decentralized Web architecture. A thorough overhaul of the Internet and IT infrastructure significantly decreased the risks and destruction caused by monopolists or criminals. To put it briefly, Web 3.0 can handle web data ownership in accordance with distributed technologies.

It will maximize the online world from a technological, cultural, and economic standpoint. Next, it encourages new approaches to content creation, organizational designs, and business models. Web 3.0, however, is still in its infancy and is now under debate.

Physical assets and cutting-edge technology like artificial intelligence, the Internet of Things, robots, 3D printing, cloud computing, etc. are united in Industry 4.0.[8]

Web 3.0 is a decentralized Web architecture that is more intelligent and safer than before. The risks and ruin posed by monopolists or criminals will be greatly reduced by a complete reconstruction of the Internet and IT infrastructure. In this architecture a machine gathers data in a hierarchical manner and classifies it according to comparable attributes. The machine facilitates human-like comprehension and cataloging of data.[9]

In summary, Web 3.0 can tackle web data ownership through decentralized technology. It will enhance the online realm considering economic, cultural, and technological viewpoints. It also encourages new methods of content creation, different organizational frameworks, and alternative economic models. Fig. 1 depicts the 3 Tier architecture of Web 3.0.

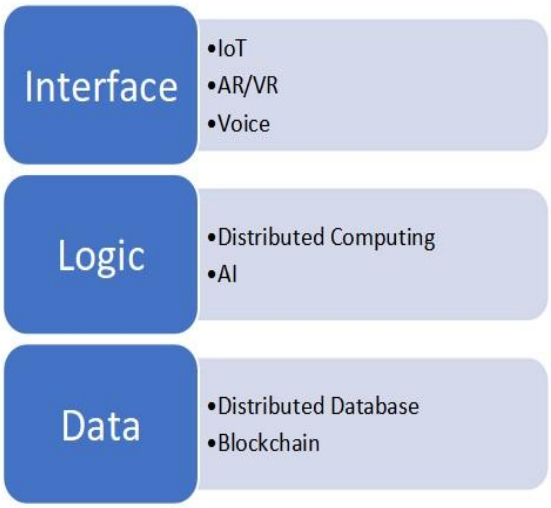


**Fig 1: 3 Tier Architecture of Web 3.0**

Web 3.0 enables processors to analyze data similarly to users and create, distribute, and intelligently tailor information to the needs of customers.[9]

The World Wide Web's structure is made up of an interconnected network of digital documents, mostly web pages, that are connected by hyperlinks. As shown in Fig 2.

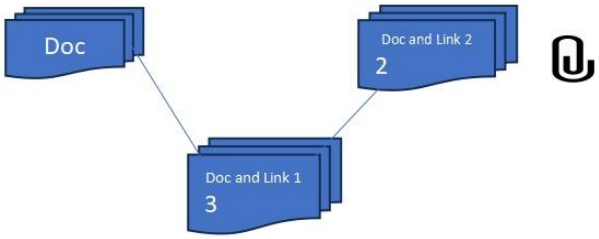


**Fig 2: Web of Documents and links**

*2.3.1Frontend*
The frontend is a client-side or user-side application retrieved via the browser and delivered to the user.

*2.3.2Backend*
Web 3.0 is based on DApps, which are databases that are decentralized. Blockchain functions as a state machine to share applications across networks. The state machine is distributed among all the participants of the blockchain network. The smart contract operates as shared state machines to execute backend logic.

*2.3.3Third-PartyNodeProviders*
Providers such as Quicknode, Alchemy, and Infura supply the blockchain network's infrastructure. When there are many nodes in the network, it becomes an extremely difficult role. Blockchain networks use JavaScript Object Notation Remote Procedure Call (JSON-RPC) protocols for provider communication. The request-response protocol, or RPC, establishes the rules and allows the client to communicate with the remote device, which subsequently completes the operation and replies to the client.

*2.3.4Signer*
Once the connection is established to the blockchain network through a provider, this state of blockchain can be determined. However, to write to the state, one more step must be done before submitting the transaction to the blockchain which is "sign" the transaction using a private key. This private key is stored in the browser and signs when the client requests a transaction on the blockchain network. Providers like Metamask acts like transaction signers and provider.

*2.3.5 Smart Contracts*
Smart contracts are decentralized programs that are saved and executed on the Ethereum blockchain. They are written in high-level languages like Solidity or Vyper. Anybody on the blockchain network can examine and communicate with other nodes on the network since each node has smart contract code.

*2.3.6 P2P storage*
P2P Storage Solution Storing the data in the blockchain is very expensive due to high transaction gas fees, so to some extent, it is reasonable to use non-blockchain distributed and decentralized peer-to-peer storage as a solution. IPFS (Interplanetary File System) or Swarm are widely used peer-to-peer file system that allows storing information across a network of machines.

*2.3.7 Reading Data*

Reading of data from the smart contract on the blockchain is done after the signing of transactions and sending them to the blockchain. Reading of data from the smart contract can be approached in two ways: first is Smart Contract Events, where web3.js libraries are used to query and listen for smart contract events. Second is Graph, which is an off-chain indexing solution on the Ethereum platform.
The graph uses GraphQL as query language to state which smart contracts to index, which events and functions call to listen, and how to transform incoming events.

With the expansion in the use of blockchain load of transactions, the number of nodes the blockchain has also increased. At this point, Scalability in the blockchain is a big challenge as it has to deal with different factors such as capacity and cost, throughput and networking, etc. Polygon and L2 are introduced as scaling solutions for blockchain scalability. Polygon has a secondary blockchain which is called a side chain that interfaces with the main chain and that processes and executes transactions. Another solution for blockchain scalability is the L2 solution which is Optimistic Rollups and Rollups. solution is similar to the Polygon solution, here batch transactions off-chain using a "rollup" smart contract and then periodically commit these transactions to the main chain.

## 2.4 Web 4.0

Web 4.0 is based on new multiple models, technologies and social relationships. The concept of Web 4.0 is not totally clear and unanimous in literature, because it is composed by several dimensions [13].

As 4.0 switches to Web 4.0 that introduces Semantic Web Fig 3 shows the same depicting Dimension of Web 4.0 depicting semantic web [10].

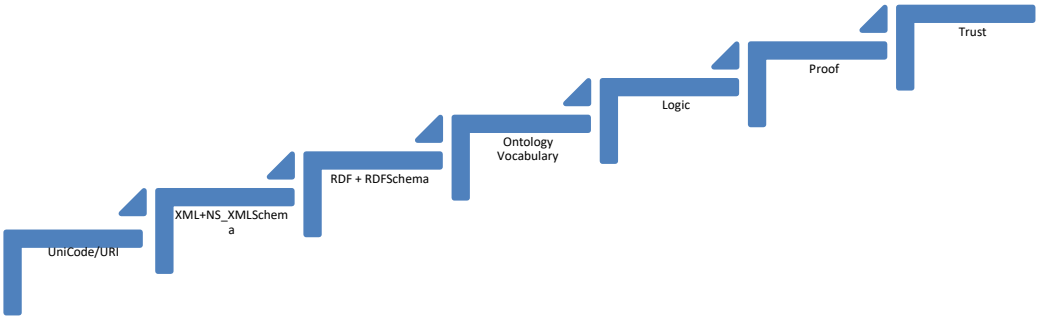


**Fig 3: Architecture of Semantic Web**

Industry 4.0, a new idea that combines information technology, services, and manufacturing, was first introduced by the German government at the 2011 Hannover Fair as the start of the fourth industrial revolution.

According to the 2016 research by Bitkom, VDMA, and ZVEI, more and more physical components are receiving sensors and tags as a kind of useful technology. These components have been connected since the advancements in the Internet of Things field.

Industry 4.0 encompasses a wide range of concepts, including increases in mechanization and automation, digitalization, networking, and miniaturization (Lasi et al. 2014). Furthermore, Industry 4.0 depends on the integration of dynamic value-creation networks concerning the connection of the physical basic system and software system with other branches and economic sectors, as well as with other industries and types of industry.

The foundation for putting Industry 4.0 infrastructure into practice, according to the notion, is research and innovation, reference architecture, standardization, and networked system security.

Adaptive robotics: The combination of microprocessors and artificial intelligence (AI) approaches results in smarter goods, devices, and services that have autonomy and sociality in addition to processing, communication, and control capabilities.

The following lists the general attributes of these applications:
High-speed data transmission via Ethernet or Wi-Fi networking; simple integration with current equipment communication systems;
Memory-based or case-based learning mechanisms; integrated robot controllers; optical and image processing for part location.

## 2.5 Web 5.0

Web 4.0 is ready on work apparently Web 5.0 , 'the sensitive web' is on its hards heels. Although the current web is emotionally neutral (Web 5.0) , the sensory and perceive of what users feel is difficult to map with emotions. Technologies still exist is that a=can measure their effects.

Using headphones, users can interact with content that responds to their emotions or changes the facial expression of their avatars in real time [14].

The expansion of the Web has changed corporate perspective, which implies that it will undoubtedly impact the caliber and substance of higher education. Change and the emergence of new production and innovation models based on knowledge, its uses, and information processing are characteristics of the contemporary economic environment and innovation based on know-how, its applications and information processing.

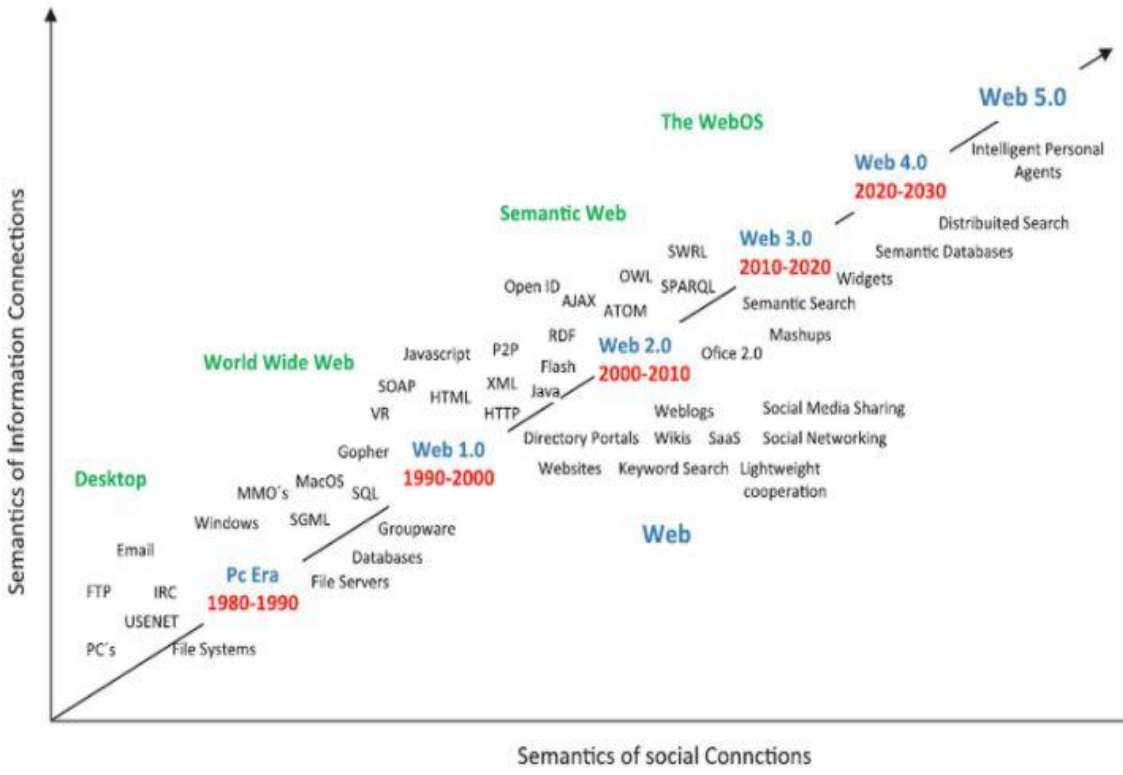


**Fig 4: Social Connections Semantic [12]**

## 2.6 Web 6.0

In Web 1.0, the previous iteration of the World Wide Web, "Resources" were designated by global identifiers found in an information space using Uniform Resource identifiers (URI). [9].

Web 6.0, sometimes known as the Symbiotic Web, imagines a time when brain-computer interfaces (BCIs) will allow human minds and the internet to coexist together. This idea envisions a future in which digital platforms and thoughts communicate directly, expanding the possibilities of human-computer connection.

The potential for innovation is limitless as we advance brain-computer interfaces, emotion-driven apps, and autonomous AI. But these developments also bring with them serious difficulties, especially when it comes to ethics, privacy, and fair access. Businesses, legislators, and individuals can ensure that the web remains a beneficial force in the future by being informed and involved with the latest advancements in online development.

The journey from Web 1.0 to Web 6.0 is far from over, and the future promises even more exciting innovations and opportunities for those willing to embrace the digital revolution this revolution

Following table 2 shows a brief comparison between the various web internet. Here is a comparison table summarizing the main characteristics and features of Web 1.0 through Web 7.0 based on current understandings.

**Table2. Comparison of Internet**

| Version | Timeline / Context | Key Characteristics | Technologies / Features | User Interaction | Notable Focus or Impact |
|---|---|---|---|---|---|
| Web 1.0 | Early 1990s to early 2000s | Static web pages, read-only content | HTML, HTTP, basic JavaScript, proprietary techs | Minimal interactivity, mostly reading | Information delivery, static content |
| Web 2.0 | Mid 2000s onwards | Dynamic content, user-generated content, social web | AJAX, APIs, SaaS, rich UX, social media | User participation, collaboration | Participatory culture, social networking |
| Web 3.0 | Emerging now | Decentralization, semantic web, AI, blockchain | Blockchain, AI, machine learning, decentralized apps (dApps), 3D experiences | More personalized, AI-driven, decentralized interaction | Decentralized control, AI and semantic understanding |
| Web 4.0 | Near future (symbiotic web) | AI integration, IoT, natural language processing, AR/VR | AI/ML, IoT, blockchain, AR/VR, real-time decision making | Context-aware, seamless human- | Highly intelligent, connected ecosystems |

| Version | Timeline / Context | Key Characteristics | Technologies / Features | User Interaction | Notable Focus or Impact |
|---|---|---|---|---|---|
| | | | | machine collaboration | |
| Web 5.0 | Conceptual advancing era | Emotional intelligence, hyper-personalization, privacy | Emotion-aware AI, deep learning, blockchain, immersive AR/VR,wearables | Emotionally intelligent interaction, data ownership | Emotional intelligence, privacy, immersive experience |
| Web 6.0 | Forthcoming futuristic vision | Brain-computer interfaces, telepathic communication | Neural interfaces, VR/AR, real-time thought processing | Thought-based user commands and interaction | Symbiosis of human cognition and machine intelligence |
| Web 7.0 | Emerging concept/framework | Unified decentralized ecosystems, trusted interactions | Decentralized identifiers (DID), DIDComm agents, verifiable credentials | Fully decentralized, resilient systems | Trusted, resilient, decentralized digital ecosystem |

This table captures the evolutionary trajectory from static, read-only web to the advanced, intelligent, immersive, and decentralized systems intended in future web phases.

## 3. CONCLUSION

We conclude for this research paper by depicting the empathetic illustration of the most earliest web internet 1.0 to the internet till date and the expectation we take forward in the the coming years, that will not need any human intervention. We also understand the earlier internet and the continuous development and modifications that have been taken place in the past year.

Web 7.0 is not a formally defined concept, but it is often used to discuss the future of web development. It's expected to be characterized by increased AI integration, more immersive and personalized user experiences, and a continued focus on security and accessibility. Other anticipated trends include the rise of Progressive Web Apps (PWAs), low-code/no-code development platforms, and edge computing. We anticipate the PhysDigital communination and digital/machinery communication to turn to be true in near future with this advancement.

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