

# EVOLUTION OF THE WORLD WIDE WEB: FROM WEB 1.0 TO 6.0

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## Abstract

The fast lane toward the development of web is coined to be as an outright phenomenon in the today 's society with incorporated use of modern innovative technology and redefining the way of organizing , communicating and collaborating with individual which in terms lead us to mixture of spectacular successes and failures. The purpose of this paper is to understand and conceptualize the evolution of web from the scratch to the upcoming trends in the field of Web Technology.

**Keywords:** Web 1.0, Web 2.0, Web 3.0, Web 4.0, Web 5.0, Web 6.0, Semantic Web

## 1. Introduction:

In today's era web technology can be easily defined by the user indifferent descriptive way. But matter in fact many user are quite unknown to the information that from where the WWW was coined first. As this paper state the evolution of web so it is important to initiate the story from the beginning where it was stated first.

Largest transformable-information constructs i.e. Web introduce by Tim Burners-Lee in 1989 at first [9] [10]. Immense progress had been made about web and related technologies. Web 1.0 referred as a web of information or percipience, Web 2.0 as web of verbalization, web 3.0 as web of affiliation and web 4.0 as a web of integration and Web 5.0 as web of Decentralized smart communicator. This paper would attempt to build a user centric view of the composition of features generation of web technology. In sum, the paper presents a holistic view of the World Wide Web.

## 2. World Wide Web:

The World Wide Web is a system of interlinked hypertext document accessed via the internet [21]. With a web browser, one can view web pages that may contain text, image, videos, and other multimedia and navigate between them via hyperlinks. On March 12, 1989, Tim Berners-Lee, a British computer scientist and former CERN employee wrote a proposal for what would eventually become the World Wide Web [1]. The 1989 proposal was meant for a more effective CERN communication system but Berners-Lee eventually realized the concept could be implemented throughout the world. Berners-Lee and Belgian computer scientist Robert Cailliau proposed in 1990 to use hypertext “to link and access information of various kind as a web of nodes in which the user can browse at will “[22]. In these ways the first web service was designed and tested and latterly confined as Word Wide Web.

## 3. Web 1.0:

Web 1.0 was first implementation of the web and lasted from 1989 to 2005. It was defined as web of information connection. According to the innovator of World Wide Web, Tim Berners-Lee considers the web as “read-only” Web [1]. It provides very little interaction where consumer can exchange the information together but it was not possible to interact with the website. The role of the web was very passive in nature.

Web 1.0 was referred as the first generation of World Wide Web which was basically defined as “It is an information space in which the items of interest referred to as resources are identified by global identifier called as Uniform Resources Identifiers(URLs)”

First generation web was era static pages and content delivery purpose only. In other world, the early web allowed us to search for information and read it. There was very little in the way of user interaction or content contribution.

### 3.1 Characteristics Web 1.0:

Web 1.0 Technologies includes core web protocols, HTML, HTTP, and URI. The major characteristics of web 1.0 are as follow:

- They have read only content.
- Establish an online presence and make their information available to anyone at any time.
- It includes static web pages and use basic Hypertext Mark-Up Language.

### 3.2 Limitation Web 1.0:

The major limitations of web 1.0 are as follow:

- The Web 1.0 pages can only be understood by humans (web readers) they do not have machine compatible content.

- The Web master is solely responsible for updating user and managing the content of website.
- Lack of Dynamic representation i.e., to acquire only static information , no web console were available to performing dynamic events.

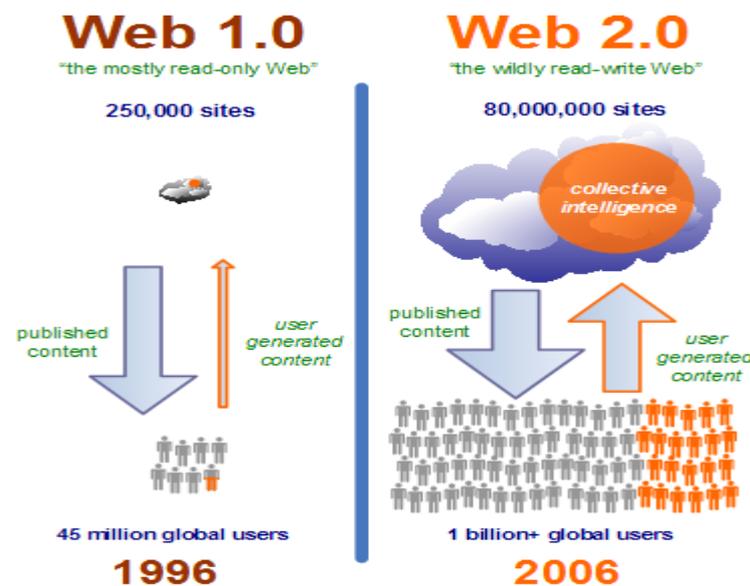
#### 4. Web 2.0:

Web 2.0 is the second generation of web. It was defined by Dale Dougherty in 2004 as a read-write web [1]. The concept began with a conference brainstorming session between O’ Reilly and Media live International. The technologies of web 2.0 allow assembling and managing large global crowds with common interests in social interactions.

Tim O’Reilly defines web 2.0 on his website as follows [8]

“Web 2.0 is the business revolution in the computer industry caused by the move to the internet as platform, and an attempt to understand the rules for success on that new platform. Chief among those rules is this. Build applications that harness network effects to get better the more people use them.”

Web 2.0 facilitates major properties like participatory, collaborative, and distributed practices which enable formal and in formal spheres of daily activities on going on web. In other terms it resemble major distinct characteristics of Web 2.0 include “relationship” technologies, participatory media and a social digital technology which in term can also defined as the wisdom web. People-centric web and participative web is taken in to concern and which facilities reading and writing on the web which makes the web transaction bi-directional.



Web 2.0 is a web as a platform where users can leave many of the controls they have used in web 2.0 In other words; the user of web 2.0 has more interaction with less control. Web2.0 is not only a new version of web 1.0 but it also implies to flexible web design, creative reuse, updates, collaborative content creation and modification in web 2.0 that should be considered as one of the outstanding feature of the web 2.0 is to support collaboration and to help gather collective

intelligence rather web 1.0

(Source: <http://taibumakumba.blogspot.in> )

#### 4.1 Characteristics of Web 2.0:

Web 2.0 is instead a label coined by Tim O' Reilly and associates to reference the transition of World Wide Web to a new phase of use and service development [17]. The categorization can be used to elaborate on the understanding of Web 2.0 achieved through varied definitions.

- **Technology Centric Characteristics:**  
Web has become a platform with software above the level of a single device. Technology that is associated with blogs wikis, podcasts, RSS feeds etc.
- **Business Centric Characteristics:**  
It is a way of architecting software and businesses. The business revolution in the computer industry is caused by the move to internet as platform and an attempt to understand the rules for success on that of new platform.
- **User Centric Characteristics:**  
The Social Web is often used to characterize sites that consist of communities. It is all about content management and new ways of communication and interaction between users. Web application is facilitates collective knowledge production, social networking and increases user to user information exchanges.

#### 4.2 Limitation of Web 2.0:

Sometimes it may happen that if the new technology meets expectations of the mass user at large, there may be a chance that these technologies may face lot of consequences from external environment which may suppress or limit the flow of technology as a whole.

- Constant Iteration Cycle of change and updates to services [11]
- Ethical issues concerning build and usage of web 2.0
- Interconnectivity and knowledge sharing between platforms across community boundaries are still limited [12] [15]

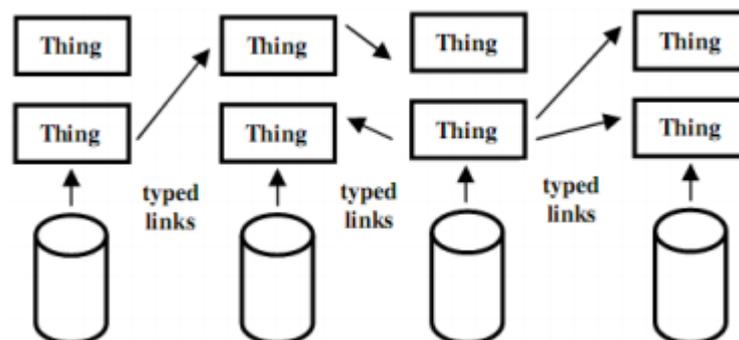
#### 5. Web 3.0:

Web 3.0 is one of modern and evolutionary topics associated with the following initiatives of web 2.0. Web 3.0 was first coined by John Mark off of the New York Times and he suggested web 3.0 as third generation of the web in 2006 [18]. Web 3.0 can be also stated as "Executable Web".

The Basic idea of 3.0 is to define structure data and link them in order to more effective discovery, automation, integration, and reuse across various applications [6]. It is able to improve data management, support accessibility of mobile internet, simulate creativity and innovation, encourage factor of globalization phenomena, enhance customers' satisfaction and help to organize collaboration in social web.

Web 3.0 is also known as semantic web. Semantic web was thought up by Tim Berners-Lee, inventor of the World Wide Web [1]. A dedicated team at the World Wide Web consortium was working to improve, extend and standardize the system, languages publications and tools have already been developed [3]. Web 3.0 is a web where the

concept of website or webpage disappears, where data isn't owned but instead shared, where services show different views for the same web or the same data. Those services can be applications devices or other, and have to be focused on context and personalization, and both will be reached by using vertical search [13]. Web 3.0 supports world wide database and web oriented architecture which in earlier stage was described as a web of document. It deals mainly with static HTML documents. But dynamically rendered pages and alternative formats should follow the same conceptual layout standards whenever possible and links are between documents or part of them. The web of document was designed for human consumption in which primary object are documents and links are between documents. Semantics of content and links are implicit and the degree of structure between objects is fairly low [19]. The Proponent of the web of data envisions much of the world's data being interrelated and openly accessible to the general public. This vision is analogous in many ways to the web of documents of common knowledge, but instead of making document and media openly accessible, the focus is on making data openly accessible, the web of data hosts a variety of data sets that include encyclopedic facts, drug and protein data metadata on music, books and scholarly articles, social network representations, geospatial information, and many other types of information in some ways like a global database that most its features are included Semantics of content and links are explicit and the degree of structure between objects is high based on RDF model. In Figure the structure of web of data is shown simplicity [14]



(Source: Web of Data[20] )

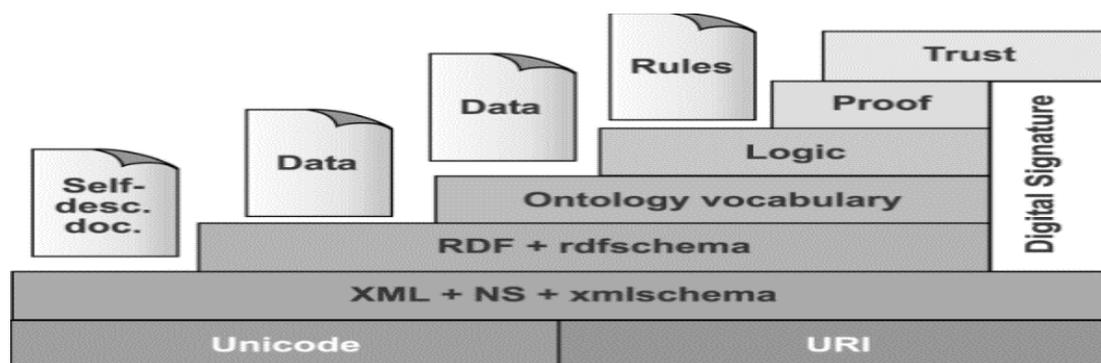
### 5.1 Semantic Web:

The semantic web is a collaborative movement led by international standards body the World Wide Web consortium. According to the W3C [4], "The Semantic web provides a common framework that allows data to be shared and reused across application, enterprise, and community boundaries"

The main purpose of the Semantic web is driving the evolution of the current web by enabling users to find .share and combine in formation more easily. The Semantic web, as originally envisioned, is a system that enables machines to understand and respond to complex human requests based on their meaning. Such an understanding requires that the relevant information sources be semantically structured.

## 5.2 Layered Architecture for Semantic Web

Tim Berners-Lee originally expressed the Semantic web as [2] “If HTML and the web made all the online documents look like one huge book, RDF, schema and inference languages will make all the data in the world look like one huge database”. Tim Berners-Lee proposed a layered architecture for semantic web that often represented using a diagram, with many variations since.



(Source :Semantic Web Layered Architecture [5] )

The development of the semantic web proceeds in steps, each step building a layer on top of another. Figure shows the “layer cake” of the semantic web which describes the main layers of the semantic web design and vision [5].

- Unicode and URI: Unicode is used to represent of any character uniquely whatever this character was written by any language and uniform Resource Identifier (URI) is unique identifiers for resources of all. The functionality of Unicode and URI could be described as the provision of a unique identification mechanism within the language stack for the semantic web [20]
- XML: It is a language that lets one write structured web documents with a user-defined vocabulary XML is particularly suitable for sending documents across the web. XML has no built-in mechanism to convey the meaning of the user’s new tags to other users.
- RDF: Resource Description Framework is a basic data model, like the entity-relationship model, for writing simple statements about web object. A scheme for defining Information on the web. RDF provides the technology for expressing the meaning of terms and concepts in a form that computers can readily process.
- Logic Layer: It is used to enhance the ontology languages further and to allow the writing of application-specific declarative knowledge
- Proof Layer: It involves the actual deductive process as well as the representation of proofs in web languages and proof validation.
- Trust Layer: It will emerge through the use of digital signatures and other kinds of knowledge based on recommendations by trusted agents or on rating and certification agencies and consumer bodies. Semantic web is not limited to publish data on the web. It is about making links to connect related data. Berners-Lee introduced a set of rules have become known as the linked data principles to publish and connect data on the web in 2007 [16]

- ✓ Use Uris as names for things.
- ✓ Use HTTP Uris to look up those names.
- ✓ Provide Useful information. Using the standards (RDF) by look up a URI.
- ✓ Include links to other URIs to discover more things.

Data providers can add data to a single global data space by publishing data on the web according to the linked data principles.

### 5.3 Characteristics of Web 3.0:

The major characteristics of web 3.0 as marked by Nova Spivack are [18]

- Saas Business Model.
- Open source software platform.
- Distributed Database or what called as “The World Wide Database”.
- Web Personalization.
- Resource Pooling.
- Intelligent Web.

### 5.4 Challenges of Web 3.0:

Web 3.0 faces several challenging issue like-

- Vastness: The World Wide Web contains many billions of pages. Redundancy in data may occur which has not yet been able to eliminate all semantically duplicated terms.
- Vagueness: This arises from the vagueness of user queries, of concepts represented by content providers, of matching query terms to provider terms and of trying to combine different knowledge bases with overlapping but subtly different concepts.
- Inconsistency: These are logical contradictions which will inevitably arise during the development of large ontologism and when ontologism from separate sources is combined.
- Deceit: This is when the producer of the information is intentionally misleading the consumer of the information.

### 5.5 Comparison of Web1.0, 2.0 and Web 3.0:

The Main difference between Web 1.0, Web 2.0 and Web 3.0 is that web 1.0 is consider as read-only web targets on content creativity of producer web 2.0 targets on content creativity of users and producers while web 3.0 targets on linked data sets. The very few comparative difference between web 1.0, Web 2.0 and Web 3.0 are given below.

Web 1.0	Web 2.0	Web 3.0
1996-2004	2004-2016	2016
The Hypertext Web	The Social Web	The Semantic Web
Tim Berners Lee	Tim O’ Reilly, Dale	Tim Berners Lee

Read Only		Dougherty	Executable Web
Millions of User		Read & Write Web	Trillions of Users
Echo System		Billions of User	Understanding Self
One Directional		Participation & Interaction	Multi-user virtual environment
Companies	Publish	Bi-Directional	People build application though which people interact & publish content.
Content		People Publish Content	Web 3.0 is curiously undefined.
Static Content		Dynamic Content	AI& 3d, The Web learning
Personal Websites		Blog & Social Profile	Semi blog, Haystack
Message Board		Community portals	Semantic Forums
Buddy List,	Address	Online Social Networks	Semantic Social Information
Book			

## 6. Web 4.0:

Web 4.0 can be considered as an Ultra-Intelligent Electronic Agent, Symbiotic web and Ubiquitous web [25]. Interaction between humans and machines in symbiosis was motive behind the symbiotic web. It is powerful as human brain. Progress in the development of telecommunication, advancement on nanotechnology in the world and controlled interfaces are using web 4.0. In simple words, machines would be clever on reading the contents of the web, and react in the form of executing and deciding what to execute first to load the websites fast with superior quality and performance and build more commanding interfaces [24]. Web 4.0 will be read write concurrency web [23]. It ensures global transparency governance, distribution, participation, collaboration in to key communities such as industry, political, social and other communities. Web OS will be such as a middleware in which will start functioning like an operating system [26]. Web OS will be parallel to the human brain and implies a massive web of highly intelligent interaction [27].

## 7. Web 5.0:

Web 5.0 is still an underground idea in progress and there is no exact definition of how it would be. Web 5.0 can be considered as Symbiotic web, decentralized i.e. it is not possible to have a Personal Server (PS) for any personal data or information stored on the net, and people tries to get interconnected via Smart Communicator (SC), like Smart phones, Tablets or Personal Robots i.e. is represented as its own avatar inside the SC, that will be able to surf alone in the 3D Virtual world of the Symbiotic. The Symbiotic servers will be able to use a part of "memory and calculation power" of each interconnected SC, in order to calculate the billions and billions needed data to build the 3D world, and to feed it's Artificial Intelligence surf alone [27]. Currently the Web is "emotionally" neutral: do not feel the user perceives. The company Emotive Systems has created neurotechnology through headphones that allow users to interact with content that meets their emotions or change in real time facial expression an "avatar".

## 8. Web 6.0

A new node named web Service Extensions has been added to the Internet Information Services Manager (ISM) in Internet Information Services (IIS) 6.0. Web service extensions are programs that extend the basic IIS functionality of serving static content. Examples of Web service extensions are, Active Server Pages (ASP), ASP.NET, FrontPage Server Extensions, Server-side includes (SSI), Internet Database Connector, Web Distributed Authoring and Versioning (Web DAV), Common Gateway Interface (CGI), Internet Server API (ISAPI), Active Server Pages (ASP), ASP.NET, FrontPage Server Extensions, Server-side includes (SSI), Database Connector, Web Distributed Authoring and Versioning (Web DAV), Common Gateway Interface (CGI), and Internet Server API (ISAPI).

### About Configuring Servers for Applications (IIS 6.0)

Internet Information Services (IIS) 6.0 delivers Web hosting services through an adjustable architecture that you can use to manage server resources with improved stability, efficiency, and performance. IIS separates applications into isolated pools and automatically detects memory leaks, defective processes, and over-utilized resources. When problems occur, IIS manages them by shutting down and redeploying faulty resources and connecting faulty processes to analytical tools.

### 8.1 IIS can run in either of two mutually exclusive modes of operation:

- Worker process isolation mode:

This is the default mode of IIS 6.0, isolates key components of the World Wide Web Publishing Service (WWW service) from the effects of errant applications, and it protects applications from each other by using the worker process component. Use worker process isolation mode unless you have a specific compatibility issue that makes the use of IIS 5.0 isolation mode necessary. Web sites that serve static content or simple ASP applications should be able to move to IIS 6.0 running in worker process isolation mode with little or no modification.

- IIS 5.0 isolation mode:

With this mode, you can run applications that are incompatible with worker process isolation mode because they were developed for earlier versions of IIS. Applications that run correctly on IIS 5.0 should run correctly on IIS 6.0 in IIS 5.0 isolation mode.

IIS 6.0 worker process isolation mode delivers the following specific improvements over earlier versions of IIS:

- ✓ **Robust performance** -Isolation prevents Web applications and Web sites from affecting each other or the WWW service. Reboots of the operating system and restarting of the WWW service are avoided.
- ✓ **Self-healing** -Automated management provides auto-restart of failed worker processes and periodic restart of deteriorating worker processes.

- ✓ **Scalability**- Web gardens allow more than one worker process to serve the same application pool.
- ✓ **Process affinity** - enables the connection of worker processes to specific processors on multi-CPU servers.
- ✓ **Automated debugging** - The debugging feature enables the automatic assignment of failing worker processes to debugging tools.
- ✓ **CPU limiting** - This monitoring feature enables controlling the amount of CPU resources that an application pool consumes in a configured amount of time. [29]

## 9. Conclusion:

This paper provided an overview from the evolution of the Web, Web 1.0, Web 2.0 Web 3.0, web 4.0 web 5.0 and web 6.0 were described as four generations of the web. The characteristics of the generations are introduced and compared. It is concluded web as an information space has had much progress since 1989 and it is moving toward using artificial intelligent techniques to be as a massive web of highly intelligent interaction in close future.

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