



Incremental Journey for World Wide Web: Introduced with Web 1.0 to Recent Web 5.0 – A Survey Paper

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Abstract: *This paper provides overview and comparison of the web i.e. Web 1.0, Web 2.0, Web 3.0, Web 4.0 and web 5.0 were described as a five generations of the web. Generations characteristics and information are introduced and compared. There is not any specific research about web generation from the web advent but it is an analytical distinction that outlined qualities of web*

Keywords: *Web 1.0, Web 2.0, Web3.0, Web 4.0, Web 5.0,*

I. Introduction:

The World Wide Web was established with the objective of accessing the data from anywhere at any time in form of interlinked hypertext language. The World Wide Web (known as **the web**) is not homologous to internet but is the most obtrusive part of the internet that can be defined as techno-social system for the interaction between human and technological networks. Techno-social system defines as a system that enhances human percipience, verbalization, affiliation, and Integration. In other words affiliation needs verbalization and verbalization needs percipience being integrated [3].

Largest transformable-information constructs i.e. **Web** introduce by Tim Burners-Lee in 1989 at first [5][6]. 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.

II. Web 1.0

Web 1.0 is the first generation of web and was created in 1989 by Tim Berners-Lee, Working at CERN (The European Organization for Nuclear Research) in Geneva, Switzerland. The web 1.0 was first implementation of the web and it lasted from 1989 to 2005. It was define as web of information connections or a web of cognition/percipience. Web 1.0 was consider as read-only web with very little interaction where consumer can exchange the information together but it was not possible to interact with the website. The role was very passive [1].

Web 1.0 is retronym which refers to the first state / version of the World Wide Web which was basically considered as “is 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 first implementation of the web represents the web 1.0, which, according to Berners-Lee, could be considered the “read-only web.” In other words, 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. However, this is exactly what most website owners wanted: Their goal for a website was to establish an online presence and make their information available to anyone at any time [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. and the characteristics for the Web 1.0 pages as Following.

- It includes static web pages and use 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].

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.

III. Web 2.0

Web 2.0 is the second generation of web. The concept began with a conference brainstorming session between O'Reilly and Media Live International. Dale Dougherty. Web 2.0 is considered as read-write web [2], [4]. Web 2.0 allows managing and assembling large global crowd with common interests in social interaction. The differences between Web 1.0 and Web 2.0 are numerous that are describe in reminder of the paper.

Web 2.0 facilitates participatory, collaborative, and distributed practices which enable formal and nonformal spheres of daily activities. Other terms used to characterize Web 2.0 include "relationship" technologies, participatory media and a social digital technology which is also known as the wisdom web, people-centric web and participative web with reading and writing, the web could become 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 web2.0 has more interaction with less control. Web 2.0 is not only a new version of web 1.0; Flexible web design, creative reuse, updates, collaborative content creation and modification were facilitated through web 2.0 one of the outstanding feature of the web 2.0 is to support collaboration and to help gather collective intelligence rather web 1.0

Web 2.0 is also both platform on which innovative technologies have been built and space where users are as important as content they upload and share with others. Web 2.0 includes social network such as MySpace, Facebook, Twitter, orkut and Ning; media sharing such as you tube, slideshare and flicker; social bookmarking, such as Delicious and CiteULike; collaborative knowledge through wikis i.e Wikipedia, codeproject, expertechange, stackoverflow etc; creative work such as podcasr, videocasts, blogs and microblogs (e.g. blogger); content aggregation and organization, such as RSS (Really Simple Syndication) Feeds.and tagging tools; and remixing or mash-ups from different content providers into new forms such as combining geo graphical data with transportation or crime data [12]. Table 1 compare web 1.0 and web 2.0 in some features simplicity.

Table1. Comparison of Web 1.0 and Web 2.0

Web 1.0	Web 2.0
Reading	Reading/Writing
Companies	Communitites
Client-Server	Peer to Peer
HTML, Portals	XML, RSS
Taxonomy	Tags
Owning	Sharing
IPOs	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
Information portals	Platforms

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:

- **Blogs-** The term weblog (or blog) was proposed by Jorn Barger in 1997. The blog is included the web pages called posts which published chronologically with the most recent first, in journal style. Visitors of the blogs can add a comment below a blog entry. Most blogs are textual and but there are other sorts such as photoblogs or photologs, videoblogs or vlogs and podcasts [13], [14].
Posts of blogs can be tagged with keywords 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 deepens on the conversational nature of the blogosphere and its sense of immediacy and helps to facilitate retrieval and to reference information on different blogs [13].
- **Really Simple Syndication - RSS** is a family of web feed formats used for syndicating content from blogs or web pages. RSS is an XML file that summarizes information items and links to the information sources. Using RSS, users are informed of updates of the blogs or web sites which they're interested in. Atom is another syndication specification aimed at resolving issues of multiple incompatible RSS versions [14].
- **Wikis-** A wiki is a web page (or set of web pages) that can be easily edited by anyone who is allowed access. Unlike blogs, previous versions of wikis can be examined by a history function and can be restored by a rollback function. Wiki features are included: wiki markup language, simple site structure and navigation, simple template, supporting of multiple users, built-in search feature and simple workflow [13], [14].

- *Mashups*- Web mashup is a web page (or web site) that combines information and services from multiple sources on the web. Mashups can be grouped into seven categories: mapping, search, mobile, messaging, sports, shopping, and movies. More than 40 percent of mashups are mapping mashups. It is easier and quicker to create mashups than to code applications from scratch in traditional ways; this capability is one of most valuable features of web 2.0. Mashups are generally created using application programming interfaces [16].

Several development tools are available to create blogs, wikis, mashups, and social networks. These tools, such as mashup tools, wiki engines, blog software, make adoption of web 2.0 easier, quicker, and cheaper. Developers use three basic development approaches to create applications of web 2.0: Asynchronous JavaScript and XML (AJAX), Flex, and the Google Web Toolkit [14].

- *Asynchronous JavaScript and XML*- AJAX is a web development approach that used for development of most interactive websites by retrieving small amount of data from web server and display it on the web application without reloading the whole page [15]. AJAX is included several technologies: XHTML or HTML, cascading style sheets (CSS), JavaScript and XML [14].
- *Flex*- Adobe Flex is a software development kit (SDK) to create and deliver cross-platform rich internet applications (RIAs) on the web [14]. Flex is based on Flash and supports common design patterns by providing a programming language.
- *Google Web Toolkit*- GWT is an open source Java development framework that makes creating AJAX applications easy. It allows to web developers debug AJAX applications in the Java language using the Java development tools of their choice. GMT provides a compiler and a special web browser that help developers to debug the GWT applications [14].

IV. Web 3.0

Web 3.0 a phrase coined by John Markoff of the New York Times in 2006 [7] is third generation of the World Wide Web, usually conjectured to include semantic tagging of content. Web 3.0 is also known as the Semantic Web The foundation of the Semantic Web is data integration. By using metadata, “display only” data is converted to meaningful information which can be located, evaluated, and delivered by software agents [8].

Tim Berners-Lee inventor of the World Wide Web was the one who came up with thought of Semantic Web i.e. web 3.0. Which intends to Read Write Intelligent web, individually oriented, highly portable and provides User developed smart applications in terms of the characteristic at front end? At backend characteristics web 3.0 provides content (semantic)-aware and context-aware, next generation browsing and searching capabilities, Richness to high data.

Web3.0 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 [17]. Semantics of content and links are implicit and the degree of structure between objects is fairly low Figure 1 represents the structure of web of documents in simple

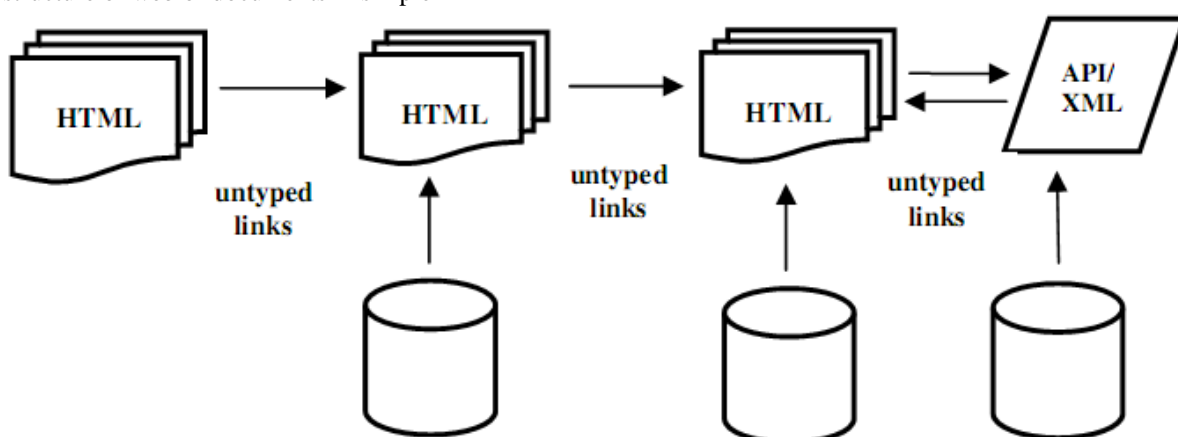


Figure.1 Web of Document

The proponents of the Web of Data envision 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 documents 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 2, the structure of web of data is shown simplicity [18], [19].

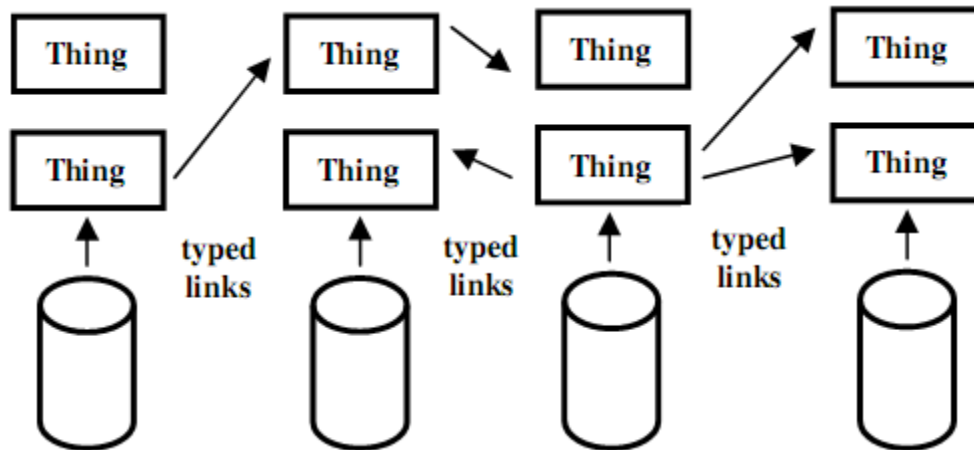


Figure.2 Web of Data

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. Table 2 compares some differences between web 1.0, web 2.0 and web 3.0. Detail comparison between web 1.0, web 2.0 and web 3.0 is shown in figure 3.

Web 1.0	Web 2.0	Web 3.0
1996	2006	2016
The Web	The Social Web	The Semantic Web
Tim Berners Lee	Tim O'Reilly	Sir Tim Berners Lee
Read only web	Read and write Web	Read, Write and execute web
Information sharing	Interaction	Immersion
Millions of users	Billions of users	Trillions of users
Echo system	Participation	Understanding self
Connect information	Connect people	Connect knowledge
Brain and Eyes (= Information)	Brain, Eyes, Ears, Voice and Heart (= Passion)	Brain, Eyes, Ears, Voice, Heart, Arms and legs (= Freedom)
The Hypertext/CGI Web. (the basic)	The Community Web (for people: apps/sites)	The Semantic Web (for machines)
Pushed web, text/graphics based flash	Two ways web pages, wikis, videos, pod casts, shading, Personal publishing, 2D poratals	3D portals, avtar representation, Interoperable profits, Multi-user virtual environment (MUVES), Integrated games, education and business, all media flows in and out of virtual web worlds.
Companies publish content that people consume (e.g. CNN)	People publish content that other people can consume, companies build platforms that let people publish content for other people (e.g. Flickr, YouTube, Adsense, Wikipedia, Blogger, MySpace, RSS, Digg)	People build applications that people can interact with, companies build platforms that let people publish services by leveraging the associations between people or special content (e. g. Face Book, Google Maps, My Yahoo!)
In Web 1.0 search engines retrieve macro contents. Search is very fast but many times results are inaccurate or more than than users can chew.	In Web 2.0 search engines retrieve tags with micro contents (Furl even retrieves tags with macro contents). The process of tagging is manual, tedious and covers negligible percents of the WWW. Web 2.0 tags everything: pictures, links, events, news, Blogs, audio, video, and so on. Google Base even retrieves micro content texts.	In Web 3.0 search engines will hopefully retrieve micro content texts which were tagged automatically. This implies translating billions of Web 1.0 macro contents into micro contents. The result could be more precise search because tagging can solve part of the ambiguity that homonyms and synonyms introduce into the process of Search.

Web 1.0 was all about static content, one way publishing of content without any real interaction between readers or publishers or each other.	Web 2.0 is more about 2 way communication through social networking, blogging, wikis, tagging, user generated content and video.	Web 3.0 is curiously undefined. AI and the web learning what you want and delivering you a Personalized web experience.
The web in the beginning when it was first developing web 1.0	New advances that allow a much more sophisticated user interaction with web pages – citizen journalism, social networks and Wikis are all products of Web 2.0	Thought to be the future – where the web is more interactive with users, leading to a kind of artificial intelligence web 3.0
Personal web sites	Blogs	Semantic Blogs: SemiBlog, Haystack, Semblog, Structured Blogging
Content Management system	Wikis, Wikipedia	Semantic Wikis: Semantic MediaWiki, SemperWiki, Platypus, dbpedia, Rhizome
AltaVista, Google	Google personalized, DumpFind, Hakia	Semantic Search: SWSE, Swoogle, Intellidimension
Citeseer, Project Gutenberg	Google scholar, Book search	Semantic Digital Libraries: JeromDI, BRICKS, Longwell
Message boards	Community portals	Semantic Forums and community portals: SIOC, OpenLink DataSpaces
Buddy Lists, Address book	Online social networks	Semantic Social Networks: FOAF, PeopleAggregator
		Semantic Social Information Spaces: Nepomuk, Gnowsis

Tim Berners-Lee proposed a layered architecture for semantic web that often represented using diagram, with many variations since. Figure 3 gives representation of this diagram [21].

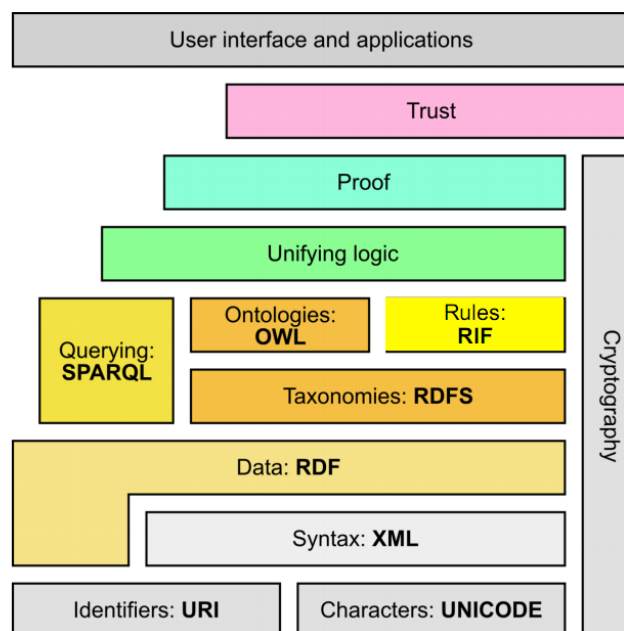


Figure.3 Semantic Web Layered architecture

The layers are described as follows.

- **URI and UNICODE:** Unicode is the standard international character set is used to represent of any character uniquely whatever this character was written by any language and Uniform Resource Identifier (URI) are unique identifiers for resources of all types[21],[22] . 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.

- *Extensible Markup Language*: – Extended Markup Language is an extensible tag metalanguage developed by W3C. XML is a standard for the exchange of information structured between different platforms which involve simple technology that includes others that complement it and make it stronger.
- *Resource Description Framework* : Resource Description Framework (RDF) is the HTML of the Semantic Web and Simple way to describe resources on the Web Based on triples <subject, predicate, object> Various serializations, including one based on XML A simple ontology language (RDFS) E.g. language used to store the data in the repository
- *RDF Schema*: provides a predefined, basic type system for RDF models. It describes classes and properties of the resources in the basic RDF model. RDF Schema provides a simple reasoning framework to infer types of resources.
- *Ontology*: Web Ontology Language (OWL) is a more complex ontology language than RDFS Layered language based on DL Overcomes some RDF(S) limitations E.g. ontology language used to define the schemas used in the
- *Unifying logic* : Bring together the various ontology and rule languages , Common inferences, meaning of data
- *Proof* : Explanation of inference results, data provenance
- *Trust*: Trust that the system performs correctly Trust that the system can explain what it is doing Network of trust for data sources and services Technology and user interface repository

V. On2Broker:

On2broker is software tool that provides the necessary support in realizing this idea. Basically it provides formalisms and tools for formulating queries, for defining ontologies, and for annotating HTML documents with ontological information. On2broker that processes information sources and content descriptions in HTML, XML, and RDF and that provides information retrieval, query answering and maintenance support. Central for our approach is the use of ontologies to describe background knowledge and to make explicit

On2Broker is a system that processes distributed information sources and that provides intelligent information retrieval, query answering

On2Broker relies on components of the Semantic Web Architecture: analysis of such systems driven the definition of the Semantic Web Architecture the semantics of web documents [22], [23].

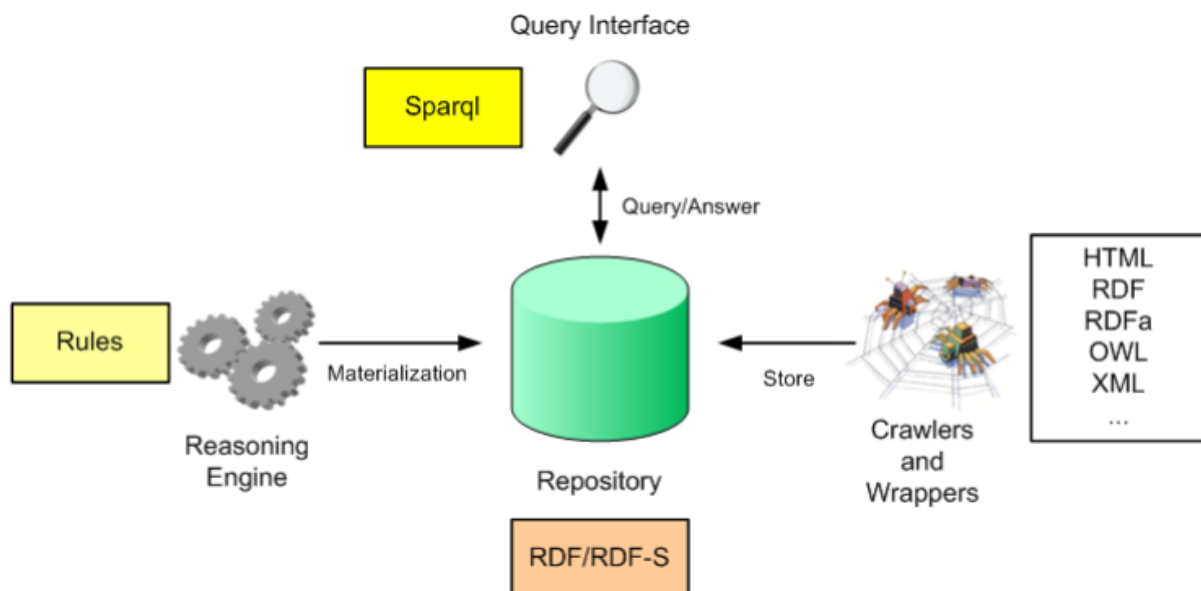


Figure.4 On2Broker: Architecture [22], [23]

Query Interface:

- I. Provides a structured input structure that enable users to define their queries without any knowledge of the query language.
- II. Input queries are then transformed to the query language (e.g. SparQL).

Repository

- I. Decouples query answering, information retrieval and reasoning.
- II. Provide support for materialization of inferred knowledge.

Crawlers and Wrappers (or Info Agent)

- I. Extract knowledge from different distributed and heterogeneous data sources..
- II. RDF-A pages and RDF repositories can be included directly..
- III. HTML and XML data sources require processing provided by wrappers to derive RDF data.

Inference Engine:

- I. Relies on knowledge imported from the crawlers and axioms contained in the repository to support query answers.
- II. Adopts horn-logic and closed world assumption.

VI. Web 4.0

Web 4.0 can be considered as an Ultra-Intelligent Electronic Agent, symbiotic web and Ubiquitous web [21], [23]. Interaction between humans and machines in symbiosis was motive behind of the symbiotic web. Powerful as human brain, progress in the development of telecommunications, Advancement on nanotechnology in the world and controlled interfaces 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 [22], [24].

Web 4.0 will be read write concurrency web [28]. Global transparency is delivering by achieving a mass participation in online networks. Rafi Haladjian and Olivier, The entrepreneurs created the first web 4.0 consumer electronics i.e. if you visit amazon.com more than once and it will recognize you and provide relevant and personalized advice. One of the most critical developments of Web 4.0 will be the migration of online functionality into the physical world. To use one of the simplest examples, imagine being able to Google your home to locate your car keys or the remote control.

VII. 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 Symbionet 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 SmartCommunicator (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 Symbionet. The Symbionet 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 built the 3D world, and to feed it's Artificial Intelligencesurf alone [27].

Currently the Web is "emotionally" neutral: do not feel the user perceives. The company Emotive Systems has created, neuro technology through headphones that allow users to interact with content that meets their emotions or change in real time facial expression an "avatar".

VIII. Conclusion

This paper yields progression of largest information construct i.e. is World Wide Web and background evolution of web forms web 1.0, web 2.0, web 3.0, web 4.0 and web 5.0. Web 1.0 as web of cognition i.e. read only web, Web 2.0 as people-centric and participative web i.e. read-write web, Web 3.0 as web of knowledge connection i.e. read-write-execution web, Web 4.0 as Ultra-Intelligent Electronic Agent i.e. read-write-execution web with concurrency and Web 5.0 as a quasi emotive web described as fifth generation web in this paper. Future work on this paper will focus on the deeper and broader research about the new possible invention in journey of World Wide Web and its issues.

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