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Technological March from Web 1.0 to Web 3.0: A Comparative Study

DR K P SINGH*
BEBI**
DIPTI GULATI***

This paper deals with the technological march from Web 1.0 to 3.0 for managing the web information. Authors have discussed about the concept of web 1.0 to 3.0. A shift from web1.0 to 3.0 has also been shown. A comparative study has been drawn on these three concepts on certain parameters such as: Technology, advancement, networking, users etc.

Key words: *Web 1.0, Web.2.0, Web 3.0, Web Technology*

1. INTRODUCTION

The Web services are typical application programming interfaces (API) or Web APIs that are accessed via Hypertext Transfer Protocol (HTTP) and executed on a remote system hosting the requested services. The W3C defines a "Web service" as "a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-process-able format (specifically Web Services Description Language WSDL).

Information services play a key role in this new stage of the Web and one must keep in mind that this involves challenges that go beyond technology, since it mainly involves a change in attitude on behalf of the Information Society. Besides the implementation of the tools and services of the Web 2.0, it involves a study and plan, since not all tools work for all units of information or type of user. Blogs, wikis, social bookmarks, social

* Senior Assistant Professor, Department of Library and Information Science, University of Delhi, Delhi, India. singhkp_1972@yahoo.co.in
** Research Scholar, Department of Library and Information Science, University of Delhi, Delhi, India bebi.mywork@gmail.com
*** Research Scholar, Department of Library and Information Science, University of Delhi, Delhi, India. diptigulati83@gmail.com

networks and RSS are just some of the possibilities for integration of these types of services into libraries and other document information centres.

Web 1.0 was the era when people could think that Netscape was the contender for the computer industry crown. Web 2.0 is the era when people have come to realize that it's not the software that enables the web that matters so much as the services that are delivered over the web. New technologies will make online search more intelligent and may even lead to a web 3.0.

The current web, which includes the traditional web and the so-called Web 2.0 or Social Web, is increasingly based more on the active role of its user. Users are no longer simple consumers of contents and services, but have become an active part in its development by producing and sharing all sorts of contents.

2. WEB 1.0

The WWW or Web 1.0 is a system of interlinked, hypertext documents accessed via the Internet. 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.[1]

Fig 1. WEB 1.0 (Source: www.watblog.com/.../)

3. WEB 2.0

The Web 2.0 can be summarized as the natural evolution of the Web, with its foundations in the development of services that focus on users and their active participation. The term Web 2.0 was coined by Dale Dougherty (O'Reilly Media) and Craig Cline (Media Live) in 2004 when they performed a study on the web and confirmed that after the downfall of the dot.com companies, those that survived offered new services based on applications that created dynamic pages and interaction with the user.

The term **Web 2.0** is commonly associated with web applications that facilitate interactive information sharing, interoperability, user-centered design, and collaboration on the World Wide Web. A Web 2.0 site gives its users the free choice to interact or collaborate with each other in a social media dialogue as creators (prosumer) of user-generated content in a virtual community, in contrast to websites where users (consumer) are limited to the passive viewing of content that was created for them. Examples of Web 2.0 include social-networking sites, blogs, wikis, video-sharing sites, hosted services, web applications, mashups and folksonomies.

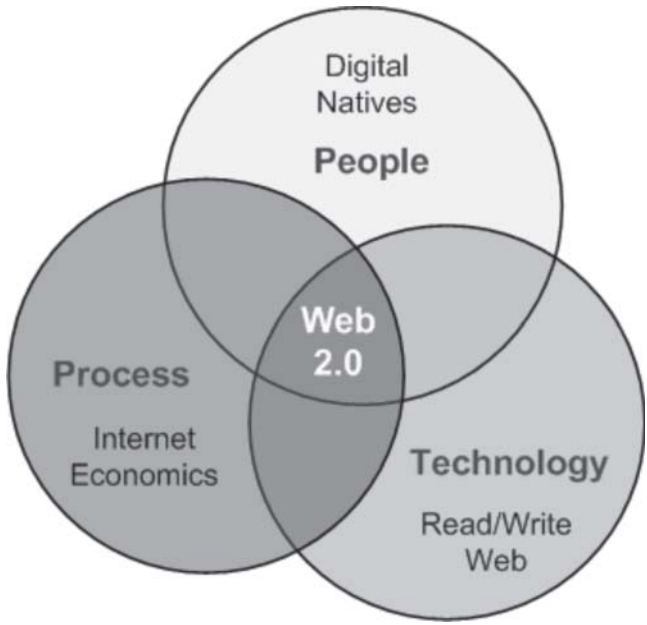

Fig 2. WEB 2.0 (Source: www.joiningdots.net/blog/2005/10/what-does-we...)

Some characteristics that define the Web 2.0 include:

- The web as a platform; many services have stopped using closed applications and now offer them online so that they can be used from any location.
- The web as an expression of collective intelligence; users edit and publish contents that are linked from other users, creating an interlinked network.
- The web as participative architecture; the web does not depend on large organizations to have contents, but on the user collective. A clear example is Wikipedia, which is now a competitor of other prestigious encyclopedias like *Britannica Online*.
- The web as a decentralized system, makes room for the majority of users that use very specific services and websites. Collaborative management of the information allows one to access not only the contents with the greatest repercussion, but also the many contents with a smaller audience.

4. WEB 3.0

Web 3.0 is a term that has been coined to describe the evolution of Web usage and interaction that includes transforming the Web into a database. Web 3.0 is an era in which we will upgrade the back-end of the Web, after a decade of focus on the front-end (Web 2.0 has mainly been about AJAX,

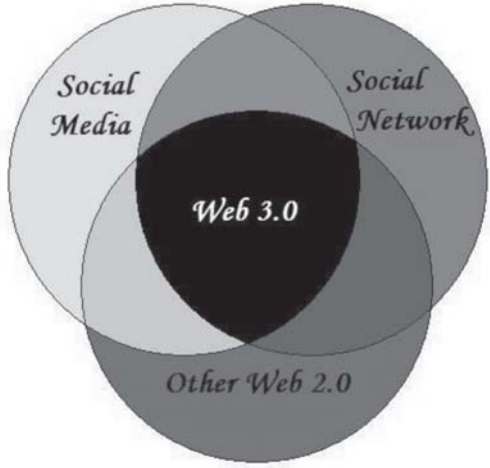

Fig 3. WEB 3.0 (Source: asegrabci2009.wordpress.com/.../)

tagging, and other front-end user-experience innovations.) This in turn leads us to the rumblings and mumblings we have begun to hear about Web 3.0, which seems to provide us with a guarantee that vague web-versioning nomenclature is here to stay. By extending Tim Berners-Lee's explanations, the Web 3.0 would be something akin to a "read-write-execute" web. Web 3.0 is defined as the creation of high-quality content and services produced by gifted individuals using web 2.0 technologies as an enabling platform.

Web 3.0 is a term that is used to describe various evolutions of Web usage and interaction along several paths. These include transforming the Web into a database, a move towards making content accessible by multiple non-browser applications, the leveraging of artificial intelligence technologies, the Semantic web, the Geospatial Web, or the 3D web. Gartner suggests the need to differentiate incremental changes to Web 2.0 from Web 3.0. Tim Berners-Lee coined Giant Global Graph (GGG) as another facet of Web 3.0.

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 / the same data. Those services can be applications (like browsers, virtual worlds or anything else), devices or other, and have to be focused on context and personalization, and both will be reached by using vertical search. One could speculate that the Google / Sun Microsystems alliance to create a web based operating system for applications like word processing and spreadsheets is an early indicator of this trend.

5. SHIFT FROM WEB 1.0 TO WEB 3.0

Web 1.0 - Defined as the era between 1991-2003 and typically shaped by the limitations of a 56K dial-up connection; Web 1.0 is characterized by one person or an organization pushing content out to many people via websites or e-mail newsletters. The primary focus of web 1.0 was one-way communication. Key features of Web 1.0 included static websites, HTML frames, guest books, e-mail correspondence, newsletters, 'donate now' buttons and web directories (as apposed to search engines) such as Yahoo and DMOZ or encyclopedia's such as Encarta.

Web 2.0 - Web 2.0 is considered to be the era from 2004 to the present day and is shaped by the advent of broadband telecommunications and web speeds of at least 1mb/sec. Different to Web 1.0, Web 2.0 is characterized

by the two way communication of users in online public commons, such as Facebook, Myspace and other content sharing or social networks. Key features of Web 2.0 include blogs, wikis, peer-to-peer sharing platforms, social networks, widgets, applications, media sharing, iPod and video on-demand (VOD) casts, mashups (hybrid applications which mix various forms of data) and folkonomies (bookmarking/content sharing sites).

Web 3.0 - Web 3.0 is the next evolution of the internet. Some hypothesize that Web 3.0 will combine the best bits of both Web 1.0 and Web 2.0 but will be a more user focused, personalized, intelligent, controlled or semantic (meaningful) web experience. Furthermore, the web is set to become more mobile too, as demonstrated through recent trends in the marketplace whereby smart phones and the iPhone are improving the web experience for those accessing through a mobile phone. With this new technology comes a much faster pace; therefore it is no surprise to see that experts estimate the minimum delivery of speed for Web 3.0 will be 10mb/sec. Key features of Web 3.0 may include intelligent mobile applications, personalized portals and search engines (such as iGoogle which can already be personalized to deliver key information to a users' desktop), integrated games, business and education, avatars and 3D role play games.

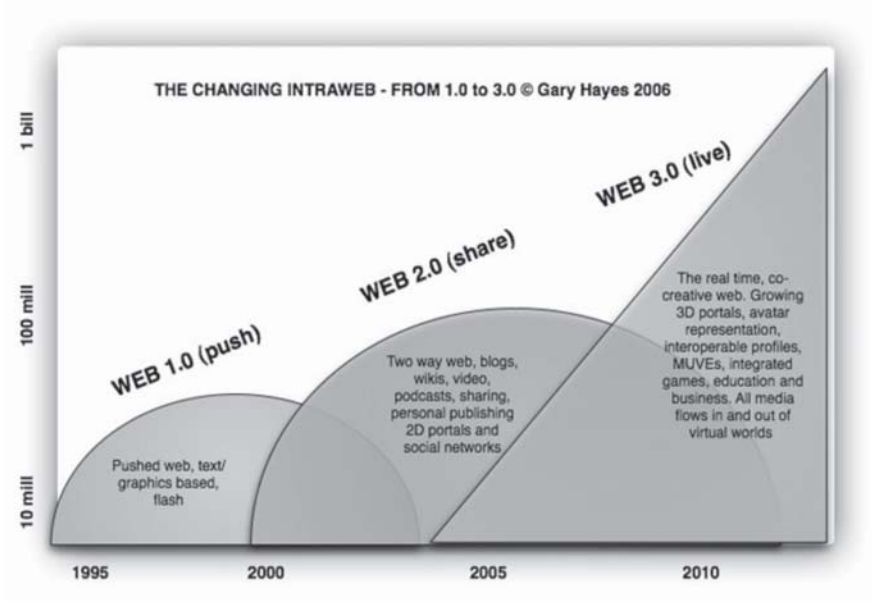

Fig 4. (Source: http://www.websitearchitecture.co.uk/blog/?p=823)

6. TECHNOLOGIES USED IN WEB 1.0, WEB 2.0 AND WEB 3.0

Web 1.0 was static and used plain HTML. This was good for the time because Internet Speeds were low as low as 14.4kb/s. With that low speed you couldn't load the things you can load today.

There are two levels of technology used in Web 2.0. The 1st level group covers technological resources used to create a final product: languages, systems and other tools that allow the professional to develop or adapt applications. For e.g. Ajax, API, RSS, XML, P2P and Mashup. The 2nd level represents the final products, created from technology based on the 1st level. For e.g. Social networks, blogs, wikis, podcast, social book marks.

Web 3.0 Technologies include Artificial intelligence, Automated reasoning, Cognitive architecture, Composite applications, Distributed computing, Knowledge representation, Ontology (computer science), Recombinant text, Scalable vector graphics, Semantic Web, Semantic Wiki, Software agents (Table 1).

7. COMPARATIVE STUDY OF WEB 2.0 AND WEB 3.0

Authors have tried to make a comparative study of Web 1.0, Web 2.0 and Web 3.0 after thorough scanning the available literature on the topic. The following parameters have been identified which seem to be quite relevant for making a comparative account (Table 2).

8. CONCLUSION

Most people today can hardly visualize life without the internet. The semantic wave embraces three stages of internet growth. The first stage,

Table 1. Comparison of the Technologies
(*Source:* http://www.computerarticle.net/)

	Web 1.0	**Web 2.0**	**Web 3.0**
Main Technology	HTML	AJAX	Unknown Something like Active X
Browsers	Proprietary Technology	Standards Compliant	Standards Complaint
How sites collect data	Email	Forms	Registered data
Speed	56k	2.0mb/s or faster	Unknown 10.0mb/s
More users means	More lag	Better Value to user	Better value to user

Table 2. Comparative Study of Web 1.0, Web 2.0 and 3.0

	Web 1.0	Web 2.0	Web 3.0
Concept	The read only web.	The wildly read-write web.	The portable personal web.
Defined as	Web 1.0 is all about static content, one way publishing of content without any realinteraction between readers or publishers or	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.
Direction	Not Available	Upload	Small download/ upload
Content	Owning	Sharing	Consolidating/ Syndication
Relation	Person to person	Many-to-many	Many-to many- to one place
Access to E-gadgets	Computers (Mobile iPhone)	Laptop	All communication devices
Focus	Companies	Community	Individual
Bandwidth	Low	High	Cloud Computing
Networks	Not Available	Online social networks	Semantic social networks
Search Engines	Search engines hopefully retrieve macro contents. Search is very fast butmany times results are inaccurate or more than users can chew.	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.	Search engines will 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.
Commu-nication	Information Sharing	Interaction	Immersion

Contd...

Users	Million	Billions	Unlimited
Advancement	The web in the beginning when it was firstdevelop-ingweb 1.0	New advances that allow a much more sophisticated user interaction with web pages–citizen journa-lism social networks and Wikis are all pro-ducts 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
Examples	Personal web sites, Content Manage-ment, Wikipedia	Google personalized, DumpFind, Hakia Google scholar Wikis,	Semantic Search: SWSE, Swoogle, Intellidimension Book search Semantic
Digital	Semantic Wikis: SemanticSystem, AltaVista, Google, Citeseer, Project Gutenberg, Message boards, Buddy Lists, Address book.	Wikipedia Blogs Two way web pages, Wikis, video, pod casts, shading, Personal publishing, portals	Libraries: Semantic Wikis: Semantic MediaWiki, SemperWiki, Platypus, dbpedia, Rhizome Semantic Blogs: SemiBlog, Haystack, Semblog, Structured Blogging 3D portals, avtar representation, Interoperable profits, multi-user2D virtual environment (MUVEs), Integrated games, education and business, all media flows in and out of virtual Web worlds

web 1.0, was about connecting information and getting on the net. Web 2.0 is about connecting people putting the "I" in user interface, and the "we" into a web of social participation. The next stage, web 3.0, is about representing meanings, connecting knowledge, and putting them to work in ways that make our experience of internet more relevant, useful, and enjoyable.

Web 2.0 technologies propose lightweight easy to use technologies for building and exploiting information and converting it into knowledge by means of collective human intelligence. They have proven in practice their workability and effectiveness as a means of offering an opportunity for sharing and collective processing of the knowledge of many educators/ authors. At the same time Web 3.0 promises to "organize the world's information" in a dramatically more logical way than Google can ever achieve with their current engine design. This is especially true from the point of view of machine comprehension as opposed to human

comprehension. The Semantic Web requires the use of a declarative ontological language like OWL to produce domain-specific ontologies that machines can use to reason about information and make new conclusions, not simply match keywords. Web 2.0 allows a much more sophisticated user interaction with web pages–social networks and Wikis are all products of Web 2.0 whereas in Web 3.0 the web is more interactive with users, leading to a kind of artificial intelligence.

81. KEY CONCEPTS

8.1 Ajax – Asynchronous JavaScript and XML is a combination of XML and JavaScript that allows for the creation of dynamic web applications that are executed on the client, thus reducing data traffic and the server's work load.

8.2 API – Application Programming Interface is a software communication interface, which is a set of functions and procedures that allow different software to communicate with each other. This way software can be used to generate different applications, exploiting its functions without having to reprogram everything again.

8.3 Blog – A blog is a periodically updated website that compiles texts or articles from one or several authors in chronological order.

8.4 Cloud Computing – Cloud computing is Internet-based computing, whereby shared resources, software, and information are provided to computers and other devices on demand, like the electricity grid.

8.5 Mashup – Mashup is a hybrid web application that uses content from other Web applications to create a new complete content.

8.6 Ontologies – Ontologies is a formal representation of knowledge as a set of concepts within a domain, and the relationships between those concepts.

8.7 P2P – Peer-to-peer involves a network without fixed clients or servers. Instead it is a series of nodes that are simultaneously shared as clients and servers of the other Internet nodes.

8.8 Podcast – This is the syndication of sound files, usually MP3, with an RSS system, allowing users to subscribe and automatically and periodically download files.

8.9 RSS – Really Simple Syndication is a data format used to syndicate or distribute contents to subscribers of a website. This format facilitates the distribution of news on a website without the need for visiting all of the pages. The format is in XML, thus requiring an RSS feed or reader to be able to view the contents.

8.10 Semantic Web – The Semantic Web is a web that is able to describe things in a way that computers can understand.

8.11 Semantic Wiki – A semantic wiki is a wiki that has an underlying model of the knowledge described in its pages.

8.12 Social Book Marks –These allow you to share personal lists of "favourites" via a public web page, so that other users can participate collaboratively in creating the list of common links. The incorporation of new links means the tagging with keywords that facilitate the classification of the website.

8.13 Social Networks – These are "web services" that allow individuals to create a public or semi-public profile within the online platform, while also allowing for the definition of a list of users which share some form of contact"

8.14 Wiki – This is a type of website where users create, edit, delete or change content; this is an interactive, easy and quick way to make a webpage.

8.15 WSDL – WSDL is an XML format for describing network services as a set of endpoints operating on messages containing either document-oriented or procedure-oriented information.

8.16 XML – Extended Markup Language is an extensible tag meta-language developed by W3C. XML is a standard for the exchange of information structured between different platforms which involves simple technology that includes others that complement it and make it stronger.

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