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Semantic Web against Classic Web (Contender or Natural Evolution)

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Abstract— Semantic Web have been quietly maturing and spreading, and now they provide a clear way to apply a basic level of formal semantics to the infrastructure and pages of the web and make cooperation between human and computers easier. The Semantic Web is a web of data and also referred to as Web 3.0 which is not a separate Web but an extension of the current one. Moreover, Semantic Web is considered a part of artificial intelligence (AI) research field. The Semantic Web is about two things: it is about common formats for integration and combination of data drawn from diverse sources and it is also about language for recording how the data relates to real world objects. This paper briefly describes and compares Semantic Web, Web 1.0 and Web2.0, in addition to different experts' points of views in semantic web as well as it discusses the features and capabilities of Semantic Web.

Keywords— WWW; Web 1.0; Web 2.0; Semantic Web; Ontology; RDF; Twine; Metadata.

I. INTRODUCTION

The web is an increasingly important resource in many aspects of life: education, employment, government, commerce, health care, recreation, and more. The web is a system of interlinked, hypertext documents accessed via the Internet. With a web browser, user views web pages that may contain text, images, videos, and others multimedia and navigates between them using hyperlinks. The web was created in 1989 by Sir Tim Berners-Lee, working at CERN (The European Organization for Nuclear Research) in Geneva, Switzerland. Since then, Berners-Lee has played an active role in guiding the development of web standards (such as the mark up languages in which web pages are composed), in recent years has advocated his vision of a Semantic web [1].

The Semantic Web has no formal definition and it often means different things to different groups of individuals. Nevertheless, the term "Semantic Web" was originally coined by World Wide Web Consortium (W3C) director Sir Tim Berners-Lee [2]. The Semantic Web is an extension of the current Web in which information is more meaningful, better enabling computers and people to work in cooperation. Semantic Web is a web of data not a web of documents like classic web.

One of semantic web goals: for a given resource (could be a person, an idea, an event, or a product, such as a lab top), we would like to know everything that has been said about it. More specifically, we would like to accomplish this goal by collecting as much information as possible about this resource automatically by machine; we will then understand it by making queries against the collected information [3].

The Semantic Web is about two things: it is about common formats for integration and combination of data drawn from diverse sources and how this data is related to real world objects this allows a person, or a machine, to start off in one database, and then move through an unending set of databases which are connected not by wires but by being about the same topic so Semantic Web can be understood as "the Web of meanings".

II. WEB EVOLUTION

A. Web 1.0

In web 1.0, a small number of writers created web pages for a large number of readers. As a result, people could get information by going directly to the source. The World Wide Web (WWW) or Web 1.0 is a system of interlinked, hypertext documents accessed via the Internet [4].

WWW or Web 1.0 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 [5].

B. Web 2.0

Currently, we are in the flourishing stage of Web 2.0, or the "read-write" web as Berners-Lee's describe it (figure 1). The ability to contribute content and interact with other web users has dramatically changed the landscape of the web in a short time. In alluding to the version numbers that commonly designate software upgrades, the phrase "Web 2.0" hints at an improved form of the WWW. Technologies such as weblogs (blogs), social bookmarking, wikis, podcasts, RSS feeds (and other forms of many-to-many publishing), social software, web APIs, and online web services such as eBay and Gmail provide enhancements over read-only websites. Web 2.0 has been described as "an idea in people's heads rather than reality. It's actually an idea that the reciprocity between the user and the provider is what's emphasized. In other words, genuine interactivity, if you like, simply because people can upload as well as download [4, 6].

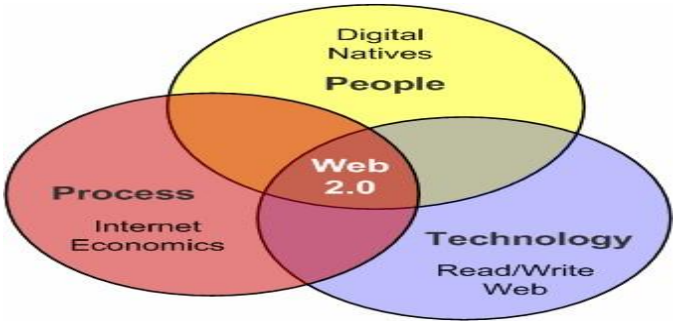

Figure 1. Web 2.0

Tim O'Reilly popularized web 2.0 as an expression when he wrote a fairly coherent definition. Web 2.0 is definitely the next big thing in the WWW; it makes use of latest technologies and concepts in order to make the user experience more interactive, useful and interconnecting. It has brought yet another way to interconnect the world by means of collecting information and allowing it to be shared affectively. It definitely has a bright future with so many Web 2.0 based websites coming up. It is a revolution in the field of computers and will definitely achieve far greater success [7].

The term Web 2.0 has been around since about October 2004. From Wikipedia, the free Web encyclopaedia, it is defined as Web 2.0 is a term often applied to a perceived ongoing transition of the WWW from a collection of websites to a computing platform serving web applications to end users. Ultimately web 2.0 services are expected to replace desktop computing applications for many purposes [8, 9].

Web 2.0 Website Types:

Audio	Blog Pod	Blogging	Bookmarking	Calendar
Chats	Collaboration	Communication	Community	CRM
E-commerce	E-learning	E-mail	Files Sharing	Forums
Games	Images	Knowledge	Base Lists	Mapping
Mashups	Multi-media	Portals	RSS	Wiki

C. *Disadvantage Of Web 2.0*

A major disadvantage associated with Web 2.0 is that the websites become vulnerable to abuse since, anyone can edit the content of a Web 2.0 site. It is possible for a person to purposely damage or destroy the content of a website. In the other hand, gives everyone the opportunity to complain, thus creating a community without rules. The other disadvantage associated with Web 2.0 is that it offers anonymity to the person who edits the content. This pitfall can be exploited by a person who wants to publish some malicious content. Also, it leads to a low quality of the actual content.

Web 2.0 also has to address the issues of privacy. Take the example of YouTube. It allows any person to upload a video. But what if the video recording was done without the knowledge of the person who is being shown in the video? Thus, many experts believe that Web 2.0 might put the privacy of a person at stake [10].

III. THE SEMANTIC WEB (WEB 3.0)

The first incarnation of the Semantic Web was meant to encourage the creators of web-pages to provide some form of metadata (data about data) to their web-page, so simple facts like identity of the author of a web-page could be made accessible to machines [11].

This approach hopes that people, instead of hiding the useful content of their web pages within text and pictures that was only easily readable by humans, would create machine-readable metadata to allow machines to access their information. To make assertions and inferences from metadata, inference engines would be used. The formal framework for this metadata, called the Resource Description Framework (RDF), was drafted by Hayes, one of the pioneers of artificial intelligence. RDF is a simple language for creating assertions about propositions. The basic concept of RDF is that of the "triple": any statement can be composed into subject, predicate, and object [3].

The Web Ontology Language (OWL) is more expressive than RDF. The Semantic Web paradigm made one small but fundamental change to the architecture of the Web: a resource (that is, anything that can be identified by a URI (Uniform

Resource Identifier)) can be about anything. This means that URIs, that were formerly used to denote mostly web-pages or anything from things whose physical existence is outside the Web to abstract concepts [12].

A. Growing Of Semantic Web

In 2006, Tim Berners-Lee, James Hendler and Ora Lassila unveiled a new vision of the Semantic Web: a highly interconnected network of data that could be easily accessed and understood by any desktop or handheld machine (figure 2, 3). They painted a future of intelligent software agents that would head out on the WWW and automatically book flights and hotels for our trips, update our medical records and give us a single, customized answer to a particular question without searching for information or navigating through results. They also presented the young technologies that would make this vision come true: a common language for representing data that could be understood by all kinds of software agents; ontology—sets of statements—that translate information from disparate databases into common terms; and rules that allow software agents to reason about the information described in those terms. The data format, ontology and reasoning software would operate like one big application on the WWW analysing all the raw data stored in online databases as well as all the data about the text, images, video and communications the Web contained [13, 14].

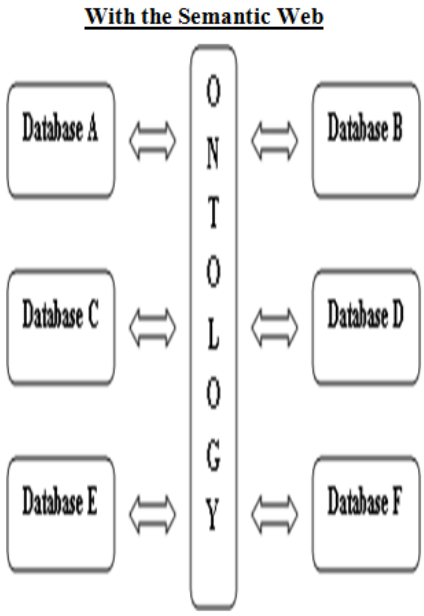

Figure 2.Data Structure with Semantic Web

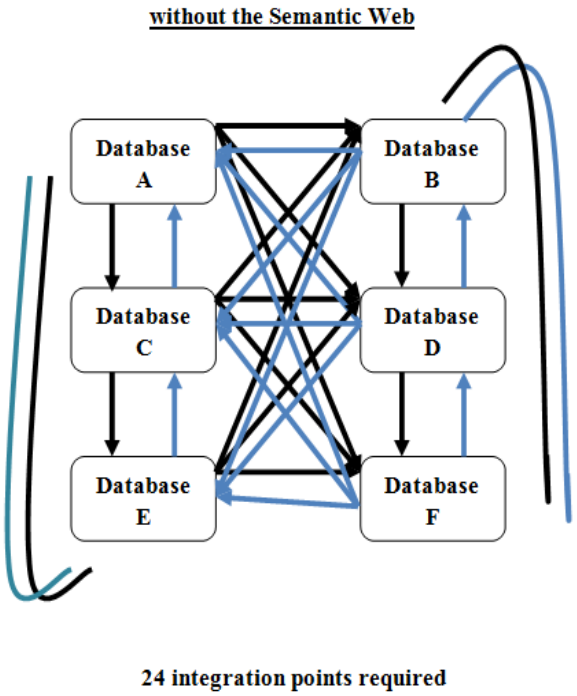

Figure 3.Data Structure without Semantic Web

B. Semantic Web v/s World Wide Web

The Semantic Web is not different from the WWW. It is an enhancement that gives the Web far greater utility. As more groups develop these taxonomies, Semantic Web tools allow them to link their schemes and translate their terms, gradually expanding the number of people and communities whose Web software can understand one another automatically [3]. Perhaps the most visible examples are the tagging systems that have flourished on the Web. These systems include del.icio.us, Digg and the DOI system used by publishers, as well as the sets of custom tags available on social sites such as MySpace and Flickr [15]. In these schemes, people select common terms to describe information they find or post on certain Web sites. Those efforts, in turn, enable Web programs and browsers to find and crudely understand the tagged information—such as finding all Flickr photographs of sunrises and sunsets taken in Giza pyramids (figure 4).

"Tags are generally single words, as most tagging technologies do not allow multiple word (phrase) tags. Also, users cannot associate a context or description with the tags. For example, a user may tag a picture as "cat". Alone, this tag (cat) could have a variety of meanings (e.g., animal, clothes, person, vehicles etc). Adding context to the tag (e.g., Omar's cat plays in the garden) could give users a better understanding of what to expect when they click on the tag. Additionally, different users can use the same tag with different meanings, thus making tags semantically imprecise. For example, pictures tagged as "cat" will not show up when a user searches for content associated with the tag "kitten". Therefore, as the tag space grows, the value of tags may diminish".

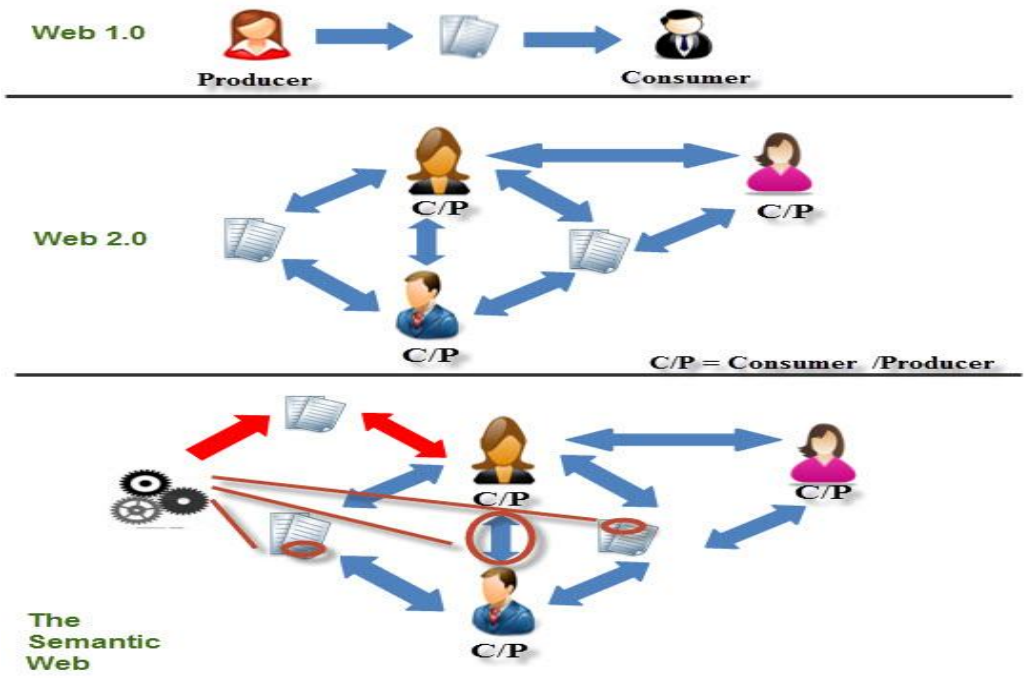

Figure 4. The growth of Web

An example for the linking of similar objects through tags is shown in (figure 5), the ontology can also enable users to add description to their tags, thus making tags more understandable, informative (more semantics), and easy to locate. Additionally, it also results in more precise and specific searches and captures the users' behaviour, usage of words, etc. For example, consider two tags—one that reads "sunrise at great Pyramid", the other that reads "sunset at sphinx". A user may search for content with tags "sunset in Giza pyramids area". Using the ontology and the semantic web, the machine may identify that great pyramid and sphinx are both in Giza pyramids area and hence display both results [14, 16].

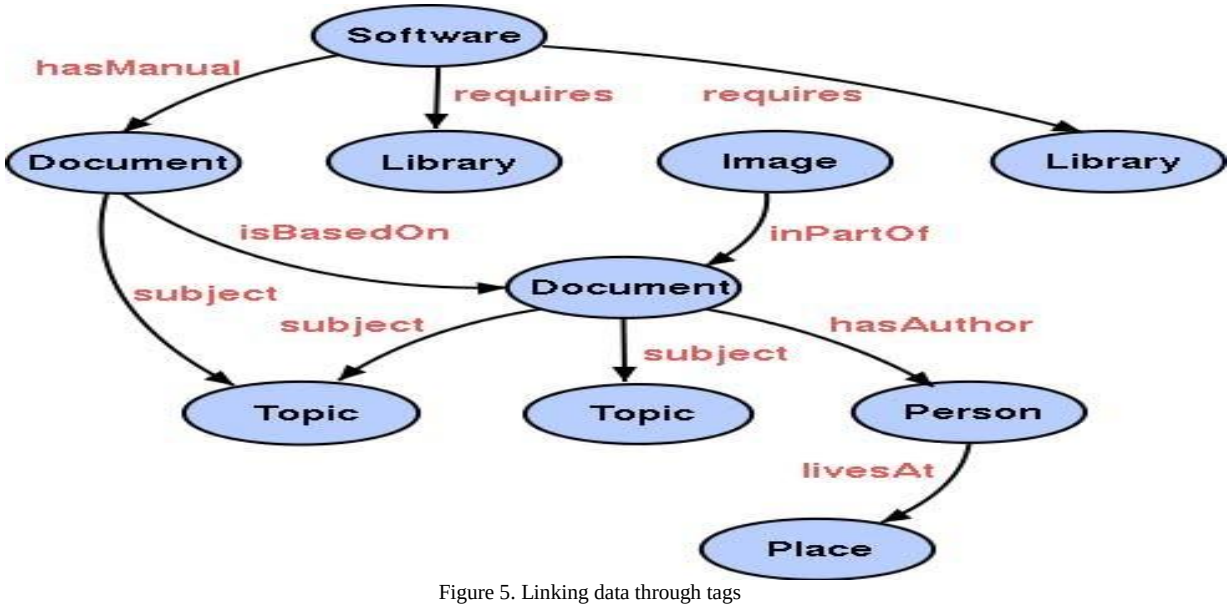

Figure 5. Linking data through tags

C. Comparison Between Web 1.0, Web 2.0 and Web 3.0 (Semantic Web):

The development of techniques used in different versions of web (1.0, 2.0 and 3.0) made dramatically increase the number of sites and users during only 2 decades as shown in figure 6.

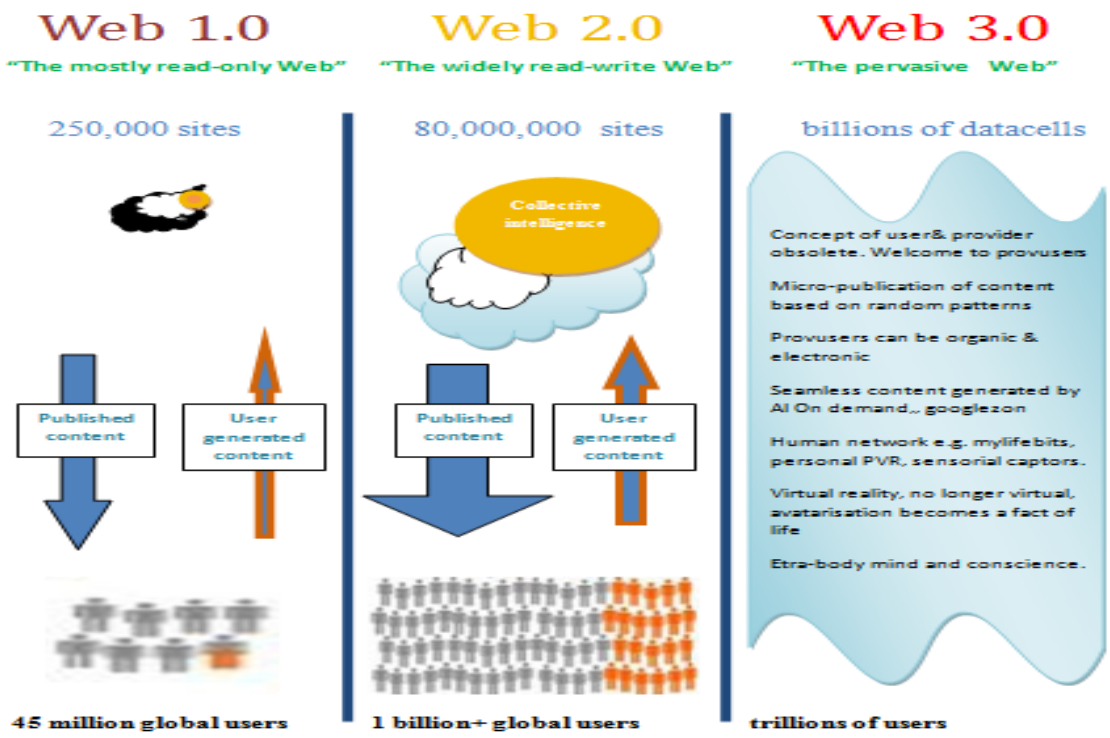

Figure 6. No. of sites and users in different web versions

A detailed comparison between Web 1.0, Web 2.0 and Web 3.0 is tabulated in table 1.0.

TABLE I
COMPARISON BETWEEN WEB 1.0, WEB 2.0 AND WEB 3.0

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	Billion of users	Trillion of users
Ecosystem	Participation	Understanding itself
Connect information	Connect people	Connect knowledge
The Hypertext/CGI Web. (the basics)	The Community Web (for people: apps/sites connecting them)	The Semantic Web (for machines)
Pushed web, text/graphics based flash.	Two way web pages, Wikis, video, pod casts, shading, Personal publishing, 2D portals.	3D portals, avatar 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. FaceBook, 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 users can chew.	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.
Table 1. continued		
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	Thought to be the future – where the web is more interactive with users,

	pages, citizen journalism, social networks and Wikis are all products of Web 2.0	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 Media Wiki, 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: JeromDl, 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, People Aggregator
		Semantic Social Information Spaces: Nepomuk, Gnowsis

IV. ADDITIONAL BUILDING BLOCKS

Building blocks are built around the central notion of Semantic Web. Some examples are:

- Data interchange formats (e.g. RDF/XML, N3, Turtle, N-Triples).
- Tools to query information described through relationships (e.g., SPARQL).
- Tools to have a finer and more detailed classification and characterization of those relationships as well as the resources being characterized (e.g. RDF Schemas, OWL, SKOS).
- For more complex cases, tools are available to define logical relationships among resources and their relationships (e.g. OWL, Rules).
- Tools to extract from, and to bind to traditional data sources to ensure their interchange with data from other sources. (e.g., GRDDL, RDFa).
- **Semantic publishing** on the Web or semantic web publishing refers to publishing information on the web as documents accompanied by semantic mark up. Semantic publication is intended to provide a way for computers to understand the structure and even the meaning of the published information, making information search and data integration more efficient [3, 17, 18].

A. *RDF (Resource Description Framework)*

Semantic web depend on RDF as a standard model for exchange data on the Web and facilitate merging for different schemas. RDF extends the linking structure of the Web to use URIs to name the relationship between things as well as the two ends of the link resource and object (this is usually referred to as a "triple"). This linking structure forms a directed, labelled graph, where the edges represent the named link between two resources, represented by the graph nodes [3].

B. *SKOS (The Simple Knowledge Organization System)*

SKOS is ontology for expressing the basic structure and content of concept schemes such as thesauri, classification schemes, and subject heading lists, taxonomies, glossaries, folksonomies, and other types of controlled vocabularies acting as a bridging technology, providing the missing link between ontology languages such as OWL and the chaotic, informal and weakly-structured world of social approaches to information management, as exemplified by social tagging applications [13].

C. *Commercial Benefits*

With semantic web, additional benefits will be gained without changing the look of browser as already some web sites use this technology in the background like Sun, Vodafone, Nokia and Yahoo. Oracle, IBM, Adobe, Vodafone, or Yahoo! are only some of the large corporations that have picked up this technology already and are selling tools as well as complete business solutions[5].

D. *Semantic Web is Considered as Artificial Intelligence*

Knowledge representation, model theory and various types of logics in semantic web are considered as AI. The development of the Semantic Web brought some new perspectives to the AI community: the "Web effect", i.e., the merge of knowledge coming from different sources, usage of URIs, the necessity to reason with incomplete data. The first major difference between early AI and the Semantic Web is that the Semantic Web is clearly not pursuing the original goal of AI as stated by the Dartmouth Proposal: "human-level intelligence". The goal of the Semantic Web is more modest and in line with later AI research, that of creating machines capable of exhibiting "intelligent" behaviour. However, there are reasons that the Semantic Web engineers have for their hope that their project might fulfil some of the goals of artificial intelligence, in particular the goal of creating usable ontology of the real world [13].

V. SEMANTIC WEB ADVANTAGES AND DISADVANTAGES

Advantages:

With Internet connectivity everywhere and overabundance of available information the infrastructure for communication is in place. Still, information and services are distributed, often hard to find and hard to integrate. This results in a higher cost to find relevant information and get value from it. Several aspects are fuelling the semantic web effort:

- Increased cost pressure and competition require businesses to reduce costs by interconnecting workflows and business processes and simplifying the effort of data and service sharing.
- Portal implementation within organizations and e-Government in almost every developed country are aiming to unify access to government information and services.
- Increase automation, interoperability and scalability.
- Semantic web achieve good results in research and commercial.
  - A research team at Cincinnati Children's Hospital Medical Center is leveraging semantic capabilities to find the underlying genetic causes of cardiovascular diseases.
  - DBpedia is an effort to smartly link information within Wikipedia's seven million articles. This project will allow users to perform complex and detailed searches of Wikipedia's content that are impossible today. Also for enhance interactive search in e-bay and Amazon.
  - Early adopters have agreed on standards of the Semantic Web practical to use. Large companies have major projects under way that will greatly improve the efficiencies of in-house operations and of scientific research. Other firms are using the Semantic Web to enhance business-to-business interactions and to build the hidden data-processing structures, or back ends, behind new consumer services.

Examples:

- British Telecom prototyping a Semantic Web service to coordinate vendors.
- Boeing- exploring Semantic Web technologies for collaborative airplane design.
- Chevron - experimenting with Semantic Web for managing refineries' life cycles.
- Pfizer-uses Semantic Web technologies to identify otherwise obscure correlations.
- Successful running applications based on semantic web technology.
- Vodafone live!, Harper's Magazine, FOAF (friend-of-a-friend project), LiveJournal, TypePad, Garlik (merge personal information databases to create a unified view of online identity) , Science Commons [13].

Disadvantages:

The first generation of semantic web application like Twine looks at content and parses it automatically for the names of people, places, organizations and other subject tags. But it still has many problems

- Twine has a lot of bugs.
- Twine is Poorly Organized.
- Twine gives Wrong Inferences [19].
-

VI. EXPERTS' SAY

Parth agrawal and Robert Cairo are saying the semantic web won't work, can't work without cooperation between W3C and all big companies. Yahoo, MySpace and Google are against semantic web and they turn off their API's. The Semantic Web will never work because it depends on businesses working together, on them cooperating. We are talking about the most conservative bunch of people in the world, people who believe in greed and cut-throat business ethics, people who would steal one another's property if it weren't nailed down. The people who designed the Semantic believed everyone would work together - would agree on web standards - would adopt a common vocabulary - would reliably expose their APIs so anyone could use them [13].

VII. CONCLUSIONS

In this paper the basic comparison of Web 1.0, Web 2.0 and semantic Web is made. The conclusion being-though they are not contenders of each other but surely quite different from each other and they complement each others. The Semantic Web needs the basic structure of Web 2.0 to enhance the user experience. It is enhancement or add on to the current Web2.0 and surely would lead to a better breed of search engines and minimize search times. The obstacle is just in the cooperation between the creator of this technology and big companies. The barriers of public data secrecy should be done away with which would also add a new dimension to the already raging war of supremacy among the internet based companies. The research in this area achieve great results in many field but need the support from all big companies to follow the new technology and work for the development of science not only for money.

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