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Systematisation of Internet by Web Semantics

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ABSTRACT

We use Web within our own semantic context as we are blessed with intuitiveness. We visually deduce and coordinate context by looking at images and text on web sites. Machines are really fast but also incredibly dumb so don't have any of these capabilities. The Semantic Web is about capacitating machines by formatting data in intelligible format to machines. The classic example for this would be the efforts for consolidating geographic data on Web.

Fifty years ago it appeared dauntless for building global web of info and deploying semantics on such a scale and to attempt inference over the resulting components. Today the Semantic Web is attainable. The goal of semantic web research is to allow the vast range of web-accessible information and services to be more effectively exploited by both humans and automated tools. RDF and OWL have been developed as standard formats for sharing of data and knowledge in form of rich conceptual schemas called ontologies. These languages and tools developed to support them are rapidly becoming standards for ontology development and deployment.

Key Words: CDN (Content Delivery Network)

1. INTRODUCTION

With phenomenal successful of World Wide Web, contents over the Web consists of millions & millions of hypermedia files accessible via combination of keyword based search and link navigation. This massive range of web content has emphasized shortcomings in hypertext prototype.

The aim of the semantic web is "*To allow data to be shared effectively by wider communities and to be processed automatically by tools as well as manually*". It helps machines in answering complicated queries, information retrieval, integration and processing.

The major hurdles in this approach is that most web content is primarily intended for presentation to and consumption by human users but poses issues for software agents. The key idea behind semantic web is to address this problem by providing machine accessible semantics to annotations by using ontologies- Rich conceptual schemas *(The method of giving formally defined meaning to terms used in annotations & transforming them into semantic annotations)*

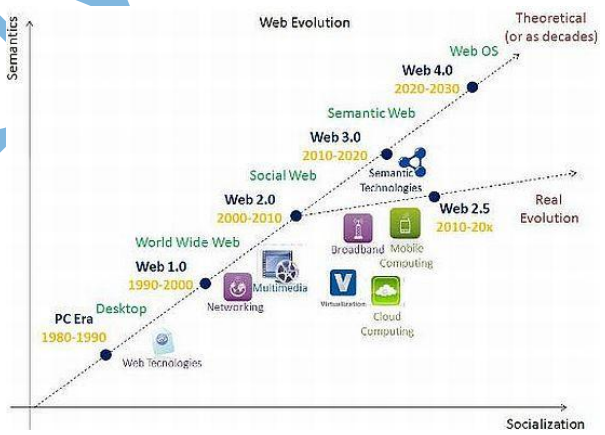

Figure 1: The graph showing web evolution in terms of graph of Semantics vs Socialization

The Semantic Web is not distinct web rather it's an extension for the current one in which information must have well-defined meaning thereby enabling computers and people to work in cooperation. The steps for inter-weaving Semantics into structure of existing Web are already under way. These developments presents significant newer functionalities as machines become intellectual to process and understand the data that before-hand was merely meant for display!

2. HOW TO STEP FORWARD FOR SYSTEMATISATION PROCESS

How the semantic web would function? The answer to this question lies in the fact that the computers must be availed to have the access to structured information via prescribed inference rules for automated reasoning. The research in Artificial Intelligence called as ***"Knowledge Representation"*** has proven itself, but hasn't realized its full potential over single global platform.

Traditional systems have been centralized which is restraining and with time the size and scope for these systems becomes unmanageable. In addition to that these systems usually limits the interrogation with computer for reliable answers. Semantic Web researchers have assumed that *'The inconsistencies and unanswerable questions are consequences for achieving versatility'*. The challenges are integration of language that expresses both data and rules for reasoning about data along-with allowed rules from any existing knowledge representation system to be exported onto the Web.

3. ADDING LOGIC TO WEB

This's not as easy as it sounds! The mathematical & engineering decisions complicate these tasks. The logic proposed must be substantial enough for describing complex properties for objects. We have two technologies for development and integration of Semantic Web into the existing Web as Extensible Mark-up Language (XML) and Resource Description Frame work (RDF).

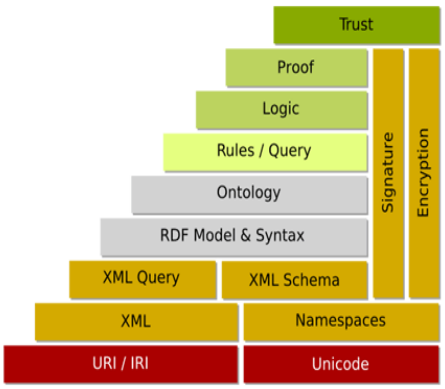

Figure 2: The building layers and abstract components of Web Semantics

1) **XML**: It lets everyone devise their own tags like unrevealing labels such as <zip code> or <alma mater> for the annotation of Web pages or Text on Website. The programs further use these tags in knowledgeable ways, provided that script writer know what each tags are used for. It empowers users to add arbitrary structure in documents without mentioning nothing about meaning of structures.

2) **RDF:** The meanings are expressed by the defined structures as given by RDF via encoding it in sets of triples. Each triple resembles like the subject, verb and object of an elementary sentence. These triples can be written using XML tags. In RDF the assertions are made via documents that specific things have special properties along-with certain values.

This's the natural way for describing majority of processed data by machines. The **"Subjects"** and **"Object"** are identified by Universal Resource Identifier (URI). A mailing address can be distinguished from street address and both can be distinguished from an address that is speech. As RDF records URIs for encoding this information in document, the URIs ensure that concepts are not just words in a document but are tied to a unique definition that everyone can find on the Web. This binding of information with the unique definition that is locatable over the entire globe makes Semantics!

4. AMBIGUITIES IN TWO APPROACHES

Well everything can't be all right when two databases are using different identifiers, say postal code. The scripts that aims at comparing information across two databases must infer that these two terms means the same thing. These problems are resolved by introducing third basic component of the Semantic Web called ontology- *The collection of information*.

For web researchers ontology is document/file that defines the relations among terms. The relationship among entities are very crucial tool for Web. By permitting subclasses for inheriting properties we can express number of relations among entities. If postal code must be of type "CITY" and all cities have Web sites implies that Web site is associated with "POSTAL CODE".

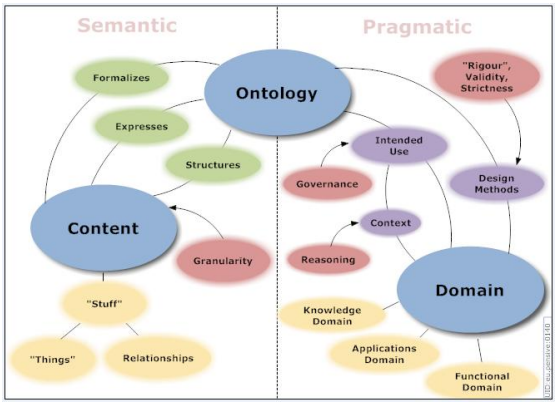

Figure 3: The relationship diagram among components

The machine don't understand any of this information, but can draw the inferences by manipulation of terms more effectively useful for end users and computers. The semantics underlined by ontologies makes it feasible for Service Provider to provide services and make its use more unambiguous! The substantial power of Semantics will be realized when programs exists for collecting Web content from divergent sources, process information and exchanging results with other scripts. An intelligent agent (or simply an agent) on Internet is program for the aggregation of information or performing service without immediate presence on scheduled basis.

An agent program looks (crawl) all or some part of Web to gather information and present it on daily or periodic basis. For personalization of information on Web site based on usage analytics, bots are used. Some site watchers notifies user whenever site is updated.

5. ROLE OF EVOLUTION IN KNOWLEDGE

With the Semantic Web every concept can be named by a URI, that lets anyone to express new concepts with slightest efforts. This unified language links concepts and Universal Web flawlessly. Human attempts are entangled between the effectiveness in small groups and wider communities. While smaller groups innovate rapidly and efficiently can produce subcultures which aren't understood by others. On the other hand, the coordination across large group is incredibly slow.

The real world fits across these extremes. Henceforth, it becomes mandatory to describe the relations between two working groups, in order for the seamless merging of the subcultures.

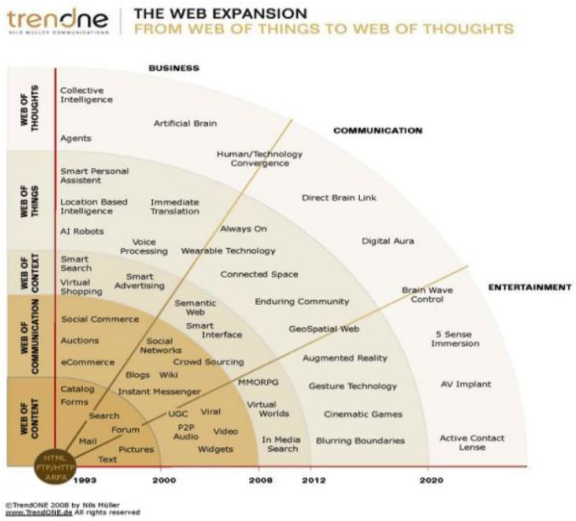

Figure 4: The diagram to illustrate web expansion

This opens up knowledge and working of humankind to meaningful analysis by software agents providing tools to collaborate with each other.

6. WHAT'S THE NEXT BIG THING

We have already seen an increasing need and arising obligations from organizations to make their data available. This data revolution presents us substantial research challenges. What's the effective way for querying huge numbers of decentralized information repositories that too with varying scales? How mappings are done among these ontologies?

The Semantics substantially reuses existing ontologies and data. The data is enriched and added to *Information Space*. It lets anyone discover related information that's the sign for uptakes in Web Semantics. The idea for building Semantic Web browser for effective visualization of huge connected RDF graph. The complications arises while we are authenticating the content. The circumstances under which data originates becomes key requirement in many applications.

The Web heavily relies over people content & ensures their authenticity. The Websites like www.creativecommons.org is an RDF-based representation of copyright policy to facilitate and maximize reuses. The *policy-aware* researches poses civic rules expected in Semantic Web environment.

The URL fundamentals brings out the principle that every Web addresses are equal. These reflections of present Web reflects what developments we expect. The Ontology Engineering and Knowledge Representation are

trying to capture aspects of shared conceptualizations.

We must impose methods over complex computational facts for confirmation that our existing concepts conforms the modern reliability design requirements. The local-scale changes in Web architecture may lead to large-scale societal and technical effects. These methodologies and challenges gives rise to Semantic Web, along-with contribution to the Web Science*(The field that seeks to develop, deploy and understand distributed information systems, systems of humans and machines all of them operating on a global scale)*.

Artificial Intelligence imposes functional and logical methods to understand distributed systems, pattern detection, data mining tools, ontological engineering and knowledge representation.

Finally, the processes involve creation of value chain in which sub-classes of information are passed from one agent to another with each step adding value for building final information requested by the human user. Web agents may harness AI (Artificial Intelligence) technologies along-with Semantics.

6. Conclusion: *The essential property of the World Wide Web is its universality*. Well there seems no upper boundaries for optimizations! The semantic web is not merely the tool for conducting individual tasks that we have discussed so far. In addition, if properly designed, the Semantic Web can assist the evolution of human knowledge as a whole.

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