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Web-based Simulation Using Semantic Web

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The area of Web-Based Simulation (WBS) has been grown rapidly. On the other hand, semantic web has attracted significant attention during the last decade. One of the missions of the semantic web is to put more knowledge on the web in an organized fashion and link it to other information and data sources and provide a means to relate various information concepts more easily and in a reusable way.
This paper focuses on developing WBS systems using semantic web. To do so, after a short reviewing of semantic web, the advantages and disadvantages of WBS over classical simulation systems are explored. Afterward, the synthesis between semantic web technologies and WBS are discussed in which the semantics of information and services on the web are defined, understand and satisfy the requests of people and machines use the web content. The semantic web acts as an additional layer on the top of the web, and is built around explicit representations of information concepts and their relationships such as ontologies and taxonomies and tries to realize a new modeling method for rapidly constructing simulation systems. It was concluded that the future of WBS may be found in the semantic web. Finally the advantages of using semantic web for WBS are outlined. The results are justified using some simulation experiments.

Keywords:
Web-Based Simulation,Semantic Web,Ontology, Semantic Search Engine

1. Introduction

The Internet and its multimedia front-end, the World-Wide-Web (WWW), has experienced tremendous growth since its development by Tim Berners-Lee of CERN (Centre for European Nuclear Research) in the early 1990s, achieving world wide acceptance [1–6]. Many disciplines are re-evaluating their strategies and techniques in view of the services offered by the Internet [4]. Simulation is no less affected by this technology than any other technique [7], as it represents a fertile area in which to perform computer simulation research [8]. Kuljis and Paul [9] go so far as to state that the pressure imposed by the proliferation of Web uses has forced the simulation community to migrate to the Web in order to stay ‘‘alive”. Whether the Web has enabled, caused or forced the simulation community to move to the Web is open for debate (see [10]), but one thing is clear, it has resulted in the emergence of the area of Web-based simulation (WBS).Web-based simulation is the integeration of the Web with the field of simulation and has been growing during the past few years [11]. It is currently not an existing field, but rather an idea that represents an interest by simulation practitioners to exploit Web technology [12]. It can be defined as the use of resources and technologies offered by the World-Wide-Web (WWW) for interaction with client and server modelling and simulation tools, therefore a common characteristic of all WBS applications is that they use a browser as a support for graphical interfaces connecting the user with simulation [12]. The downloading of a simulation package from a server to the client's computer and its execution as an application wholly independent of the browser and the Web is not included in the Web-based simulation category: a browser always has to play an active role in the modelling or simulation process, either as a mere graphical interface or, additionally, as a container for the simulation numerical engine [12].

Although the notion of Web-based simulation is probably as old as the Web itself [13], early Web-based simulation efforts began in 1995, first by providing Web-front ends to simulations running as Common Gateway Interface (CGI) scripts/programs, and in addition, work began on Java-based simulation packages, systems and environments that would run anywhere on the Web [14,15]. One of the first research papers to describe the issue of WBS as a reality that was already present in the ideas of many computer simulation researchers was a paper by Fishwick [16] at one of the work sessions at the 1996 Winter Simulation Conference in San Francisco [9,12,15–17]. From this event, interest was aroused in the scientific and industrial community leading to sessions devoted solely to numerous aspects of Web-based simulation at international congresses organised by different international scientific associations (IFAC, IEEE, SCS) [12]. At this time, research in the area of Web-based simulation grew rapidly [18]. The first conference dedicated to Web-based modelling and simulation was held in 1998, and covered issues concerning Web agents, distributed simulation, simulation toolkits/products and applications [9,15,17]. This conference was held again in 1999, however in the year 2000 there was a large drop in papers being presented [9]. By this time, Kuljis and Paul [9] note that there were only a few WBS-related papers published in journals. However Miller et al. [15] and Miller et al. [19] report that WBS has exhibited explosive growth in the simulation research community. Indeed, Fishwick [20] notes that the area of WBS had good coverage at conferences and in special journal issues.

Still quite active on the research-side, the area of Web-based simulation is still in its infancy but is maturing, with efforts to expand Web-based simulation to include new capabilities beyond those found in conventional simulation technology or provide interoperation with other information processing technology being particularly promising [12,15]. However, despite the great promise held by Web-based simulation [3], the number of real applications and efficient tools for Web-based simulation is still very small [21]. For example, Wiedemann [21] states that after a review of actual Web-based simulation technologies, a lot of Web-based simulation projects were done as a test scenario, and the requirements of real customers were not taken into account.

The future holds great promise in terms of developing applications in the area of Web-based simulation, with the advent of such Web-related areas as the Semantic Web.

The Semantic Web (SW) is a meta-web built on the existing WWW to facilitate its access. SW expresses and exploits dependencies between web pages to yield focused search results. Manual annotation of web pages towards building a SW is hindered by at least two user dependent factors: users do not agree on an annotation standard, which can be used to extricate their pages inter-dependencies; and they are simply too lazy to use, undertake and maintain annotation of pages.

2:Web-Based simulation advantages and disadvantages

Web-based simulation has many benefits in comparison to classical systems, and many authors attempt to classify these,see [22–24].
A number of advantages of Web-based simulation over classical systems have been identified and can be classified as follows:
● Ease of use. The act of simulation model construction is accepted in the simulation community to be a fundamentally hard problem [25]. According to Kuljis and Paul [9] and Wang and Liao [26], simulation is and always was a highly specialist application area, with a high degree of difficulty. Simulation beginners often spend a great amount of time to accumulate the knowledge as well as the experience to overcome the technical complexity of simulation [27], and even for the experienced user, building, running, and analysing a simulation model can be a very time-consuming and error-prone process [28]. One of the main characteristics of the Web is its ease of navigation and use [9]. Obtaining data from the Web has become second nature to most users [29], and the Internet provides a familiar interface for both interacting with and controlling a simulation. Web-based simulation environments insulate the user from the intricacies involved in utilising third party models and the overheads of distributed simulation [23]. However, as Wiedemann [21] notes, it seems to be very dangerous to make an extrapolation from the ease of use of common Web-based systems to Web-based simulation systems,as the typical work and necessary features are very different.
● Collaboration. Communication and interaction are one of the essential factors to achieve a successful simulation project [26]. It is possible to develop environments with coherent Web-based support for collaborative model development [9], where people can communicate with each other from different places to develop the same simulation model over the Web. Such collaboration can include monitoring and debugging with the help from experts [9,26]. This approach may result in a reduction in simulation model development cost and time, over the use of simulation modelling packages such as Arena and eM-Plant which are only used at a local machine and lack group interaction capability [26].
● Licence and deployment models. The tool can be deployed locally, in an intranet setting or over the Internet, regardless of how it has been developed. The possibility exists to tailor the GUI allowing the use of the application on any device with a relevant Web browser installed. New licence models for simulation software have become possible, which is particularly useful for individuals and small companies where simulation capabilities are only rarely needed [30]. Traditionally,the starting investment for a typical simulation environment or external simulation consultant are on a high level [21]. The risk of losing money rises with increasing investment costs, as the revenue of a simulation study is unknown at the beginning [21]. Web-based simulation allows new business models for the use of simulation services, where these services can be rented for an interval of time (such as in an application server provider (ASP) or software as a service (SaaS) environment [31]) which can result in savings in terms of the possible previous prohibitive factors of time and cost [21].

● Model reuse. Since the appearance of Web-based simulation at the Winter Simulation Conference (see http://www.wintersim.org/) in 1996, the theme of model reuse and its methodological and technological support has attracted much discussion and debate in the modelling and simulation community [32]. The viewpoint of simulation modellers who use COTS simulation packages suggests that model reuse may in fact cost more than developing new models as trust must be established through testing [32]. The Web can support the reuse of existing simulation models very well by its distributed nature and the content management function like search machines and common data access protocols [21].
● Cross-platform capability. The Web allows for the ability to run an application on any Web browser on any operating system without compiling [18,33,34]. This capability relieves the application developer from having to worry about a client's configuration.
● Controlled access. Access can be controlled to a Web-based simulation application through the use of passwords, and limited time-span access can be allocated [18]. Users who need access to specific or limited areas of an application can be given access merely by being added to a password list, instead of having their client machines updated [33].
● Wide availability. A Web-based simulation application can be used from anywhere in the world with an Internet connection and outside of normal business hours without having to transport hardware or software [18,35].
●Versioning, customisation and maintenance. In using a Web-based system, maintenance is minimized [18,34]. All modifications can be made through the server [18], enabling frequent modifications, customisations and updates to be made and instantly distributed to the application, reducing error potential and eliminating virtually all on-site maintenance.
●Integration and interoperability. A Web-based tool can integrate and interoperate with both existing and future Web-based applications, as well as Web-enabled desktop applications [18,33,34].

A number of disadvantages of Web-based simulation over classical systems have also been identified, and these can be classified as follows:

● Loss in speed. The user can experience loss in speed when interacting with the tool due to downloading time and network traffic [33].
● Graphical user interface limitation. The interface provided by the Web as opposed to desktop simulation tools is limited [33], although this is starting to change with the evolution of multimedia authoring tools for the Web. Wiedemann [21] notes that the effort in replicating a complex interface provided by traditional desktop-based simulation tools on the Web is very high and might not be possible.
● Security vulnerability. Web-based applications are more vulnerable to malicious attacks than client-based applications [33]. Also if an ASP or SaaS licensing model is utilised by a company, sensitive data might be stored in a database external to the company [21].
● Web-based simulation application stability. The stability of the Web itself is not affected by the addition of new sites,removal of existing sites or any changes to sites, whereas the stability of a Web-based simulation application can be affected or disabled by, for example, the disappearance of any site that hosts parts of the modelling environment [9].

Any Web-based simulation application should be designed for robustness in coping with this issue.

● Licensing restrictions. If the simulation engine is developed using traditional proprietary simulation software, there may be license restriction issues, as traditional software licenses of simulation packages only allow a single place usage whereas a Web-based system must have the same license model as a network license [21]. This could be overcome through the use of open source simulation software for the simulation engine.

● Difficulty in simplifying simulation. Wiedemann [21] notes that the Web cannot simplify the simulation modelling process in the near future, concluding that simulation models should be developed by using traditional simulation tools, and the Web used to support the reuse of existing simulation models.

3:Review On the Semantic Web[36]

The Semantic Web is now becoming a well-established branch of computer science and software engineering with its own standards, languages, technologies and applications. It is also a foundation for what is termed 'Web Science', where the Web itself is the object of a dedicated science of its own when it is deployed in a wide range of domains.1 There are a number of research institutes now feeding new knowledge into the associated research community , and a large number of new and existing industries are deploying Semantic Web techniques to provide goods and services to customers. While the World Wide Web and its associated technologies and applications have become a 'disruptive technology' over a relatively short period of time, it remains to be seen whether the Semantic Web with its related new technologies and applications will do the same. There are nevertheless some encouraging indications. The number of new business start-ups that now deploy Semantic Web technologies has become noticeable. Web 2.0 companies such as Freebase, Faviki and Zemanta have embraced Semantic Web technologies. The New York Times also identified commercial industries around the world that are using Semantic Web technologies as part of their core business offerings to customers [37]. Giants such as Oracle,Vodafone, Amazon, Adobe, Microsoft, Yahoo and Google are now experimenting with Semantic Web technologies to provide new value to customers [38], with some recent efforts including the Yahoo! SearchMonkey search engine [39] and Google's support in indexing structured RDF information from the Web.2

The core of the Semantic Web contains a number of fundamental formal models, languages and technologies for interoperability and reuse of information, including RDF, RDFS, the OWL family of languages, the WSML family of languages and SPARQL. Semantic Web Services build on the Semantic Web and previous work regarding Web Services to power semi-automated or automated interoperable applications.

The 'Semantic Web' can be thought of as the next generation of the Web where computers that can aid humans with their daily web-related tasks as more meaningful structured information is added to the Web (manually and automatically) [40]. For example,using a combination of facts like ''John works_at NUI Galway'',''Mary knows John'', ''a Person works_at an Organisation'', and ''a Person knows a Person'', you can allow computers to answer relatively straightforward questions like ''Find me all the people who know others who work at NUI Galway'' which at this moment is quite difficult to do without significant manual processing of the information returned from search results. The Semantic Web represents these facts through the use of metadata that is associated with Web resources, and behind this metadata there are specific vocabularies or 'ontologies' [41] that describe what are the semantics (or meaning) of this metadata and how it is all related to each other. Metadata can be thought of as 'data about data'. Similar to how librarians traditionally put information about books into catalogues or library cards, metadata on the Web commonly refers to descriptive information about Web resources that can support a wide range of operations [42] ranging from retrieving to recontextualising content. Metadata elements are used to give structure to the description of a resource. For example in an educational course, metadata elements will include title, description,keywords, author, educational level, version, location,language, date created, and so on. RDF (Resource Description Framework) is used to express metadata about resources [43] while these resources are defined using URIs (Uniform Resource Identifier) such that they are provided with unique and nonambiguous identifiers at Web-scale, enabling interoperability between various applications. Led by the W3C consortium, RDF is supported by a wide range of stakeholders ranging from digital librarians to B2B industries and has achieved significant industrial momentum.

RDF consists of two aspects: a graph-based abstract model for the data (made up of multiple statements, or triples) and the RDF syntax (with a variety of serialisations to represent these triples in a computer-readable form such as N3, Turtle, RDF/XML or RDFa which allows RDF annotations to be directly embedded within XHTML pages). For example, to say that Alice knows Bob, we could use the Notation3 (N3) syntax for the corresponding RDF triple: ''http://example.org#Alicehttp://xmlns.com/foaf/0.1/knowshttp://example.org/#Bob''. All triples are in the form of a directed graph, from subject via a directed arc (the predicate) to an object. In the previous example, Alice would be the subject, the 'knows' relationship is the predicate and Bob is the object. URIs are normally used to give identifiers to the subject, predicate and object, but the object may sometimes be a literal or text string if an attribute is to be assigned to a subject, e.g. ''http://example.org#Alice http://xmlns.com/foaf/0.1/name 'Alice Cooper'''. A sample RDF graph model is shown in Fig. 1. Further structure is provided by a metadata schema or ontology (e.g. as shown in the bottom layer of Fig. 1).

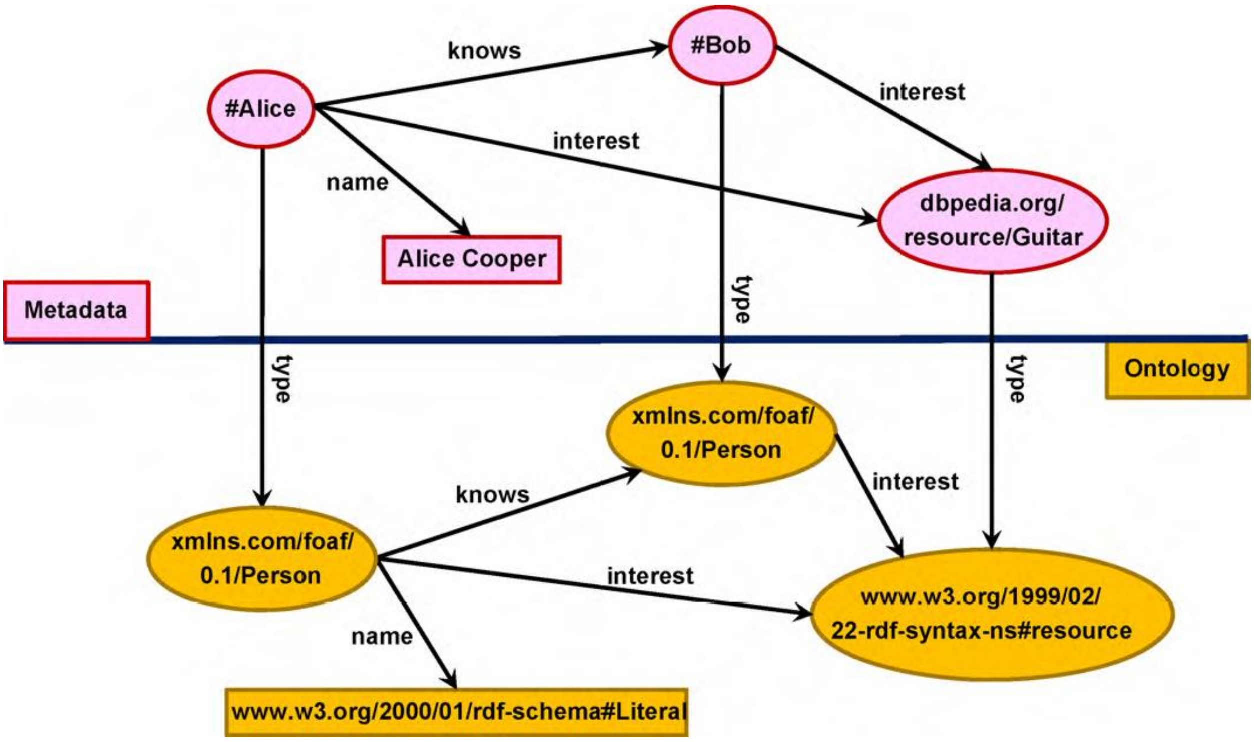

Fig. 1. Metadata and ontologies.

For example, if there is metadata about a soccer team, an underlying ontology will say that a soccer team always has a goalkeeper and always has one and only one manager, so each metadata entry for a soccer team should have that information. Ontologies are formal and consensual specifications of conceptualisations that provide a shared and common understanding of a domain [41]. In order to deploy ontologies on the Web, two languages have been put forward as standard proposals by the W3C, namely RDFS and OWL. RDF schema (RDFS) is commonly used for the definition of RDF ontologies (and written in RDF) on the Semantic Web [8:2]. Some of the more popular Semantic Web lightweight ontologies include FOAF (Friend-of-a-Friend, for social networks) [45], Dublin Core (for resources online or in libraries), SIOC (Semantically-Interlinked Online Communities, for online communities and content) [44], and the Geo vocabulary3 (for geographic locations). Recently, Bizer et al. [46] provided a list of popular and core vocabularies that people should use when publishing data on the Semantic Web as well as some best practices for publishing RDF data on the Web. While popular, RDFS is somewhat limited in various regards. In order to overcome some of the limits of RDFS, ontology developers can use OWL (the Web Ontology Language) [47] (currently being revised towards OWL2)4 to define more precise axioms within their ontologies, for example, transitivity of some properties (e.g. in an ‘‘ancestor’’ property), symmetry (e.g. ‘‘sibling’’) or cardinality constraints (such as the ‘‘has one and only one manager’’ in the previous example). In addition, ontologies also act as a support for reasoning systems, both to derive new facts or to check the consistency of the model. OWL provides three increasingly expressive sublanguages designed for use by specific communities of implementers and users: OWL Lite, OWL DL and OWL Full. OWL Lite supports those users primarily needing a classification hierarchy with simple constraints. OWL DL supports those users who want the maximum expressiveness while retaining computational completeness, whileOWLFull is meant for users who want maximum expressiveness and the syntactic freedom of RDF with no computational guarantees.

Once this metadata has been published, using RDF(S)/OWL,query languages are required to make full use of it. SPARQL (Protocol And RDF Query Language) aims to satisfy this goal and provides both a query language and a protocol for accessing RDF data [48]. SPARQL can be thought of as the SQL of the Semantic Web, and offers a powerful means to query RDF triples and graphs. As Tim Berners-Lee stated5: ‘‘Trying to use the Semantic Web without SPARQL is like trying to use a relational database without SQL. SPARQL makes it possible to query information from databases and other diverse sources in the wild, across the Web.’’ SPARQL is a graph-querying language, which means that the approach is different than SQL where people deal with tables and rows. Since query patterns are based on the RDF graph model, advanced queries are made possible such as ‘‘find every person who knows someone who knows someone else interested in Semantic Web technologies’’. In addition, to overcome some of the current limitations of the language, the SPARQL Working Group in W3C is now working on updating the language and considering some new features such as aggregates and updates [49]. When data is represented using RDF and can be accessed with SPARQL, queries can be created that are relevant to a particular organisation, e.g. ‘‘show me the most popular or least popular reports’’, or ‘‘show me any reports that used some of my data’’. According to Eric Miller from Zepheira [50], this can bring organisations into a ‘‘Linked Enterprise Data’’ (LED) framework,6 a parallel idea to the Linking Open Data7 initiative (a community project focusing on providing interlinked RDF data from existing open sources, leading to the availability of billion of resources and triples on the Web, and based on the Linked Data principles defined in [51]). LED aims to both expose and link enterprise data, while showing that there are benefits in terms of solutions that can be made available immediately. Other components are required to achieve the complete Semantic Web vision, including proof, trust and user interfaces and applications, leading to the Semantic Web stack designed by the W3C as depicted in Fig. 2. Some of these components are described under the discussion on Semantic Web Services.

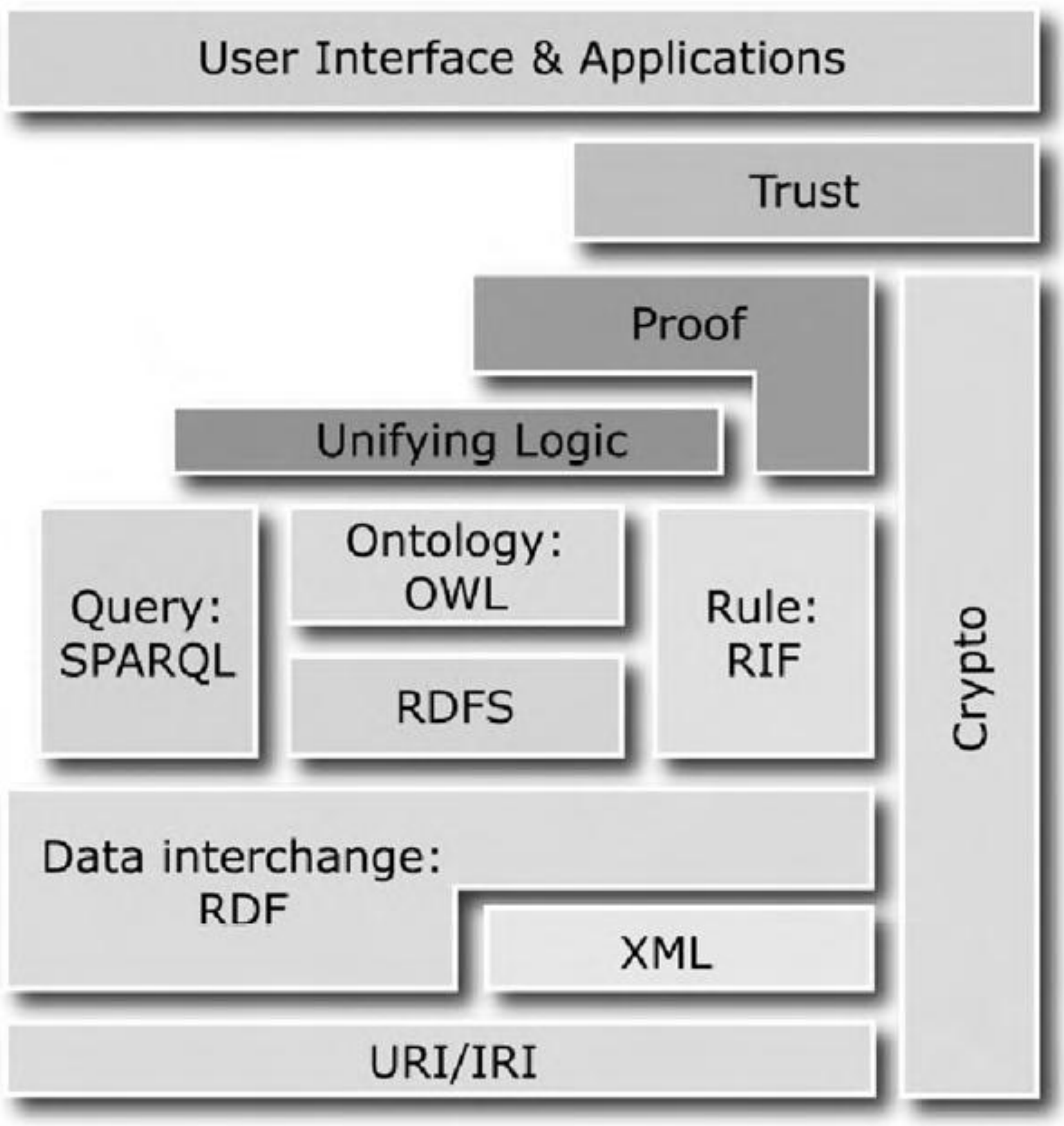

Fig. 2. The Semantic Web stack

3.1:Application Domains of Semantic Web

Three applications domains of Semantic web are Knowledge Management, Enterprise Application Integration and E-Commerce that is shown in Fig3. For more details see[36].

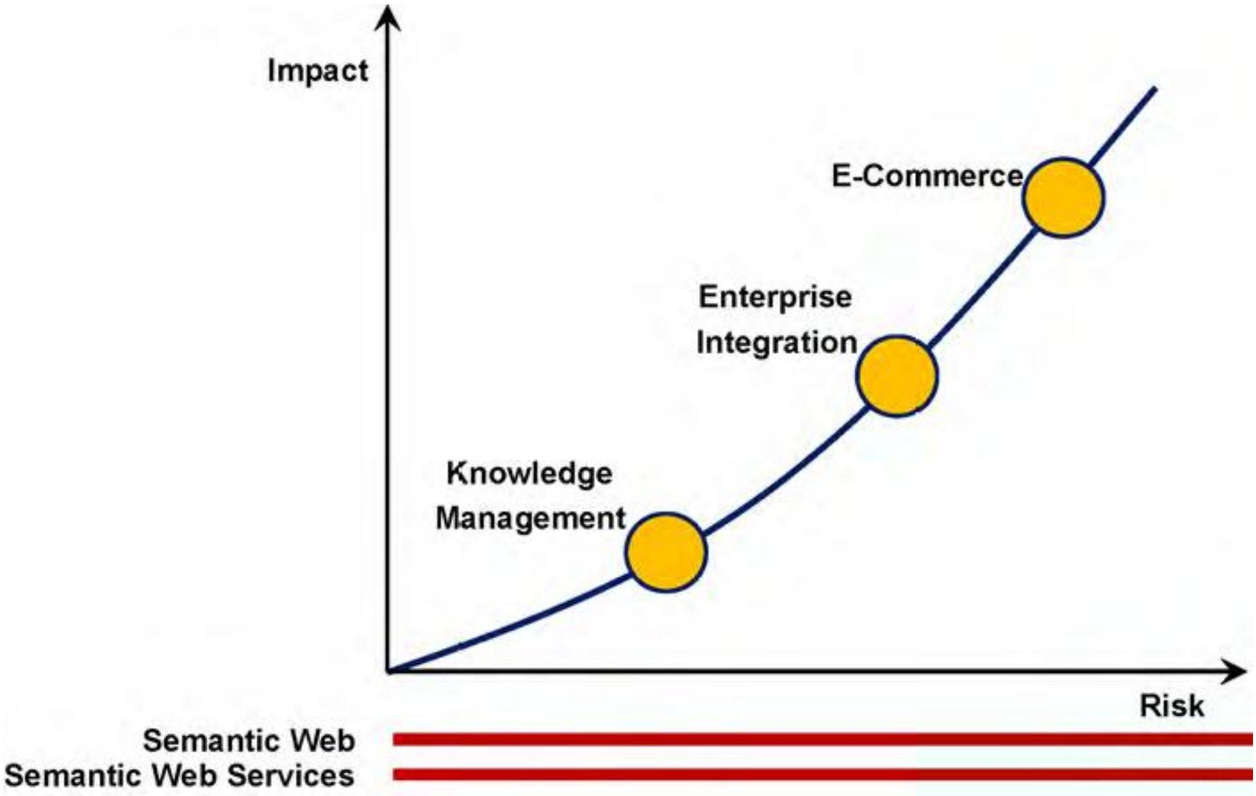

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Fig. 3. Industrial applications for the Semantic Web and Semantic Web Services.

3.1.1: Knowledge Management and the Semantic Web[2]

‘‘Enterprise 2.0’’ [52] describes a next generation of Knowledge Management and collaboration tools being used in organisations, similar to how Web 2.0 is being used to describe a secondgeneration of web-based communities and hosted media services.
It is defined as ‘‘the use of emergent social software platforms within companies, or between companies and their partners or customers’’.For instance, blogs can be used to ease information sharing within organisations [53], wikis can be efficient platforms for collaborative document editing, from project management to software development [54], while microblogging can be used as a means to enhance real-time conversations and questions and answers between employees. Enterprise 2.0 is a new way to share and manage knowledge in industry, focusing on the ‘‘we are smarter than me’’15 meme [55] in order to enable collective intelligence in organisations. For more details see[36].

3.1.2: Enterprise data integration using semantic web technologies [36]

By nature, Semantic Web technologies are a great candidate for enterprise data integration and middleware services [56]. By mapping data contained in heterogeneous applications to common representation layers using RDF(S)/OWL, they unify heterogenous data structures in a meaningful way. Among the various systems using Semantic Web technologies for data integration, Ontobroker [57] (now available as a commercial product from Ontoprise)18 uses ontologies to extract and integrate information from distributed and heterogeneous semi-structured data sources,and provides a single query interface so that the user sees these distributed applications as a single system. Since lots of knowledge in organisations is stored inside relational databases management systems, another relevant area for enterprise data integration is also how this existing data can be integrated with Semantic Web applications. Recent efforts have provided various tools to translate existing databases to RDF, or to directly use SPARQL to query RDBMS. These include Triplify and D2RQ [58], and work regarding integrations between RDBMS andRDF is to be tackled in the W3C by the RDB2RDF Working Group.19. For more details see[36].

3.1.3: E-Commerce[36]

The term e-commerce as used in this article relates to the applications that facilitate business-to-consumer and business-tobusiness transactions using elements of Semantic Web technologies and Semantic Web Services discussed earlier, to improve and enhance value-adding processes. Current transactions depend to a large extent on human interaction between co-operating processes and/or on vendor-specific software that utilises various standards available in this domain. Semantic Web technologies and services can provide mechanisms that integrate applications and services in an extended and virtual business environment. Virtual enterprises can be envisaged that will support configuration and reconfiguration through semi-automatic service discovery and mediation. Major information transactions from functions such as design,production, planning, distribution, supply chain, recycling and the innovation process can be codified into an ontology and made machine processable. For more details see[36].

4:The synthesis between semantic web technologies and web based simulation[59]

4.1:Semantic Search Engine

Search engine has become a primary need to explore the internet. Without Search Engine, there are no uses of information in website, blog, etc; because without search engine, it is almost impossible to look for one by one website just for search information in internet. In a row with the extraordinary growth of web, there are many search engines come out to help the users on finding their need, but search engines find it increasingly difficult to provide useful results. To manage this explosively large number of web documents, automatic clustering of documents and organising them into domain dependent directories became very popular. The terrific increment of the web has made the evolution of the web itself. From web 1.0 (first generation of internet – 1990 – 2000), web 2.0 and now has become to web 3.0. Web 1.0 refers to Internet at its emerging stage, with corporate and institutional websites occupying 90% of the cyber space, with an one-way mode. Thus Internet access serves functional purpose, and people could also read and extract information from the websites. Internet access was achieved typically through telephone dial-up at that time . "Web 2.0" is transforming the Web into a space that allows anyone to create and share information online—a space for collaboration, conversation, and interaction; a space that is highly dynamic, flexible, and adaptable .Web 3.0 is one of the terms used to describe the evolutionary stage of the Web that follows Web 2.0. Given that technical and social possibilities identified in this latter term are yet to be fully realized the nature of defining Web 3.0 is highly speculative. In general it refers to aspects of the Internet which, though potentially possible, are not technically or practically feasible at this time.

Differently from traditional search engines, a semantic search engine stores semantic information about Web resources and is able to solve complex queries, considering as well the context where the Web resource is targeted. Semantic search integrates the technologies of Semantic Web and search engine to improve the search results gained by current search engines and evolves to next generation of search engines built on Semantic Web. In general, processes of semantic search engine are:

(1) The user question is interpreted, extracting the relevant concepts from the sentence, (2) that set of concepts is used to build a query that is launched against the ontology, and (3) The results are presented to the user.

The Architecture of Semantic Search Engine A typical semantic search engine should consist of the following components: (1) Ontology development, (2) Ontology Crawler, (3) Ontology Annotator, (4) Web crawler, (5) Performing semantic search, (6) Query builder, and (7) Query pre-processor. Some of the reason why someone want to develop an ontology are (1) To share common understanding of the structure of information among people or software agents, (2) To enable reuse of domain knowledge, (3) To make domain assumptions explicit, (4) To separate domain knowledge from the operational knowledge, and (5) To analyze domain knowledge. An ontology crawler can crawl through the Web to find new ontologies and populate the database with them. Note that the ontologies crawled by the ontology crawler will not be directly dumped into the database. Ontology translator, with the help of ontology mapper, will translate them into the database tables. Ontological annotations identify real-world entities alongside properties and relations that characterize the entities' attributes and role in their textual context, with respect to a reference ontology. Web crawler is an automatic program (sometimes called a "robot") which explores the World Wide Web, following the links and searching for information or building a database - such programs are often used to build automated indexes for the Web, allowing users to do keyword searches for Web documents - it is also the name used by one of the most popular publically available keyword searching engines. (A) Ontologies are created in plain text format (.OWL or .DAML). Ontology translator translates them into relational database tables. Ontology Crawler finds new ontologies on the Web and adds them to the ontology library. (B) Users use Ontology Annotator to annotate their Web pages with these ontologies and publish them on Web. (C) Web Crawler crawls the Web to find Web pages annotated with these ontologies and builds knowledge base from the instances of these ontologies in these Web pages.

(D) Users construct search queries with the help of Query Builder and these queries are sent to the Inference Engine after pre-processing by Query Pre-processor. (E) Inference Engine carries out reasoning on these search queries by using ontology database and the knowledge base. The results are finally sent to the user to be viewed on the Web.

4.2:The Use of Semantic Search Engine

Semantic search attempts to improve the results of research searches in two ways, a) traditional search results take form of a list of a document/web pages and b) the search phrase in research searches typically denotes one (or occasionally two) real-world concepts.

There are several advantages of semantic search, such as

• A semantic search makes it easier to locate relevant information to the user's subject of interest, saving the user a lot of time reading unrelated Web pages.

• A semantic search engine can handle of long-tail queries. Without relying on statistics, long-tail queries can be analyzed by semantic algorithms 384 on the fly, and bring search results with the accurate context.

4.3: Why Semantic Search Engine is Important

Finding what we need is often a hard job. Current search engine technology is very good in finding complete Web pages published all over the world, but it lacks the desired precision and recall when searching for multimedia resources. Semantic searches can overcome the aforementioned limitations of keyword searches because they use an ontology to infer information about objects. This enables a semantic search system to correctly identify objects even when the object's associated metadata does not explicitly match the user's search criteria. The ability to infer information based upon relationships encoded in the ontology enabled users to identify objects which are logically related. For example a database may contain objects from multiple domains whereby researchers in each discipline use there own terminology. To locate all desired objects using a keyword search would require the user to have knowledge of the relevant terminology used by workers in each discipline. This type of information can be encoded in an ontology and the semantic search system could automatically retrieve the semantically related items.

A. Traditional Search Engine vs. Semantic Search Engine There are some differences between traditional search engine and semantic search engine. The differences are:

Traditional Search Engine:

• In engine prompt, you are entering keyword.

• Do not understand polysemy and synonymy.

• Unknowing meaning of the terms.

• Do not take into account stop words such as a, and, is, on, of, or, the, was, with, by, after, the.

• When looking at a web page, a conventional search engine looks for the distribution of words within the web page to try and find how relevant it is to the user's search query. Basically, this means that a web page with similar words to those the user types into a search engine will be thought to be more relevant, and will appear at a higher position in the search results page.

• Unable handle long-tail queries.

Semantic Search Engine:

• In engine prompt, you are entering question.

• Understand polysemy and synonymy.

• Knowing meaning of the terms.

• Take into account stop words such as a, and, is, on, of, or, the, was, with, by, after, the.
• Is designed to try and understand the context that the words are used within the web page to try and match it more accurately to the user's search query.
• Able handle long-tail queries.

***4.4: Comparison between Traditional Search Engines vs. Semantic Search Engine**.*

For the comparison between Traditional Search Engines vs. Semantic Search Engine, please see these two search engines. Hakia (www.hakia.com) as a semantic search engine and Dogpile (www.dogpile.com) as a traditional search engine. The keyword phrase that is used for this comparison is “what is the weather in Kuala Lumpur”.

5:Conclusions

Search engine is the most important tool to discover the any information in World Wide Web. In a row with the terrific growth numbers of the web, traditional search engine nowadays is not appropriate anymore to be used. Searched by keyword and do not understand polysemy and synonymy are some reasons the traditional search engine is not suitable anymore.
Analogously with the arise of web site that is directly proportional of the internet user growth, has made the traditional search engine not able to provide the precise result. It is because the weakness of that search engine which search just based on keyword and also the traditional search engine does not care about polysemy and synonymy. Sometimes, when we are using the traditional search engine the result that is showed is not satisfy to the user needs. Semantic search engine is became an answer to overcome the lack of traditional search engine. It is not like traditional search engine which search based on keyword, semantic search engine try to analyze and understand the user want by doing logical reasoning, so the result will more precise. Semantic search engine also can handle polysemy, synonymy and long-tail queries well. It is no doubt if semantic search engine will show the result almost that you want. One of the advantages of semantic search engine is no need to open the website one by one just to check the content, because the search engine will give you the precise result which is not the wor.

the charactrestics of the semantic web that make the different way of searching in comparison to the current web are:

1.Instead of web pages ,we work with real objects and their relationships
2.The information is understandable for machines and humans.
3.The language which is used is more advanced than html.
4.Distributed environment.(different sites may cooperate in definition of one concept).

Finally according to this charactrestics It was concluded that the future of WBS may be found in the semantic web and Semantic search engines.

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