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SEMANTIC WEB BUSINESS MODELS

Borce Cifliganec
Postgraduate
Radovis, R.Macedonia

Ph.D. Dimitar Trajanov
FEIT
Skopje, R.Macedonia

ABSTRACT

With the emergence of the Semantic Web, that represents an extension of the existing WWW, many opportunities and different ways to use the Internet were created. From the idea to date has spent quite a while and there's still no appropriate business model that will attract the attention of companies to begin more intensive use of Semantic Web. The semantic web information is a machine understandable format, so the semantic agent who is used by the customer gives pure and relevant information, without any other supporting information that basically is necessary for the classic business model. The need of appropriate business model is more than necessary at a moment when many opportunities for business are open and new rules of operation of e-commerce are introduced.

This paper explores new opportunities and exploits the benefits of using semantic web technologies to develop improved and better business models. New business models, on the other hand, will increase business success and profit and will allow faster and easier accomplishment of the final goals. This will empower business capabilities, directly and indirectly, and will lead to positive changes in e-commerce: transparency will increase to satisfactory level, small and medium enterprises will have greater chance for success, access to the consumers will be more direct and increased and they have maximum chance to be found if the offered product fits the needs of customer etc.
This paper also presents to entrepreneurs and accomplished business executives new features and functionalities of applications that use semantic web

I. SEMANTIC WEB

The main idea of the Semantic Web is adding semantics to information and services on the Web, to enable it to be machine understandable, and satisfy the requests of consumers. The final goal is to create a universal medium for exchanging data, information and knowledge. At the present time only people are able to understand the product information published online. However, semantic web technologies will give digital assistants and agents the ability to search web for products that correspond best to the specific need of certain user, and give relevant and trustful information.

The semantic web initiative was promoted by the World Wide Web Consortium (W3C), which is lead by sir Tim Berners-Lee, inventor of current web and is driving forward the vision of semantic web to success. Key principles of Semantic web include RDF and OWL, which is W3C standardized languages used to express information in a machine interpretable form. Using this language, manufactures can publish their product and service description in a standardized form based on product and service ontologies. Ontology can be seen as an enhanced standardized taxonomy which is used to describe or models aspects of reality. One of the application areas of ontologies is product and service description made by the business companies and published on their web space. Similarly, it allows vendors to describe their offers in a machine interpretable form by using offer ontologies. Consequently, all semantic engines are able to find, retrieve and interpret products and offer information for their users. As these engines are able to understand this structured information, they are able to compare the products and offers based on specific attributes for the individual user.

Semantic consume information without human intervention on the Web. Fig.1 is showing semantic web pyramid to explain why semantic web is so important on playing a pivoting role to other emerging core technologies, such as agent, grid (p2p), ubiquitous computing, and web services. Being located at the top of the pyramid, trust is a high-level and crucial concept: the Web will only achieve its full potential when users have trust in its operations (security) and in the quality of information provided. Without information trust, provided from the internet all concepts for communication and presentation of knowledge are non usable and not reliable for making business online.

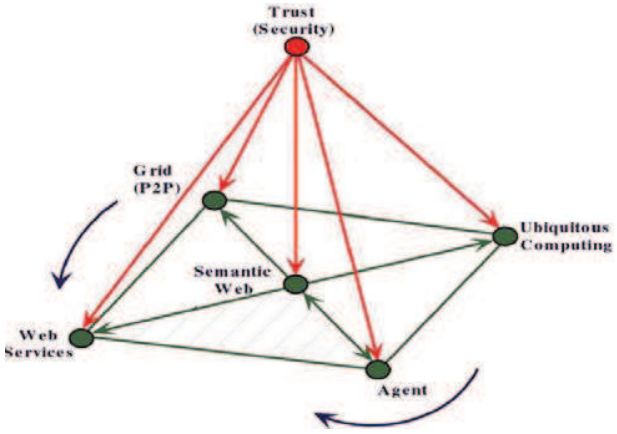

Figure 1: Semantic web pyramid

While consumers today have to rely on the limited number of the offers available on centralized e-commerce portals when looking for products, future application will be able to provide users with a search process based on product attributes, which will include all products published in this form on internet. Furthermore, in a next step semantic web services will enable digital assistants to handle business processes like selling and buying or even negotiation automatically.

The fact that semantic web is still in its initial phase of implementation, there are many benefits to be valorised in the early beginning and use many advantages which come with use of semantic technologies. The semantic web information is a machine understandable format, so the semantic agent who is used by the customer gives pure and relevant information, without any other supporting information that basically is necessary for the classic business model.

II. Business Advantage of Semantic Web

The core of semantic web is to develop ontology-based semantics in terms of some standards, thereby making information with explicit meaning and machine understandable. The semantics can cover any structured or non-structured data and applications, such as Web sites, Web services, devices, flow data, databases.

Business advantages of semantic web over previous web have been identified. But these advantages have different influence to create real ROI (return on investment) for end users. The detailed examinations one by one are as follows:

A. Search

Semantic web enhances search mechanism with respect to exactness and amount because of the standardized Web annotations and service descriptions. Currently keyword searching creates the all-or-nothing results. Ontology-based searching uses the relationships and axioms of concepts, thus it could filter some seemingly appropriate but unwanted results and add some seemingly different but actually same results. The advantage has been confirmed in the arena of information retrieval. Internet commerce has to search for the right products and services, business partners, customers and Web services. One of hard ebXML (e-business XML) issues is to search exactly what we need and how to search core components that represent business processes.

B. Agents

Agents are programs acting on behalf of another person, an entity or a process. Intelligent agents are widely known and useful for application automation and Internet commerce. Ontology-based intelligent agents could obviously enhance application integration and thus improve Internet commerce.

C. Social networks

Social network with SW will be more useful and predict the needs of users. With information provided from user profiles, SW social networks will know the interests of the user and use them for more effective advertising, and offer the proper activities on the network. With the posts or twits, social network will know the users need at the moment and act to solve all requirements. The growing trends of social networks will more and more rising with implementation of semantic web.

D. Knowledge management (KM)

KM includes the processes of capturing, extracting, processing and storing knowledge. Ontology allows Web data meaningfully related instead of existing linked Web, no matter whether they are structured or non-structured. The advantage of KM is realized via ontology manipulation, which needs support tools, e.g., ontology creating, ontology learning and manipulation.

E. Integration

Integration here indicates business cooperation as an entity, internally and externally, to achieve business goals. Ontology can be used for specifying the terminology of heterogeneous systems, and ontology mappings can resolve the mismatches between the systems, thereby realizing semantic integration. SW technology could ease the

messaging between applications and software component used by companies and B2B automation. The combination of SW and Web services is changing the integration between applications internally and externally, thereby enabling standardized, searchable and intelligent agents on the Web. The semantic B2B engine is emerging to allow business partners to understand document syntax and semantics, and thus to transfer the exchanging documents into the right applications to process.

F. Multimedia collection

A collection handles a set of non-textual objects such as images and audio. SW via ontology offers a way to enable semantic annotations that could be easily organized and found. Nearly all e-commerce Web sites have to handle a large amount of images and audio of products and services.

G. Information filtering

Information filtering occurs in the processes of information receiving, sending and storing by filtering unwelcome data and Web services invocation, sending selectively to the right clients and storing in the right place for the value-added consumption. An enterprise always has to process a huge amount of e-commerce data. Theoretically filtering via semantics could be more effectively than keyword filtering.

H. Machine dialogue across the domains

Ontology provides formal semantics, thereby making not only humans but also machines understandable. In addition ontology mappings or translation could foster the understandings between domains so as to enable the dialogue across multiple domains. Ontology translation could bridge them. Internet commerce requires automatic negotiation and contracting for all searched results. This feature could significantly help machines process a large amount of business partner information that humans cannot handle, and thus save time and money.

I. Virtual community

Some enterprises for common interests can be tightly connected on the Web and form a virtual enterprise, due to the mutually benefited preferences defined in terms of ontology. Ontology also can be used to define relationships in the community from forming, organizing, communicating to demising automatically.

J. Online advertising

Online advertising can be exposed via more easily and more exactly searched ways. It not only waits for humans to click but also for machines to consume. It could be found through efficient search engines and processed by software agents, and thus directly contribute to Internet commerce.

K. Unexpected benefit

The business partners normally tend to be quite fixed, stable and long-term. Through SW techniques, there is a higher possibility of finding unexpected partners, customers as well as superior products and services, and thus collecting benefits. Probably serendipity service providers will emerge to help collect the benefits.

L. Vocabulary flexibility & standardization

Theoretically, ontology mappings and translation allows users to flexibly choose the words they like. Since users are diverse and it is hard to require them to fully know the standards, this advantage could be interesting.

Flexibility and standardization seem conflicting. In fact they reflect different developmental stages of SW. In the initial stage, vocabulary standardization could be prioritized, whereas with the emerging of ontology mapping or manipulation tools the advantage of vocabulary flexibility will show up.

III. PERFORMANCE OF SEMANTIC WEB BUSINESS MODELS

A business model as financial product with continues evolution. When market is changing its conditions, business models must adapt to new market conditions, if they want to survive the enterprise and make profit. An indispensable factor for successful business model is the power of his transformation or variability. A rapid adjustment to new market is warranty initial success, as well as a great advantage over the competition. Especially if it comes to the first mover of the new patented technologies that easily win customers and guarantee rapid development of the organization. It is essential to change existing business models in relation to the new situation as the market and the environment.

By using semantic technologies in business processes, differences in the development of the business are evident also the business performances are improved many times. The impacts of these technologies enables rapid

implementation of the goals, thereby using fewer resources previously used to achieve the same goal. Users in this case quickly find the information and pursue appropriate action (buying product, transaction and exercise etc.), thereby not wasting your precious time asking for this information and if the resulting information is confidential. The large numbers of benefits that are obtained by integrating semantic web technologies in common, provide easier realization of the business plan and all the previous analysis of the business model. Using all benefits ease conducting business through the Internet with presenting better methods of using the web. As mentioned earlier the Semantic Web means expanding the current, not its replacement. From here the impact of new technologies only increase the efficiency and effectiveness of business performance. Table 1 is given the impact of semantic technologies in improving business performance.

Table 1: Impact of semantic web on business performance

20-80%	Less labour hours
20-90%	Less cycle time
25-80%	Less set up
50-500%	Quality gain
2-50X	Productivity gain
2-25X	Increased return of assets
2-30X	Revenue growth
20-80%	Reduction of total cost of ownership
2-300X	positive ROI over 3 Year

The reason why performance are improving with using the new technology are many, some are:
- Maximize the value of information,
- Information sharing with ultimate flexibility,
- Greater level of future-proofing and re-use,
- Data isn't trapped within individual applications.

IV. SEMANTIC WEB BUSINESS MODELS

From the idea to date has spent quite a while and there's still no appropriate business model that will attract the attention of companies to begin more intensive use of semantic web and utilize many of advantage of using semantic technology. The problem is that many of the current business models that function well in the Internet environment largely rely on visual and textual presentation of information, and the goal is users to read text or see the image presented on the website. New business models should use the advantage of semantic technology to improve the current business models. Better efficiency and effectiveness will increase revenue and produce cost savings. All advantage above are critical for making a new business model which will attract a attention of consumers, increase business success and profit also will allow faster and easier accomplishment of the final goals. Business models with implemented semantic web must be:
-easy to use,
-economical,
-extremely secure(trustful),
-industry strength

When all of parameters mentions above are utilized in the system, than business can feel safe with implementing semantic web and taking all advantages of a system.

For example new business model which include semantic search engines will increase value proposition on higher level. Consumers get the opportunity to consider the maximum amount of possible products allowing them to find the solutions, which fit their individual requirements best. Furthermore, the possibility to perform reasoning on the semantic web data, will allow search engines to display the aggregated information in a much more user-friendly way. Accordingly, the strongly increased transparency of the market will maximise the chance of finding the best and cheapest offer. In the future, semantic web services will enable search assistants to order products for a user at a dealer's web shop. This mean that users do not have to get accustomed to the user interface of yet another platform. They just have to register once on the platform of the semantic search assistant and this assistant can then interact with the dealers' website on behalf of the consumer, and order for example a certain notebook. On the other hand dealers and suppliers only have to publish their product information and offer once their own web site and all search engines will be able to interpret this information.

Business models from domain of e-retailers and electronic stores have the most potential for implementation of new technologies. Only in the USA, via e-commerce are spent 173 billion dollars, and is forecasted to 2014 to spend 250 billion dollars (www.emarketer.com). Selling products online is a renaissance of traditional trade. With using semantic web, users find what they want much faster and simpler at an acceptable price. On the other hand, market transparency is becoming a greater possibility for manipulation of price and quality products to a minimum. With that kind of transparency products are sold almost no profit or with minimal profit, to that end retailers must think up alternative ways of income apart from

sales. For example you can profit from different types of time-limited delivery, advertising and offering additional services. The benefit increases to consumers, retailers are down in a position to have to think about alternative models of income and strategy for utilizing every sale over the Internet. Besides consumers, manufacturers of the product have great benefits, many consumers have come easily to their products, and obtaining relevant information about the characteristics of the products, which is essential for buyers to decide to buy the product. While increased market transparency leads to a reduction in selling price which is another benefit to consumers. In this segment of e-commerce very important factor is the rapid implementation of new technologies and take market share, companies end up with a great job in achieving the business strategy and meeting the goal of the company. As first to market that will offer new benefits from the Semantic Web, the chances of success are enormous and overcome problems with the price of the products. When company will gain confidence in a numbers of users, then is much easier to implement different models of income. For example the first companies that occurred in E-Commerce Amazon and E-bay today possess a large market share and still now are companies that earn most of electronic commerce. Although competition is increasing every day these companies managed over time with different services to not only keep, but daily increase its market share.

All advantage of using semantic web will find implementation in different domain business models. In this paper only some of the business models are mentioned, but that doesn't mean that only this business models are ready for implementing new technology. Many business models in health care, medicine, auto industry, agriculture, government projects all have a lot of opportunities for better performance and achieving their final goals more efficiently and effectiveness with using the benefits from semantic web.

V. CONCLUSION

As discussed in this paper the semantic web for business is new technology with great potential for success. Most work to date has focused on issues of data integration, system interoperability, and security issue. There is significant value in this. But, it is only the beginning. Much more business value will be harvested from semantic technologies in the coming decade. The need of new business models will be necessary for keeping the success of current business, or making new business. This represents a number of advantages of using semantic web, which are discussed in this paper. Also with new business models, business performances are much better as mentioned above.

Over the years that come, semantic technologies have the potential to drive 2-3 order of magnitude improvements in capabilities and life cycle economics of business solutions through cost reductions, improved efficiencies, gains in effectiveness, and new functionalities that were not possible or economically feasible before now.

New semantic business models will be different and much more successful and ready for making business. They will provide:

New capabilities: Semantic technologies enable new capabilities that tap new sources of value.
Sources of new value include: value from knowledge modelling, value from adding intelligence, value from learning and value from reasoning.

New performance: The classic motivations for new investments in technology are: efficiency gain, effectiveness gain, and strategic edge.

New life cycle economics: Semantic technologies improve economics and reduce risks across all stages of the solution life cycle: research and development, deployment and operations, maintenance and evolution.

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