SOA and Web 2.0 Merging Tendencies and Its Impact on the IT Based Business Processes

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Summary: The article discusses the merging of two key information technologies for control and effective use of IT based business processes – SOA and Web 2.0.

The characteristics of the two technologies are discussed in short and the advantages and disadvantages of each one are pointed out and the missing part in the other one is clearly marked. The application areas of each technology and the limitations to their use are defined.

A special attention is given to the analysis of the prerequisites for SOA and Web 2.0 merging. The special features and functionality of each technology, that are supplemental to the opposite one, are marked. The advantages of merging the two technologies are defined – from a technological point of view, as well as from a user and business point of view.

An analysis is performed of the real world results, stemming from SOA and Web 2.0 merging and the impact on the IT based business processes is determined.

The results of the conducted analysis of the SOA and Web 2.0 merging is additionally supported by expected tendencies for future enhancements.

The conclusion grounds in shorts the advantages of SOA and Web 2.0 merging and the favorable impact on the IT based business processes.

Key words: Information Technology (IT), Software, Data, Services, Web based business applications, Service Oriented Architecture (SOA), Web Oriented Architecture (WOA), Web 2.0, Enterprise Web 2.0, Application Programming Interface (API).

JEL: C6, C63, C8, C81, D8.

1. Introduction

Time, when corporations and companies isolated themselves from the outer world, is long gone. Then organizations could allow themselves make changes within its inner structures to adapt to the changing market conditions. Nowadays the close interaction between the organizations and their partners, suppliers and clients forms a complex network of constant dynamic mutual relations. The due and effective adaptation to the dynamics of the changes controls the competitiveness and possibilities for business growth.

The role of the Information Technologies (IT) is important in these processes. They could not stay an isolated land any longer in the business

strategy of each organization and they must not be taken as a pure process automation, which require a long implementation time, nor as a designing complex and costly software.

They must be a strategic weapon in expanding the business abilities [1, 5] for achieving a maximum usefulness from modern information technologies implementation. Hence some obsolete comprehensions for the IT must be abolished and new ones must take their place – within the technologies themselves, as well as in the behavior of the managerial structures and mechanisms. These two sides must be united in one common entity, so the IT should give results that are understandable and available to the corresponding managerial staff.

The Service Oriented Architecture (SOA) gives the necessary business interface. On the other hand the number and use of Web 2.0 based business applications constantly increases – two trends in the modern information technologies, which by definition must be mutually excluding one another. Is it really so in practice? There are numerous examples for the opposite case – the tendency for the merging of the two technologies in one common trend and the generation of new advantages for business processes' control from and IT point of view [9].

The current articles aims at analyzing the SOA and Web 2.0 merging and its Impact on the IT Based Business Processes. The main focus of the article are the key points of interaction, main components, achieved results and possible trends for future development.

This leads to answering the following points:

• Definition of SOA and Web 2.0 technological foundations.
• Definition of SOA and Web 2.0 merging prerequisites.
• Illustration of SOA and Web 2.0 merging real results.
• Expected future tendencies stemming from SOA and Web 2.0 merging.

2. SOA and Web 2.0 Technological Foundations

SOA is a technology from the field of software design in which the client application requires one or more services from another application that delivers similar or complementally services [17, 20, 21, 22]. This approach allows for the combination or recombination of internal and external business processes for proving support in the execution of business processes. SOA defines the services as a center of the business application. They organize and control the data exchange between the different applications, but the main focus of the traditional SOA solutions in on the functioning of the IT systems and not on their most valuable asset.

The service in the SOA sense is a well defined and autonomous function (business process) that does not depend on the contents or the condition of other services [4, 6]. SOA represents a set of services that communicate on the basis of a high level abstraction layer using existing or emerging standards for Web services. The latter ones belong to the technical standards and they allow for communications between sets of services, which additionally combine or recombine in the implementation of business processes. The standards are an inherent part of the Web services, which form the SOA foundation.

Currently three Web standards form the basis for SOA development:

1. SOAP – a specification on the basis of XML for defining the type of message exchange between Web services.

2. WSDL – a taxonomy on the basis of XML for defining the features and functionality of Web services.

3. UDDI – provides for a central repository which contains the existing and available Web services.

The technical components of each services in SOA are the means not only for the implementation of service's interface, but as for the service itself. The interface component creates an interoperability between the services. The implementation component gives the results from the business process (usually by updating the information database).

The purpose for achieving an interoperability between the business processes is motivated by the need for overcoming the barriers between the software components that have been designed and implemented by different (often incompatible) architectures and platforms, as well as for achieving a greater level of independence from the changes in their implementation. Since the business processes are a starting point and a main goal of the business applications, their integration is a natural extension of the modern process of business globalization.

Once defined, the services can be applied and combined repeatedly by numerous different users. This loosely coupled structure allows for the achieving of a greater flexibility of the business processes in comparison with many other software applications that set a more severe integration.

The SOA technology is successfully complemented by a user-oriented approach, which includes a system of criteria for the determination of the user interface usability. This approach allows for achieving a higher level of system effectiveness. This is done by increasing the work performance, work

efficiency and human error reduction. The training time is reduced too. All that leads to quicker and more qualitative results in system's functioning.

Some of the most important advantages of SOA application are as follows [18, 19]:

• Business transformation implementation through providing a business process on a corporate level.
• Minimizing the influence of introducing changes in the software toward other software components by the loose coupling approach.
• Decreasing system redundancy.
• Providing a scalability of specific business processes.
• Providing a functional compatibility toward internal and external systems.

Besides the SOA advantages, there are certain disadvantages too, as it is with any software technology [14, 18]:

• The process for the initial SOA development could be with an extended duration.
• The large volume of transactions requires the administration of substantial technical and functional resources.
• A protection for the dynamic exchange between the software components on a global scale is hard to achieve.
• The functioning could be worse in comparison to more tightly integrated interfaces.

The possible SOA applications are numerous and the most important ones could be: data control, workflow control, merging of services, relationship support with external clients, etc.

In the sense of numeration, following the identification of each software product, is the presumption that there is a new and advanced

version of the product. Hence Web 2.0 must be understood as an advanced and extended version of World Wide Web [10, 12, 15, 23]. The Idea of Web 2.0 could be linked with the transition from isolated information repositories to interrelated computation platforms that, from an end-user's point of view, operate as a software provided locally for him. Additionally, Web 2.0 contain a social component too, where the users generate and distribute contents, that in most cases is provided for free and it could be repeatedly used. The result from this activity is the increase of the economical value of the Web since the users can provide a greater quantity of finished products and services when working on-line.

The technological foundations of the Web 2.0 infrastructure include server software, communication protocols, message protocols, content merging, standard browsers, numerous client applications. These components provide the Web 2.0 sites with abilities for a specific information storage, content production and distribution that exceed by far the abilities of the traditional Web applications. Usually the web 2.0 sites include some of the following features and components [11, 13, 23]:

• Semantic valid XHTML and HTML.
• CSS for separation of the presentation and content.
• Application programming interface (API) on the REST and XML basis.
• Micro formats that extend the pages with additional semantic abilities.
• Data merging through RSS and Atom.
• Content merging from different sources.
• Tools for blog publishing.
• Wiki for content support, generated by users.
• Rich Internet Applications.

Web 2.0 does not have strictly fixed boundaries but rather a core around which different technologies and applications gravitate. Web 2.0 is a set of principles and practices that give the user an experience that is closer to desktop applications rather than the traditional Web pages. The Web 2.0 applications often use combinations of miscellaneous existing technologies [15].

Therefore, Web 2.0 is a natural extension and development of WWW, which is reduced to the formation of asset of practical design principles and it directs the creation of new technologies, standards and business models. The focus is on the simplicity of use, speed, solutions for the end user, community building and software that is provided as network services. The Web 2.0 scope is very wide – everything that allows the user to obtain a discrete and modular function – may be included in the Web 2.0 notion.

The Web 2.0 increasing popularity to a great extent is due to the tendency for creating multifunctional content through a flexible integration of diverse informational recourses and services in the Internet. The Web 2.0 acceptance is due to the expanding community of developers from different business areas and end users, who have the ability to define the end process and who can create different applications.

3. SOA and Web 2.0 Merging Prerequisites

Several main prerequisites for the merging of the two software technologies can be defined not only on the basis of their technological foundations, but also on their abilities to create Web based business applications [2, 14, 16, 21]:

1. Currently **SOA** is a main paradigm for business software design and implementation

and most of the software projects use a subset of this concept as a major organizational principle. The SOA essence is in the ability for the decomposition of software in sets of services that can be used and assembled into new applications with a high level of integration an abilities for repeated application.

2. The SOAP protocol – the basis for the SOA functioning, whose strong and weak points are well known, is not Web oriented and, besides not suitable for Web based systems, in the general case represents foundations for numerous IT based systems that communicate through the Web. Many large software developers refuse to use SOAP and instead they switch to REST and ATOM (for instance, Google), others tend to use simultaneously several different protocols – SOAP and REST (for instance, Amazon). On the other hand, REST and ATOM are Web 2.0 main components.

3. Taking into account the existing accepted assumption that the Web 2.0 applications operate best in weaker organized, but more widely spread applications in Web environment, practically we come to the idea that in fact Web 2.0 represents the pragmatic result, which operates best in securely designed and implemented on-line solutions.

4. SOA and Web 2.0 have numerous intersecting activity areas regarding the Rich Internet Applications (RIA), and particularly the AJAX technology.

5. The newest concept for online applications – WOA (Web Oriented Architecture) – defines software solutions that basically have the Web as a foundation, but they expand the Web infrastructure by a natural way, which includes SOA and Web 2.0 common components. One of the main arguments against SOA is the fact that in practice a great volume of software platforms exists which do not use the common SOA foundation (the SOAP and WS-* protocols), the result of which is a difficult to implement interaction between

them, which in some cases is even impossible. By WOA each system can communicate through HTTP – the main Web protocol – and each application, that can process XML, can efficiently and securely operate not only with any other application, but also brings to creating new ones, hierarchically situated over such services.

Taking into account the aforementioned facts and discussions it could be summarized that the whole software is a building component of a much bigger system. Web offers a proven model for integration of different systems, a model for designing software solutions according to the needs and requirements of the users and the community of users, as well as focusing on the key points that are important for the business. SOA, from a technological point of view, offers more enhanced, predefined and formal view, that satisfies a wider area of important technical criteria, but misses one important aspect – the users are the center of this software and their date is the highest priority. In this sense the software and services are important, but they do not carry the main value. Hence SOA and Web 2.0 merging are not the outcome of casual events, triggered by a limited community of users and developers, but it is a durable steady tendency, stemming out not only from the needs of the individual interacting parties, but also as a natural supplement and enhancement of the existing technologies.

The merging of the two technologies will bring to [16, 18]:

• Easy and secure connection between systems and users.
• Provision of software and date for repeated use through Web services.
• New value on the basis of the existing informational resources.

4. SOA and Web 2.0 Merging Real Results

The concept of Enterprise Web 2.0 emerged as an immediate result of the tendencies for SOA and Web 2.0 merging – social applications, which are not obligatory to use, which are not bound with unnecessary structures and which support many data formats [11, 13]. In other words – the use of emerging social software platforms within companies, between companies and their clients or between the clients. Such social software platforms are based simultaneously and on the SOA and Web 2.0 technologies. The following can be showed as particular results [11, 13]:

• The global SOA foundations have been definitely laid. Until that moment different types of open source APIs and commercial Web applications have existed. On the other hand Web has transformed into the largest SOA as a result of such APIs, that has lead to its transformation into the richest source of content and functionality. The emergence of Web API, not without the help of IBM, has brought for the creation of an API repository, which allows for the creation of global SOA applications.
• The social networks are ready for the business – the social networks receive an acknowledgment as a functional business tool.
• The biggest software companies have begun to offer Web 2.0 based business solutions – Microsoft, IBM, Oracle, etc. have announced the creation and offering of Web 2.0 based business solutions for their clients.
• The offering of Web identity has started, controlled by users and business – the protection and control of user accounts are a main priority for the companies. The new software solution will solve unsolved until now solutions to a much higher extent.
• The users' experience, obtained as a result

from the work with Web based applications has received new dimensions – the emerging and use of RIA (for instance, on the basis of Adobe AIR or Microsoft Silverlight) lays the foundations for a new effectiveness degree of the business solutions.
• The Mobile Web business applications have turned into an obligatory component of the modern business operations. The boundaries between the Web and the mobile networks have begun to dilute with a stable tendency the Web based business applications and tools for mutual operations, planning and coordination of the business partners to unify into a single solution.
• The emergence of key strategic Web platforms – achieving the dominant business role in the Web environment can be implemented through the development of a platform with a highest level of priority regarding the network operations. Google's Android can be shown as a successful example, whose main aim is to free the business applications, that operate on mobile platforms, from the media, which directly control them.

5. Expected future tendencies, resulting from SOA and Web 2.0 merging

It is a stable tendency SOA and Web 2.0 technologies to get bound each one with the other one, which will bring for their natural merging by making changes in each of them separately. According to literature the following more important changes are expected [7, 8, 15, 16]:

• The SOA technologies will become more pragmatic, Web oriented and applicable. The classical principles of SOA will be valid, but the ways they will be implemented in the business environments will change. The Web orientation of SOA will not only allow for critical mass

accumulation, but also for its greater distribution and application in Web environment.

• Achieving a satisfactory protection for the Web 2.0 based business applications will pose a major problem that will be kept as a tendency in the future generation Web platforms.

• The unstructured information in blogs and wikis will keep on increasing, which will lead to searching software solutions for extracting and merging data for business processes and activities. The demand for software tools for data analysis in social applications will increase.

• A significant part of the corporate Intranets will be supplied with abilities for social network operations. The transfer from the well-known Intranet networks to such providing abilities for work in social environment will aim at increasing the business user experience in areas as relationship management, mutual operations and innovations.

• Yet the systems for accumulating Web based business information (mashups) will not reach an acceptable efficiency. Nevertheless the emergence of the first software tools and applications will be observed, which, using the resources of the local or global SOA, will allow for building composite applications with a real business value (by means of visual assembly and almost a complete lack of programming).

• The successful application of information technologies in each business oriented environment will demand the use of SOA solution on one side, as well as miscellaneous components of the Web 2.0 applications on the other side (for instance, use of mashup systems).

• The Web 2.0 key component, such as RIAs, will set as a major software component in many business applications.

• The mobile devices will obtain new usage abilities regarding to business activities by combining particular business activities and Web based interaction.

• Enterprise 2.0 will transform into standard obligatory component in most of the organizations and the Web 2.0 versions of the traditional corporate applications will compete for a greater share with the software giants.

6. Conclusion

The service Oriented Architecture (SOA) is a corporate tool for normalising the different aspects of the IT systems, which aims at providing them with a greater level of mutual use, dynamics and integrity.

Web 2.0 follows a similar idea, but it is more popular and social oriented, which by its own manner transforms the applications into platforms, allowing for their repeated use, sharing and merging.

At a first glance these two software technologies are direct competitors and there is no room for their merging regarding not only their functionality, as well as regarding the expected and received business value. Nevertheless these obvious contradictions, there is a stable tendency for SOA and Web 2.0 merging. This results from the following reasons:

• The Web 2.0 technologies should conduct a direct relation between the technologists and the managerial staff in the corporations and companies without going through the IT departments.

• The Web 2.0 technologies should avoid the attempts for providing new architectures, but instead they should concentrate over provision of business solutions with short-termed effect.

• If the Web 2.0 should fail to achieve the expected results, most probably they will lead to a substantial delay of the transition to the following generation of business software.

The process of overtaking of SOA by Web 2.0 is obvious – beginning from corporate applications for data collecting and analysis

through mashup applications and getting to solving situational business processes and supporting dynamic business processes. All that points at the potential advantages of SOA and Web 2.0 merging, which will lead to significant advantages for an effective control and use of business processes, based on the modern information technologies, and particular such functioning in Web environment.

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