The Place and Value of SOA in Building 2.0-Generation Enterprise Unified vs. Ubiquitous Communication and Collaboration Platform

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Abstract—Based on an extensive examining of different industrial and research resources we have recognized that SOA is one of the most progressive IT concepts in the enterprise management. Besides, the rise of social networking in the enterprise, the adoption of Enterprise 2.0, and the use of mobile applications in business are influencing the enterprise SOA development. Thus, in this paper, we focus onto the evaluating the role and place of SOA in new generation of enterprise management paradigm, which highly relies onto the social collaboration tools. Namely, we investigate here integration challenges of main services delivery strategies. Also, we perform an analysis of SOA role in the enterprise social collaboration platform. Next, we define impact factors of social networking and social SOA onto corporate world including placement of a social collaboration layer in new enterprise architecture. And finally, additionally to SOA strategy, we introduce a Syndication-Oriented Architecture concept, defined as a middleware for connecting applications to users, and explore its importance for enterprise collaboration platform.

Keywords- Enterprise 2.0, Mash-ups, Service Oriented Architecture (SOA), Social Networking, Syndication-Oriented Architecture, Web 2.0.

I. INTRODUCTION

The businesses have been going on now in a particularly cruel economic climate. For many companies and industries it is almost as hard to see how things get worse as it is to understand how things can get better. To survive and thrive, organizations are looking to make the most of what they already have while gearing up to the conditions of an unknown landscape of challenges. These concerns impact the majority of the Enterprise Web 2.0 forecasts, though not all.

Besides, it is observed that SOA is becoming more Web-oriented. Recently, numerous online debates about Web-Oriented Architecture and the future of SOA eventually culminated in some bold conclusions by industry leaders who suggest that SOA dead being eclipsed by Enterprise Mashups, BPM, SaaS, Cloud Computing, and all other architectural approaches that depend on services. It is clear that SOA is not really dead, but evolving evidently in response to years of experience as well major business and technological changes in the industry. The rise of social networking in enterprises, the adoption of Enterprise 2.0, and the use of mobile applications in business also demonstrate notable influence onto the enterprise SOA (see Figure 1).

Figure 1. Enterprise Management and Performance Technologies [1].

The significant early adoption of tools to take the unstructured information in blogs and wikis and mine them, major adoption of collective intelligence applications.decision support and a push by IT for governance budget for Enterprise Web 2.0 systems and applications is widely observed as well (see Figure 2).

The problem of SOA is in complicated technology, hard to master skills, and too much the purview of technologists not business people. Therefore, SOA will not survive in its present form and the future is in deep transformations for it. The mashup technologies will be in the center with this transformation as well as the closely related Web-Oriented Architecture (WOA) as Web 2.0/SOA convergence continues unabated.

Currently, there have been few major new technologies that reach the level importance, like Cloud computing, mashups, and SOA. They can be considered as strategic business enablers as well as technologies.

And, the stress to be done now on the partnering with the marketplace over the network (customer communities, cloud sourcing, and crowd-sourcing), looking for major new opportunities for low cost growth, and just doing more with less [1][2][22][23].
The paper structure is as follows. In Section 2, we discuss the integration necessity of two main services support/delivery strategies Web 2.0 and SOA including the challenges faced on that phase. Section 3 gives our understanding of SOA role and place in the Next-Generation Social Enterprise Collaboration Platform. In Section 4, we perform a comparative analysis of the two strategies to ERP – to answer a question how the SOA-based one is better and which benefits it brings. In Section 5, we define impact factors of Social Networking and Social SOA onto Corporate World. As a next logical step (Section 6), we bring in and place a Social Collaboration Layer in new Enterprise Architecture. Further, additionally to SOA strategy, we introduce in Section 7 a Syndication-Oriented Architecture concept, defined as a middleware for connecting applications to users, and we describe its importance in/for Enterprise Communication&Collaboration Platform. As a last step, we conclude our study on “Place and Value of SOA in Building 2.0-Generation Enterprise Unified Collaboration Platform”.

II. WEB 2.0 AND SOA - MINIMIZING THE COLLISION OF CONCEPTS

These two cultures are generally failing to cross-pollinate like they should, despite potentially extraordinary opportunities. As most know, SOA is a corporate means of normalizing the aspects of IT systems to make them more shareable, rewirable, dynamic, and integrated. Web 2.0 is a similar, but more populist and social concept, that also involves in its own way the turning of applications into platforms that can be reused, shared, and aggregated. For its own part, SOA has stodgy-sounding composite applications, while Web 2.0 has a virtually identical concept with the much hipper mark - mashups.

These two worlds seem quite far apart, despite being practically related in their technology genes, though certainly far from being identical twins. For one, SOA is technically more complex and has higher-order concepts, like orchestration, while Web 2.0 has social, presentation, ad-hoc organization, and participatory aspects that SOA generally doesn’t address at all. Practically, SOA and Web 2.0 almost complete each other.

Finally, if the intangible concerns with highly federated data and software get defeat, we can expect the proliferation of enterprise mashups (see Figure 3), and the tools to create them, for solving situational business problems and supporting dynamic business processes. This is one of the biggest potential benefits of the merging of Web 2.0 and SOA, but only, if software architects and designers find the right ways of adding critical enterprise context and social utility to the resulting mix [2][3][4][24][25].

III. SOA FOR AND IN THE NEXT-GENERATION SOCIAL ENTERPRISE COLLABORATION PLATFORM

Many organizations are seeking solutions that link their customers and partners with the suppliers and producers, and that smooth the flow of essential information across their value chain. The rapid growth of the social media marketplace promises to provide many opportunities to reduce information management costs, to improve the efficiency of specific operations, and to increase the quantity and richness of customer interactions [5][26].

The right enterprise collaboration improves efficiency and productivity. But finding the proper technology solution for collaboration is a challenge. Current enterprise collaboration solutions, including standalone wikis, social software suites, and enterprise collaboration software, have serious limitations. In general, Web 2.0 technologies contribute to improved collaboration within enterprises, but they need to be tied together via a single interface to reach their full potential [4][7][25][26].

A. The Collaborative Platform Potential

Although all enterprise technologies make a contribution to the ability to share information with a purpose, to reach their full potential they need to be tied together via a single interface. The best interface for doing this is the wiki, the essence of the social collaboration movement. With their ease of deployment and ability to spread virally, wikis can transform how enterprise employees access the data in their existing systems and collaborate around intranets and file servers, knowledge bases, content and project management systems. A fully realized collaborative platform with a wiki interface can serve as an integration platform for applications and secure access to data integrated from siloed sources, improving productivity dramatically.

And, despite the lack of understanding of the full potential of wikis, the desire to improve collaboration and
business processes has generated significant interest and hundreds of thousands of wiki deployments.

![Figure 4. Information Interoperability Stack [27].](image)

So, why are enterprises so interested in a technology they do not understand? - Because they know that enterprise collaboration will give them a competitive edge [7][25].

### B. The Mashing-up idea

Today, collaboration has taken on a new and more sophisticated meaning. In “Multi-Enterprise SOAs: The Most Important Paradigm Shift for Enterprise Revenue Growth,” [6] a whitepaper by Sterling Commerce, collaboration takes the form of integrated business platforms that must provide for the seamless flows of information across organizational, departmental and geopolitical domains, regardless of which technologies or standards are in place. They must accommodate all of the following:

- Multiple, regularly changing trading partners;
- Multiple business processes;
- Multiple legacy systems;
- Multiple internal/external organizational domains;
- Multiple message formats;
- Multiple communication protocols.

To accomplish all this, today’s distinct Web 2.0 technologies (e.g., blogs, micro-blogs, social forums, etc.) must be brought together under a single, efficient interface and integrated with existing enterprise systems. This is the idea of the mashup [8][26].

### C. Wikis as the Foundation for a Collaborative Platform

On Wikipedia, anyone with the right permission can edit an entry. The advantage is that instead of working on a document in Microsoft Word on a single machine and then uploading it to the Website, and then having editors download and upload it every time they want to make changes, everyone collaborating on an entry can make changes to a single view of it, complete with conflict protection and revision history.

As a Web-centric collaboration platform (see Figure 4), even a crude and cumbersome wiki like Wikipedia removes time and distance as impediments to collaboration and facilitates the exchange of information within and between teams by making information available and usable anytime, anywhere. Everyone in an organization can capture, discover, edit and contribute content. Information is archived contextually in a logical order, ready for easy access and reuse. Beyond these simple benefits, however, wikis have the potential to add far greater value to the enterprise as the front end to a full-featured collaboration and integration platform [7][27][28].

### D. Current Enterprise Collaboration Solutions

Enterprises can deploy few types of collaboration solutions today. Each type offers different capabilities and delivers a different level of value:

- **Standalone Wikis** - such as MediaWiki and Twiki. Many of these are based on the open-source development model.
- **Social Software Suites** - A relatively new class of solution is Enterprise 2.0 social software suites such as Jive Clearspace and Telligent, include many attractive social components, such as profiles, forums, blogs, and social networking [7][8][9][10].

### IV. SOA FRAMEWORK TO INTEGRATE WEB 2.0 TECHNOLOGIES INTO ENTERPRISE APPLICATIONS

The majority of ERP (Enterprise Resource Planning) applications today are built using decade-old client/server technology. However, only a business application built from the ground up on top of a SOA platform is able to incorporate seamlessly Web 2.0 capabilities into a business environment.

With SOA a business process expert can link and sequence services to create new business applications. Underlying and enabling this is metadata that describes the characteristics of these services and also the data that drives them. XML has been used extensively in SOA to create data that is that is exhaustively described.

Many vendors today are transforming existing client/server ERPs into services by creating XML wrappers around them. This enables easier application to application and B2B connectivity. But, applications built natively on top of an SOA platform benefit from a more adaptable, process-based and real-time platform that’s built for change. For example, SOA based applications have Business Process Management (BPM) capabilities at their core that allow business people, rather than programmers to re-configure and model business rules and business processes at a business level without customization or change to source code.

Thus, a business application built from the ground up on an SOA platform is able to incorporate Web 2.0 capabilities such as enterprise search, mashups and is easier to deploy, manage, upgrade and use for the following reasons:

- **Improving information findability** - SOA simplifies the process of integrating all of an organization’s data sources to enable search of all enterprise data in a single search.
- **SOA simplifies mashups** - Services are designed specifically to offer functionality for reuse and for use in composite applications.
- **SOA-based applications are easy to deploy, manage, upgrade, and use** - Since the client is abstracted from the application, the architecture enables the use of
any smart client against the interface, including Web browsers, PDAs and Web services (which are a specific type of service that reads and writes eXtensible Markup Language (XML) based on the business logic embedded in them and exchange XML using the Simple Object Access Protocol (SOAP).

Enterprise search capabilities make it easier for users to find relevant information wherever it is located on the Intranet or Internet. Collaborative Presence technologies allow organizations to harness knowledge and to work more effectively. Mashup technologies simplify integration to get the right applications into end users hands quickly. And web based technologies are easier for end users to use and for IT to maintain, administer and update enterprise applications. As a result, organizations can improve efficiency and productivity, harness knowledge through collaboration, and reduce IT costs [11][12][13][14].

V. THE IMPACT OF SOCIAL NETWORKING AND SOCIAL SOA ONTO CORPORATE WORLD

Social Networking is a concept that federates both personal and professional environment changes and is at the center of this transformation. Tools and behaviors which sprang from the consumer area are now making the transition to the corporate world; with diverse implications for businesses.

The main question is how corporations are impacted and how they make the most of the Web 2.0 and social SOA opportunities:

1. Corporations change the way they communicate - Social Networking is bringing a broad new range of technology innovations to communications: multimedia, presence, interactivity, etc.
2. Corporations change their vision - As businesses become more transparent thanks to the increasing volume of information available online, employees rely more on the enterprise culture. In parallel, stakeholders seek proof of corporate social responsibility awareness, made inevitable by the growing transparency.
3. Corporations change their organization - Many businesses debate how they can flatten the pyramid, to gain the benefits of startups with their associated adaptability and fast growth models.
4. Collective intelligence and customer experience lead innovation - Many different ways to innovate are being piloted recently, all of which include collective thinking, most often through contests, but also via a regular process of gathering together employees, customers and partners from the value chain.
5. Networking as a key to employee excellence - People pay attention to what their online contacts mention, and use social network features to gain greater depth of knowledge in their areas of interest.

Additionally, Social Networking may allow companies to find and address new markets, creating a new branch of their strategy as well as marketing and sales practices that we could call “niche management”.

As corporations move to more collaborative activity and collective intelligence, the traditional organizational model also evolves: Social Networking challenges the roles and responsibilities in place today (see Figure 5).

The Web 2.0 startups often have a flat organization (the Google model) with few management layers, large groups under each manager-mentor, informal work relationships based on synergistic teamwork; their structures are adaptive and able to process information quickly enough to make daily meaty business decisions; personal connections predisposed to community work are facilitated by physical closeness and focus on projects rather than on hierarchical relationship (see Figure 6).

The second family who meets structural changes in its role and mission is the knowledge management organization (see Figure 7). The knowledge management discipline was set-up in the mid-90’s to improve organizational efficiency, address critical adaptation and prevent know-how and practice vanishing. Now that Social Networking boosts the establishment of links between people, sharing information and using collective thinking, the challenges for Knowledge Managers change.

Knowledge Managers become Social Networking architects. Although with a shepherd style rather than a one based on compulsion: research together with the potential IT tools, survey their piloting by the business people, lead awareness information and communication. This new role definition offers a more operational footing, and is necessary for the corporation to address the increasingly discontinuous environment changes [13][14][15][28].
VI. ROLE AND MEANING OF SOCIAL COLLABORATION LAYER IN NEW ENTERPRISE ARCHITECTURE

The Social Collaboration Layer (SCL) in the enterprise architecture stack is situated under the Presentation Layer and above the so-called “Middle-Tier or Integration Layer” upon which the Enterprise Service Bus (ESB) and other messaging services like web services, MQ, JMS, etc. (see Figure 8).

The SCL contains features like Wikis, Blogs, comments and conversations, ratings and reviews, voting up and down, and other Web 2.0 functions. It renders information from various legacy applications normalizing data and flattening data architectures thus simplifying everyone’s access to information as David Wienberger so eloquently explains in his recent work, “Everything is Miscellaneous” [16][26]. It is a Meta-Layer because its purpose is to expose information to end users as and when they need it. Moreover, it captures the meta-data created through User Generated Content (UGC).

The Social Collaboration Layer must be capable of leveraging standards based enterprise technology assets like LDAP, SOA, Web Services, Registries, ERP, CRM, BI, etc. It improves the use and reuse of information increasing the value of corporate information assets. Clearly, Wiki’s, Blogs, ratings and reviews, RIA, AJAX and other techno-gadgetry does not a SCL make; these are simply features that facilitate user interaction the platform that stimulates collaboration.

Social Collaboration platforms and applications are designed from inception for social collaboration. The SCL provides organizations with a layer that handles and manages social and informal interactions created in the new Enterprise (Enterprise 2.0). Conceptualizing the SCL allows to understand and deal with the issues of security, authorization, access control, identity management, registries, content, and multi-channel delivery through the presentation layer. It puts social collaboration and Web 2.0 into context with Service Oriented Architecture. It is also a way to introduce Web Oriented Architecture into an enterprise environment spanning information access and content creation across the firewall. It provides users with explicit self management capabilities.

![Image](image.png)

Figure 8. New Enterprise Architecture [17].

Most importantly, it exposes information into a layer in which existing corporate information can be consumed by the end user, the knowledge worker, through any device to collaborate.

Collaboration is at the center of many businesses future vision and strategy. The ability to link information (video, data, voice, mobility) from any technology network to any human network – anytime, anyplace, through any device supports businesses catching the transition of human-to-computer interaction from individuals to PCs, and organizations to host systems; to groups of people collaborating with each other about sports teams, events and celebrities. As a technology abstraction, the social collaboration layer provides the technical perspective on how to integrate existing technologies and assets into the social collaboration [17][18][28].

VII. SYNDICATION-ORIENTED ARCHITECTURE OR MIDDLEWARE FOR CONNECTING APPLICATIONS TO USERS

The core element in the Service-Oriented Architecture concept is an Enterprise Service Bus. It routes messages and notifications between any services, whether developed in-house, purchased from a third-party, or hosted over the Internet. A comparable concept exists for integrating the complete workflow between people and applications. Routing messages and notifications between applications and their users is defined as a Syndication-Oriented Architecture.

If company deploys a Service-Oriented Architecture for connecting the various stages of the service process, it becomes a lot easier to inspect messages and notifications and collect new statistics that are not readily measurable by any one component. However, every one of those components also has a user interface, and the unstructured data they pass along in comment fields, in email updates, in error messages, and in all of the other ways applications connect to their users suggests an equally intriguing new concept, e.g., the Syndication-Oriented Architecture.

The syndication is new communication pattern for the Internet that lies between client/server and peer-to-peer. In its broadest sense, syndication is a business model where content (e.g. TV shows, columns, or comics) is systematically made available for re-use. On the Web, the most common way of expressing the portions of a site intended for re-use is a feed format such as RSS or Atom that lists the headlines, authors, and links currently available. The specific sense in which syndication becomes the basis for software architecture, though, is how those feeds are subsequently advertised and aggregated: a pattern of communication where senders do not necessarily know who the receivers will be, but does not broadcast to every potential receiver, either.

The key benefit of a SynOA is analogous to a SOA’s: rather than hard-coding integration hooks from one stage of a workflow that explicitly invoke the next, separating out the messages allows workflows to be choreographed externally and enhanced incrementally. It is not needed to decide in advance who needs to know; users who do can establish their own rules for staying side by side of enterprise events.

The RSS and Atom syndication and aggregation, in conjunction with instant messaging and presence tools, can enable a standards-oriented syndication service to deliver...
such notifications to the right users, at the right time, on the right device, all without rewriting individual applications.

SynOA guides the deployment of a wide range of ancillary services that can better manage information overload:

1. **Publication** - adopting a single syndication schema.
2. **Distribution** - adopting a single distribution interface for all of a user’s notifications that supports a wide range of protocols and devices.
3. **Personalization** – the “fine-tuning” information streams for each end-user.
4. **Collaboration** - can power entirely new social-network analysis of readership, detecting the spread of new ideas, and enhancing how teams share knowledge inside and outside the enterprise.

Enterprise application integration has made great treads with Service-Oriented Architecture toward managing all the “hard” data flows between operational systems. Syndication-Oriented Architecture is a blueprint for managing all of the “soft” data that flows from applications to users and between users as well. In this light, syndication standards can enable “information agility” for all of the knowledge assets flowing inside and outside an enterprise [19][20][23][26][28].

VIII. CONCLUSION

Modern competitive marketplace has made business vital for individuals to access, create, share, refine, and distribute content rapidly on a worldwide scale in continuous performance improvement cycle. The rich Internet applications (RIAs) can be composed quickly from the reusable services and promptly customized and deployed in business-specific solutions. All of this is delivered on an enterprise SOA-based management platform that not only manages a complete information lifecycle according to IT and business requirements, but also accelerates content integration and reuse across businesses [21].

Thus, to understand properly place, role, and value of SOA in the effective enterprise management as well as successful service delivery was the research objective of this paper. In details, we have performed an analysis of the following open issues: (1) the integration necessity of two main services support/delivery strategies Web 2.0 and SOA including the challenges faced on that phase; (2) an analysis of two strategies to ERP, to answer a question how the SOA-based one is better; (3) definition of the impact factors of social networking and social SOA onto business; (4) place a Social Collaboration Layer in new Enterprise Architecture; (5) the meaning of Syndication-Oriented Architecture concept in Enterprise Communication and Collaboration Platform.

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