

A Roadmap towards the Convergence of Business Process Management and Service Oriented Architecture

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Abstract

Traditionally Business Process Management (BPM) and Service Oriented Architecture (SOA) have been pursued as two independent initiatives. Recently, the BPM-SOA combination is being advocated as the best approach, enterprises have, to bring a closer alignment between business processes and IT resources and reach the desired business agility and responsiveness to changing business requirements. This article takes a closer look to the BPM-SOA convergence trend. It recognizes that the convergence landscape is not as smooth as many believe. The article then tries to sketch a roadmap to further facilitate a broader BPM-SOA adoption, while identifying the main hurdles standing in the BPM-SOA convergence landscape.

1. Introduction

Over the past few years, Business Process Management (BPM) and Service Oriented Architectures (SOA) have been advocated as evolutionary initiatives that will enable organizations become more agile through better flexibility and better reusability that lower costs and increase efficiency [1]. When combined together, BPM and SOA have the potential to empower enterprises to automate and optimize value chains through adaptable business processes, while easing the capability of IT in developing and managing flexible systems and applications which integrate complex and heterogeneous technologies. BPM and SOA are however two distinct initiatives. BPM is mainly a management discipline and strategy which endorses the idea that we can model a business in terms of its end-to-end processes that cut across traditional organizational and system boundaries. These processes are then represented in a way computers can understand and process [1,2]. On the other hand, SOA is an architectural approach to systems development that builds and delivers reusable and encapsulated business services so that different applications can share them in a loosely coupled and highly interoperable manner. In doing so, SOA seeks to better align business processes with service protocols, the associated legacy applications and software components. The different nature of BPM and SOA is also reflected in many other aspects, as reflected in table 1, below [3].

Table 1. Additional differences between BPM & SOA

BPM	SOA
Business-driven	IT-driven
Top-down process approach	Bottom-up architectural approach
Reuses process model	Reuses service implementation
Project-oriented	Enterprise infrastructure-oriented
Success measured by business metrics and Key Performance Indicators (KPIs)	Success measured by architectural metrics, logical consistency, ease of integration, and cost of change.

Despite their differences, when applied together, BPM and SOA become synergetic, providing the most favored infrastructural approach to counter the challenges imposed by changing business environment, and the need to reduce cost and increase efficiency. In fact, BPM and SOA are becoming two sides of the same coin [2]. On one side, SOA is smoothing the path for BPM proliferation, helping it to deliver its agility promise through its loosely coupled and agile enabling infrastructure. Thus processes modeled by BPM tools can be rapidly implemented by SOA. On the other side, as SOA's killer application, BPM is providing SOA with a strong business-case, and is facilitating a closer alignment between business and IT. When combined together, BPM and SOA will require enterprises to implement BPM processes as services and BPM tools as

service-oriented composition applications. These BPM tools will output service-oriented metadata that is directly consumed (in a loosely coupled manner) by SOA as service-oriented composite applications [2]. At bare minimum, the fusion of BPM and SOA will allow the business to become more agile and more flexible to respond to changes, due the flexible architecture of SOA. In fact, a key concept behind SOA is that it exposes services or applications with the premise that these can be easily reused and quickly changed.

Recently, Gartner Inc. analysts [4] have predicted that, beginning in 2007, BPM will become the driver for SOA implementation. The analysts observed that the technology for the BPM-SOA convergence might not fully mature until 2010, but urged business to immediately adopt "process architecture" if they wish to become leaders in this trend. In a very recent report, Forrester Research Inc, wrote that BPM and SOA markets are becoming one and converging to the point that the "integration suite" market category is obsolete and is being replaced by the emerging "Integration-Centric Business Process Management Suite" (IC-BPMS) [5].

The aim of this article is to take a closer look to the BPM-SOA convergence trend. The article looks to this convergence as a journey rather than a destination. It recognizes that the convergence landscape is not as smooth as many believe, and thus it is important to recognize the obstacles and sketch a roadmap to further facilitate this convergence.

In the next section, we will probe further into the nature of the BPM-SOA partnership. In section 3, we will sketch a roadmap for the convergence journey. Finally in section 4, we will summarize the main findings of the article.

2. The BPM-SOA partnership

There are no doubts that BPM and SOA initiatives can be pursued independently from each others. In fact, BPM can be (and has been) effectively deployed without SOA, relying instead on proprietary infrastructure. However, as the organization and its supporting IT infrastructure grows, frequent changes to services and processes become necessary. This is where SOA and its associated industry standards come into play, relieving the coordination and integration problems a stand-alone BPM solution will endure under a dynamic environment. This is due to the technical capability of the SOA integration platform to empower BPM with a loose coupling between business applications and integration systems; thus creating a strong decoupling between process design and service implementation. This independence makes it possible to change applications instances and processes without affecting the underlying integration technology; thus lowering operating costs and speeding up process creation and modification. For these reasons, and as shown in figure 1, it makes more sense to blend BPM and SOA together as a holistic and enterprise-wide approach to business performance improvement. Both approaches encourage reuse and can potentially adapt to the dynamic needs of the competitive environment, instead of being constrained by applications which are tightly integrated at design time [6].

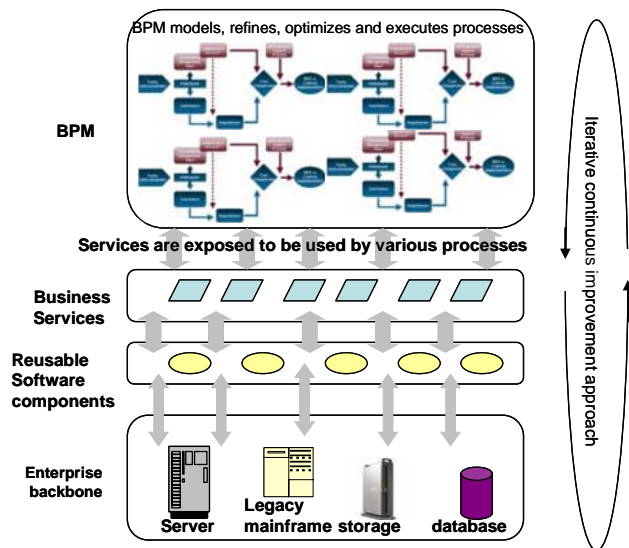


Figure 1. A Unified architecture for BPM and SOA

Combining BPM and SOA will help creating services that can be reused throughout the organization and that are readily accessed via web technologies by various stakeholders, including suppliers and business partners. Both approaches also encourage loose coupling, spreading internal and external applications across a distributed technology platform [6]. This would eventually reduce development and maintenance costs, while speeding-up time to market. Many experts (see for example [7]) believe that the BPM-SOA partnership will evolve the goal of business process design from simple 'automation' towards 'managed flexibility', where the priority will shift from mere hard-coding of processes to be repeated indefinitely towards creating reusable services that are consumed by multiple processes. This paradigm shift is believed to be the catalyst for the creation of tomorrow's agile enterprise.

3. The BPM-SOA convergence landscape: hurdles and ways out

While the convergence of BPM and SOA looks predestined and is just matter of time to concretize, the convergence landscape is still rough and bumpy, waiting for further techno-social and business-driven developments for the landscape to 'flatten'. In the sequel, we identify and analyze the main obstacles impeding the proliferation of integrated BPM-SOA solutions in the market and highlight some remedies that (are being and) need to be put in place to counter these challenges.

3.1. Industry consolidation of two communities

BPM and SOA initiatives have been traditionally pursued separately by different vendors. With the growing synergies between both methodologies, BPM vendors are recognizing the need to adopt SOA services to provide a more standards-based and model-driven approach of doing BPM. In the other camp, SOA vendors are finding in BPM a strong business driver that promises to bring the organization's business and IT groups closer together. The two camps also acknowledge a lucrative market for business process modeling solutions, which according to Forester research will grow from \$1.2 billion in 2005 to \$2.7 billion in 2009. As a result, the past two years have witnessed an ongoing industry consolidation, with SOA-based infrastructure vendors adding BPM solutions to their product portfolios via internal developments and acquisition of pure-play BPM vendors. In the other camp, pure-play BPM vendors, as well as those who have roots in integration and B2B are also adding web services-enabled functionality to their product portfolios through acquisitions [8]. The most significant deals so far include IBM's acquisition of Holosofx, Oracle's acquisition of Collaxa, Tibco's purchase of Staffware, BEA's acquisition of Plumtree and Fuego, and Tibco purchase of Staffware. Vendors from the two communities are also establishing partnership for combined BPM-SOA solution offerings such is the case of Fujitsu and Software AG partnership to jointly develop the CentraSite SOA 'registry', which combines the features of a registry and repository. As the convergence trend is still on its upswing, and with the presence of more than 100 pure-play BPM vendors, it is widely anticipated that more acquisition and mergers will materialize in the coming months. When done successfully, such strategic moves will definitely ease the proliferation of integrated BPM-SOA solutions, creating a stiffer competition that will further haze the line between IT infrastructure and the underlying business processes.

3.2. Standards evolution

The growing interest in BPM-SOA solutions has generated a wide spectrum of protocols and tools, which are not all compatible among each others. As a result, a key facilitator for the BPM-SOA convergence is the adoption of industry-wide technology standards which

- Allow the architecture to be portable and operational independently from specific vendors or technologies (including hardware, operating system, and software environments).
- Allow the smooth integration of compatible tools and real-time business processes, across heterogeneous deployment environments.

Let us focus on SOA standards first. As observed in [9], without the SOA foundation standards depicted in figure 2, it would not be possible to do model-driven development in the BPM tools, as BPM will become slow and expensive. In particular, the Business Process Execution Language (BPEL) is widely recognized today as the de facto SOA orchestration language.

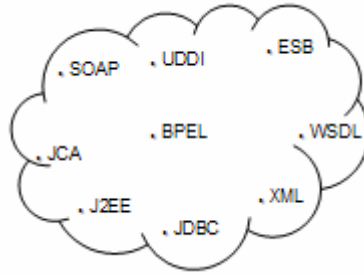


Figure 2. SOA foundation standards

Recently, the Object Management Group (OMG) has proposed its Model Driven Architecture (MDA) for modeling processes and services based on a platform-independent approach. MDA standards are positioned as being able to empower organizations to design a complete SOA solution through models, with minimum investment in specific technologies and protocols [10]. The OMG has also created the SOA Special Interest Group (SIG) to further coordinate SOA standardization efforts between the OMG and other SOA standards groups (such as W3C, the Open Group, and OASIS). If this coordination succeeds, then one would expect a faster adoption of SOA-specific modeling approaches and best practices.

From the BPM side, some of the associated foundation standards and technologies are shown in figure 3.

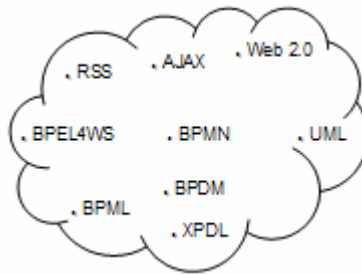


Figure 3. BPM foundation standards and technologies

In particular, the Business Process Modeling Notation (BPMN) has gained momentum last year with its latest version 2.0. BPMN is currently the predominant notational standard to graphically depict process models. This was made possible thanks to the 2005 merging of BPM Initiative (bpmi.org) into the Object Management Group (OMG) due to the overlapping scope of BPMN and UML activity diagrams. Very recently, XPDL (XML Process Definition Language) and Business Process Definition Metamodel (BPDM) have also gained widespread adoption as interchange and serialization formats, outperforming Business Process Modeling language (BPML). XPDL and BPDM are even competing against SOA's BPEL standard. In fact, as mentioned in [11], if BPEL isn't used as an execution language, but just as an import/export interchange language as is done by many vendors today, then there might be little value left for BPEL over XPDL (or eventually, BPDM). This debate on the issue of XPDL/BPDM versus BPEL and whether these standards are competing, overlapping or complementary is still ongoing. Though it is too early at the moment to speculate which standard will prevail, many experts prefer to see these competing standards brought together instead of being embarked in unwanted war that will further delay early customer adoption.

Another challenge facing the BPM-SOA convergence, at least from a standardization point of view, is that BPMN (BPM standard) and BPEL (SOA standard) were not originally designed to work together [12]. This leaves some gaps that need to be addressed before processes can be modeled, optimized and executed end-to-end within a BPM-SOA unified framework.

It is expected that big BPM-SOA players will use their weight in the various standards committees to further accelerate the acceptance and adoption of standards that best fit their BPM-SOA vision. This is a particular challenge, taking into account the relative complexity associated with most BPM / SOA standards. At the same time, organizations that want to gain a first mover advantage in implementing converged BPM-SOA solutions would endure higher cost in implementing emerging standards that would take time to become fully accepted.

3.3. The need for dynamic process management tools

Standalone BPM products (without SOA) have traditionally relied on design-time process modeling tools. For successful BPM-driven SOA solutions, it is also important to provide run-time process management tools that capture the actual state of the running system [12]. Such tools will allow a change in the running process, to be automatically reflected on the application and composition and vice-versa.

3.4. Getting the right mindset and proper education for the transition

Assisting enterprises setting up BPM-SOA integrated solutions requires that key players in the converged BPM-SOA field start serious initiatives to educate the market about BPM-SOA integration, what it means and how to implement it. This has to do more with strategic business concepts than tools, and software. Unfortunately, because BPM and SOA were not originally designed to work together, SOA architects from the IT side are not fully grasping the business process modeling approach and its principles. Similarly, BPM process owners on the business side do not fully comprehend SOA and how it interacts with BPM [13]. This gap is however being aggressively addressed through BPM-SOA market consolidation and some vendors' initiatives to further educate the market about the integration. Since top executive endorsement of any potential BPM-SOA initiative is crucial for its adoption, it is important for vendors to articulate to CEOs the value proposition of their BPM-SOA solutions. In doing so, focus should be more on specific business values, and bottom-line results than on technical jargons. Previous successful case studies can also be highlighted to provide further credibility and make stronger impact.

Before large enterprises invest into a multi-million dollar BPM-SOA project, it is important that the business case of the project is clearly articulated, and that extensive preparation (governance, education, training, change management, planning) is undertaken. In particular, the iterative nature of both BPM and SOA requires a new state of mind for both the business and IT camps [14]. A proper governance model, which articulates a collaborative coordination between the business and IT is mostly needed for the successful adoption of BPM-SOA best practices. In doing so, it is important for enterprises to acknowledge and address the inherent differences (highlighted in table 1) between BPM and SOA, and its implications on an integrated BPM-SOA initiative. It is also important to acknowledge and leverage the commonalities between the two approaches. These include the promotion of encapsulation, modularity, reuse, and loose coupling.

3.5. Governance, leadership and executive support

The transition toward a successful implementation of a converged BPM-SOA solution does not happen overnight. Rather, it requires time, effort, planning, and above all strong commitment from all levels of the organization, starting with top management. In particular, strong leadership that eloquently articulates the organization commitment and support for a sustained BPM-SOA initiative is required. Strong leadership is also a prerequisite for the adoption of comprehensive cost-reduction, quality of service and business compliance requirements strategies that are core elements in the BPM-SOA value proposition.

The adoption of a proper governance model should take into account the fact that a BPM-SOA initiative should endorse a new state of mind that brings business and IT closer together than any previous time before. A successful implementation requires a strong harmony between process design (Business-driven) and IT architecture and applications (IT-driven). At the same time, it should clearly articulate the business entity who will own (and be accounted for) the BPM-SOA initiative. One way to address these two needs is to form a high-level coalition team from major corporate functions. This team will act as a steering committee, bringing the necessary cross-functional expertise to oversee the BPM-SOA project and ensure a better alignment between business needs and IT architecture and strategy.

3.6. The consultancy alternative

Organizations that do not possess the required in-house competencies to make the most of BPM-SOA partnership might opt for training courses to further develop the internal skill-sets and expertise required to embark on a BPM-SOA project. Alternatively, outside consultants with credible BPM-SOA expertise can be contracted to lead the BPM-SOA project from initiation to execution. The consultancy team needs to address the most important business processes as well as the underlying services, applications and IT infrastructure.

Such an approach might lead to a faster planning and execution of BPM-SOA practices. However, the obvious drawback of this approach is that it will most likely deprive the organization from developing its own internal skills, and expertise. Further, in the long-term, the consultancy alternative might not promote the creation of a new organizational culture and behavior that changes the business into a BPM-SOA driven organization.

3.7. Starting small and refining

Embarking on a BPM-SOA project is a journey of iterative process/service improvements rather than a destination that would yield a perfect solution. As suggested by the Gartner report [4], organizations who want to take a leadership role in the BPM-SOA convergence trend should start adopting process modeling and developing process architecture now, despite the fact that all the 'bells and whistles' may not be available yet. Business analysts and architects need to get started and going and then iteratively refine their process modeling and architecture. A good start will be to focus on a small, tightly scoped BPM-SOA project that focuses on optimizing the top (2 to 10) core business processes which have immediate impact on bottom-line results. Then it is important to identify the services that are consumed by these top business processes. A particular emphasis should be put on those important activities and tasks that need greater flexibility and adaptability [4], since this is where a converged BPM-SOA approach will bring a fundamental edge.

Starting small will also allow the business analysts and architects to build and refine their skills, while demonstrating the viability of their BPM-SOA integration approach. The latter is most needed to gain the buy-in from all levels of the organization to go further and tackle more challenging tasks.

3.8. Getting the proper level of service granularity

By recognizing the power of the library of reusable services and associated applications enabled by a BPM-SOA partnership, enterprises are seeking the adoption of an agile platform which will support flexible business operations. One obstacle standing in the way of achieving the desired flexibility is the challenge to specify the proper level of service granularity.

On one hand, SOA services with fine granularity make it very difficult for BPM designers to manage and use for building meaningful applications. On the other hand, coarse-grained services are easier to manage since they can be located and reused appropriately through the associated meta-data. However, a coarse granularity reduces the degrees of flexibility in the resulting applications [14]. Thus it is important that SOA developers bring the right level of service granularity that best matches the need of business-level components.

3.9. The need for a unified BPM-SOA terminology

Converging the BPM (process driven) and SOA (service driven) viewpoints towards a unified approach take more than just bringing the associated two methodologies together. There is also a gap between the two viewpoints when it comes to using the same terminology to mean different things [15]. For instance, the same terms like business processes, businesses services, business practices, business components and business capabilities are often used to mean different things to the two camps. With the growing trend to adopt a unified BPM-SOA modeling and architectural approach, there will be more pressures to unify and 'standardize' the technical terms to help create a unified mindset.

3.10. Design for scalability

By nature BPM-SOA initiatives endorse an iterative approach of continuous improvement, where processes and underlying services are continuously fine-tuned for optimized performance. For large-scale, enterprise-wide deployments, this means that services and processes are most likely to proliferate both in terms of numbers and versions. If the prevailing BPM-SOA tools do not facilitate such scalability requirement, then managing the growth of business processes and services will become a real turmoil. BPM-SOA vendors have already started tackling this challenge by different approaches, such as combining the registry and repository functionality through blended 'registories' [16].

3.11. Leveraging existing legacy applications

Many large enterprises have accumulated through time a substantial number of legacy systems that are often based on a mix of automatic and manual processes. These legacy applications need to be properly managed, and preferably leveraged before migrating towards a converged BPM-SOA initiative.

To tackle the challenge of unleashing inherited legacy functionality and integrating it into new BPM-SOA-enabled applications, enterprises need to carefully revisit and probe their existing legacy applications. Once a legacy application is carefully analyzed, and its impact on other processes is well understood, many alternative actions can be envisaged. For instance a number legacy processes might need to be relearned, some re-engineered, while others replaced [14]. Many other legacy processes are candidates to be leveraged as BPM-SOA service-enabled applications. This is the task of SOA, which can wrap or encapsulate such legacy applications into reusable Web services that can be invoked by different business processes.

4. Conclusion

Business analysts, consultants and integration experts, all tend to agree that BPM and SOA are heading towards a meant convergence. In fact, the question is no longer 'if' converged BPM-SOA combinations will be the leading enterprise practices; it is only 'how soon'. The value proposition of a joint BPM-SOA partnership is well established and clearly articulated. The BPM-SOA combination allows services to be used as reusable components that can be orchestrated to support the needs of dynamic business processes. The combination enables businesses to iteratively design and optimize business processes that are based on services that can be changed quickly, instead of being 'hard-wired'. This has the potential to lead to increased agility, more transparency, lower development and maintenance costs and a better alignment between business and IT.

The article looked at the BPM-SOA convergence trend as a journey rather than a destination. It explored the various challenges facing the broad adoption of converged BPM-SOA initiatives, as well as some of the enabling solutions. To this regard, the article identified that a converged BPM-SOA adoption can be facilitated by the following main initiatives and practices:

- More acquisitions, partnerships, and mergers between pure-play BPM players and service integration vendors
- Adoption of unified industry recognized standards, capable of bringing both BPM and SOA under the same umbrella
- Proper planning, education, knowledge and skill building. If these cannot be developed in-house, a consultancy approach can be envisaged
- Mindset change in both business and IT organizations.
- Executive support, governance policies and clear accountability
- Greater role to be played by major players in market education to better articulate to CEOs the business values of the converged BPM-SOA offering and its impact on bottom-line results
- Starting small, by focusing on top important business processes that need greater flexibility and adaptability
- Bringing the right level of service granularity that best matches the need of business-level components and finally
- New approaches to design converged solutions that are scalable and adaptable for enterprise-wide deployments.

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