Applying SOA to Your Enterprise

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As more and more organizations are either considering or already have made a commitment to Service-Oriented Architecture (SOA), it is extremely important to understand not only what SOA is and why it is important, but also how it can be practically applied to your enterprise and what some of the consequences of adopting SOA will be. As SOA has become more popular, most major vendors are relabeling and introducing new products with "SOA" branding. This trend has lead to widespread confusion around what SOA is and what it really means, as everyone seems to claim "SOA? We've been doing that for years!"

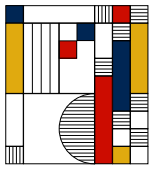
This paper cannot hope to cover the details of SOA implementations in a scant few pages, but what it can do is provide a basis of understanding for SOA and what it takes to make an SOA initiative successful within your organization. Using this information, you should be able to better relate the benefits of SOA as well as ask tough questions of your vendors and solution partners. SOA is an important paradigm because it has the potential to provide a level of visibility and meaningful exposure of key business processes and information across the enterprise, but SOA is something that can be easily misunderstood and associated with a level of hype that can lead to unmet expectations.

If you are seriously considering SOA, it is essential that you approach it with the proper perspective. SOA is not a "silver bullet" that will solve all of an organization's technology problems, but it is a powerful way to view the IT assets and capabilities of your organization. Therefore, it is important to be properly prepared for the changes to your organization that accompany an SOA initiative.

SOA Fundamentals

One of the unfortunate problems with SOA is that because it is really just a way to describe the structure of a complex system – be it an organization, a software package or your enterprise IT architecture – any existing definition of SOA is intentionally abstract. SOA describes the characteristics of the system, but the actual details of the system may vary dramatically between the type of system and even across organizations. The power of SOA is that these differences turn out to be less important than they may first appear when all you can see around you are the trees and not the shape of the forest.

Most importantly, SOA is not a product. While you can buy software



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packages designed to help you build *your* SOA, these software packages on their own are not *an* SOA. Many business and technology leaders accustomed to making software infrastructure investments in HR, ERP, CRM or other complex software packages have made the mistaken assumption that they can purchase an "SOA in a box" from a software vendor or service provider. To be fair, this assumption is not their fault, because there are plenty of vendors and service providers marketing their products and services in exactly this way. However, if SOA is approached with a "we need to get us one of those" type of attitude, the SOA initiative is doomed before it even starts.

To be successful, an enterprise's SOA must be a reflection of the way that enterprise works. This does not mean that you should expect an ERP-like experience where you purchase "an SOA" and are assaulted by an army of consultants who are required to implement massive customizations of the package before it is useful. SOA solutions should not work this way.

Either on your own, or with outside assistance, you need to first come up with a rough idea of what your SOA needs to do to deliver business value for your organization. To do this in practice requires that you take both a strategic and tactical view of what technology can do to enable your business strategy. In today's business environment, and depending on your industry, "strategic planning" can encompass anything from "breakfast" (if you're in retail) to a 10+ year view of how the business needs to develop. Therefore, you will need to provide as many near-term successes as possible that are aligned with the enterprise strategic vision.

The "Service" of SOA

One of the key elements of SOA is obviously *the service*, but again, since any real definition of "service" will be abstract, it can be difficult to nail down what this means in the context of your organization. One of the reasons for this is the generic nature of what a service is and the other is that the definition of a service within SOA is dependent on the level of detail you wish to discuss.

The best way to address the first problem is to consider two definitions for *service* from Dictionary.com:

- **service** *(n.)*: the performance of any duties or work for another
- **service** *(v.)*: to supply with aid, information or other incidental services

While these definitions are also abstract, they capture the main intent of the "service" of SOA: to identify a business process or information source and expose it in a meaningful way across the enterprise.

Addressing the second problem is actually much harder, and is probably one of the main sources of confusion when attempting to describe SOA, because people tend to discuss services at different levels of detail in the same conversation. For example, take the following, only slightly contrived, sentence:

There are service companies offering their services to help you plan your Service-Oriented Enterprise and provide tools, technologies and services to help you build and implement your IT services using Web Services to support the necessary quality of service (QoS) levels to sufficiently allow you to provide your products and services to customers with a solid commitment to quality customer service.

There are seven different uses of the word "service" in the above sentence, relating to both the noun and verb definitions above and operating across multiple levels of detail or levels of abstraction. Obviously, if your organization helps individuals pick the right investment plan for their needs, this process is viewed as a service provided by you to your customers. However, the functionality of the IT systems that a particular broker agent may use to help the customer may also be viewed as "services": the CRM system provides information about the customer, the in-house pricing system provides pricing and return calculations over the investment period and the customer's order is processed by the in-house order management application.

Clearly, there is only one fundamental truth about SOA services: the service is defined by those being served. This truth also provides the basis for understanding SOA in comparison to the traditional view of IT within the enterprise—as a shift in perspective. Rather than looking at IT investments and seeing discrete applications – e.g. ERP, HR, CRM, the billing system and the order management system – each with their own method of interaction or separate user-facing

application, SOA focuses on the capabilities and information required by the people within the enterprise and your external trading partners. SOA is about *what you do* rather than *how you do it*, and this is why it is so powerful when applied to enterprise IT.

The Service-Oriented Enterprise

In a service-oriented enterprise, the particular application, package or external third-party providing the implementation of the service becomes an articulation point for business and technology leaders when they are deciding how best to implement the business strategy. If today it makes sense to provide a particular service maintaining customer information using an internal implementation of a CRM package such as Siebel but in three years the cost of maintaining the internal implementation is more than it would be to use an externally hosted solution such as Salesforce.com[1], migrating from one system to the other becomes a business decision rather than an automatic investment in a massive re-systemization effort. This isn't to say that there won't be costs associated with such a change, but they should be only related to moving the data between systems. The rest of the systems and processes depending on customer information in the service-oriented enterprise should continue to work *exactly as they did before the switch*.

This kind of flexibility in selecting service providers can go a long way to enabling business leaders to make the decisions they need to make to keep the organization profitable and focused on delivering the core business. Once the services that enable the enterprise are defined and used across the organization, the phrase "it would cost us too much to change" should be heard much less frequently. Of course, this level of flexibility is not something that will happen overnight, without proper planning or without investment, but it is something that is possible to achieve with today's technologies. They are still not perfect, but most of the technological issues that have prevented previous efforts such as EAI from delivering on these promises now have better solutions.

The biggest factor contributing to the success of SOA is not technological, however. As with any other organizational change, the ultimate success is dependent on how well the people in the organization can adapt and take advantage of the new capabilities. One other major way that SOA is different from previous attempts to provide this level of flexibility is that SOA can allow your organization to integrate technologies and products into the way you do business instead of requiring your organization to adapt to the requirements of an application such as ERP or CRM. The idea is to put the focus on the what the business needs and then to allow you to pick the best way to accomplish those needs without having to make massive investments as a result of those decisions.

Applying SOA

Once the theory of SOA is understood, the next big question is: "how do I make it work for me?" Since your SOA is a reflection of your organization, the answer will vary from place to place—even within the same industry. Strategic business priorities should directly drive the evolution and character of your SOA.

Even though SOA is about allowing you to adapt existing systems to the needs of your business rather than having your business adapt to the system, there are likely to be to initial problems. First, the way you do business internally may be more influenced by the systems you already have than you may realize, and second, as a result of the first problem, you are likely to need to consider some changes in the way you do business internally. Both of these realities are unfortunate, because it is relatively easy to let cynicism to set in and think, *that's what they said about the last great idea*.

The situation is a little different this time around however, because instead of the starting point being "you need to do things like this," the starting point is really "what processes and information are essential to the way you do business?" This open-ended starting point is a little scary, and it can also be a bit dangerous without a focus on delivering value early. Still, it is the necessary place to start because it is the only way that you can differentiate the information and processes that directly contribute to the business from the things which you currently have because they are defined by a particular system or application. Without this

1 The comparison of Siebel vs. Salesfore.com is purely for illustration purposes and is not intended to be any kind of formal comparison or recommendation of one over the other. They are simply real examples of two ways of providing CRM functionality.

separation, there is no way to achieve the flexibility described above, because the "what" of your business will be too closely tied to a particular "how" provided either internally or by a software vendor.

The best way to begin this process is to focus on the high-level interactions between entities within the organization and the processes and information required to complete them. There is no need to define the exact details of what concepts like "customer", "invoice" and "order" really mean at this point—to attempt to try will derail the discussion and diminish the value of trying to understand how the organization really collaborates to deliver the business. There will be plenty of time for arguing about the details later.

This conceptual exercise is a crucial part of successfully applying SOA to your enterprise, regardless of how you decide to go about ultimately implementing it. Without identifying the way the organization works as a unit, who or what departments/divisions are responsible for the parts of the process, and what capabilities are the most important to the business, embarking on an SOA initiative of any size will be a time-consuming and costly endeavor.

"Top Down" or "Bottom Up"?

How to start an SOA initiative within an organization is always a question. As Web Services, one of the enabling technologies in many of today's SOA environments, is increasingly delivered by vendor products, Web Services may already be in use in your enterprise. However, it is crucial to understand that Web Services is an enabling technology and not the same as SOA.

One of the major problems of the "bottom-up" approach to making SOA real for your organization is that it is often more driven by the technologies, products and systems in use by IT rather than driven by business necessity. In some cases, multiple "bottom-up" initiatives have been undertaken within an organization with the intent to provide an external view of information, perhaps "customer", but the views of the information were biased towards either what was available in the existing systems or tailored specifically to the needs of the individual department or division. This is a situation that must be avoided at all costs—it is an integration solution, *not* SOA, and will become a liability in efforts to deliver an enterprise SOA in the future.

The "Architecture" of SOA

SOA is intended to expose business processes and information in a consistent and meaningful way *across the enterprise*, not simply within a department or to integrate existing systems. Integration of systems is a natural outcome of an SOA, but it cannot be the primary goal. Only by exposing concepts and processes meaningful to the business, and not the underlying systems' constructs, will the potential value of your SOA be realized.

This is not to say that pilot projects cannot be run within the organization by a particular department or as individual projects. This approach is a very legitimate way to deliver visible and measurable value of your SOA strategy, but to deliver this value, these projects must be coordinated with delivering information and/or processes with meaning across the enterprise. It is similar to separating the framing of a house from the installation of the wiring or plumbing. Each can be accomplished relatively atomically, but how they fit together to form the finished house is established well before the first board, wire or pipe has been cut.

The direct and traceable relationship of each delivered project or pilot service implementation to the desired enterprise capabilities is the "architecture" of SOA, and it is what delivers the long-term value to the organization. Therefore, some amount of "top down" analysis and design needs to be done before even considering a pilot project. Integrating two systems using Web Services proves the technology works, but it does not deliver long-term value to the business.

Transformation and Governance

Successful SOA initiatives result in fundamental changes in the way IT delivers capabilities to the business, but these transformations cannot happen without direct support from executive management. A recent article from McKinsey & Company stresses the importance of visible leadership of the CEO during transformations, "CEOs who give only lip service to a transformation will find everyone else doing the same." However, in order

to get CEO-level support, the SOA initiative must deliver measurable business value to the organization—it must be a means to an end and not an end itself.

A recent GCR survey sponsored by BEA Systems cites cost savings, improved customer service and faster time to market as three of the primary justifications for ongoing SOA initiatives in North America and Europe. While these goals and others such as increased profitability are surely on the executive agenda, they can also be easily used as umbrellas to justify investments in technologies and approaches with only vague benefits. A much better approach is to directly link strategic goals with the capabilities needed to achieve them and then demonstrate how these capabilities will be better provided using SOA than other techniques.

Embarking on the SOA journey is a commitment to the transformation of a key piece of organizational infrastructure: IT capabilities. It is no less important than an investment in a new manufacturing process or changing the organization's channel distribution model. Therefore, SOA is something that cannot succeed without providing the answers to why the change is necessary, how it will be achieved and how it will affect the individuals in the organization. Like other necessary infrastructure such as phone systems and connectivity to the Internet, SOA may not need to be overt to be successful, but the capabilities it provides certainly should be.

Success through Effective Governance

Once the challenges of getting the SOA program started have been addressed, the SOA will wither and die without proper oversight and management to ensure that not only will it initially deliver value to the business, but that it continues to do so over time as the SOA matures. To ensure the long-term success of your enterprise SOA, an appropriate governance structure must be put in place that allows for continual assessment and improvement based on feedback from across the organization.

An ongoing governance challenge for your SOA is determining who in the organization is responsible for the operational support and funding. This challenge is a direct consequence of SOA being a cross-organizational infrastructure rather than being owned by a particular department or division.

Many organizations have traditionally allocated budget to departments and divisions for the procurement, management and operations of their IT systems. SOA requires a different accountability model, because if a core capability such as billing and pricing is exposed across the organization to put information more reliably in the hands of customer care and sales, the reliability and access requirements of the system is potentially much greater than it was before. Also, since the capability is now a core enabler of both the customer care and sales function, when the service needs to be enhanced to provide additional information, where should the funding come from? As more and more services are offered by the SOA, there needs to be a considered effort to manage the sometimes conflicting demands of multiple departments, resolve funding questions and determine which new organizational enabling capabilities need to be developed.

The governance body for the SOA should also include direct input from business leaders on a regular basis—preferably including input from the CEO. It can then provide a forum to articulate changing business needs, new business strategies and discuss what capabilities need to be added or changed to deliver them. Under no circumstances should the governance of the SOA be handed over to the IT department alone. The exact relationship and organizational structure of the governance body will vary from organization to organization, but it must include aspects of both business strategy and IT strategy to ensure the SOA is focused on delivering real value to the business.

Consequences and Pitfalls

While there are many consequences and potential pitfalls to adopting SOA, some of the main ones need to be understood from the beginning. Some of the consequences, such as being less dependent on a particular software vendor or solution provider are good for you, but not benefits that vendors and providers focus on, for obvious reasons. Most of the items discussed in this section have already been mentioned in this paper, but they bear highlighting again.

Some Consequences

- *Gaining a better understanding of how your business actually operates*

  The exercise of introspection into your enterprise to determine the processes and information that define it – seeing the "what" rather than the "how" – often uncovers information and process needs that have been overlooked. Like the grain of sand in the oyster, the organization has gradually adapted ways of dealing with the problem, which often become second nature to how work gets done. However, it is unlikely that these workarounds are the pearls of your organization.

- *Making the organization less dependent on key software and service providers*

  One of the benefits of SOA over other approaches is that it can allow dependencies on particular vendors and service providers to be minimized. In practice, there will still likely be some dependence on data or functionality provided by a critical internal system, but, where possible, these dependencies can be minimized using SOA as much or as little as makes sense to the organization. The trade-off to this flexibility may mean that the organization's own IT department becomes responsible for maintaining some of the core business concepts, like the definition of customer, so that they are not tied to a particular application. A related consequence of this approach is also a greater insulation from changes as a result of upgrades and enhancements to products and services used by the organization.

- *Providing greater opportunities for continuous process improvement*

  Since over time the SOA will grow to provide services representing more and more key business processes and information sources, it will become easier to experiment with changes to the way they are used in the course of delivering the day-to-day business to find increased efficiency. This area is mainly the domain of the Business Process Management (BPM) class of solutions, but many BPM approaches are predisposed to or better implemented within an SOA than other environments.

- *Reduction in the costs to deliver new business functionality through service reuse*

  One of the strategic consequences of SOA should be the development of a set of core, shared services that are leveraged across the enterprise to deliver customized solutions to specific departments and divisions. If these services are in place, new applications can make use of them without needing to start from a blank slate each time a solution needs access to the customer's buying history, up-to-date product pricing information or the order management system. With proper governance structures in place, these cost reductions can be real unless each new application or solution requires entirely new supporting information and processes.

Some Pitfalls

- *Lack of consideration for both tactical and strategic views*

  With any significant infrastructure investment there is a need to balance near-term and long-term benefits. SOA is not an exception to this rule. For the SOA infrastructure to be able to support the business strategy, considering only short-term integration wins or tactical solutions as input into the SOA planning and governance will not be sufficient. Even small pilots of SOA should be considered in terms of how they will provide the capabilities needed to deliver the business once they have been put in production. Planning a successful SOA is like carefully cultivating a field of crops instead of blowing seeds into the wind. You must understand how isolated efforts fit into the bigger picture for enabling the overall business strategy.

- *Lack of direct links to business objectives and measurable value*

  SOA cannot be successfully implemented for its own sake; it must be directly linked to enabling

or delivering on business objectives. However, it is also not fair to justify your investment in SOA solely on the basis of achieving a single business objective or project. Normally, there are many related objectives which rely on some common enabling process or information being available. Showing how multiple objectives can be furthered through a common investment is just good business, and it will ensure greater understanding across the organization for how SOA can deliver ongoing value.

- *Unclear responsibilities for funding and control*

  It is not unusual for everyone to want benefits from the capabilities provided by your SOA until it takes funding out of their budget. Budgetary and operational responsibility disagreements and uncertainty can kill an SOA quicker than most other issues. Therefore, funding mechanisms and operational control needs to be established from the outset. Ongoing management of these issues will be the responsibility of the SOA governance body, in whatever form it takes within your organization. Shared capabilities and benefits require shared investment.

- *Attempting to implement SOA as an IT project rather than as an organizational transformation*

  Because many of the same products and technologies can be used to facilitate both integration of applications within a department or division as well as deliver an organizational SOA capability, it is tempting to try and "get SOA in the door" through a particular IT integration project. There are two main problems with this approach. First, the "SOA project" may be more focused on the technology or the needs of the particular integration issues, and second, the "SOA project" is unlikely to be directly applicable to providing the core processes and information that are needed do deliver the business strategy. In this scenario, there is a very real danger that instead of seeing the project as a stepping stone to an enterprise SOA, it will be viewed as "just another IT project technology" with the cynicism of ERP and EAI.

Conclusion

To successfully apply SOA to your enterprises requires you to cut through the confusion and hype currently surrounding it and understand what it is, what it takes to be successful and what are some of the benefits and potential problems you can expect. SOA is not a product you can buy, install and then try and forget about; it is an approach to transforming the way IT delivers essential capabilities to the business. As a result, SOA must be constantly assessed against how well these capabilities are delivered and ensure it continues to deliver business value. Keeping these thoughts in mind can help you deliver an SOA infrastructure that is aligned with the business strategy of your organization.

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