Service Oriented Architecture
An Executive Overview

Bob Sutor
Director, WebSphere Foundation Software, Web Services, and SOA

In October, 2002, IBM CEO Sam Palmisano first described IBM's definition and vision for "on demand business":

> *An on demand business is an enterprise whose business processes—integrated end-to-end across the company and with key partners, suppliers and customers—can respond with speed to any customer demand, market opportunity or external threat.*

It would be a significant understatement to say that this has struck a responsive chord with our customers as well as many of our competitors. It's important for you to note that on demand is very much a *business* statement. At its core, it about being fast and flexible, while giving your customers what they need. It applies equally well to companies trying to do their best in weak economic times as well as those trying to grow in better business environments.

While the above statement makes a tremendous amount of sense, it immediately begs the question: how do I do it? Companies want to respond to great opportunities and deliver superior, fast service to their customers, but how do they accomplish it? What are the characteristics of an IT infrastructure that can make this a reality?

As we think about the business challenges we now face in this Internet-connected, post dotcom bubble world, we find that there are matching IT imperatives. For example, CEOs want to increase the speed of business changes and this requires the IT organization to be more responsive and to quickly adapt to the changing business priorities. To improve business efficiency and performance, we need to align IT more tightly with business strategies in a cost effective manner. Finally, we must protect the privacy and security of critical information assets, and this may even be required by law. IT must provide the secure and managed integration environment to provide the necessary corporate and legal compliance.

An important element of how IT can deliver on these imperatives is Service Oriented Architecture (SOA). SOA is a set of patterns, best practices, and technologies that allow us to build cross-enterprise, standards-based distributed computing environments. Moreover, SOA helps us maximize re-use while providing the necessary security, reliability, and maintainability for true enterprise class business solutions.

Services

In an SOA world, business tasks are accomplished by executing a series of "services," jobs or applications that have well defined ways of talking to them and well defined ways in which they talk back. In some sense, it doesn't really matter how a particular service is implemented, as long as it responds in the expected way to your commands and offers the quality of service you require. This means that the service must be appropriately secure and reliable, as well as fast and scalable enough.

This makes SOA a near ideal technology to use in an IT environment that deploys software and hardware from multiple vendors. It will be your individual requirements around “secure,” “reliable,” “fast,” and “scalable,” not to mention “ability to provide products, training, and services” that will drive your choice of vendor.

For a business process to be flexible and dynamic enough to respond to the necessary changes in the business environment, it should be created from components that can be reused and it should be composable. That is, we should think of a business process as built from components like “check inventory,” “validate user identity and authorization,” “verify vehicle identification number,” and “bill insurance company” that might be useful elsewhere. This allows us to reduce redundancy and provide consistent, manageable behavior across the enterprise, perhaps across multiple channels. Once modeled and built, the entire business process might be used as one component in a larger process.

These notions of components and composability map very well to the IT world where the components are services. The actual implementation of a “check inventory” service can hide the facts that warehouses may be globally distributed, use different ERP systems or databases to store the information, and may even be outsourced. Nevertheless, it is possible to create an IT service that can effectively answer questions like “do we have N units of product XYX in stock and ready for delivery?”.

Standards are the key to providing the interoperability that SOA requires to be effective. We need the pieces to be able to talk to each other whenever it makes business sense for them to do so. While the industry has tried before to produce technologies that everyone might use for application integration, Web services now shows the most promise to provide the universal standards platform to help link together the business processes of a company and its key partners and customers.

Business Drivers for Adoption

Over the past four years, IBM has worked with hundreds of customers on Web services and SOA engagements. When we recently analyzed the solutions we helped create with the customers, we found that they fell into two main categories: customer retention and improving operational efficiency.

Customer retention means keeping customers happy and doing things that will encourage them to come back again. This means, for example, that when they speak with a service representative in a call center, the representative has real time information about inventory and order status, even if those details are being collected from systems both inside and outside your organization, and spread across several geographies. Web services and SOA can make this possible. These technologies make it much easier than previously possible to add new sources of information and then putting that data at the fingertips of those who are interacting with your customers. It also means that you can create more usable websites and portals for customer self-service.

Many of the operational efficiency engagements around SOA involved improving the supply chain. It has been evident for several years now that Web services has the potential for both extending EDI systems for better application integration as well as allowing more members of supply chains to interact electronically. This is especially important for those small and medium sized businesses who cannot afford a full EDI infrastructure or those who simply want a solution that takes advantage of the

relatively inexpensive and near universal connectivity of the Internet. For example, one of our customers, a trucking company, allows those who wish to arrange shipments to do so automatically via Web service calls from their ERP systems. Once a shipment is *en route*, the customer can get status updates and delivery confirmation in real time. This particular example illustrates how SOA can both improve operational efficiency as well as providing services that customers find beneficial and, presumably, a positive differentiator from the competition.

The Pathway to SOA Adoption

A further benefit of our analysis of SOA and Web services customer engagements is an understanding of how people started using these technologies. We identified four steps, although it is probably better to think about them as three entry points to a path that eventually leads to your being a fully on demand business.

The first step is to start making individual applications available as Web services to multiple consumers via a middle-tier Web application server. I'm not precluding writing new Web services here, but this is an ideal entry point for those wishing to deploy an SOA with existing Java or Cobol enterprise applications, perhaps targeting customer retention or operational efficiency projects.

You should work with multiple consumers to correctly define the granularity of your services, and pay proper attention to keeping the services and the applications using them loosely coupled. Most of our customers use the IBM WebSphere Application Server at this level.

The second step involves having several services that are integrated to accomplish a task or implement a business process. Here you start getting serious about modeling the process and choreographing the flow among the services, both inside and outside your organization, that implement the process.

The choreography is essentially new business logic that you have created outside the boundaries of any one application, therefore making it easier to adjust as business conditions or strategy require. Your ability to manage the processes and services and their underlying implementations will start to become important as well. This entry point is really "service-oriented integration" and will probably affect a single department or a business unit such as a call center. The WebSphere Business Integration products are frequently used here, including the recently introduced Server Foundation. Many customers also use IBM Tivoli products for the security and management needed at this level.

If you already have an enterprise application integration infrastructure, you will most like enter the SOA adoption path at the third steppingstone. At this point, you are looking to use SOA consistently across your entire organization and want to leverage your existing enterprise messaging software investment such as WebSphere MQ and the message and event brokers.

We want to stress here that proper SOA design followed by use of enterprise messaging and brokers constitutes a fully valid deployment of SOA. Web services give you an easy entry to SOA adoption, but they don't constitute the gamut of what service orientation means. Modeling is likely required at this level, and integration with your portal for "people integration" will also probably happen here if you didn't already do this at the previous SOA adoption point. IBM’s WebSphere Portal Server already includes support for Web services.

The final step on the path is the one to which you aspire: being a flexible, responsive on demand business that uses SOA to gain efficiencies, better use of software and information assets, and competitive differentiation. At this last level, you'll be able to leverage your SOA infrastructure to effectively run, manage and modify your business processes and outsource them should it make business sense to do so. Your business processes will be properly componentized and will be composable to implement the new business models you need to succeed.

Why IBM?

There are three main reasons why we think you should consider IBM as your primary vendor for your SOA products, education, and services: product leadership, standards leadership, and proven experience.

IBM has adopted SOA and Web services across its WebSphere, Rational, Lotus, Tivoli, and DB2 product lines and has the broadest support in the industry. We've focused on enterprise quality implementations that allow simple integrated development as well as secure and scalable deployments. Our products allow your adoption of SOA and Web services to be incremental and allow you to capitalize on the enterprise investments you have already made.

IBM is the world corporate leader in driving IT standards. This includes *de facto* standards created by the very large marketshare of products like WebSphere MQ enterprise messaging, as well as more formal standards such as SOAP, Web Services Description Language, and Web Services Security. IBM was a primary driver and founder of the Web Services Interoperability Organization. More recently, IBM has teamed with industry partners to introduce specifications for transactions, reliability, management, and grid computing. IBM was the founder and chair of JSR 109, "Enterprise Web Services," in the Java Community Process. JSR 109 is a key element of J2EE 1.4 and IBM was the first major application server vendor to deliver certified support of this important industry-developed standard.

Our proven experience in helping customers implement SOA and Web services means that you can mitigate your risk in adopting these technologies, leverage the best practices we have developed through actual engagements using current products, and improve your time to value. We are investing over $1 Billion in 2004 across IBM on SOA and Web services and have over 35,000 consultants with expertise in these technologies. Our three SOA/Web Services Centers of Excellence leverage IBM's deep industry knowledge to help clients in specific industries identify opportunities for SOA and Web services in their organizations.

In the last year over 50,000 developers in 164 countries actively worked on Web services applications through IBM's Speed Start for Developers Program. We invite you to work with us to assess your business goals and how we can work together to see if SOA and Web services can help you become the on demand business you aspire to be.