The 411 on SOAs

Why Companies Taking On Web Services Today Will Have a Decisive Advantage in the Future

Web services enable businesses to share and request information with customers, suppliers and partners with ease and speed as never before. To this end, it should come as no surprise that Web services are having a significant impact on manufacturing enterprises. Industry analyst firm Compass estimates between 50-60 percent of manufacturers have one or more Web services projects underway.

To harness the power of Web services, many organizations are rearchitecting their IT systems around the concept of next-generation Service-Oriented Architectures (SOAs). Unlike traditional object-oriented architectures, SOAs are comprised of loosely joined, highly and reusable interoperable software services. SOAs are essentially a blueprint for how an enterprise will use Web services to enable interoperability among autonomous systems.

SOAs offer significant benefits to manufacturers related to the design, extension and enhancement of computing systems. Providing a methodology and framework for documenting enterprise capabilities and supporting integration and consolidation activities, SOAs enable businesses to leverage best-in-class software services through open industry standards, simplifying application development and integration. All functionality is exposed as Web services, offering new levels of application reliability, scalability, system interoperability and flexibility, combined with ease of user and low total cost of ownership.

One area where SOAs are being deployed is in Enterprise Resource Planning (ERP) systems. ERP is often seen as the enterprise backbone for many manufacturers, and a foundation for performance management, adaptive supply chain practices, compliance, and other corporate initiatives. The function of ERP systems is to:

- integrate financials and customer order information delivering one uniform view of company information,
- improve productivity by standardizing and streamlining processes,
- reduce inventory by improving visibility of the order fulfillment process, and
- track labor time and reporting data, to deliver more accurate job costing.

One drawback of ERP systems of the past is a client-server architecture, which executed business logic and the user interface together. This made them notoriously inflexible in responding to changing business needs, often requiring major software upgrades or custom coding to accommodate even seemingly minor business process changes. The hidden cost of customizing these systems is extremely high as is the ongoing maintenance. But the real cost is in loss of agility.

Take for example a company that produces and sells aerospace components, that to grow and gain strategic advantage, is trying to evolve into more customer-centered business.

To enable this change, the company wants to provide customers with better, more easily obtained information about the status of their orders--both to improve customer service and to reduce operating costs. The second initiative aims to expand the company's range of products by sourcing and reselling complementary offerings from third-party manufacturers.

On the face of it, neither task seems particularly daunting. However, perhaps the company has three manufacturing plants, two of them acquired from other companies, and that each uses different enterprise applications to run its operations. To check the status of orders entails having to access three separate applications with different user interfaces and methods of presenting product information.

To make information directly accessible to the purchasing systems of customers, the company would have to create three custom-designed connections linking the customer's purchasing system with the enterprise suites of the three manufacturing plants--connections that would have to translate information for product descriptions, shipping instructions and status, and other key data.

The connections would be not only expensive to create (because of the coding time required) but also unlikely to be reusable for anything other than their original purpose.

To address the second initiative, if the company wanted to resell third-party manufacturers' products and to give customers for them the same level of order-status information, it would need to create custom-designed connections between each customer and every supply chain application that its suppliers were running.

Even during the early deployment of the company's first initiative, its complexity, cost, and lead times would mount. If the company later wanted to enhance each of these connections--by giving customers a limited ability to modify orders before they were shipped, for example--that feature would have to be coded into every customized connection. Suppose too that some of the company's first product suppliers didn't work out and had to be replaced. The company would then have to create entirely new connections.

The expense and effort needed to establish connections across technology resources increase exponentially with the number of resources connected. It’s no wonder that companies spend large portions of their IT budgets on integration as they create new connections and redesign old ones to keep up with changing business conditions.

Sending Out an SOS for SOAs

The underlying principle behind SOAs is that businesses should not be slave to information technology, IT should adapt to business requirements.

To this end, SOAs take a different approach to connecting systems. Instead of customized, hardwired connections, these architectures rely on "loosely coupled" ones in which heterogeneous IT resources can be joined together easily without customization -- and just as easily disassembled and reassembled.

SOA-based ERP systems enable customers to model and manipulate the system to suit their own requirements without having to customize any code. This enables users to rapidly respond to changing business needs and innovate quickly without changing core processes, for maximum business agility. In this way, the system adapts to a manufacturers’ changing needs, driving improved operating efficiency as a business grows.

With an SOA-based ERP system, companies can leverage seamless integration to connect the IT environment to users, customers, suppliers and partners. This enables collaboration from the shop, plant, warehouse, and across the enterprise, for increased revenue opportunities and improved decision making.

Benefits also include reduction in IT resource requirements on the front end – for systems integration and customization, and on the back end – in the form of reduced maintenance requirements and a lower total cost of ownership.

Streamlining the Supply Chain within an SOA

For many years, ERP systems have continued to refine practices such as Just-in-Time manufacturing and vendor managed inventory in order to streamline the flow of goods and thus reduce costs. However, until the recent advent of XML document processing and the ability to transport documents over the Internet, the flow of information between systems has been mired in

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the complex arena of Electronic Data Interchange (EDI), which has changed little since the '70s.

Even with the use of XML to simplify the EDI document format, the EDI paradigm is still such that the systems are loosely connected via a document-based interface. When a customer requests a quotation, or wishes to place an order via your manufacturing system, they may send the document in an agreed upon format containing the structured data for the transaction. When the document is received over the Internet, an adaptor (an integration software component) analyzes the document, extracts the data and interacts with the business system to perform the necessary function. A response is constructed and delivered back through the Internet to the customer.

The EDI interface is prone to errors and complexity due to potential problems with delivery of documents when document formats change or they are not consistent among partners.

Systems that support Web services, on the other hand, can easily be connected into a SOA to support direct interaction with the business logic. The architecture exposes, and makes visible to other applications, the features and capabilities of each of the company's supply chain management applications. SOAs allow functional areas within the manufacturing system to be made available to other authorized systems. Using Web services, the quoting functions of one company can be made available directly to customers' purchasing systems, allowing direct access to the data and business rules that form a quote. Essentially, your computer system and your customer's system function as one system through the SOA.

Synovis Gives SOAs a Spin

One manufacturer that is deploying an SOA is Synovis Interventional Solutions, a diversified medical products company that develops devices for the interventional treatment of disease. Synovis' produces critical wire components for medical devices and contract manufacturing services such as precision machining and polymer production. Synovis markets its own proprietary products and also manufactures parts for well-known medical device companies all over the world.

Between the financial requirements of a publicly traded company and the FDA regulations of a medical products manufacturer, Synovis must be able to track and document virtually all its processes and products in painstaking detail.

The company leverages its ERP system to maintain information about products and production history. Users must enter their personal password whenever working in the system, and the system then creates a footprint or device history record for each action regarding a device, tracking who worked on it and when.

Recently, Synovis made the move to a 100 percent SOA-based ERP system, looking to address new and emerging requirements for real-time information. The new system provides flexible and powerful reporting. For day-to-day operations, Synovis has developed a library of reports, tracking all the key metrics for running its business, including efficiencies, variances on jobs, margins and revenue. The system provides all the key information required to give an accurate, real-time summary of business conditions and key metrics. And Synovis can customize dashboards without programming.

The Time-Phase Material Report improves Synovis' responsiveness to customer orders. With it, the purchasing department can quickly check inventory levels and order additional materials if necessary based on customer demands or specific min-max levels defined in the system. Together with proper order-cancellation procedures, this has essentially eliminated obsolete inventory. Slow-moving inventory is traced in the change log to determine the root causes.

Synovis uses other reports to trace material lot numbers, meeting both FDA requirements and customer demands. For example, if a customer calls about a certain wire lot number, real-time information can be quickly pulled up on all jobs linked to that lot number.

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The SOA architecture reduces the amount of IT and administrative support needed to manage the system as Synovis grows. Software updates occur dynamically. And most importantly, Synovis has the ability to customize the software easily and integrate with other third-party software packages.

Summary

In the past, the expense and difficulty of introducing a new product or service, adding a new channel partner, or targeting a new customer segment was often so great that some manufacturers abandoned these new business initiatives rather than attempt to make changes to their enterprise applications.

IT is on the verge of a shift to a new generation of SOAs that promise to go a long way toward reducing, if not removing, current obstacles to integration as the basis of new operational initiatives. SOAs enable companies to introduce new business practices and processes more rapidly and at lower cost, enabling organizations to be more agile and responsive to changing market demands, to capitalize on new opportunities and drive competitive advantage. The future of IT for manufacturers is here; in SOAs we trust.

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