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Streamlining Manufacturing Processes with SOA Frameworks

SOA Value in Manufacturing Industry

Atul Saini

AMERICA'S
Fiorano Software, Inc.
718 University Avenue Suite 212, Los Gatos,
CA 95032 USA
Tel: +1 408 354 3210
Fax: +1 408 354 0846
Toll-Free: +1 800 663 3621
Email: info@fiorano.com

EMEA
Fiorano Software Ltd.
3000 Hillswood Drive Hillswood Business Park Chertsey Surrey
KT16 0RS UK
Tel: +44 (0) 1932 895005
Fax: +44 (0) 1932 325413
Email: info_uk@fiorano.com

APAC
Fiorano Software Pte. Ltd.
Level 42, Suntec Tower Three 8
Temasek Boulevard 038988
Singapore
Tel: +65 68292234
Fax: +65 68292235
Email: info_asiapac@fiorano.com

STREAMLINING MANUFACTURING PROCESSES WITH SOA FRAMEWORKS

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Executive Summary

Most medium to large manufacturing companies (and many smaller ones as well) use some form or ERP system to help manage the data and processes related to their businesses. While ERP systems have strong transactional capabilities and are good at tracking and storing data, most of them have relatively poor process management capabilities, forcing users to tailor their businesses to the software rather than molding the software processes around what's required by the business.

A good case in point is SAP. SAP ships with a rich set of process templates for Dispatch, Invoicing, Production Planning, Logistics, Stock Allocation and several other functions. However, SAP (like many other ERP systems) is designed around the concept of "Separation of Duty", where an assumption is made that every step in a business process may potentially be executed by a different party; in the majority of cases, however, a single person executes a process (for instance, an invoicing process), in which case the process can be dramatically simplified. Moreover, changes to default process templates in SAP and other ERP systems are difficult and time-consuming, often requiring significant programming in "ABAP" and other proprietary languages. Finally, integration with third party enterprise applications remains a significant challenge in the enterprise ERP world.

Enter SOA. SOA platforms and frameworks can dramatically simplify the 'default' manufacturing business processes implemented on an ERP system. In this article, we examine how the world's third-largest distiller, United Spirits Limited, optimized a number of critical business processes via an SOA framework, saving well over $750,000 in the first year alone. The company in question uses SAP as its ERP system but the discussion on simplification of the process applies equally well to other ERP systems (such as Oracle and other, smaller ERP systems) as well.

Invoicing and Dispatch

The default invoicing and dispatch process implemented over SAP requires five steps and nine SAP screens for each invoice creation. Designed for generality, where multiple people may be needed to execute separate steps, this process takes 12 minutes per invoice on average. Moreover, significant (and expensive) SAP training is required for each person creating an invoice, making it difficult to scale the invoice creation process across offices located in different geographical locations.

When implemented over an SOA framework, the entire invoice-creation process is reduced to just two steps with two screens, requiring only 2 minutes per invoice. Invoicing data is now entered into customized HTML screens and the SOA framework manages the details of updating the SAP system by making the appropriate SAP API ("BAPI") calls at the backend. The result is a dramatically simplified invoice creation process that requires no SAP-specific training, can be easily scaled across different geographical locations and is over 600% more efficient.

As an example, USL generates over 7,000 invoices per month. With the new, optimized SOA-based invoicing process, USL saves over 150 man-days per month. Moreover, non-tech-savvy personnel in remote locations and factories can easily create dispatch requests and invoices; this was not possible earlier since such personnel had to be pre-trained on SAP – a difficult and expensive proposition.

Lifting Plans and Bulk Orders

A Lifting plan is an estimate of the sales that will possibly be made over a quarter, half-year or other fixed term. A bulk order is an estimate of what will be lifted in a larger order.
Lifting plans and Bulk Orders are both critical processes in the sales organization of most manufacturing companies. Very often, however, the IT systems of the manufacturer do not support the Lifting Plan and Bulk Order concepts. Even sophisticated ERP systems such as SAP and Oracle Applications have inadequate support. For instance, in SAP the concept of a Bulk Order is tied to a single unit or plant and it's functionality is inflexible and cannot be easily customized to match the needs of the business.

SOA technology helps resolve the problems created by inflexible IT systems. It is now possible to create application flows that compare the Lifting plan and Bulk Orders for each salesperson against actual orders, with the results being fed directly to the automated invoicing process discussed in the previous section. Further, the SOA systems enable managers to track differences between actual invoiced orders and the Lifting plan / Bulk Orders for each salesperson, enabling closer monitoring and better tracking of sales and salesperson performance. Benefits include fully automated processes with the Lifting plan and Bulk Order concepts integrated with invoicing and report generation and easy modification of processes without programming.

Logistics

Manufacturers normally ship goods on a regular basis to multiple distributors mostly via road and rail and sometimes by ship. In the typical case, distributors send trucks to a multiple manufacturing plants to pick up goods. Each distributor has a credit limit with the manufacturer. It this limit is exceeded, explicit approval is normally required from a company manager to raise the credit limit.

The problem of securing credit change approvals efficiently is complicated due to several reasons: distributor vehicles may arrive at a company's production facilities at night; ideally, decisions on approvals should be available quickly since delayed approvals cause significant disruption and loss of profits for both the distributor and the manufacturer. Unfortunately, with the ERP systems that most manufacturers use today (SAP, Oracle or equivalents), the approval process is complicated: company managers need to manually log on to SAP to approve credit; bad internet connectivity can often prevent access to central company IT systems from remote locations; plus, the ERP interfaces used (e.g. SAP R/3) are typically poor and difficult to learn, requiring companies to spend significant resources in manager training.

SOA applications alleviate this situation by easily enabling approval requests on mobile phones. The initial approval request is processed by an SOA flow and placed on a portal that can be accessed by company provided mobile phones. The SOA flow then generates an SMS (Short Message Service) message that is sent to the GPRS-enabled mobile phone of the manager, who then accesses the secure portal by clicking the link in the SMS. The manager can now approve or reject the request in the portal directly over his/her mobile phone. Once the request is handled, the SOA flow automatically updates the company ERP system (for instance, SAP) at the backend with the approved/rejected notice.

This process of using SOA flows to manage approval requests has several benefits. Managers no longer need to access the company ERP system via cumbersome client applications; all relevant information now available on their mobile phones. The learning curve is much lower, as are licensing costs (since fewer ERP client licenses are needed). There is also a significant cost and time saving for distributors due to faster turnaround times for approval requests.

Order Processing and Stock Allocation

Problems with enterprise ERP systems often have a negative impact on the stock allocation and order processing in a manufacturing unit. For instance by default the SAP system allocate stock immediately for any sales order. If orders are processed using the default templates, then by the time one reaches the last order in a batch one may have run out of stock. Also, orders with higher priority that arrive in the middle of the batch cannot be processed because available stock has already been pre-allocated to previous orders. In such cases, the "rollback" needs to be performed manually – a cumbersome and error-prone process.

All of these problems make it impractical to enter all orders into SAP in a single shot. In the typical case, orders not entered into the system until they are ready for dispatch. the lack of prioritized allocation of stock based on how the company wants to run its business is also a major hindrance.

Enter SOA. Using SOA flows, all orders can be entered into the system as they are produced. The orders are 'held' with the SOA flow while they are prioritized. SOA flows are used to prioritize orders before any stock is allocated to each order. Once the orders are prioritized, an SOA flow is invoked to pick up an order, allocate stock to it "just in time" and send it for invoicing via the optimized 2-step invoicing process

discussed earlier in this article.

The benefits of the SOA approach include, among others, highly flexible order processing tailored to enterprise needs, easier and flexible order prioritization, no manual rollbacks and “Just in time” stock allocation.

New Regulations

In almost any jurisdiction globally, new regulations (especially tax regulations) often have revenue implications for manufacturers. For instance, consider a manufacturer that outsources a task to a third party contract manufacturer (CM). For convenience, the manufacturer instructs the CM to sell directly to and end-user or distributor, collect the revenue and pay back the Manufacturer its share after keeping the CM commission.

This process works well as long as there’s no change in the tax regulation. If for instance, as was the case in a European jurisdiction recently, the payment from the CM to the Manufacturer becomes subject to a new tax regulation (such as Service Tax), the CM has to deduct the new tax from the payment to the Manufacturer. The Manufacturer thus loses money unless the Manufacturer directly sells to the End-user.

A solution to this problem requires custom business processes to be implemented to “reroute” cash flows to legally circumvent a regulation. Using the previous example, a new business process is required to re-route the payment as follows: Manufacturer sells direct to End-user and End-user pays Manufacturer directly; Manufacturer instructs CM to dispatch goods to the End-User; Money flows from End-User to Manufacturer and from the Manufacturer to the CM, thereby avoiding service tax.

Existing ERP systems cannot easily handle process-change-requests such as the above. A flexible SOA system, however, can implement such changes within days if not hours. The benefits include rapid, automated business process changes to circumvent new regulations, leading to added business flexibility and profitability

Summary

In this article, we have discussed several real, practical business problems that plague manufacturers every day. All of these examples have been taken from a large manufacturer – specifically, USL – the world’s third-largest distiller of spirits. By moving to a flexible SOA platform, USL saved over $750,000 in the first year alone (on an investment of less than $200K) by optimizing its Invoicing, Logistics, Order prioritization/Stock Allocation and other processes. USL believes that in the coming years it will save several million dollars a year because of the flexibility of its SOA platform.

About the Author

Atul Saini is CEO and CTO of Fiorano Software Inc. He founded the company in 1995 with the vision of bringing an architectural revolution in the realm of business integration. Today, Fiorano provides the most comprehensive enterprise-class integration middleware powering companies' enterprise nervous systems ranging of the most respected names in the Fortune 500 to midmarket enterprises and SMBs. Atul holds an M.S. degree in computer science from Indiana University and a B.S. degree in computer science from the Indian Institute of Technology (IIT) at Madras.

About Fiorano Software

Fiorano Software (www.fiorano.com) is a leading provider of enterprise class business process integration and messaging infrastructure technology. Fiorano's network-centric solutions set a new paradigm in ROI, performance, interoperability and scalability. Global leaders including Fortune 500 companies such as Boeing, British Telecom, Credit Agricole Titres, Lockheed Martin, NASA, POSCO, Qwest Communications, Schlumberger and Vodafone among others have used Fiorano technology to deploy their enterprise nervous systems.