Integrate back-end legacy systems: International Truck developed an SOA-based "Common Vehicle Tracking System" to surface all types of back-end legacy systems and track truck production in near real time, while flagging any defects or bottlenecks in production.

Better connect with partners. MedicAlert built an SOA-based system called E-HealthKEY with the goal of achieving interoperability not only between its own internal applications, but also with partners — hospitals, doctors’ offices, EMTs, and other medical professionals and establishments — to provide up-to-date personal health records.

Componentize product offerings: Experian leveraged SOA-based processes and technologies to develop a Customer Event Management system (CEMS) to support its base of leading financial institution customers. The system enables financial institutions to rapidly assess and process new accounts using Experian's online services.

Abstract multiple ERP functions into a single service layer: Washington Group employed SOA-based middleware to move to an SOA that would abstract many of the functions used in various ERP systems across the company into a common service layer.

Streamline requests to IT: The IT operations group at Siemens AG built services around automating and streamlining the processes for fulfilling internal requests to IT for new equipment and passwords. The company releases four to eight new business processes to run on its SOA every six to 12 weeks.

Maintain service quality: The Hartford has a very strong SOA governance effort, led by an SOA steering committee consisting of application architects. Committee members assess proposed new services based on such criteria as supportability, reusability and adherence to the company’s SOA reference architecture.

Keep vendors on their toes: The Federal Bureau of Investigation has been investigating SOA, and launched a Regional Data Exchange, or R-DEx, a
series of information sharing pilots with regional databases. Under R-DEx, the
FBI has created plug-ins to Justice Department databases for four regional law
enforcement data sharing associations, with more to come — using an SOA
registry built with off-the-shelf IT products.

Expand a global reach: Monster – the online jobsite —expanded its
reach to 24 countries across the globe, and needed a service oriented
architecture that would stretch across separate regional units, and avoid the
need for manual routing of new orders to financial systems for invoicing.

To manage a world of data: An SOA-focused deployment is helping the
National Aeronautics and Space Administration to streamline access to its
mounds of data, as well as link users of the data to the services they need to
process the data.

To manage workflows: A BPEL-based workflow system was employed
at State Children’s Health Insurance Program to manage the nine-step
application process that determines and responds to applicants’ eligibility.

To consolidate services: Harvard Medical School and its hospital
affiliates radically streamlined their business processes around the sharing of
medical data by building an SOA involving about 25 categories of Web services
shared between 400 different departments with 14,000 employees. Seattle’s 17-
hospital Providence Health System is leveraging Web services to link its in-house
legacy systems into a single patient portal, permitting online bill paying among
other services.

To improve customer service: Starwood Hotels and Resorts Worldwide
is replacing its legacy room-reservation system with an SOA-based one, going
live with as many as 150 service-based applications built on Web standards.

For more effective partnerships: T-Mobile is employing SOA for both
internal integration and reuse, as well as the external, partner- and revenue-
generating elements. This approach enables T-Mobile to work effectively with
third-party content providers such as Time Warner and the Bertelsmann Group to deliver services to customers.

**To trim costs:** Verizon Communications claims it averages about 2.5 million to three million Web services transactions a day through a "home-grown" SOA. The system went operational in 2004 and Verizon says it has slashed its IT budget by 50% by eliminating redundant systems inherited from the merger of Bell Atlantic and GTE. The SOA also helped integrate the operations of some 7,000 developers.

**To increase speed to market:** Owens & Minor, a distributor of medical and surgical supplies, has embarked on a four-year SOA initiative, and forecasts annual savings of $650,000, half attributable to better inventory accuracy and half to productivity savings and improved cash flow. Leveraging SOA and BPM, the company can now automate processes in a few weeks that once would have taken as much as nine months.

**For strategic differentiation:** Fireman’s Fund is relying on SOA to consolidate 70% of its technology applications. By more effectively aligning business with IT and strengthening its relationship with agents, Fireman’s Fund believes it can strategically differentiate itself in a crowded property and casualty marketplace.

**To increase agility:** Motorola has introduced 180 services through its SOA framework and business activity monitoring projects (monitoring the linkages between enterprise software apps), and has an average of 50 rules, covering everything from credit card transactions to warranty services.

**To loosely couple businesses:** Mohan Sawhney, professor at Northwestern’s Kellogg School of Management, says the best-run companies may not be producers themselves, but networks of producers, orchestrated by a front-end broker of services. Some mobile phone companies already "don't do anything themselves, they just collect the money."
SOA Case Studies

Abstracting enterprise information from underlying systems. eBay has built a service architecture to manage more than six million lines of code and two petabytes worth of data, employing SOA middleware to enable integration across disparate technology stacks.

Reducing application inventories. IBM has at least 80 shareable and reusable services in production — ranging from authentication to order fulfillment — as part of its own service-oriented architecture. With its own SOA, Big Blue reports that it was able to reduce its inventory of 16,000 applications in 1998 to 4,000 applications today. The secret sauce to streamlining down to a quarter of its applications was SOA governance.

"Rocking the boat," bringing IT closer to the business, and improving business productivity. IT movers and shakers at Wachovia Bank used SOA techniques to "rock the boat" and changed their organization's culture. Wachovia's SOA consists of business services and frameworks available for reuse across the enterprise. Previously, separate business units had been building duplicated capabilities over and over, which included desktop presentation, data management, workflow management, messaging, and customer information management.

Cutting operational costs. Hewlett Packard implemented an SOA that has seen up to $70 million in savings. HP says the initial paybacks from SOA came through consolidation, reduction of redundancy and reuse across services through its e-business center.

Handling growing transaction loads as simply as possible. Amazon moved off its mainframe to SOA-based middleware to achieve a more flexible architecture that could handle what is now a base of 60 million customers and one million partners.

Enabling the "separation of powers" between corporate, divisions, and departments. Citigroup recognized early on that just as it would be impossible and dangerous to manage a nation of 300 million citizens with a single government entity, it would be just as difficult to manage the IT of a
company with 300,000-plus employees and more than $1 billion in revenues every 11 days. Thus, the financial services giants put into place a federated SOA governance structure, with a "separation of powers" similar to the way the US federal government is structured.

**Moving business rules out of applications.** OnStar, the vehicle communications platform, was moving its software business rules, now embedded in applications, to a middleware layer of reusable components. The company said at least seven or eight application platforms will be moved to the SOA middleware layer, starting with Emergency Services, Vehicle Services, Business Objects and Billing. Such applications help handle service calls and provide remote vehicle diagnostics.

**Making movies -- or at least, the business systems behind the movies.** DreamWorks Animation SKG, producer of the Shrek trilogy (number 3 is due out in 2007), made a transition to SOA to simplify and consolidate key business operations. The company took a smelly green monster of an IT infrastructure — in the form of 12 legacy ERP applications running on Sun servers — and made it a bit more handsome, in the form of Linux servers, Oracle databases, and JBoss middleware. The SOA model also supports company directories, employee bulletin boards, vacation requests, and cafeteria menus. It also supports a new copyright-tracking application with authorization and authentication features for incoming film scripts.

**Case study: Bepet**

British Energy Power & Energy Trading (Bepet) totally rethought both the way it designs software and its relationships with suppliers as a result of shifting to a service-led model for delivering IT.

The energy company moved to a process-driven architecture, deliberately shunning the SOA label to disassociate itself from the hype. The moved enabled Bepet to prioritise processes and make IT better serve the business.

"Processes are the DNA of our organisation. We had to focus on higher-value activities, rather than factory-type programming, to be in good shape for
future business. There are no prizes for second place," says Jeremy Lock, IT manager at Bepet.

Having an SOA would enable the IT department to support value added processes, rather than support functionality in a more piecemeal way.

In order to facilitate this shift, Bepet divided its business applications into three categories of services, defining a service as a self-contained and independent unit of work.

The three categories were: a task requiring a human decision, an information service and a functional service. Technology services support all of these three categories.

Converting these activities into services has exposed the energy company to some new ways of thinking about intellectual property rights and the execution of design.

"Traditionally we bought packages and did little bespoke development. We would lob our requirements into the market place, get bids back, build them, and then accept or reject," Lock says.

However, using an SOA entails a shift in thinking about intellectual property rights. Within the new regime, Bepet looks at the best of breed packages on the market, but does not customise. Where packages are lacking in functionality, the team writes a service to supplement it.

"Whether the service is inside or outside a package we have to connect to it. And the intellectual property rights of every service have to be captured within our model."

This means that Bepet may own the intellectual property rights of a service within a package, an unusual concept for some software and system integrators.

"The big five consultancies all have their own method for implementing packages. And we are now saying to them, 'we want you to do it our way'," says Lock.
SOA Case Studies

Harvesting reuse, another major objective of the SOA investment, has also called for a radical rethink of design, says Lock. “You need to design business services at the right atomic level. And an upfront investment in design is crucial if you are going to get reuse later down the line. It really challenges all the normal paradigms of software design and support.”

Even for companies like Bepet that are compliant with the IT Infrastructure Library (ITIL), breaking everything into more granular units makes everything more complex by default.

"We have a team of seven supporting 60-odd applications, and when I tell them we are breaking these into services, they are rightly concerned about the risks," says Lock.

Governance perhaps represents the biggest expenditure of effort in moving to SOA. "Only 30% of SOA is about development, the rest is about governance and managing services. Working with partners accelerates the adoption rate, but it is important to internalise the lessons and to assume control."

Case study: EBS Building Society

EBS Building Society, Ireland’s largest mutual building society, arrived at an SOA model of delivery by accident.

"We have been doing integration and service work for years. We did not call it SOA until we discovered it written up recently and realised we were doing the same thing," says David Yeates, senior manager, IT architecture, at EBS.

EBS runs its mortgage origination systems as a portfolio of services. After all, says Yeates, "A mortgage is actually a portfolio of systems blended into a single product."

Over the years EBS had built general and life assurance systems, and had duplicated code and functionality as it went along.
"We realised we could break down this monolithic application and give some of it to partners. It is no different from what manufacturers have been doing for years."

The building society stumbled across a way of making this happen when it did an internal survey of reuse. "Our big moment came five or six years ago when we moved from simple, internal integration to rich integration. We had a proliferation of hardware and application servers - it was spaghetti."

However, EBS had difficulties in achieving reuse, even though it had been dabbling in object oriented programming. "Investigation revealed that the area where there was the most reuse was an ancient Cics application, which we had exposed to some terminals," says Yeates.

The building society also discovered that keeping an audit trail was a good model for delivering services, according to Yeates.

As a result of these discoveries, in 2001 EBS rolled out its Enterprise Application Integration Project, moving from a tactical to a strategic delivery. This encompassed building application and peer-to-peer communication into its applications at the outset.

At some point during this evolution, Yeates and his team discovered they could talk to business users using this communication technology. A non-IT literate business user was able to track and discuss the development of a service by observing the flow charts and diagrams on the wall in the IT department.

"We were sharing the same vocabulary. But if we had talked about SOA, we would have been laughed out of the room," says Yeates.

During the experimental and somewhat accidental business of implementing SOA, data semantics was the biggest stumbling block, according to Yeates.

"The meaning of 'salary', 'name' or 'income' change according to who you are talking to. Nor do you have one system to deal with, but multiple ones, and that has huge implications for the IT department."

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There are a number of other important lessons that Yeates can pass on, too. He is keen to point out that SOA is not the same as web services.

"We were doing SOA long before web services came along, using advanced program-to-program communication, remote procedure calls, remote method invocation and internet inter-orb protocol."

Nor is SOA good for everything. "We got carried away at one point. We use expert systems to generate answers to online questions, but realised exposing these as a service was not appropriate."

The biggest ongoing challenge for EBS is security. "If an external partner is providing part of your web service in real time they need to be working to a framework such as ITIL," says Yeates.

"Exposing your application in a business-to-business web service is a security headache that we are still finding our way around."

**Case study: Vanco**

Virtual network provider Vanco wanted to extend a trouble ticketing system as a shared business process to a business partner.

Vanco operates many such support services on behalf of its system integrators and channel partners on a sub-contract basis, and the company reasoned that making the technical support service visible would improve communication and create a better experience for the end-user.

Vanco deliberately started small: "We were not sure how many services we wanted to create and expose at this point," says Dave Doherty, global IT programme director for Vanco. His expectation was that the technology would be used to integrate other functions internally.

A small beginning was also pragmatic because it meant funding a shorter learning curve. "We run quite a small technology team and so wanted to limit the amount of new technology that we had to skill up on, even if this meant a trade-off of fewer features." The network provider selected Sun's Seebeyond software to meet these requirements.
Exposing a service to a third party threw up issues relating to the two-way interactions, and these had to be treated with great precision. Is it an outbound or inbound creation of a ticket? Whose responsibility is the fault handling? All these questions had to be nailed down precisely in order to create business rules at the centre, says Doherty.

Exposing a service to a third party also calls for greater programming discipline and version control. "There was one incident when we were halfway through an implementation and found our partner had upgraded some software. That put us back for half a day, for example."

The lesson Doherty learned is that although web services offer fantastic flexibility that enables you to connect to anywhere, the problem is that no web service is constructed exactly like another.

"None of them are vanilla flavoured," he says.

**Case study: DKSH**

Services, marketing and distribution company DKSH needed to connect to customers and suppliers faster in order to retain its pole position in a highly competitive market.

DKSH offers marketing and distribution for a portfolio of consumer and healthcare products and operates from four business divisions in 35 countries. The company employs 22,000 staff who manage 100,000 customers.

Given the scale of the operation, the major challenge was organisational. "Each country had a different culture and a different set of processes and systems to exchange information," says Alexander Buech, chief technology officer of E2E Technologies, DKSH's system integration supplier for the project.

And, because of past mergers, there were different ways of connecting to different local business partners, too.

DKSH initially tried a technically driven implementation that failed because it was not viable to separately specify technology and business requirements.
The company realised it needed a standard way of describing services that employees across business departments and across locations could understand.

The alternative was a model-based approach where the high level business logic became the IT delivery mechanism, avoiding error in the conversion of business abstracts into code.

Using a universal modelling language (UML) solved the problem because the model executes directly instead of generating code. It means no programming, and therefore a much faster turnaround for projects.

DKSH opted to use a E2E Bridge, a UML virtual machine from E2E Technologies as the enterprise-wide integration backbone, as well as three of the specialist supplier’s programmers.

Over the space of 10 weeks the team modelled requirements, roles, services, systems, data and security created semantic mappings of metadata and associations defined service logic and specified the system landscape.

The resulting SAP template became the central hub of shared services with which every country's processes would integrate. This entailed persuading people to give up their attachment to proprietary systems and agreeing to exchange data in the selected SAP format.

"The new process instead consisted of taking orders in SAP, tracking in SAP, recording status and finally shipping the product to the customer," says Buech.

The approach enabled DKSH to achieve another key objective of no longer relying on individuals to correctly interpret the services between countries and reuse services.

In order to achieve this outcome, business intelligence employees were nominated as project managers and the IT departments became the service providers.
Although the business intelligence team were deemed the appropriate people to lead the project, they also had to be disabused of the "uniqueness" of their individual services. "They listed 78 services necessary to deliver all functionality - we whittled it down to 15," says Buech.

DKSH chose to pilot the SOA in Singapore. "The goal was to get rid of all incumbent enterprise resource planning systems and to replace them with a lean system for connecting manufacturers and resellers," says Buech.

With each subsequent country that came on-board, the reuse factor was higher and the roll-out therefore quicker.

Factors already existed that were working in favour of a successful outcome for SOA, says Buech.

"DKSH was a centralised operation and was ready to embrace the new way of working, because their future depended upon it."

References:

Computerweekly

ZdNet

CDBI