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# Service Oriented Architecture

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Discover how  
companies in seven  
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# *Service Oriented Architecture*

FOR

# DUMMIES®

2ND IBM LIMITED EDITION

**by Judith Hurwitz, Robin Bloor,  
Marcia Kaufman, and  
Dr. Fern Halper**

**Foreword by Sandy Carter**  
VP, SOA, BPM, and WebSphere



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# About the Authors

**Judith Hurwitz** is a technology strategist and thought leader. She is the president of Hurwitz & Associates, a business technology strategy firm that helps companies gain business benefit from their technology investments. In 1992 she founded the Hurwitz Group, a technology research group. She has worked in various corporations such as John Hancock, Apollo Computer, and Patricia Seybold's Group. She has written numerous white papers and publishes a regular blog. Judith holds BS and MS degrees from Boston University. She is a co-author of *Service Oriented Architecture For Dummies*, 2nd Edition, Wiley, 2009, *Information on Demand For Dummies*, Wiley, 2008, and *Service Management For Dummies*, Wiley, 2009.

**Robin Bloor**, a partner with Hurwitz & Associates, has been an IT consultant and technology analyst for almost 20 years. He lived and worked in the UK until 2002, founding the IT analysis company, Bloor Research, which published comparative technology reports that covered everything from computer hardware architectures to ecommerce. Robin is the author of the UK business bestseller, *The Electronic B@zaar: From the Silk Road to the E-Road* (published by Nicholas Brealey Publishing), which analyzed and explained the field of ecommerce. He is a co-author of *Service Oriented Architectures For Dummies*, 2nd Edition, Wiley, 2009, and *Service Management For Dummies*, Wiley, 2009.

**Marcia Kaufman**, a founding partner of Hurwitz & Associates, has 20 years of experience in business strategy, industry research, SOA, and information management. In addition to publishing a regular technology blog, Marcia has written extensively on SOA and the business value of information technology. Marcia has worked on financial services industry modeling and forecasting in various research environments including Data Resources Inc. (DRI). She holds an AB from Connecticut College in mathematics and economics and an MBA from Boston University. Marcia is a co-author of *Service Oriented Architecture For Dummies*, 2nd Edition, Wiley, 2009, *Information on Demand For Dummies*, Wiley, 2008, and *Service Management For Dummies*, Wiley, 2009.

**Dr. Fern Halper**, a partner with Hurwitz & Associates, has over 20 years of experience in data analysis, business analysis, and strategy development. Fern has published numerous articles on data analysis and content management. She has done extensive research, writing, and speaking on the topic of text analytics. She publishes a regular technology blog. She has held key positions at AT&T Bell Laboratories and Lucent Technologies where she was responsible for developing innovative systems to analyze data and developing strategy for Lucent's Internet Software Unit. Fern received her BA from Colgate University and her PhD from Texas A&M University. Fern is a co-author of *Service Oriented Architecture For Dummies*, 2nd Edition, Wiley, 2009, *Information on Demand For Dummies*, Wiley, 2008, and *Service Management For Dummies*, Wiley, 2009.

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## *Dedication*

The authors, as a whole, dedicate this book to Carol Caliendo, our colleague who made this happen.

Judith dedicates this book to her family: Warren, Sara, David, and Elaine.

Marcia dedicates this book to her family: Matt, Sara, and Emily.

Fern dedicates this book to her family: Clay, Lindsay, and Katie.

Robin dedicates this book to Judy, for her encouragement, support, and advice, and to his children: Maya, Jude, Hannah, Jacob, and Seth.

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### ***Composition Services***

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**Layout and Graphics:** Carrie A. Cesavice,  
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# Foreword

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**F**aced with the most challenging business climate in decades, business leaders are demanding effective solutions that can help them achieve business results while doing more with less. They also recognize that now more than ever, driving business efficiency alone is not enough. Successfully navigating today's turbulent economic climate also requires agility. Solutions that deliver both cost optimization and business agility will be critical to companies looking to:

- ✓ Adapt to changing customer buying patterns
- ✓ Respond to unforeseen business events
- ✓ Drive growth strategies when the inevitable economic rebound comes

Now more than ever, companies will be looking to SOA as a critical part of their strategy to navigate the economic storm. With SOA, companies can leverage the opportunities of an interconnected, instrumented, and intelligent world to drive efficiency and position themselves for new opportunities on a smarter planet.

We now know we can't simply rely on more resources to do our work; instead, we must work smarter:

- ✓ We must have the agility to shift business models for leaner times.
- ✓ We must make our business processes more dynamic to capture new insights for effective decisions.
- ✓ We must have a smart IT platform to support this new way of working.

In short, we need Smart SOA.

Each business will leverage SOA and embark on a Smarter Planet journey in the context of its industry and unique challenges. That is why there is such a strong industry focus in *Service Oriented Architecture For Dummies*, 2nd IBM Limited Edition. In these pages you will hear businesses from around the world sharing their success stories and ideas on how to reduce costs, speed time to market, grow customer loyalty for greater retention, and reach customers through new channels to drive growth.



With that, it is our pleasure to present this copy of *Service Oriented Architecture For Dummies*, 2nd IBM Limited Edition. I think it is a great reflection of SOA best practices for today and into the future.

Sandy Carter

VP, SOA, BPM, and WebSphere

# Introduction

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**W**elcome to *Service Oriented Architecture For Dummies*, 2nd IBM Limited Edition. We are very excited by the topic and hope our enthusiasm is contagious. We believe service oriented architecture (SOA) is the most important technology initiative facing businesses today. SOA is game changing, and early SOA successes make it clear that SOA is here to stay. This book introduces you to the basics of SOA in context with the real life experiences of seven companies. Seen through the varied business environments depicted in each of the case studies, we hope you will recognize that SOA is more than a bunch of new software products strung together to allow technology companies to have something else to sell. SOA represents a dramatic change in the relationship between business and IT. SOA makes technology a true business enabler and empowers business and technology leaders alike.

The software industry has been on a journey toward a service oriented approach to software for more than 20 years. Smart people have known for a long time that if software can be created in such a way that it can be reused, life will be a lot better. If software can be designed to reflect the way business operates, business and technology can align themselves for success. Finding good ways to reuse the years of investment in software means money spent wisely. These issues are at the heart of SOA and are among the reasons we think this book is so important.

SOA is not a quick fix, but it is a very rewarding adventure. It's an approach built on industry standards — with large doses of forethought and planning. It is indeed a journey. We hope this book inspires you and helps you get started.

## *About This Book*

We have talked with many companies about the challenges and successes of their SOA implementations. Not every company gets off to a great start right away. The IT executives we spoke with were very candid about both the good choices they made and some of the bad ones. That's why we asked everyone if they had learned any lessons they would like to share. Service oriented architecture is a big new area and requires that a lot of people

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familiarize themselves with it in a relatively short period of time. Understanding the lessons learned and best practices of other companies is one of the best ways we know to get lots of different people up to speed on a topic very quickly. That's why we wrote this book. If you would like to get deeper into the business and technical details and read up on additional case studies, we think you'll love *Service Oriented Architecture For Dummies*, 2nd edition, published by Wiley.

## *Foolish Assumptions*

Try as we might to be all things to all people, when it came to writing this book, we had to pick who we thought would be most interested. Here's who we think you are:

- ✔ **You're smart.** You're intelligent, yet the topic of service oriented architecture gives you an uneasy feeling; you can't quite get your head around it, and if pressed for a definition, you might try to change the subject.
- ✔ **You're a businessperson who wants little or nothing to do with technology,** but you live in the 21st century and find that you can't actually escape it. Everybody around you is saying "SOA this" and "SOA that," so you think you better find out what they're talking about.
- ✔ **Alternatively, you're an IT person who knows a heck of a lot about technology,** but this SOA stuff is new, and everybody says it's something different. Once and for all, you want the whole picture.

Whoever you are, welcome. We're here to help.

## *Icons Used in This Book*



Throughout this book, you'll find a couple little icons beside text:

We think this a particularly useful point to pay attention to.



You may be sorry if this little tidbit slips your mind.

## Chapter 1

# Getting to Know SOA

### *In This Chapter*

- ▶ Understanding why you should care about SOA
- ▶ Defining SOA
- ▶ Saving bundles by using what you have
- ▶ Using SOA to improve quality of service
- ▶ Illustrating the benefits of SOA
- ▶ Getting started with SOA

**I**n these times of economic uncertainty, it has become startlingly clear that the viability of a business requires adaptability, accountability, and credibility. Businesses of all sizes and in all industries rely on technology to become more flexible, to uphold government and industry regulations and standards, to anticipate and plan for the future, and to make the right decisions at the right time. “Why SOA?” you ask. Today, the very survival of a business hinges on its ability to adapt its IT to meet ever-changing business challenges. SOA helps business and IT to unify goals and bridge the gaps between their very separate worlds by establishing a common language and creating a more flexible infrastructure to support change.

Service oriented architecture (SOA) is a business approach to building IT systems that allows businesses to

- ✔ Leverage existing assets
- ✔ Create new ones
- ✔ Easily enable the inevitable changes required to support the business

With SOA, business and IT have a means to meet each other half-way and work together using a business focused approach to develop new ways to use technology to grow the firm. SOA helps companies to develop tools they need to spot new trends and opportunities and see new ideas to fruition.

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## *SOA Means Smarter Business and Smarter IT*

SOA can make it easier and faster to build and deploy IT systems that directly serve the goals of a business. SOA integrates business requirements with an IT framework that simultaneously leverages existing systems and enables business change. A SOA enables the business to keep its focus on business and allows IT to evolve and keep pace in a dynamically changing world.

We divide the world of SOA into the Business Services layer and the Plumbing layer. Imagine a diagram that shows all the software that your organization runs. Divide it into the Business Services layer and the Plumbing layer. The Business Services layer contains your business logic. Your Plumbing deals with your computing resources.

Business managers need not understand the intricacies of the Plumbing layer and everything it contains. If you cover up the Plumbing layer, you're left with a diagram that shows all the business services that software applications provide, both inside your organization and to others that interact (technologically speaking) from outside, like your customers, business partners, and suppliers. Looking at your organization's software resources in this way, you may be able to think about ways to improve or better exploit the software assets you have.

Likewise, if you cover up all the business functionality in your SOA diagram, you are left with a set of plumbing services that your IT department is responsible for providing. We know that many of your "legacy" applications also have a good deal of plumbing in them, and the Plumbing layer doesn't replace that. However, SOA enables an IT department to choose how it will evolve toward providing a service oriented architecture — and, in time, might obviate a good deal of poor plumbing.

SOA doesn't guarantee happier employees and a more efficient and highly profitable business. Lots of work has to be done to create a well-managed SOA environment. However, movement toward SOA is usually a movement toward technical freedom and business flexibility and bodes well for the performance and profitability of an organization and for the sanity of the people managing the business.



## What Is SOA?

A *service oriented architecture (SOA)* is an architecture for building business applications as a set of loosely coupled black-box components orchestrated to deliver a well-defined level of service by linking together business processes.

Admittedly, this definition doesn't flow trippingly from the tongue. However, from it springs a sustainable, reusable, extensible approach to business and technology that is already providing huge competitive advantages to organizations around the globe. Here's a little elucidation:

- ✔ **SOA is for building business applications.** Many legitimate approaches to software architecture exist, and SOA isn't intended for building every kind of software. It is intended explicitly for building *business* applications.
- ✔ **SOA is a black-box component architecture.** SOA deliberately hides complexity wherever possible, and the idea of the black box is integral to SOA. The black box enables the reuse of existing business applications by adding a fairly simple adapter to them, no matter how they were built.
- ✔ **SOA components are loosely coupled.** The term *loosely coupled* refers to how two components interact within a SOA. One component passes data to another component and makes a request. The second component carries out the request and, if necessary, passes data back to the first. The emphasis is on simplicity and autonomy. Each component offers a small range of simple services to other components.  
  
A set of loosely coupled components does the same work that used to be done inside tightly structured applications, but the components can be combined and recombined in myriad ways. This makes the overall IT infrastructure much more flexible.
- ✔ **SOA components are orchestrated to link together through business processes to deliver a well-defined level of service.** SOA creates a simple arrangement of components that can, collectively, deliver a very complex business service. Simultaneously, SOA must provide acceptable service levels. To that end, the architecture embodies components that ensure a dependable service level. Service level is directly tied into the best practices of conducting business — commonly referred to as *business process management*.

From our perspective, one of the most important aspects of SOA is that it's a *business* approach and methodology as much as it is a *technological* approach and methodology. SOA enables businesses to make business decisions *supported* by technology instead of making business decisions *determined* by or *constrained* by technology. And with SOA, the folks in IT finally get to say "yes" more often than they say "no."



No sizable business can function without IT — it's as simple as that. However, we are advocating a new world order. We advocate that business leaders and IT work together to create this new world order. *Together*, business leaders and IT will communicate how the automated processes of its business should be facilitated, and work together to make it a reality by using SOA. *Together*, IT and business leaders can determine a strategy that both liberates business from IT and allows IT to create maintainable, extensible, compliant systems to support the initiatives determined by business leaders.

## *Better Living through Reuse*

One of the biggest deals in the SOA world is that you don't have to throw things away. You take the stuff (software assets) that you use every day — well, the *best* of the stuff you use every day — and package it in a way that lets you use it, reuse it, and keep on reusing it.



One problem common to many large companies is that they have lots of similar programs — software applications — representing commonly used business processes. Every time a department wants something slightly different, it has its own version of the software built so that across a particular company, you might find umpteen versions of more or less the same process — with, of course, slight variations. Many IT shops have policies and procedures designed to prevent this sort of thing, but reality intervenes with software packages being bought or user departments insisting on having their way. Such duplication becomes a nightmare when one company acquires another and finds that they have similar (but not identical) applications purporting to do the same thing.

These slight variations are a major cause of systems becoming very complicated and expensive to maintain — even one business

policy change might affect lots of different applications. In situations like this, it's very difficult to find every instance in every application that needs to be changed. The testing required for this type of change takes time away from more innovative development work and inhibits businesses from getting to market quickly with new products.

With SOA, these important business processes — such as creating an invoice, calculating an interest rate, securing a reservation — become business services. Briefly, a *business service* is a sealed container of software code that describes a specific business process that can be connected to other business processes. You end up with one single business service for a given function that gets used everywhere in your organization. With SOA, when you need to change a business policy, you change it in only one place. And, because the same service is used everywhere, you have consistency throughout your organization.

For example, you know that if you decide to create a new line of business in your organization, you're not going to create new Accounting, Human Resources, Legal, Cleaning, Training, and Travel departments to go along with it. Even if you need to add staff, you'll likely use your existing Accounting, HR, Cleaning, Training, and Travel departments to *service* — note the word *service* — this new department.

The problem is that over time, IT (no, not those nice folks in the IT department today, but *over time*) ends up embedding redundant functions in programs everywhere in the organization. That redundancy — just like having separate Accounting, HR, Legal, Cleaning, Training, and Travel departments for every department — is what SOA ultimately eliminates. This lack of redundancy gives you the same obvious benefits of scalability, consistency, and maintainability.

With SOA, business managers work with IT to identify business services. Together, they determine policy and best practices. These policies and best practices become *codified business services* that represent honed company business processes. No need, for example, to have 30 different variations on an exchange rate translation application, each used by a different department and all requiring IT time for ongoing maintenance. One business service will do. Onward, the new world order!

## Redundant reiteration, again

For any IT old-timers out there who have labored long and hard in the IT trenches, the concept of software reuse isn't new. You're familiar with subroutine libraries and the great theme of object orientation, and you extol the virtues of standardization. "What's the big deal with SOA?" you ask. "Aren't we already doing this?" Well, yes and no. Yes, because the world of SOA depends on a good understanding of reuse and on the building of reusable components. No, because SOA extends the idea of reuse not only to *Web services* — software that uses standard Web interfaces to

communicate with other software containing Web service interfaces — but also to *business services* — codified representation of a business function such as software designed to "prepare an invoice." In the world of SOA, the level of granularity shifts profoundly. No longer are we talking simply about reusable low-level components: We're talking about reusable high-level business services. This shift, and its implementation, is no mean feat either for business managers or for IT, but the rewards for everyone are dramatic.

## Assuring a Better Quality of Service

If you're ready to jump on the SOA bandwagon, just remember not to go it alone. You need to bring along some friends from IT and the business. In other words, you need to get others to buy in to the concept of beginning the SOA journey. You need to sell SOA and you need to focus on the benefits in order to get others to join with you. One of SOA's greatest benefits is the ability to improve quality of service. Does that sound a little too pat? Well, maybe an example would clear up what we actually mean when we say *quality of service*.

Consider this example. Have you ever gone to a restaurant, and everything seemed to work just right? You called ahead and asked for your favorite table. It was ready for you when you arrived. The host was polite and called you by name. The temperature in the room was just right — not overheated and stuffy, but not air-conditioned to fridity, either. The waitress was friendly and brought you water, rolls, and a menu. Service was fast, but not too fast. Overall, it was a smooth, positive experience. If anyone asked you, you would declare that the quality of service was excellent.

This kind of smooth, satisfying, efficient operation is precisely what businesses can achieve by using service oriented architecture. SOA adds predictability and regularity between business rules, policy, and software services. Therefore, one of the greatest selling points for SOA is that it can help management know what tasks a particular service is executing and what rules and policies are codified within these services. Being able to track this not only makes software within the company better but also makes corporate governance more predictable and less cumbersome. Now, maybe you're a skeptical person and think, "Wait, wait. I can do all this by having the developers write good modular code. I don't need SOA." In a certain way, of course, you would be right. The difference is that when change happens, you can be a lot more nimble with SOA.

If you're building services, you must design them to adhere to the following three requirements:

- ✔ **They must be safe.** *Safe* means that the service itself is secure and doesn't introduce bugs and problems into the organization.
- ✔ **They must be accurate.** *Accuracy* means that the service itself executes the function it's designed to execute. At the end of the day, accuracy is all about corporate governance. Organizations implementing SOA must be reassured that each business service is executing the right function in association with governmental regulations.
- ✔ **They must be predictable.** *Predictable* means that the service does what it's expected to do. If a service is designed to calculate a 30-year mortgage, it had better do exactly that each time it's used; likewise, a service intended to pay a claim needs to execute the same process across many different composite applications.

## *Educating Rita and Peter and Raul and Ginger*

No sane person spends time or money on something they don't understand. Understanding how SOA can improve quality of service is a key selling point of SOA, but don't make the mistake of including too many technical details as you begin to educate your company about SOA. ("How 'bout those Web Services interfaces!") In selling SOA, you need to explain the business

benefits of the technology in layman's terms. Be prepared to answer questions such as

- ✓ How will implementing SOA improve our ability to service our customers?
- ✓ How much will it cost? Will it pay for itself? How long will it take?
- ✓ Is this safe? How can we make sure someone won't steal our data?



Part of your education begins outside of your own company. Find peers of your organization's managers in other organizations who have successfully taken the plunge. If a company that looks like yours has been able to begin its SOA journey, your management should take notice. One endorsement by a peer is worth at least ten return on investment pitches.

## Complying with Government Regulation

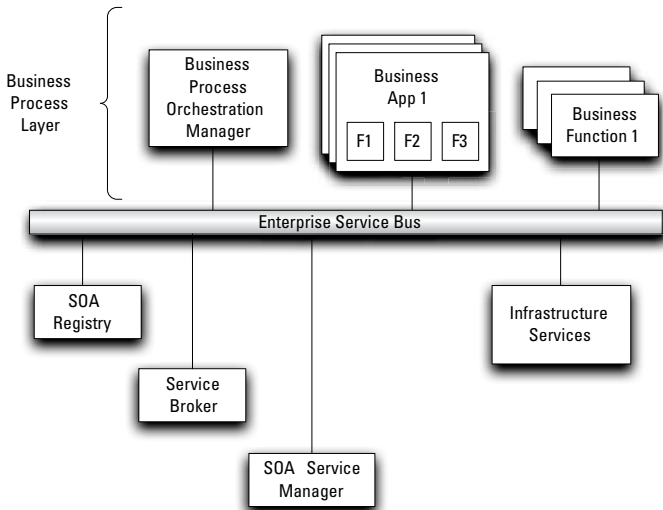
Instituting and following a SOA approach ultimately makes an organization much healthier. When every aspect of IT is under SOA governance, regulatory compliance is a natural byproduct. So, if you know people in your organization who have been tasked with making sure that the company is adhering to guidelines for the Sarbanes-Oxley Act, HIPAA, Basel II, the Gramm-Leach-Bliley Act, or any other regulatory or policy-based requirement, you may want to talk to them about SOA. After they understand what SOA can do for them, you're likely to have allies.

## Making SOA Happen

We show major components of a service oriented architecture in Figure 1-1. We provide an overview of these components in this section, but recognize that you may have more questions than can be fully answered here. You can find lots more detail on the components that make SOA happen in our big book on this topic, *Service Oriented Architecture For Dummies*, 2nd Edition.

The Enterprise Service Bus (ESB), the SOA registry and repository, the business process orchestration manager, service broker, and SOA service manager each have a role to play, both independently

and with each other. The ESB makes sure that messages get passed back and forth between the components of a SOA implementation. The SOA registry and repository contain important reference information about where the components of a SOA are located. The business process orchestration manager provides the technology to connect people to people, people to processes, and processes to processes; the service broker connects services to services, which in the end, enables the flow of business process.



**Figure 1-1:** Fundamental SOA components.

The role of the SOA service manager is to make sure that the technology underneath the SOA environment works in a consistent and predictable way. The goal is to create an environment where all these components work together to improve the flow of business process. All these services are required to link unrelated technology components as though they were designed to work together.



When all these component parts work together and sing the same tune, the result is dependable service levels. A finely tuned SOA helps guarantee service levels.

## *Catching the Enterprise Service Bus*

In service oriented architectures, all the different pieces of software talk to each other by sending each other messages — a lot of messages. The messages are critical to delivering end-to-end service. They must be delivered quickly, and their arrival must be guaranteed. If that doesn't happen, "end-to-end" service quickly becomes "lack of service."

To transport the messages between software components, SOAs typically use an ESB. The ESB is so important to SOA that some people think that you can't have a SOA without one. Other folks think that if you have an ESB, you have a SOA. Neither statement is accurate. You don't need to have an ESB to have a SOA, but you do need a way for the services to communicate with each other. The ESB is a reasonable and effective way to accomplish this goal.

You can think of an ESB as a special layer that runs on top of the network and provides a guaranteed messaging service for the most important messages on the network, including the messages that the components of SOA continuously send to each other.

Usually, in architecture diagrams, the ESB is represented as a separate pipe through which information and instructions flow. (Refer to Figure 1-1 to see what we mean.) In reality, it's not really a pipe. Rather, the ESB is a collection of software components that manage messaging from one software component to another. A software component connects to the ESB and passes it a message by using a specified format along with the address of the software component that needs to receive the message. The ESB completes the job of getting the message from the sending component to the receiving component.

## *Welcome to the SOA registry and repository*

Somebody — or something — has to keep track of all the available business services that you created to represent your most important business processes. All those reusable components have to be recorded somewhere, and that somewhere is the *SOA registry*.



Think of the SOA registry as a kind of electronic catalog where you store information describing what each component does. It has two roles:

- ✓ One rooted in the operational environment
- ✓ One rooted in the world of programmers and business analysts

In the operational environment, the SOA registry provides reference information about software components that are running or available for use. This information is of particular importance to the service broker — the software in a SOA framework that brings components together by using the rules associated with each component.

For programmers and business analysts, on the other hand, the SOA registry acts as a reference that helps them select components and then connect them to create composite applications that represent business processes. It also stores information about how each component connects to other components. In other words, the SOA registry documents the rules and descriptions associated with every given component.



The SOA registry is extremely important because it acts as the central reference point within a service oriented architecture. The SOA registry contains information (metadata) about all the components that the SOA supports. For that reason, it defines the *domain* of the architecture.

The SOA registry is where you store definitions and other information about your software components so that developers, business analysts, and even your customers and business partners can find the services they need. Business services are *published* in a registry to make them easier to find and use.



The idea of *publishing* Web services is critical to SOA. You can only reuse services that are available for reuse, which means they have to be published first.

Comparatively, the repository is like a central reference point within the software development environment. It stores the source code and the linking information used to build all the programs that run in the operational environment. The SOA

repository feeds the service oriented architecture with changes and new components. The SOA repository works within the operational environment and takes on the responsible role of acting as the counterpart of the registry within the development environment.

Simply, here's the difference between the repository and the registry:

- ✔ **Repository:** Central reference point for all the components within the software development environment from which services are built
- ✔ **Registry:** Central reference point for definitions, rules, and descriptions associated with every service within a SOA environment

## *Managing business processes under SOA*

With all this discussion of registries, repositories, brokers, and buses, we want to remind you that the whole point of SOA is to make a business more manageable, more flexible, and more responsive to change. The primary culprit when it comes to instigating change is *business process*: how businesses do things.

Businesses constantly change *how* they do things while not necessarily changing *what* they do. For example, an insurance company might change the methods it uses to introduce new products or how it handles insurance claims, but when all is said and done, it still sells insurance. SOA enables business people to change business processes without having to focus on the underlying technological plumbing. You can concentrate on designing and improving business processes by threading together business services. IT can build composite applications from existing business functions, adding other functions or making changes where necessary. Together, business and IT can determine the flow of work from one person to another (or from a person to a process or from a process to a person) within the larger business process.

“But how do they do that exactly?” you may wonder. Thanks for asking. With all these business processes to manage, the somewhat obvious solution is *business process management* (BPM). BPM is the modern approach to designing and managing

business processes, and many business managers and business analysts receive BPM training. All by itself, BPM has contributed significantly to the liberation of business from technology.

Whereas BPM focuses on designing business processes effectively, SOA is an architecture that conveniently allows IT to align with business processes. It's only natural — yet very important — to successful implementation of SOA that SOA and BPM have converged, with BPM software tools becoming a natural part of a SOA development environment. Coupled with SOA, BPM is doubly powerful.

## Choosing a Test Case Carefully

After you have some buy-in (notice we aren't asking for unilateral, unanimous, unmitigated buy-in — just *some* buy-in), you want to pick a project that's relatively small in scope that can quickly prove the merits of SOA. Every organization has a lot of projects that would make great SOA candidates. Be careful to pick an important project that's both doable and important enough to get management attention and that can be completed in a relatively short time frame. We know of at least one company (that we aren't allowed to mention) that saved more than \$40 million in just three months. Maybe you can't find something quite so dramatic, and you may need help figuring out what project will bring the quickest big yield, but our point is that you should pick your early SOA projects carefully. Early SOA success is critical to gaining more buy-in.



One of the most exciting benefits of SOA is that there isn't just one way to start. Depending on your business issue and the nature of your industry, you can achieve business benefit in a lot of ways. For example, are you in a company where a lot of knowledge is residing only in people's heads? Is there a danger that knowledge might walk out the door unexpectedly? Are some of the most knowledgeable people getting ready to retire? If you answer "Yes" to questions like these, it may be important to start by working to extract the knowledge and processes that people carry around in their heads and make that information into business services with clearly defined interfaces.

On the other hand, you may have a situation where the processes and rules of the business are well-documented in various applications, but these software applications are associated with

different departments and located in different places in the company. This disaggregation of each department and its specific applications representing business processes and rules makes it difficult for one application to access another. So even though the rules of the business are well-documented, you still have some work to do. The processes and rules of the business should be articulated in reusable business services that can be consistently used across the different departments of the organization as a way of improving governance and oversight.

Or you might have a common service that is implemented in 500 different ways across hundreds of applications. You may want to start by creating some shared services that can replace these 500 different services. Or you may want to put a registry/repository in place so that everyone can find the right authorized service.

Other organizations may gain value from simply discovering exactly what assets they have in their IT systems. The point is to pick your starting point based on the issues that are most important to your company. (And remember that such starting points may not necessarily be the most sophisticated features of the organization but yet may still have significant business values.)

## *The Case for Case Studies*

Aside from introducing SOA, we describe the benefits and how to sell the benefits to others so that they support efforts that your organization makes to adopt a SOA strategy. We could provide you with a lot more detail on the subject, but in the end the proof of the pudding is in the eating. In the next seven chapters we report on seven companies that have used SOA in their own ways for their own benefit. We describe what was achieved and how they achieved it.

We think this will help. With new technology ideas and new business methods it is always comforting to know that others have been successful in making them work. The company case studies in the following chapters represent a cross section of industries: financial services, healthcare, travel and hospitality, manufacturing, retail, telecommunications, and energy/utilities.

## Chapter 2

# Financial Services

### *In This Chapter*

- ▶ Understanding CIGNA's business initiative for SOA
- ▶ Looking at why financial services companies need SOA
- ▶ Viewing lessons learned and best practices

**M**any companies in the financial services market segment have been early adopters of new technology. The various company types included in this sector — banks, insurance, investment, and brokerage companies — all have a common need to manage very large amounts of data very fast, with a high degree of security and accuracy. Advanced technology has been leveraged to support an increasingly complex network of global financial transactions managed by the financial services industry. However, as the global financial crisis of 2009 underscores dramatically, even the most sophisticated use of technology can play only a supporting role to the business decision makers leading the business.

The need for the new world order of technology we discuss in Chapter 1 is intensified by the challenges of economic discord. There is an urgent need for “smart” business decision makers who are able to cooperate with a “smart” IT team to make even “smarter” decisions. The complexity of the technology infrastructure at many companies in the financial services sector makes it very hard to leverage IT services in a coordinated way across the enterprise. Many large companies have either merged or acquired other very large companies resulting in the integration of new business units with very different work cultures and widely different information infrastructures. The need to be able to trust and understand the information about the business across its many disaggregated parts has been a prime motivator for change in the IT infrastructure at these companies.

Financial services companies require strong, supportive, and well-integrated IT infrastructures to manage future change. The

industry needs to be able to become more customer focused, to respond to increasing levels of regulatory compliance, to continue to build up levels of security and privacy surrounding financial transactions, and to provide increased attention to fraud prevention.

Given the complexity of the IT infrastructure in many financial services companies, it's no wonder that they have been some of the pioneers of the SOA movement. Companies like CIGNA, which is highlighted in the case study in this chapter, recognize that having the ability to take existing business logic and turn it into a business service can become a strategic advantage.



We think that the most important parts of the discussion of real-life experiences with SOA are the lessons learned. Because companies have had both success and failures, they have a lot to teach all of us about how to do SOA in a way that brings financial and business benefits. So read on and get smart about SOA.

## CIGNA

“Think like a business person” is a message that resonates with the IT folks at CIGNA. In fact, this philosophy has fostered a partnership between business and IT at the company and helped to make it successful. So, when CIGNA Group Insurance — the part of CIGNA that manages disability, life, and accident insurance products — realized that it needed to fundamentally shift how it viewed its customers, IT was on top of it.

Historically, CIGNA viewed its primary customers as corporate employers who purchased products and services on behalf of their employee population, their beneficiaries, and their dependents. Several years ago, CIGNA began to evolve its thinking around this to address employer concerns over the ever-increasing costs of employee benefits, particularly in the healthcare space due to the trend of skyrocketing medical costs. To address this issue, CIGNA looked to leverage its data assets, along with its clinical and vocational expertise.

As a result, CIGNA continues to focus on the core capability of processing claims, while at the same time placing greater emphasis on providing products, services, and data assets that help keep individuals healthy. By proactively addressing — and in some cases predicting — medical conditions before they become serious, medical costs tend to decrease, fewer people take disability leaves, and work-related absences are better

managed. In a nutshell, sharper focus is placed on the individual, not just the employer, and everyone wins.

This all sounds good on paper. However, CIGNA had supported its traditional customers — the employers — using an account management structure that didn't lend itself easily to directly dealing with the individual population. CIGNA had developed many of its systems to support innovations to launch new products and services as well as deal with immediate business capability gaps in its current systems. The result? Over time, CIGNA built a complex infrastructure using a variety of different technologies. The company needed to change its underlying infrastructure and architecture to support this new individual-centric business view, but it knew it couldn't simply replace all of its systems. A service oriented architecture (SOA) provided the means for CIGNA to incrementally move away from its legacy environment. At the same time, it enabled the company to introduce new business functionality.

## *Business and IT Cooperation*

The architecture team realized that to solve the business problem, it needed to bring the thought process up a level from services and instead develop a more business-focused enterprise-level architecture. To do this, the architecture team is using what Brian Mitchell, chief architect for CIGNA Group Insurance, calls a “capability mapping and modeling approach.” The team is defining core business capabilities and then mapping these capabilities to core business functions and end-to-end business processes. It's looking at how business functions map to the products and services that the company sells, and it's also evaluating how products and services are distributed in the marketplace. By carefully defining and grouping related business functions, the architecture team has established a number of enterprise services in its overall SOA.

So how does this all work? CIGNA's enterprise architecture has defined several hundred business capabilities, each defined in terms of one or more business functions. A business function is like a mathematical function in that it takes in several input parameters and produces a single output parameter. For example, the *calculate benefit business* function is needed in support of several enrollment, eligibility, medical underwriting, self-service, and claims business capabilities. This business function determines for a particular individual (the input) the benefit structure (the output) for the products and services that have

been purchased from CIGNA. For example, it can help determine whether an individual is eligible for a flat amount of \$100,000 of life insurance or entitled, instead, to receive a multiple of his or her salary as a life insurance benefit. This function is defined in CIGNA's enterprise service for managing benefits for individuals, called Consumer Service. This process of grouping related business functions resulted in the definition of all of CIGNA's core enterprise SOA services, and it helped determine the necessary responsibility and functionality each service needed to have in the end-state architecture. All in all, CIGNA defined and mapped more than a thousand business functions into approximately a dozen enterprise services.



So, whereas the business had thought about eligibility and enrollment as two completely different functions, from an enterprise architecture perspective with a lens on the individual, they are one. The SOA framework allows CIGNA to orchestrate a series of business-process-aware services around the individual — one for enrollment, one for eligibility, one for billing, and so on. As an example, the enrollment service will interact with the consumer service to determine the benefits that an employer has purchased on a particular individual's behalf, as well as determine any additional benefits for which an individual is eligible to purchase directly. Currently, the team is building out most of its individual-related service interfaces using the Human Resources XML (HR-XML) schemas. HR-XML is a library of XML schemas developed by the non-profit HR-XML Consortium. These industry-standard schemas support a number of business processes related to benefits administration and human resources.



A unique aspect of what CIGNA did to make this architecture more business-focused was to work with the business directly. The members of the architecture teams met with their business counterparts on a regular basis. They participated in business strategy and planning meetings and partnered with their counterparts to better understand their business issues. The team even briefs the division president. Through this level of engagement and two-way dialogue, IT asserted itself as a more valued business partner and showed the business how IT can improve overall business capabilities, not just solve localized problems on a reactive level.

CIGNA has a good view of the enterprise architecture and how the components eventually integrate. The team is making sure that each individual project is being designed and developed in a



fashion where they can eventually hook services together. As CIGNA builds out its new capabilities, it is redirecting existing legacy systems to use and integrate with the new services or the underlying databases to support these enterprise services. In this way, CIGNA is able to move forward thoughtfully and incrementally, and not risk breaking legacy systems.

Architecture team members are quick to point out that they didn't invest in SOA strictly for reuse because they don't think about services this way. Rather, CIGNA views the primary benefit of SOA as extensibility, so that a service built to meet today's needs can evolve to meet future requirements. It's also common to have requirements where enterprise services need to behave somewhat differently in different business scenarios. By using what's commonly referred to as a *message-centric approach* toward service design, a developer can add further attributes or behaviors to the services without endangering backward compatibility by updating the service's interface schema.

## *Lessons Learned and Best Practices*

CIGNA believes that taking a business-focused approach helps make its SOA effort successful for the following reasons:

- ✔ SOA can help solve a real business need. In CIGNA's case, one primary driver was repositioning technical capabilities more around the needs of the individual in support of CIGNA's overall health improvement strategy.
- ✔ At a high level, the business understands the benefits of SOA in business terms — such as cost reduction and efficiency. For example, service-enabling the systems used by the contracting department will also enable CIGNA to implement new cases faster by improving the integration with the existing legacy systems and providing them with accurate post-sale data from a single source.
- ✔ The enterprise architecture helps the business see that services built for one part of the business can also be used and extended for other parts of the business, thus benefiting everyone. Projects are now defined in terms of the entire business. In other words, CIGNA is now positioned to build capabilities that better support up- and down-stream business processes, instead of simply focusing on building localized departmental functionality.



## Chapter 3

# Healthcare

### *In This Chapter*

- ▶ Looking at Independence Blue Cross's initiative for SOA
- ▶ Understanding why healthcare needs SOA
- ▶ Viewing lessons learned and best practices

**I**n many ways, the delivery of healthcare is still a cottage industry. Although there have been enormous technological advances that help physicians diagnose diseases at an earlier stage and improve the overall quality of care, a positive patient outcome after a medical emergency often boils down to whether the facility you're being treated at has your medical records. Traditionally, healthcare facilities — from independent physician offices to clinics and hospital departments — have been siloed to an extreme. However, in order to get excellent care, your care providers, payers, and drug providers need to cooperate and this requires on-demand access to your medical history. If the healthcare industry is to function more efficiently, then the availability of care needs to be tied into the availability of data about the patient.

Physicians make use of large amounts of time-sensitive data when caring for patients — including results of lab tests, pathology reports, X-rays, and digital imaging. Many hospital systems have deployed integrated systems for delivery and storage of results from various medical tests. The patient's medical information also needs to interface with hospital billing systems for payment by third-party payers. In addition, there may be tie-ins to drug delivery systems so that there can be an online record of what dose of what drug has been administered to patients at what time.

However, there are many hospital systems that fall far short of integrating all the medical information needed to speed the delivery of healthcare for the patient. What these systems are generally lacking is the ability to provide an integrated and comprehensive source of patient data that follows that patient wherever and whenever they need healthcare. Therefore, one

reason why large hospital systems, medical insurers, and pharmaceutical companies are moving to SOA is to help break down the silos of medical data in order to provide an integrated network of high quality care for patients.

Of course, there are many reasons why the healthcare industry is moving to SOA. The healthcare industry has many challenges, ranging from issues related to privacy legislation to the need to provide more holistic patient care for less money. Healthcare insurance providers need to manage the relationships with both providers of healthcare and the needs of consumers. Pharmaceutical companies need to successfully leverage data and best practices across the entire healthcare ecosystem to ensure that they're developing medicines that address emerging needs.

Healthcare organizations are looking to SOA to allow them to more easily link business services and data across departments. They are implementing SOA to improve the level of cooperation between healthcare providers and payers and to improve outcomes to their constituencies. Service orientation has started to have a major effect on healthcare.

## *Independence Blue Cross*

All healthcare companies are looking to reduce costs to balance expenses and maintain a reasonable cost of healthcare, and Independence Blue Cross is no exception. Independence Blue Cross and its subsidiaries are the Philadelphia region's largest health insurers, with more than 3.4 million overall members. The company offers products and services such as Managed Care, Traditional Indemnity, Medicare, and Medicaid. Independence Blue Cross processes more than 32 million claims a year and responds to more than 6 million customer inquiries.

A service oriented architecture has become an important part of this cost reduction strategy. SOA has provided high value to the company, while reducing costs associated with application development. In fact, it has changed the way application development is done at Independence Blue Cross. It was a "leap of faith" that Independence Blue Cross needed to make this change, according to Thomas Cangelosi, Director of the Infrastructure Integration Services department at the company.

## *Strategic SOA*

Independence Blue Cross began to deploy its SOA strategy about two years ago. According to Cangelosi, the company got off to a quick start with SOA because it had strong support at the highest levels of management. However, support and funding alone can't guarantee success because SOA has implications other than technology, and its introduction brings a new level of social complexity and organizational change. What did Independence Blue Cross do to ensure success? The first step was to create a governance model. The second step was to help the application developers understand the value behind SOA and then actually use the approach.

A good example of SOA in action is claim status. Say you go to a physician and want to know whether your claim has been paid. In this case, you might call the customer service agent at Independence Blue Cross to find out. Or you might call the billing department at the physician's office. Or you might simply go online to check yourself. The front-end system might be different in all three cases, but the back-end uses the same service. It may be that the service may cross multiple systems to get the information; but in another case, it may use only one. The point is it is still the same service, so there is only one version of the truth.

So, in many respects, Independence Blue Cross was fortunate that it got off on the right foot with SOA from the start.

## *Step 1: Governing SOA*

At Independence Blue Cross, the governing committee is a multi-disciplinary body, consisting of technical subject matter experts from six areas across the business, including claims, enrollment, marketing, finance, project management, and technology. The initial focus of the committee was to establish a set of low-level foundation services. One example of this type of service would be a mapping service that maps proprietary provider numbers with government-issued National Provider IDs (NPIs). All the rules codified by the governance committee are stored in the company's registry.

Cangelosi's group chairs the committee but doesn't get a vote. The business experts were the stars of the show and made the governance decisions. The group first put together an initial document that outlined processes and the life cycle of a service. It took several months to finalize a draft, and they took it to senior leadership, where it was iterated and ultimately ratified in two weeks. Cangelosi's group has been given the leverage to make sure this gets enforced.

From a governance standpoint, Independence Blue Cross established a policy from day one that a service was a service only if it was used more than once. The company realized that it could ultimately save a lot of time and money by developing reusable, standardized services. An important aspect of an enterprise-wide approach is assigning responsibility for service development and maintenance. The individual IT support function for each line of business builds the services and then supports those services. For example, if a service is pulling data from a provider database, the provider IT department has stewardship for that data. The provider department has responsibility to develop that service, pull data out, and get it to the service. Ultimately, they're responsible for anything that goes against that system.

## ***Step 2: Application Developers Take a Leap of Faith***

With a governance and support plan in place, all that was left to do was convince the developers that SOA was the way to go.

According to industry statistics, almost a third of all application development is focused on integration issues. Not surprisingly, Independence Blue Cross focused on SOA integration at the outset. Prior to the movement toward SOA, integration was part of the process of developing an individual application. Cangelosi's group told the developers that they didn't need to worry about programming their applications to deal with getting the data from point A to point B. Likewise, the developers were told all they needed to know was what data they were requesting from a service. So, they didn't really need the service for their own development process: They simply needed to know what they're requesting and what they will get back.



Developers hate change, and they hate losing control. Therefore, the move to SOA was a big cultural change for developers. Cangelosi determined that he would have to convince the developers to trust that SOA would be helpful and get rid of annoying and time-consuming tasks. Before SOA, all development was tied to an application. Developers were used to doing a direct connection to a database. This was no longer allowed. If a developer was going to get data, he or she needed to access it via a service.

Management's responsibility was to demonstrate to the developers the value in the new approach. If the developers perceived that the approach was a bottleneck, it wouldn't be successful. Although changing a methodology is difficult, Independence Blue Cross noticed that after the developers realized that something that used to require four weeks now required only three weeks, they began to see the value and jumped on the bandwagon. As the services were built and developers started to use them, they began to see how a SOA approach added value from a productivity perspective.

To this end, Cangelosi's group is seeing a rapid increase in the number of services being requested from various groups in the company. Discipline is maintained because developers are seeing the value in the approach. For example, Independence Blue Cross was developing an application that needed to determine the status of a claim. Rather than writing this code from scratch, two different development groups got into the act. One group developed the claims status service, while another group built the front end for the application. These development groups worked in parallel. When the group was ready to use the claims status service, the developers were able to find it easily because it was exposed as a service on the enterprise service bus. As Cangelosi put it, "It was a perfect match."

## *What's Next for IBC?*

Independence Blue Cross put a three-year road map together last year. With the first governance stage completed, the company is now embarked on the second phase.

This second phase includes a process to automate the governance process. It will also focus on the ability to measure how well SOA is working. Measurements will provide answers to questions about how services are being consumed and how they add value to the company. The registry, which was implemented

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in the first phase, will help the company capture metrics on use of services. The active registry will provide information about how services are being used and the retirement of existing interfaces. Today, this is being done manually.

In 2009, Independence Blue Cross will implement the third phase of the SOA plan. The focus will be on two critical areas: Master Data Management and Business Process Monitoring. With Master Data Management, the company will focus on creating a common set of data elements across the company, so there can be a “single version of the truth.” Because the company is starting to have a strong catalog of well-designed services, it will be necessary to monitor how these services are linked into a business process. Monitoring the state and effectiveness of these processes will be important to managing how these services are used in specific business situations.

## *Lessons Learned and Best Practices*

Cangelosi attributes the company’s success with SOA to three main practices:

- ✔ **Taking an enterprise-wide view with executive support:** According to Cangelosi, “We have been successful where we have seen other people trying to do the same that have not been successful.” Others weren’t successful because they couldn’t look across the enterprise. So, using that approach and getting executive backing on it is very important.
- ✔ **Separating the technology from the methodology:** The governance put in place is technology agnostic. The company doesn’t care what technology it has under the covers; its governance method will be the same across the board.
- ✔ **Federated governance model:** The fact that the governance committee consists of multiple groups across the company ensures that all aspects of company business are taken into account. It also provides varying perspectives. This further enables the enterprise view.



## Chapter 4

# Travel and Hospitality

### *In This Chapter*

- ▶ Understanding the SOA plan for InterContinental Hotels Group (IHG)
- ▶ Looking at why travel and hospitality companies need SOA
- ▶ Viewing lessons learned and best practices

“Are you traveling for business or pleasure?” This simple question can’t possibly describe the very complex market segmentation that exists in the travel industry today. Consider just a few examples of various types of accommodations or travel experiences: green hotels and eco-focused travel, high-end luxury spas and resorts in exotic and remote locations, trendy new pod hotels offering budget travelers tiny sleeping spaces with shared common areas, and grand all-inclusive resorts catering to business events. Many of the largest hotel-management companies operate multiple brands, catering to a broad range of these varied market segments. Intense competition and a high rate of mergers and acquisitions have contributed to an environment where a diverse group of hotel properties are managed by one parent company. In the past, large hotel-management companies commonly had individual hotels or groups of hotels that functioned as independent business units. But what happens when you want to optimize profitability and improve customer satisfaction and guest loyalty across *all* brands within the enterprise?

A large, distributed hotel organization can find it impossible to leverage all the important information it’s collected about guests and hotel properties if the data is highly distributed and inconsistent. Typically, information about guest preferences, customer billing, spa services, restaurant services, and room availability have been managed at the property level and were often not standardized across a diverse hotel enterprise. In this highly competitive industry, large companies need a way to increase the value they receive from one of their most important assets: namely, information about the needs of guests and the operation of the hotel. Integration between the various systems that manage this information is critical to

deliver this information accurately and on time and to help manage the customer experience.

In this chapter, we highlight InterContinental Hotels Group (IHG), a hospitality industry organization that manages numerous hotel chains. IHG implemented SOA to improve the flexibility of its IT infrastructure and to improve overall customer experience.

## *InterContinental Hotels Group*

InterContinental Hotels Group (IHG) is one of the world's largest hotel groups and includes such brands as InterContinental Hotels & Resorts, Crowne Plaza Hotels & Resorts, Holiday Inn Hotels & Resorts, Holiday Inn Express, Staybridge Suites, Candlewood Suites, and Hotel Indigo. It also manages Priority Club Rewards, which is the world's largest hotel loyalty program, with more than 37 million members worldwide. IHG manages over 4,000 hotels in more than 100 countries and opens new hotels daily.

The hotel business is competitive. Customer satisfaction is critical, and expectations are high. Although the customer experience begins when the customer books a reservation, the ecosystem involved is quite complex and dynamic. IHG works with many channels to service its customers, including hotels, the Web, call centers, travel partners, global distribution systems, travel agents, and other intermediaries. Information such as room rates, room availability, and guest profiles must be immediately available to these channels. A service oriented architecture ultimately provided the agility and efficiency IHG needed to better serve its customers and move information through its channels.

## *Distributing Key Channel Information*

IHG began its journey to SOA in 2002. The company faced several technical challenges, including a requirement that key information (such as Guest Profile, Room Rate, and Loyalty Unit Balance) must be available to multiple company channels simultaneously. At the time, according to Eric Norman, Director of Infrastructure Integration at IHG, the hotel industry hadn't yet grasped SOA's basic tenets. He thought that a service oriented approach could be well utilized by hotels, but there were few roadmaps or best practices to light the new path.

It was clear that a centralized computing platform — or even a distributed computing environment — would not be lean and limber enough to take on IHG's wide array of ever-changing data. The architectural solution had to be agile, flexible, and extensible; it had to be technology- and vendor-independent; and its components had to be interoperable, *composable* (able to be built into larger components), and reusable. IHG implemented a number of projects using a SOA-based approach but fell short of expectations, partially because the team approached SOA from a development (bottom-up) perspective — a very common approach for many companies. From this perspective, services aren't leveraged across the company because these services are just built to address a particular need.

The journey was, therefore, an evolution, rather than a revolution. CIO Tom Conophy joined IHG in 2006, and he understood the challenges of implementing a service oriented solution in hotels. He had led a successful SOA initiative at Starwood Hotels and wanted to extend this vision at his new venture. To jumpstart it, he created a special Enterprise Architecture Group (EAG) whose initial focus would be the development of a SOA at IHG. The group included Conophy, his direct reports, and a cross-disciplinary Enterprise Architecture Workgroup (EAW).

Conophy also initiated an Enterprise Architecture Team (EAT), placing it at the core of the EAG. The team was championed by Bill Peer, Director of Enterprise Architecture in IHG Global Technology, and comprised system, infrastructure, governance, and solutions architects. (Each architecture group specialized in a particular facet of the SOA.) The group's objective was to develop a SOA-based solution for the company that leveraged extensible, composable, and reusable services based on IHG's business model.

Peer's team aggressively sought out tools and drafted standards to engineer a robust, agile new SOA solution that would eventually provide a roadmap for the company. After months of research, software evaluation and testing, and consultation (with technology companies, businesses inside and outside the hotel industry, and internal IHG resources), the EAT completed a SOA that is now used to develop services accessible across multiple business units at IHG.

## SOA Implementation Highlights

IHG's SOA relies on an *enterprise service bus (ESB)*, which enables the rapid integration of services that can be exposed to multiple business units. The ESB uses an *orchestration* engine to define the sequence of such important services as *MakeReservation* and *CommunicateWithGuest*. Orchestration dramatically increases the power and flexibility of these and other pivotal IHG services. In addition, the ESB uses a centralized *registry-repository*, which standardizes policies and other service description artifacts, and which enables service discovery.

For example, IHG's Loyalty business unit may decide that it would like to send a seashell to every Priority Club member who books a room at a beach hotel. A new orchestration process can be created from the existing services *SendGift* and *CommunicateWithGuest*. Because both services are stored in a federated registry-repository, they exist in a standard format that can be accessed and customized by any other IHG business unit.

*Reusable* services are key to the success of IHG's solution. A federated registry-repository is used to enable discovery of the services. To illustrate, consider how the *SendGift* service can be used to meet the goals of IHG's Loyalty business unit versus those of Distribution Marketing. The Loyalty group manages IHG's Priority Club program; Distribution Marketing's goals include increasing reservations at IHG hotels. Whereas the *SendGift* service can be used by Loyalty as a small gesture of thanks to Priority Club members, it can be used by Distribution Marketing to send coupons or other incentives to IHG guests to ensure return visits.

IHG services are composable as well. For example, IHG may determine that the *MakeReservation* and *CommunicateWithGuest* services are always called during the Reservations business process. The organization may then decide to create *one* new service from those two services. The new service, called *ReserveAndCommunicate*, will be composed of the *MakeReservation* and *CommunicateWithGuest* services. Composable services can (where applicable) yield simpler, leaner, more elegant programmatic solutions at IHG.

## IHG's SOA Reference Architecture: A Self-Healing Ecosystem

IHG's computing platform goes beyond implementing a SOA. It's an autonomous, self-healing ecosystem that uses a dynamic resource broker to manage component instances (including starting and stopping of components, as well as managing components during peak conditions and low usage periods).

The IHG reference architecture has the following capabilities:

- ✔ Transparent scaling of *service container* (the implementation of the service interface) instances across a shared virtualized hardware pool in a *grid topology* (hardware components that are connected to neighboring components in a grid).
- ✔ Centralized management used to automate the deployment and lifecycle management of system components. Software stack updates can be performed without suffering service outages.
- ✔ Runtime visibility into memory, CPU, threading, and other resource utilization, made available using dashboard views. This virtualized administration allows the entire fabric of system components to be managed as a single logical unit.
- ✔ Transaction state querying and root cause analysis, provided by the event stream processor. Performance metrics and usage patterns are available for determining the system's state of health and for taking proactive curative measures.

## Lessons Learned and Best Practices

Now that IHG's SOA has evolved, it will continue to be used in development groups and will doubtless be refined as the months and years progress. During its exploration and adaptation of service oriented architecture, the IHG Enterprise Architecture Team learned several important lessons:

- ✔ **Use standards and governance to manage the number of services and force their reuse.** A couple of past IHG development teams had used anywhere from 200 to more than 1,000 services, which made versioning changes,

API-level changes, or client-level changes difficult, if not completely impossible.

- ✔ **Don't use a governance model that's too structured.** Use a registry and repository to centralize the storage and communication of service-oriented policies. However, maintain a more or less hands-off approach with individual project teams so as not to interfere with their specific development goals.
- ✔ **Promote strong SOA tenets across the organization.** Make sure that all development teams understand thoroughly that a SOA *must* be loosely coupled, interoperable, reusable, composable, stateless, and discoverable, among other features. This means, for example, that a mainframe system accessed by an application stack (even a Java-based one) is a middleware solution, not a SOA.
- ✔ **Make sure services are rigorously tested.** Best practice is to append an additional 10 percent to the testing phase; this gives you extra time to ensure that a wayward client can't demolish a service.

Peer emphasized what he considered the most profound insight gained during his group's endeavor into SOA: "Education and communication of SOA help ensure buy-in from all levels in the company. Make sure that all parties with a vested interest in SOA have a thorough understanding of what it is and is not (both in a business and technical sense). Vendors, magazines, and pundits have polluted the term SOA, so invest heavily in comprehension before undertaking architecture and design. Sprinkle those who have a strong comprehension among the development teams that are delivering or using the services."

## Chapter 5

# Manufacturing

### *In This Chapter*

- ▶ Understanding Cisco's business initiative for SOA
- ▶ Looking at why manufacturing needs SOA
- ▶ Viewing lessons learned and best practices

**I**mproving operational efficiency is a prime driver for success and profitability in the manufacturing sector. In addition to a sharp focus on operational efficiency, this sector is driven by two key needs: to reduce the cost of manufacturing goods, and to have a sophisticated and effective channel of distribution.

In this chapter, we highlight Cisco, a computer and electronics manufacturer. Like many other companies in this sector, Cisco provides solutions directly to customers and indirectly through a complex partner channel. Therefore, it's not surprising that technology innovation is at the core of how companies in this sector differentiate themselves.

The advent of a service oriented manufacturing and distribution strategy has enabled companies in this vertical to be much more nimble in connecting partners, suppliers, and customers. These companies have leveraged online ordering, self-service portals, and integrated sales channel technologies. These companies face a stiff competitive environment, and view using SOA as a way to stay ahead. In this chapter, we show how Cisco developed specific business services that allow it to respond quickly to its partners' requirements. SOA enabled the company to improve the way it provides service to customers, suppliers, and partners.

## *Cisco*

You'd have to live in a cave not to know about Cisco, which is one of the world's leading providers of hardware, software, and

service offerings for creating Internet solutions. Although best known for its IP-based network technologies, Cisco has dramatically expanded its business over time through strategic acquisitions. In adding companies such as WebEx and IronPort to the fold, Cisco had to evolve its systems to support multiple business models — including traditional product, Software as a Service (SaaS), subscription, and IT as a service offering — in parallel, and on a global scale.

Realizing the impact that such changes would have on its ordering capabilities, Cisco IT embarked in 2006 upon a major initiative to transform how it conducts online commerce with both its direct customers and its significant partner community.

Because most of Cisco's products are sold through channels, it wanted to be sure there was a consistent user experience when placing an order, regardless of the product or service being offered. Not only did Cisco want to ensure process, data, and application logic consistency across its own customer and partner-facing applications, but it also sought to allow its partners to provide the same consistency through their individual customer-facing Web ordering tools. Cisco embarked on a SOA journey to make this a reality.

## *Transforming to SOA*

Prior to the start of its Commerce Transformation initiative, like many early adopters of SOA, each IT group within the company had implemented a relatively disconnected series of Web services. Although each group did a good job developing its own system to support its business process, their approaches weren't created with an overall enterprise architecture in mind. So the end result was that Cisco had a series of disconnected Web Service-enabled application silos that required too much complex coding to support needed integrations. "When you have a billion lines of software code, it actually should be called hardware because you can't be very agile," said Craig Hinkley, VP of Architecture and Technology at Cisco.

Having learned some important lessons, Cisco IT changed its approach in 2006 to work more directly with the business to define the strategic objectives and the business processes that would deliver upon its Commerce Transformation vision of making it easier to do business with Cisco.



Vice President (VP) of Commerce IT Guillermo Diaz led a team that worked with the different business units to define the right starting points to enable business process agility through SOA. Rather than trying to boil the ocean, the team picked out a few critical business processes — pricing, discounting, configuration, and ordering — to develop as enterprise-wide services. The idea was to roll out individual services as pilots, obtain key wins with targeted applications, and then start to make them generally available to other parts of the business as reusable services.

“Having built a number of discrete services associated with the commerce process, over time, we began the task of deploying these services to support our customers and partners,” said Diaz. These services included pricing (localized in 15 different languages), discounting, and product configuration, as well as identity and access management to securely extend the ordering process outside the company.

One of Cisco’s biggest concerns was scalability. What would happen if too many partners tried to use the same service at the same time on the same network? “To ensure a positive user experience, it was critical that we looked at architecting services for our customers and partners that not only allowed for value-add customization, but that were reliable and consistent in their performance,” said Hinkley. To solve this problem, Cisco used a network-based acceleration service that could be deployed across a distributed environment to ensure consistency and scalability of their applications.

Cisco thinks about measuring the value of IT and SOA across three dimensions: experience, productivity, and growth. Cisco wants a consistent experience around the application services it has developed across its different channels. One of the clear benefits of a SOA approach is that when a service needs modification, the experience is uniformly changed across all the channels. Another benefit is that the company can evolve composite business services faster than before because it now focuses on how to evolve each service component versus how to deal with functionality in a monolithic system. Finally, SOA affects growth because it gives Cisco the agility to respond quickly to its customers and partners. For instance, as designed, the pricing service allows the company to substantiate pricing rules that are needed for certain situations much faster than it could before.

## *Changing the Nature of Partnerships with SOA*

We don't have to tell you that change isn't always easy. Getting partners who are used to their own way of doing things to adopt SOA-based services can be difficult.

Many of Cisco's partners, for example, are accustomed to ordering products from its more traditional commerce Web site that helped propel Cisco's early growth in the mid-to-late 1990s. These partners built their own tightly coupled software and processes to support this method of ordering. In essence, to make the transition to SOA take hold externally, Cisco has to sell its partners on the value and ease of use of this new approach. If partners adopt these new Web Services now, innovations and changes will be easier for them to deploy in the future. Cisco envisions that over the next few years, its partners will use the services it provides — and expose them as widgets or portlets to create their own online selling experiences using standard components from Cisco.

## Chapter 6

# Retail

### *In This Chapter*

- ▶ Understanding Spotlight's business initiative for SOA
- ▶ Understanding why retailers need SOA
- ▶ Viewing lessons learned and best practices

**T**here was a time, not all that long ago, when a retailer could expect consumers to walk into a store and make a purchase based on the visible choices. If the consumers didn't like what they saw, they might check out the store across town or perhaps look through a few catalogs, but there weren't many other options.

That's all changed. Today, retailers need to be able to anticipate how a consumer will want to interact with them at any moment, and they need to be ready to service that consumer through many different channels. For example, if a consumer wants to buy a complicated piece of technical equipment, she may choose to research prices and brands online and then make the purchase in a store. Or the consumer might decide to walk into a large store to ask a real person for advice and then go home to make a purchase from an online retailer who offers a better price. Retailers recognize that the increase in retail options has led to a consumer base with very high expectations about quality, price, and selection. In addition, customer loyalty is hard for any retailer to maintain when just a little online research can help a consumer to locate new brands, find the right color or size, or a better price.

These trends in consumer behavior have helped to make an already competitive retail environment even more challenging. Although smaller stores still exist, the trend has been toward larger chains and giant multinational corporations. Many large retailers have grown even larger through multiple acquisitions across regional and geographic boundaries as they strive to expand their reach across the globe. Retailers of all sizes typically need to manage multiple channels of distribution including the store, catalog, and Web site. They need to market aggressively to

remain competitive across all these channels. In addition, to make sure that stores and warehouses are well stocked and the consumer can choose from a diverse group of products and brands, retailers need to partner with many different suppliers. This means managing large amounts of data and numerous interactions with partners and suppliers. The technology infrastructure is an important part of this equation. If a retail chain doesn't know how much inventory it has, it will be in trouble. If it can't analyze its data, it can't market itself effectively. If its point-of-sale (POS) systems are outdated, it can't be as efficient. You get the idea.

The retail company, Spotlight, turned to SOA to help revamp IT infrastructure with a goal of providing a higher quality of service to customers. Insight into its success is highlighted in this chapter.

## *Spotlight Pty Ltd*

“Legacy system spaghetti” is the phrase that Anne McDiarmid, Chief Information Officer of Spotlight Pty Ltd, uses to describe the old IT infrastructure at Spotlight Stores. Spotlight is a privately owned retail company with two brands — Spotlight Stores and Anaconda Stores. Spotlight Stores is one of Australia's largest craft, fabric, and home interiors superstores. It sells everything from craft and fabric supplies to home furnishings to party goods. Spotlight has opened 106 stores across Australia, New Zealand, Hong Kong, and Singapore. It owns 12 additional Anaconda Stores that sell outdoor supplies for camping, fishing, hiking, and even skiing. Over the past few years, the company has experienced explosive growth.

Although expansion of the business is most always a good thing, the IT infrastructure at Spotlight didn't keep pace with the rest of the company's growth. The result was that Spotlight had some real governance issues in terms of product and price. One of its biggest challenges was maintaining accurate visibility into product availability across all its stores. It lacked the infrastructure that a traditional retailer needs to support the customer at point-of-sale (POS) — on-demand information on product price, description, and availability. The company had many different systems held together with a multitude of middleware that on a diagram looked literally like spaghetti.

So, although the company had managed to be successful despite the limitations of its infrastructure, Spotlight knew it was only a

matter of time before the situation got out of control. It knew that its POS systems wouldn't support its expansion plans, and it knew that it needed to move past its home-grown enterprise resource planning (ERP) systems. Spotlight needed to upgrade its infrastructure — and quickly. The company management felt that the only way to accomplish this rapid change was to bring in outside expert help — and along with that help came SOA.

## *Step 1: The Point-of-Sale System*

Why bring in an outside team? McDiarmid's staff of 50 was so busy holding all the legacy systems together that they simply didn't have the time to stop and try to figure out how to solve the issues. In 2006, McDiarmid brought in Australia-based KAZ Group Ltd. to help. KAZ is the largest Australian-owned IT services company, with 30 years of experience under its belt and an army of about 1,500 employees. According to Vicki Redwood, a Solution Architect with KAZ, the goal was to try to establish control over Spotlight's systems while at the same time introducing change. And the time frame for change was very aggressive — less than two years to change a number of critical parts of the business process, from installing a new multilingual POS system to deploying a major ERP system and enabling online commerce and communities of interest. The final requirement was that these changes could not impact downtime in any way because Spotlight is an event-driven business.

The first step was to determine the “as-is” situation. The company had very little documentation about its systems. The KAZ team took about three months to map out the process of buying and selling to understand common processes across the company and the role of the legacy systems.

After this was done, Redwood's team got to work and developed a phased approach to providing the functionality Spotlight needed. The first part of the plan was to address the POS systems. POS systems are used by retail businesses to collect payments, track sales for analysis, and track inventory. The Spotlight system was fairly old and didn't perform all these functions well. Additionally, Spotlight was opening new stores in Hong Kong, and its system didn't support multiple languages. The plan was to implement a new POS system in Hong Kong and gradually phase out existing systems for the rest of the stores. The old system was tightly integrated with a multitude of middleware code that couldn't support the new POS system.

Spotlight implemented a new POS system by using what Redwood refers to as a *service separator layer*: a group of services on a commercial process server that sits between the POS system and the back-end legacy system. This process layer could pass information between the POS system and the back office system. It also helped to provide consistency to various retail processes. One way that consistency of retail processes was improved was by establishing an alert system to identify errors and application problems, such as checking for the use of invalid product names or numbers in the ERP system. Finally, the process server also helped to save time and improve the accuracy of the POS check-out process by allowing for failed processes to restart from the point of failure.

## ***Step 2: The ERP System and Beyond***

The next phase of the SOA plan was to swap a series of Spotlight's old home-grown systems for a commercially available ERP system. The number of home-grown systems had increased over time, and the result was multiple versions of the truth. For example, different divisions might show conflicting sales results or product or customer information. The plan was to implement an ERP system to provide a single version of the truth. Instead of implementing it as a monolithic application, the team was able to use a plug-and-play approach because of SOA. It simply implemented a series of service interfaces that talked to each module of the new system. As it brought new ERP modules live, it simply shut down the old legacy system. The process was transparent to the end user. Spotlight plans to implement a Customer Relationship Management (CRM) system in the same way.

Spotlight is also moving to bring its e-commerce system online. The team plans to build on the common processes already in place for the POS system and to tweak them a bit for this channel. It's also planning to implement a portal for a community of interest groups, such as quilters and other people interested in crafts. The portal will enable these people to work together.

## ***Choosing the Right Technology***

To deliver the required business process improvements, Spotlight needed a technology that would provide end-to-end control among a variety of business processes. This technology had to work for both the old and the new systems. Therefore, it was

necessary to develop interfaces between these systems: for example, between the legacy ERP systems and the new POS systems. In addition, the company needed interfaces between SAP software and warehouse management systems and logistics providers. Finally, the new e-commerce solution needed to work with the old ERP and legacy applications as well as the new SAP implementation.

The technology also needed to provide processing improvements in the areas of performance, robustness, growth, audit, and security. It needed to be able to mediate between different services and applications as well as comply with industry standards. Finally, it needed to provide visualization capabilities of Spotlight business processes that would be used by both business and IT. And, of course, the business couldn't be affected as new services and applications were added and old ones removed.

So, how did Spotlight meet this list of requirements? The team selected an industry standard process server. It provided the following set of capabilities for Spotlight:

- ✔ Industry standard adapters to allow POS events (old POS and new) to be initiators, participants, or recipients in a variety of business processes without change to the POS applications. Adapters provided with the process server include Web services, messaging services, and database connectivity services.
- ✔ Industry standard adapters to allow SAP and the old ERP/legacy systems to be initiators, participants, or recipients in a variety of business processes without change to the host applications. Adapters provided with the process server include SAP, Web services, messaging services, standard file, and database connectivity services.
- ✔ Service choreography facilities to allow Spotlight to plug and play, binding application snippets and services to provide an appropriate process to address business needs.
- ✔ Human workflow services included in all choreographed process flows — hand-offs to humans, alerts, notifications, and task assignments.
- ✔ Graphical depiction of the business process flows operating in the runtime environment, allowing business involvement in what the technology is actually running.
- ✔ Compliance with open standards (service standards bodies including OASIS, W3C, WSI, and IETF).

- ✔ Graphical representation, mediation, and transformation between an application-specific view of Spotlight's business and the overall Spotlight model.

This process server technology provides a simple architecture, allowing Spotlight to focus on the tasks (services) that must be done to improve its business and also to choreograph the process flows from these tasks.

## *Lessons Learned and Best Practices*

The 20-month timeline for implementing change was certainly a whirlwind for Spotlight. Based on its experience, it recommends the following:

- ✔ **Bring in the experts.** According to McDiarmid and Redwood, if you're fundamentally going to change what you do in every way, shape, and form — and you're going to fast-track it — you need to bring in experts. Spotlight brought in KAZ as it overhauled its infrastructure and a separate group of consultants with SOA skills to help fast-track its ERP implementation.
- ✔ **Know your business.** You also need to have a clear understanding of what your business is and what the business processes are. Spotlight knew its business as well as the business processes it needed to accomplish. It was able to help fast-track its implementation because it had a good handle on its processes and requirements.
- ✔ **Establish trust between IT and the business.** The teams at Spotlight realized that they were in the project together. Rapid change can happen only if both sides of the house understand the plans, the complexity of the plans, and the benefits of the approach. In this way, the two groups can better communicate and build trust.
- ✔ **Plan for a skill transfer.** In Spotlight's case, it knew that its current workforce couldn't handle maintaining its existing systems and putting a new infrastructure in place. It was too much work, and the team didn't necessarily have the skillset. However, the plan is to transition the work to the in-house staff. The Spotlight IT department knew upfront that consultants were coming in to work on the conversion, so there were no role issues.



## Chapter 7

# Telecommunications

### *In This Chapter*

- ▶ Looking at Telenor Iris's business initiative for SOA
- ▶ Understanding why telecommunications needs SOA
- ▶ Going over what's next for Telenor Iris

**T**he telecommunications industry has changed dramatically from being a virtual monopoly to a highly competitive global market. Today, telecommunications companies provide a range of products and services to support local and long distance wire-line calling, wireless, TV, Internet, and a host of other network offerings. Because competition is fierce, telecommunications product and service providers are always looking to provide their customers with value added services as a way to differentiate their offerings. Speed to market, customer service, and delivering innovative products and services are all critical to success.

In this chapter, we highlight Telenor Iris, a subsidiary of the global mobile communications provider, Telenor. Service oriented architecture became the linchpin of the company's strategy to deliver innovative products and services to customers with agility and flexibility. The company's requirements for data quality are extremely high given its focus on data aggregation services for customers. Improving data quality and overall data management was an important motivator behind Telenor Iris's decision to implement SOA.

## *Telenor Iris*

It's important to be quick and flexible when launching new products or services for customers — and that's what Telenor, the seventh-largest wireless provider in the world (with 143 million subscribers), wanted to do when it created its new Iris division. Telenor Iris, a subsidiary of Telenor, is an innovation activity within the parent

company. Telenor had been growing rapidly the last few years, expanding through emerging markets, and had reached a certain maturity level in its home market. It was looking at new areas to expand and was interested in creating managed, 'Net-centric services in particular.

The company saw an opportunity in offering managed services for organizations that want to take advantage of RFID (radio frequency identification) and other sensor technologies in their supply chain for inventory control. *RFID* is a technology that uses tiny computer chips to track items at a distance, by emitting radio waves. An example of this is tracking containers from one location to another. According to Magus Bakken, General Manager of Telenor Iris, what appeals to customers is the ability to offer an automated collection service without having to install a software stack at the customer site. To provide a managed service, the team needed to have a framework to offer a variety of services to different companies. Two critical requirements included the ability to track huge amounts of information and also to integrate with legacy systems.

## *The Enterprise Service Bus*

Iris began its SOA journey in 2007. It knew that to offer managed services to its customers, it needed to be extremely flexible because each customer would have slightly different requirements. For example, the team needed to be able to gather information from a wide variety of sensors and RFID readers. And at the back end, the team would have to integrate into a customer's ERP system or other applications that were in use. SOA provided the right framework for this.

Telenor Iris needs to be able to track items as diverse as lettuce and auto parts. For example, one customer might be interested in tracking produce. Telenor Iris collects data from many different locations — from the production plant, the trucks, the distribution center, and then out to the retailer. It then pushes the data from its location into a third-party application that allows the customer to view where the produce is, when it left the plant, and when it arrived into the retailer's store. Temperature information is tied into this so that the customer knows that the produce is being kept fresh.

A key element in the solution is the enterprise service bus (ESB). When information is transmitted from the RFID devices, it goes to a server, where it is transformed and placed in a queue to be sent

to the ESB. The ESB is the backbone of the service. It functions as a hub, directing the messages that come from the sensors. The IT system needs to have some basic information about a message to know how it should be treated. The ESB collects this information. It looks up where the messages came from and who owns the message. Then, after this information is known, the services that the message is subscribed to are called in a specific order, and information is routed to the appropriate place.

The team developed a number of services to support the offering. These include a message tracking service and a sensor store service, which stores all the messages that are gathered for logging and control purposes. There is also a billing service. On the back end, the company can integrate to its customer's ERP systems or other applications using a series of adapters.

These services are all reusable, which is very important to Telenor Iris. As a managed service, it needs to be able to scale the business efficiently. Reusable services enable Telenor to capture information from many different types of RFID readers. This allows the company to sell to a much more diverse market than if it provided integration with only specific types of RFID readers and certain ERP systems. For Telenor Iris, reusability means flexibility, and flexibility leads to growth.



Data quality is also an issue for Telenor Iris because the main service it offers is data aggregation. It needs to ensure that the right data goes to the right customer — for example, the right temperature or weight data. Also, sometimes the RFID readers provide data that isn't reasonable — like a weight that is ten times what it should be. The data needs to be reliable, and it needs to be secure.

## *Scaling the Service*

RFID generates quite a lot of traffic, and the service needs to be able to handle this high traffic load — hundreds of tags per second. The architecture has to handle the traffic in a reliable way. How is the team dealing with this?

Here's how Juan Carlos Lopez Calvet, technology manager at Iris, sees it. Because basically all the data that Telenor Iris gathers is message-based and asynchronous, it needs to take care of these messages at various layers. This means that Iris has to be able to store the messages in case the network link goes down but then

resend the messages when the link comes up and also route the messages properly. To do this, the company uses message queues and filters at different layers:

- ✔ The first filtering step is at the reader layer. An edge server, which gets the messages from the readers, provides some aggregation, depending on the customer's business logic. For example, the service reads all the tagged contents in a storage room but informs the application only about items that have been removed.
- ✔ The second layer provides the message queue that enables Iris to persist the messages in case of network failure. This means that the message is not lost if the network goes down. The plan is to have virtual copies of these queues that share the load of incoming messages. Each queue stores the messages and attempts to send them to the incoming service on the ESB.
- ✔ The final layer is the ESB that helps to dynamically route the messages and to provide load balancing at the services level.

## *What's Next?*

In addition to scaling out the service, Iris plans to allow companies to share information on specific items by using a standard interface; this will increase the visibility within the supply chain. In other words, the service will be extended so that other supply chain partners can view the status of the items being tracked. In order to do this, the team plans to implement the Electronic Product Code (EPC) Information Service, which allows them to publish and subscribe EPC data by using a standard interface defined by an organization called EPC Global. The EPC Information Service is a specification for a standard interface for accessing EPC-related information. The standard interface allows trading partners to use the same function for querying data across the supply chain.

## Chapter 8

# Energy and Utilities

### *In This Chapter*

- ▶ Looking at Delaware Electric's business initiative for SOA
- ▶ Understanding why energy and utility companies need SOA
- ▶ Recognizing lessons learned about the importance of business process

**E**nergy and utility companies are on the hot seat these days. In the old days, they were responsible for literally keeping the lights on. With increases in energy costs and increased emphasis on finding cleaner and renewable energy sources, utilities now have a much tougher task. They have to provide good service to a broad range of businesses and individuals at a reasonable cost. And it isn't easy. These companies also have to get creative in complicated times. For example, utilities have to find ways to partner with businesses and individuals to conserve energy. Energy providers also have to be able to provide good feedback so the energy consumers understand how they can adjust their energy consumption behavior to conserve energy and save on energy costs. Consumers need to understand how much energy they use at different times of day and different seasons.

What does this have to do with a service oriented architecture, you might ask? The following case study on Delaware Electric is a great example of how a utility used SOA to help break down information silos, improve business processes across the organization, and develop a technology framework to support future business requirements. The utility's technology innovations help to build partnerships that result in energy conservation.

## *Delaware Electric*

Delaware Electric is an electric cooperative that serves 80,000 customers. Its entire staff of 140 employees includes an IT staff of only 4 people. Of the more than 900 electric cooperatives in the

United States, Delaware Electric is one of the fastest growing — great news, of course, but its success hasn't always been easy.

Problem #1 occurred when the utility was deregulated. At that time, the state utility commission put a freeze on electric rates for five years, meaning that the cost of a kilowatt-hour was fixed — Delaware Electric couldn't raise the price. And in times where the cost of energy continues to rise, Delaware Electric had to do something clever to keep ahead of things. Now, electricity is a commodity like any other, and an electric cooperative's success depends on delivering that commodity in a fashion that impresses its customers. Energy costs, on the other hand, are rising steadily, which means that Delaware Electric had to find ways to cut its own costs without compromising service.

The onus of Delaware Electric's business predicament (and financial success) fell upon everyone, including its Chief Financial Officer, Gary Cripps. He was first and foremost a businessman who viewed his primary responsibility as "keeping the lights on" — not only metaphorically, as in keeping Delaware Electric solvent, but literally for all 80,000 Delaware Electric customers. He was also responsible for Delaware Electric's small IT organization and brought a business-focused perspective to the IT environment.

## *Looking to IT to Solve Business Problems*

Looking for ways to optimize, economize, and deliver better service, Cripps closely examined the various IT systems already in use at Delaware Electric. He found a lot of critical systems that didn't talk to each other. He looked around for some sort of packaged software that would solve the problems efficiently but found none. "We simply couldn't find a software package that would handle the diversity of requirements that would provide integration for all of our business needs and would provide real-time services," is how he put it.

In addition, Cripps wanted each department to be able to use the software that best fit that department's business goals — based on the best software available — and he understood that all these individual systems needed to be brought together if Delaware Electric was going to achieve the efficiencies required for a viable business.

Delaware Electric decided that SOA would help break down the barriers between various systems, allow it to leverage the critical assets it already had, and provide a framework for future requirements. As Cripps said, “The primary objective was to integrate our processes across the enterprise in order to become more member-centric.”

That undertaking ended up being no small feat. Delaware Electric had many packaged applications that were critical to running the utility. Although each of these applications performed a valuable function, each was isolated from the next. Therefore, for example, employees had no way to connect information about a service outage with information about which customers were affected. They had an interactive voice response system, but it couldn’t communicate with the system that tracked outages.

When applications can’t talk to each other, people have to fill the gaps. Employees created manual processes to move between the various business functions separated by the individual applications. Faced with the necessity of cutting cost, these complex processes were a luxury Delaware Electric could no longer afford. Ironically, even if Delaware Electric had funds to add people to solve the gaps in business process, manual processes are inefficient and prone to error and would likely have had a negative effect on customer service.

Cripps’s team members realized that they needed infrastructure software focused on integrating business processes across isolated applications. Specifically, they wanted to integrate business processes within that part of the company responsible for everything that happens *in the field* — that is, on customers’ premises. For example, they wanted to be able to compare their customer information system — including the ability to load mapping data from a geographic information system (GIS) — with information coming from the Distribution Management (Outage) System. Delaware Electric needed to be able to compare this information in real time, especially during serious outages that could affect a huge number of consumers.

## *Getting Some SOA Help*

The management at Delaware Electric understood that they didn’t have the expertise or the staff to undertake this plan. Instead, they worked with three consultants to develop a strategic plan. Working together, the team developed a customer-focused plan that

identified key business processes. They then mapped the process plan to the various applications across the organization.

To manage power outages, they had to link the customer database and the field engineering database, and they needed a way to connect these applications with the company's interactive voice response system. All these systems had to be integrated with all the processes throughout the company. Delaware Electric's management understood that they could benefit greatly from changing the focus of their IT systems to support efficient customer service, but that meant shifting the focus away from the billing system that had been the primary focus.

The consultants recommended using an enterprise service bus (ESB) as a way to link packaged applications to each other. In this first phase, Delaware Electric used Web service interfaces to hook its various packaged applications into the ESB. This phase required both the subject-matter experts within Delaware Electric and the consultants working with the package software vendors to connect these applications into the ESB. As a result, Delaware Electric's PR department can say, "We can now provide more services to our customers."

Delaware Electric completed Phase One of its journey. Its employees have integrated the outage management system with GIS and the field management system. They are currently integrating the customer information systems into the ESB. They are also in the process of installing automated meter-reading equipment and connecting that equipment into the ESB. These additional projects will require an understanding and mapping of business processes.

## *Realizing the Importance of Business Process*

After Delaware Electric worked through its initial starting point with SOA, management decided to take SOA to the next level. The focus was automating business process in the field so that the systems from accounting to engineering applications to materials management could communicate with each other from a process standpoint.

Cripps is very proud that Delaware Electric has been able to reduce the mapping backlog significantly. He explained, "We used to have 2,100 work locations in the backlog. This required follow-up and field visits, which obviously has had a significant reduction in



hours spent by employees. With the change based on business process, a lot of work is done automatically. We focus on not writing the code because we are a true believer in understanding the business process.”

Rather than just jumping into business process, Cripps’s team members took a step back. They realized that more than half the time required to get a project done was determining the right business process. In contrast, writing adapters took only 20 percent of the time. If a project would cost Delaware Electric \$200,000, as much as 80 percent of that work related to getting the business process right. Delaware Electric determined that it made the most sense to have the IT team work directly with the business to determine what the business process is today and how it could be streamlined. Cripps said, “We understand that business process is profitable from a technical view. If our organization can determine how we want to innovate with process, we can bring in coders to finish the job.”

Cripps has an interesting perspective with Delaware Electric’s journey to SOA. He explained, “I am a CFO first. It is a lot less expensive for us to optimize technology within a SOA environment than to pay expensive consultants to start from scratch each time we need to innovate and streamline processes.”

Delaware Electric has ambitious plans for using SOA for innovation in the energy field. It wants to start using SOA to affect the energy-metering side of the business. As Delaware Electric completes its goal of putting automatic meter readers in all homes and businesses (80 percent complete), it can start using its data to take action. Cripps said, “There are times when I am buying a kilowatt hour for a penny and other times when it costs a dollar. We feel we can use SOA to help inform customers, real-time, that if you curtail your energy use now, or at a specific time, you can reduce your payment to us and we save money. I can contact customers through e-mail, text messaging, and, in the future, through their meter, to encourage them to partner with us on energy savings. Successfully managing real-time business events and leveraging our data sources can save our consumers and the utility almost \$300,000 per month because of conservation and energy management. That’s big money!”

Reflecting on how Delaware Electric’s SOA plan will benefit its customers, Cripps says this:

*Imagine that you are an individual who is in the process of adding an addition to your home. You need the electric company to tell your contractor where the electric hookup is on*

*your property and you need them to come out and work with the contractor to plan for the extension of power to the addition. With the new process and the enterprise service bus in place, you will be able to call Delaware Electric and have the clerk at the call center go into the application, look up your house, view where the hookup is, and tell you when the technician is scheduled to arrive. The call center clerk will not have to know how each of these systems works; he or she will simply be able to fluidly move from one function to another. The customer gets the information they need in a timely manner, and everyone is happy.*

With the focus on customer service, the folks at Delaware Electric believe that SOA will help its customers minimize energy costs. With the new SOA environment, customers can go to the Web and view their own energy consumption. Customers can see when peak energy times occur and thus schedule major energy use (such as a printing production run) for a time when energy usage is low, thereby saving money. Cripps continues:

*If a consumer has an electrical problem, I want my call center representative to be able to determine whether there is a problem with our system or a problem within the customer's home. If we have to dispatch an expensive line-truck only to discover that the problem is unrelated, everyone loses. On the other hand, if the call center representative can verify energy is flowing at the meter, we can inform the customer that they should call their own electrician. This could save the customer many hours waiting time only to be told by the technician it's not the utility's responsibility. When the call center is able to intervene in this way, the utility saves money by not sending out expensive service resources, and the consumer has the right person fixing the right problem at the right time.*

Now, that's progress!

Delaware Electric's business problems were ripe for SOA, but it took astute management to recognize the need and opportunity. The acute problem of needing to cut costs while at the same time delivering better service led Cripps's team to take a close look at the entire company. Understanding that many of the problems stemmed from the fact that the applications in the various parts of the company "couldn't talk to each other" — and that if they could, the whole company would benefit — was key to selecting SOA. In some ways, Delaware Electric was lucky — it recognized the value of innovation and knew it didn't have the resources to tackle it on its own. Buy-in from senior management is critical to SOA success.

## Chapter 9

# Top SOA Quick Starts: Entry Points for Starting the SOA Journey

### *In This Chapter*

- ▶ Charting your business structure
- ▶ Adopting best practices with industry frameworks
- ▶ Speeding adoption of standards with industry frameworks
- ▶ Getting your team ready for the journey
- ▶ Making sure you don't go it alone

**I**f you made your way through the case studies in the previous seven chapters, then you have seen how varied the challenges and solutions can be across different companies. Hopefully, you have been able to recognize a little bit of your own company in the stories we have presented about these SOA pioneers. Now it's time to plan your journey. We have two strong caveats about what you *shouldn't* do:

- ✓ **Don't try to boil the ocean.** Don't attempt to do everything at once. Initially, prove your success with SOA by starting with a project that is small, achievable in a short time, and will have a significant impact — then build incrementally.
- ✓ **If you're business management, don't turn SOA over to the IT organization and wash your hands of it. If you are IT management, partner with business management.** For SOA to be effective, it must be done from the top down. In other words, if you really want your SOA plan to succeed, business management and IT must work together.

So, how should you approach SOA? You need a SOA plan that combines a business perspective, a technology road map, and an organizational initiative. Instead of giving you a deep, philosophical discussion on these (and other) matters, however, here are some practical guidelines for getting started with SOA.

## *Mapping Your Organization's Business Structure*

One of the biggest differences between planning for SOA and planning for any other technology initiative is that SOA planning forces you to think differently about your company, industry, and ability to innovate as well as the value of technology.

What does your company do, anyway? Are you in the retail business? If so, do you manufacture the products you sell, or do you sell products from a variety of manufacturers? Are you a financial services company? If so, do you put forth one type of offering or many? Do you have business partners who are important to your business? Are you a distribution company? If so, what makes you different from other companies in your market? And what does it actually mean to be “different” in your market? Finally, how should an innovative company act tomorrow and in ten years? Can you anticipate how you will have to compete two months from now or two years from now? Are you able to leverage your unique intellectual property to leapfrog the competition?

Start your journey by stepping back and figuring out what your company is really about and how what you are translates into the core business services that define your business. Most businesses have key factors that have made them successful over time. SOA structure requires you to think from the perspective of reuse. In order to think from that perspective, you need to figure out a way you can structure the business as a set of services. Think about how to define your own business as a set of discrete services.

The good news is that you probably don't have to start from scratch. Many vendors have done a lot of work to create maps or frameworks particular to specific kinds of companies, and those vendors are happy to help you get started. Leveraging industry best practices and standards through the use of industry frameworks can help you to speed implementation and to drive successful outcomes. Industry frameworks can help in two

important areas: 1) understanding and incorporating industry best practices and 2) adopting industry standards and compliance requirements. You probably don't want to try to tackle SOA without help.

## *Using Industry Frameworks to Adopt Industry Best Practices*

Once you begin to map your organization's business structure, you should also look for existing industry frameworks that have been created based on the best practices of other companies. There are thousands of SOA implementations in progress at companies and you can learn from their experiences. Some of these companies will follow business processes that are similar to those followed at your organization. We understand you have some unique workflows and business processes that are important to your differentiation. But there are also many processes that can be identified that will be nearly identical across different organizations in your industry.

Look for pre-integrated software components and pre-built reusable services that you can begin using right away. An industry framework can also be used to help you create a SOA roadmap to ensure a successful journey. You can expect a faster and more accurate SOA implementation because you are, in effect, learning from the mistakes of others.

Chances are that your SOA vendor can help you get started with a framework designed for companies like yours. Consultants, system integrators, and software vendors who have worked with hundreds of companies just like those presented in the previous seven chapters have codified their best practices into models or frameworks that you can leverage. Compare one of these frameworks to your own company and then modify the particulars that make your company different from the model. *Voilà!* You now have a view of your company as a set of business services. This framework helps you figure out where to start. When developing a framework specific to your company, include the following steps:

- ✓ Discover and gather business requirements.
- ✓ Research your current set of assets so you know what you have today.

- ✓ Simulate and optimize the business process of your company.
- ✓ Determine what you need to measure in order to figure out how well your business is performing.

## ***Adopting Standards Faster with Industry Frameworks***

Hopefully, we have convinced you that using industry frameworks will help keep you from reinventing the wheel as you begin your SOA implementation. Now, we'd like you to think about all those industry standards you need to pay attention to — ACORD for the Insurance industry, SWIFT for the financial services industry, ARTS for the Retail industry, and RosettaNet for commerce across industries. Vendors who offer an industry map or framework should ensure that these codified standards are supported. Working with an industry framework becomes a very pragmatic approach where standards are concerned. You can adopt standards faster while lowering the cost and overall risk of your implementation because a lot of the heavy lifting has been done for you.

## ***Picking Your Initial SOA Targets to Gain Experience and Demonstrate Success***

If you try to move your entire company to SOA overnight, you'll likely end up living your own worst nightmare. Instead, start by reviewing the business services map to identify your first target. Select a specific area where you can leverage existing software assets, turn them into services, and create a plan that demonstrates the value of the flexibility you'll gain from SOA. You don't need to start with something huge. Rather, you should start with something that is important to management so the effort will be noticed. Remember, you're proving that SOA works in your organization and has real value.

For example, we know an insurance company that chose its Claims Processing department for its first SOA implementation. It turned the method of processing a claim into a business service called (tah-dah!) Claims Processing. By making it easy to change

provider information, the company was able to add new claims providers in a few weeks rather than the 24 months it took previously. This speed allowed the company to add new partners quickly and increase revenue. In addition, the company was able to offer this flexible and rapid Claims Processing service to other companies, providing a new source of revenue for the company.

We recommend that you pick a high-profile area where you can see results quickly. Demonstrating the benefits of SOA can make business change much less painful. You might have many good choices about where to start. One company might need to create a portal or a specialized Web site that brings key business services together to meet an immediate business objective. The portal view can help create an entirely different user experience within an organization. Another company may need to provide a single view of customer data so that various departments, subsidiaries, and business partners can find creative ways to grow revenue by focusing on customer opportunities to up-sell and cross-sell. Other companies may choose to focus on getting the necessary architectural components in place to support their movement to SOA. Still others may look at the manageability of various processes. Other companies may focus on the security aspects of SOA, while others will look at issues around governance.

We could list hundreds of different options — all perfectly appropriate for a particular company or concern — but you, and you alone, know best what will have the greatest impact for your organization. Figure out what will get the biggest bang for your buck and go for it.

## Why you shouldn't wait

If you are a company CEO or high-level manager, you may be thinking this SOA stuff sounds complicated — and very new. You may think that maybe you'd be better off waiting a few years until the vendors have all the angles figured out. Our advice: *Don't wait*. Because SOA is as much a philosophy of making technology work for your business as anything else, it is a fundamental shift in the way you work. You'll need

time to find how to work across departments and turn your software assets into reusable components.

A singular advantage of SOA is that companies can get started using it in an incremental manner, identifying and building SOA components that are in support of the core business with a mind to building a SOA architecture in due time.

## *Preparing Your Organization for SOA*

No matter where you start, all roads lead to the people. SOA is about how people across organizations work together to change the way they think about the intersection of business and technology. In this regard, the organizational issues are much more important than any single technology issue. Often, departments within organizations work in isolation, and corporate structures have been designed to emphasize departmental objectives rather than cross-departmental cooperation. For SOA to succeed, organizations need a new way to think about the value of technology, one driven by a corporate-wide effort to approach technology differently.

In order to kick-start such a new approach, we recommend establishing working groups that span departments. Separating work by different parts of the organization isn't going to fly. Information can't be owned by one department: Information is a corporate asset, as are business services. Business services must be valuable across many different departments. We recommend that top management establish SOA as a corporate mandate and set up an organizational structure that encourages and fosters its development. Establishing recognition programs that reward cooperation between the IT and the business departments is a good starting point. If your company isn't at that stage, find high-profile departmental executives who can set an example. You'll need to approach different areas from different points of view.

### *IT developers need a different approach*

Most IT developers are used to writing code that lives within its own enclosed world. When an organization begins the movement to SOA, developers need to start writing software based on the assumption that the software will be used in many different circumstances. Developers who come from the old school of doing things don't necessarily see this as an intuitive approach. Part of preparing the development organization is helping them understand how the business might use the components they'll be asked to build. Developers should be teamed with business professionals across the organization to help developers change to a more global perspective. It's also important to allow time for constituents and stakeholders to arrive at a mutual understanding of project goals.



## ***Business managers need to look beyond their own departments***

Business managers tend to worry about their own department's goals and objectives as well as the metrics that they're judged on. SOA involves thinking creatively about business processes and business measurements as they affect the enterprise as a whole. To appropriately identify key business processes, you need cooperation between departments and divisions.

## ***Finding Out Why Business Partners Are Part of the SOA Success Story***

In a highly competitive business world, no company is safe without partners. SOA can play an important part in making partnerships innovative. Any company that has a SOA strategy needs to implement its strategic plan in conjunction with its business partners. Partners may need to be educated on the value of the strategy and how it will help them take advantage of the combined strengths that partnerships can create. Some forward-thinking partners may have already started their SOA journeys.

## ***Getting Help with SOA***

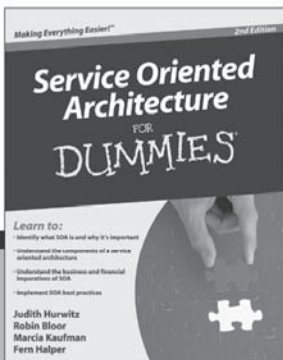
SOA is a journey, not a one-time project that a single department implements to get a quick hit or quick success. It's a corporate-wide process to leverage technology in a way that reflects key business processes, enabling business to change when needed without being constrained by technology. Therefore, don't approach SOA in isolation. Find yourself some help. Look for technology suppliers that have created successful SOA implementations for companies like yours. Admittedly, you probably won't be able to find a single vendor that can provide you with everything you need. Still, you should actively look for companies that can offer you an easy-to-implement package based on established standards that you can then add pieces to (or subtract pieces from) as your implementation matures.

Look for models of SOA success. What can you glean from companies that have already started on their SOA journeys? What would they do differently? What worked well for them? How have they managed to get their people to work together toward a common goal?

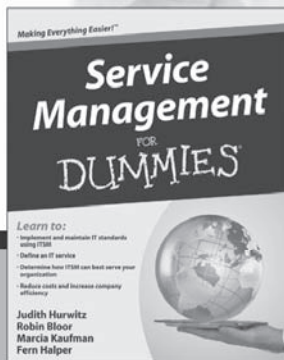
## *Setting Off to the Races*

We hope we've given you enough to whet your appetite for SOA. And we hope that understanding more about the actual experiences of companies that have already put SOA into action has provided inspiration for your journey. We believe that a service oriented architecture will be critical for any business that relies on technology to run the business. The world is changing rapidly, and SOA helps an organization keep pace. SOA can help "future-proof" a company — making it ready and able to change when change inevitably comes.

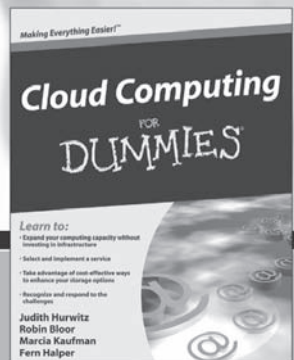
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