Service Oriented Architecture
Business Value Proposition

Customer Version 2

October 2004

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1 Explaining SOA to the Business Executive

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> *"Technology architecture is one subject guaranteed to make a chief executive eyes glaze over. For many CEOs, the topic is mysterious. Even for those who understand technology better, it is a sore subject because today IT architectures, arcane as they may be, are the biggest roadblocks most companies face when making strategic moves."[1]*

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You're a business person starting to see the phrase "Service Oriented Architecture (SOA)," more and more in the press and hearing it bantered about by your Information Technology (IT) group. Since this appears to be more than a passing thought, you ask yourself the businessperson's tried and true quadruplet.

1. What is it?
2. Why do I need it?
3. What benefits will I receive?
4. What will I give up if I don't have it?

Somewhat frustrated you then ask, "Is this the next bright idea from the IT industry? What in the world are they doing to me now?" ---- This white paper will answer these questions.

1.1 Short Answers

What is it?
From a non-technical perspective:

> *SOA is a set of business, process, organizational, governance and technical methods to reduce or eliminate frustrations with IT, quantifiably measure IT's business value and create an agile business environment for competitive advantage.*

From a slightly technical perspective:

> *SOA is a way for different computers, from different vendors, with different programs, from different functional areas of the business (or externally to customers, suppliers or vendors) to intelligently talk and exchange data with each other.*

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[1] "Flexible IT, better strategy," John Seely Brown & John Hagel III, The McKinsey Quarterly, 2003 Number 4.

Another way to look at this is from the view of a Chinese proverb:

If you don't know where you are, a map will not help.

If you don't know where you are going, any road will do.

➔ SOA is the map that will guide you down the road to competitive advantage. ⬅

Why do I need it?
The combination of SOA and Web Services is very close to being the "silver bullet" that companies have been looking for to:

1. Realize IT's long-promised potential
2. Justify IT expenses and capital outlays
3. Provide non-technical people a clear understanding of what IT does, how they do it and their intrinsic value.

From a slightly technical perspective:

Those "non-compatible" computers can now communicate without the previous technical complexity or high cost of maintenance. SOA has become today's premier method to attain business agility through the reuse of a company's current IT assets and integrated processes.

What benefits will I receive?

1. Saves money, time and people
2. Eliminates frustrations with IT
3. Justifies IT investments
4. Provides business executives with a clear understanding of what IT does and its value
5. Eliminates IT's 6-6 answer i.e., the project will take 6 months and cost 6 figures
6. Provides a business and competitive differentiator

What will I give up if I don't have it?
It is very likely that business transactions will be orders of magnitude easier with an SOA. An SOA could be the difference between the success and failure of the next:

- Department, intra-company or inter-company merger
- Acquisition
- Divestiture
- Product or service rollout
- Business partner, customer or supplier addition
- Geographical expansion
- Competitive onslaught

<u>Is this the next bright idea from the IT industry?</u>
SOAs are not a new idea – they have been around for at least a decade. SOAs have previously been implemented in proprietary (translation: expensive) ways. That means it was very difficult if not impossible for disparate computers to intelligently communicate with each other. So what's different now?

- SOAs have a long history of successful implementations. Even with their previous high costs they still provided economic value and functional flexibility within the company. The reason the term SOA has become so visible now is because a new implementation technique has arisen to make SOAs much more cost efficient and productive.

- This new technique is called Web Services. It is important because it finally breaks the proprietary barrier between vendors and software programs. Major vendors like IBM and Microsoft have agreed to standards which allow their respective hardware and software to share information and data.

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<u>Rule of Thumb</u>

There are many business and technical benefits to an SOA, but none as important as the capability for a company to respond quickly and effectively to business change and to leverage that change to competitive advantage.

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Now this may spawn another thought such as: "<u>OK that's fine, but I don't need to think about this now</u>." To that I present a summary of the legend of the death of King Richard III of England.

For the want of a nail the horseshoe was lost,
For the want of a horseshoe the horse was lost,
For the want of a horse the rider (the king) was lost,
For the want of a rider (the king) the battle was lost,
For the want of a battle the kingdom was lost.

How valuable was that nail to King Richard? If he could have anticipated the scenario would he not have given a treasure for that inexpensive nail?
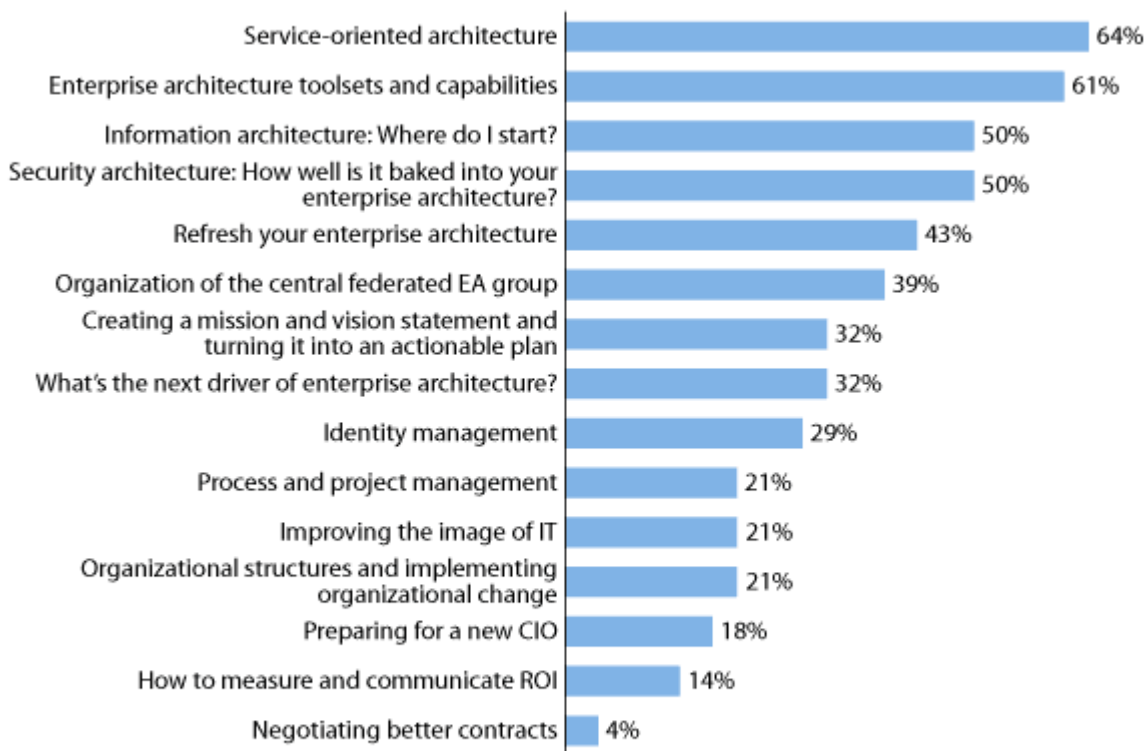
It is quite possible that an SOA is that same simple treasure for your business.

1.2 Defining SOA

Most companies today are being pressured by their customers and shareholders to drive growth by improving productivity and squeezing costs out of every aspect of the operation. But it's impossible to maximize efficiency if the company is wed to rigid, expensive and/or proprietary IT systems. In fact, the most valuable thing a company can buy itself as an organization these days is *flexibility* i.e., flexibility to meet new market demands and seize opportunities before they're lost. To increase flexibility, the company has to look at its business as a collection of interconnected functions - discrete processes and services, such as check customer credit or authenticate user - and then decide which of those functions are core or differentiating, and which can be streamlined or even outsourced. If the company can mix and match these functions at will - or on the fly, in response to changing business conditions – the company will have a tremendous competitive advantage in the marketplace. It's a powerful idea. But to achieve this degree of flexibility in the business operations, the company will need an equally flexible IT environment. It needs a **Service Oriented Architecture,** or SOA.
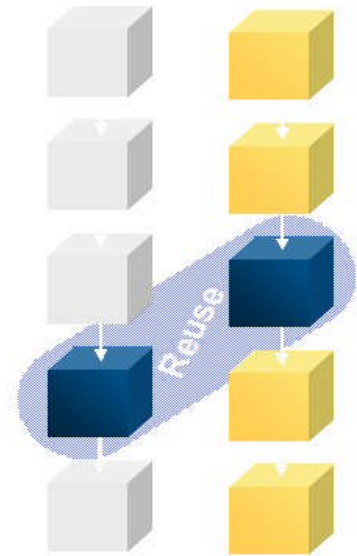
"What topics are you most interested in learning more about?"

Topic	
Service-oriented architecture	64%
Enterprise architecture toolsets and capabilities	61%
Information architecture: Where do I start?	50%
Security architecture: How well is it baked into your enterprise architecture?	50%
Refresh your enterprise architecture	43%
Organization of the central federated EA group	39%
Creating a mission and vision statement and turning it into an actionable plan	32%
What's the next driver of enterprise architecture?	32%
Identity management	29%
Process and project management	21%
Improving the image of IT	21%
Organizational structures and implementing organizational change	21%
Preparing for a new CIO	18%
How to measure and communicate ROI	14%
Negotiating better contracts	4%

Base: 28 IT decision-makers on Forrester's Enterprise Architecture Council
(multiple responses accepted)

Source: Forrester Research, Inc.

Figure 1-1[2] shows the importance that companies are giving to SOA today.

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[2] Survey by Forrester to its members of the Enterprise Architecture Council of the Forrester Oval Program, January, 2004.

An SOA is an application framework that makes it easy to reuse and combine the discrete business processes and services that make up the business. Think of it as a mosaic made up of individual functional components that can be arranged and rearranged. With an SOA the company can build, deploy and integrate applications and link heterogeneous systems and platforms together across the organization. While the SOA concept isn't new, it has yet to reach its full potential, because most applications are still integrated using custom code - hardwired, if you will - making it slow, difficult and costly to rearrange the pieces in the mosaic. What everybody's been waiting for is a way to standardize the connections between all those components so they work the same way everywhere without requiring any programming. That standardization has finally arrived in the form of Web Services.

In defining something as important to a business as SOA, there can be a tendency for discussions to take on a religious fervor. To alleviate this possibility, we present IBM's official SOA definition.

> *A Service Oriented Architecture provides the flexibility to treat elements of business processes and the underlying IT infrastructure as secure, standardized components (services) that can be reused and combined to address changing business priorities.* [3]

Common components and common information from business processes can be reused multiple times in an SOA to give the company's customer varied experiences. For example, information about a car is a static commodity, but its presentation can be dynamic based on perceived user preferences.

1.3 Simulating SOA

Service Oriented Architectures are all about connections. A good analogy to explain SOA is the connections used in audio-video (AV) systems as shown in Figure 1-2.[4] Specifically, services in a SOA are to AV components as Web services are to the connections between AV components. For example, let's take an AV system that has components that have been purchased over the years. Let's assume you want to add a DVD player to the system. The system has the usual cable box, receiver, VCR, CD player, speakers, and television set. One of the oldest components is the receiver and the DVD has connections that the receiver can not handle, such as s-video and optical connections. It does, however, have the common three RCA connections. You decide at this point to change all of the connections in the AV system to RCA connections.

These components could be connected in different ways, depending on what you want to do. For example, you could set up your cable connection to go through your VCR or split the signal so that you can watch one program and record another. It wasn't too long ago when we had monolithic hi-fi or stereo systems. Then the industry settled on the various, components in a stereo system and later video was added. What does this have to do with SOA? Well, it's all in the connections. Web Services have provided an infrastructure for creating connections not unlike those we have with AV systems. And, just like AV systems, we will be able to assemble components in all sorts of ways because of those connections.

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[3] Official IBM definition of a Services Oriented Architecture as given by the FAQ section of the Project Sonata announcement April 21, 2004
[4] "Web Services and Service Oriented Architectures, The Savvy Manager's Guide, Your Roadmap to Emerging IT" ©2003, Douglas K Barry, pp 17-19.

An SOA is essentially a collection of services. Services mirror and execute business processes. These services (business processes) communicate with each other. The communication can involve either simple data passing or it could involve two or more services coordinating some activity. Some means of connecting services to each other is needed. Those connections are Web services. (The choice of the name Web services as the connection medium for "services" is somewhat unfortunate as it generates much confusion. When you see the term, "Web services," just think "connection," or in the case of our AV example – RCA cable.)
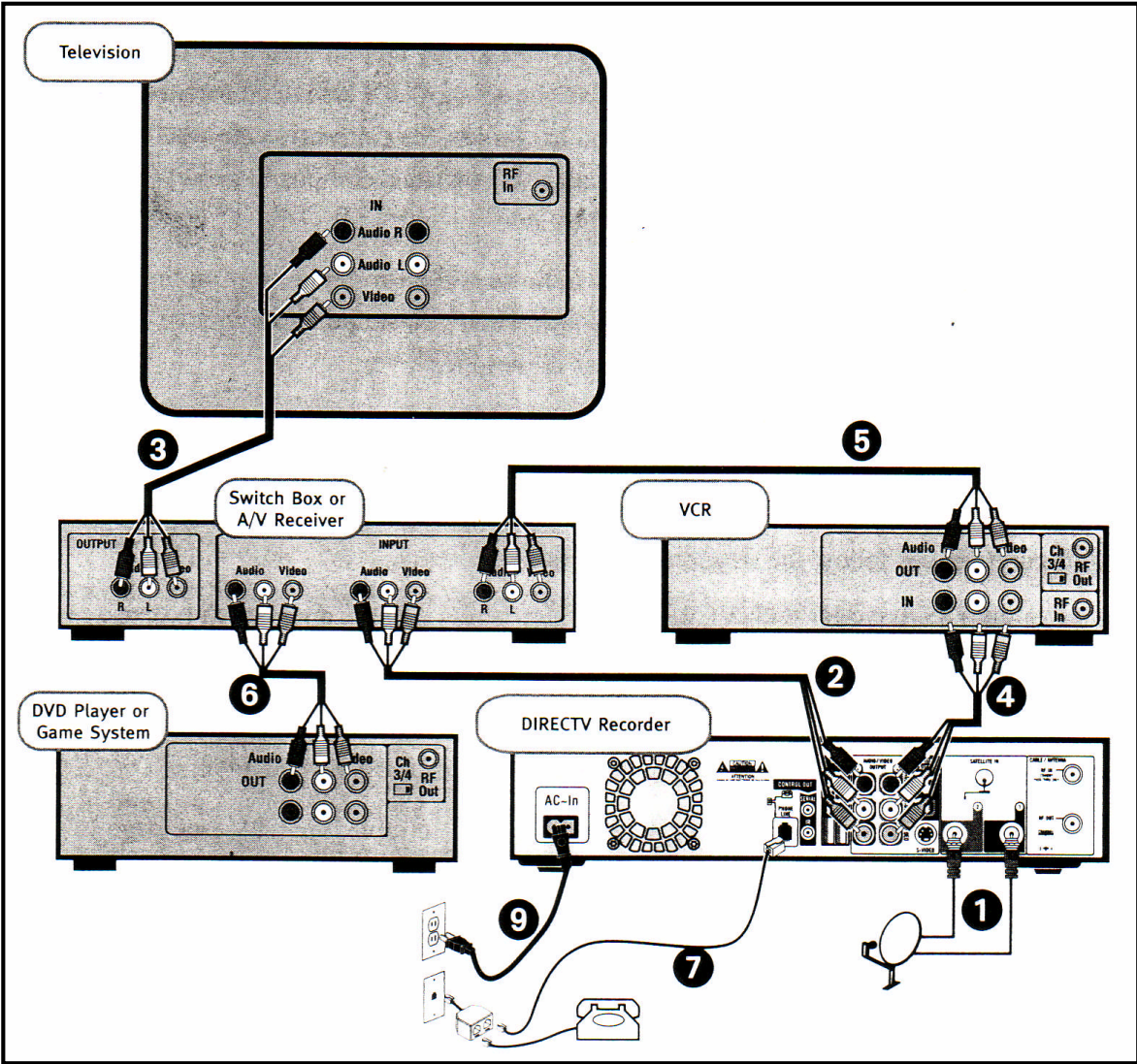

Figure 1-2 Audio-Video Analogy.

In figure 1-2, the entire picture represents the SOA. The services (business processes) are the AV components and the cables #'s 2, 3, 4, 5, 6 represent Web services (the connection mechanism).

1.4 A Scenario: The SOA-Enhanced Business Trip[5]

This section is a story of a business trip that illustrates how a service-oriented architecture and Web Services might be used in the not-too-distant future. It provides a vision of how a service-oriented architecture might work in an organization.

David is about to take a regular business trip. It involves flying to California from the Midwest-US, renting a car, and visiting several customers in different cities over 3 or 4 days. To plan his trip, David uses his browser to see all the possible customers he could visit within driving distance of his destination city.

Although there are a few customers he knows he wants to visit, he also wants to make sure he is keeping in touch with as many customers as he can. Using his browser, he selects the three customers that he must visit. David sorts the remaining customers by the number of problems reported in the previous 3 months and by the amount of business David's organization has received from these customers. Using this list, he identifies ten additional customers he might see and they are listed in order of importance according to his chosen criteria. David adds the dates he wants to leave and return and selects the **Submit** button and moves on to working on other things.

A little while later, David receives an e-mail message from his contact at one of the customers saying that dinner on Tuesday would be great, but the customer would need to meet an hour later than David suggested. David opens up his calendar on his browser and adjusts the dinner time already on his calendar and replies to the e-mail message. (You will note that David did not originally set up the dinner time; this was done for him by the software system.)

As the day progresses, David gets a few more e-mail messages and he updates his calendar accordingly. Within a few hours, he also receives information on his flights, car rental, and hotel reservations at three cities. David again opens up his calendar on his browser just to check that everything looks okay. The arrangements are fine and he confirms the plans. At this point, his manager receives basic information about David's trip along with notes on her calendar about when, he departs and returns. David's spouse also receives updates to her calendar that include the departure and return trips along with the hotels where David will be staying and hotel phone numbers inserted in the appropriate days. This is something she likes to have handy when David is traveling.

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[5] "Web Services and Service Oriented Architectures, The Savvy Manager's Guide, Your Roadmap to Emerging IT" ©2003, Douglas K Barry, pp 5-8.
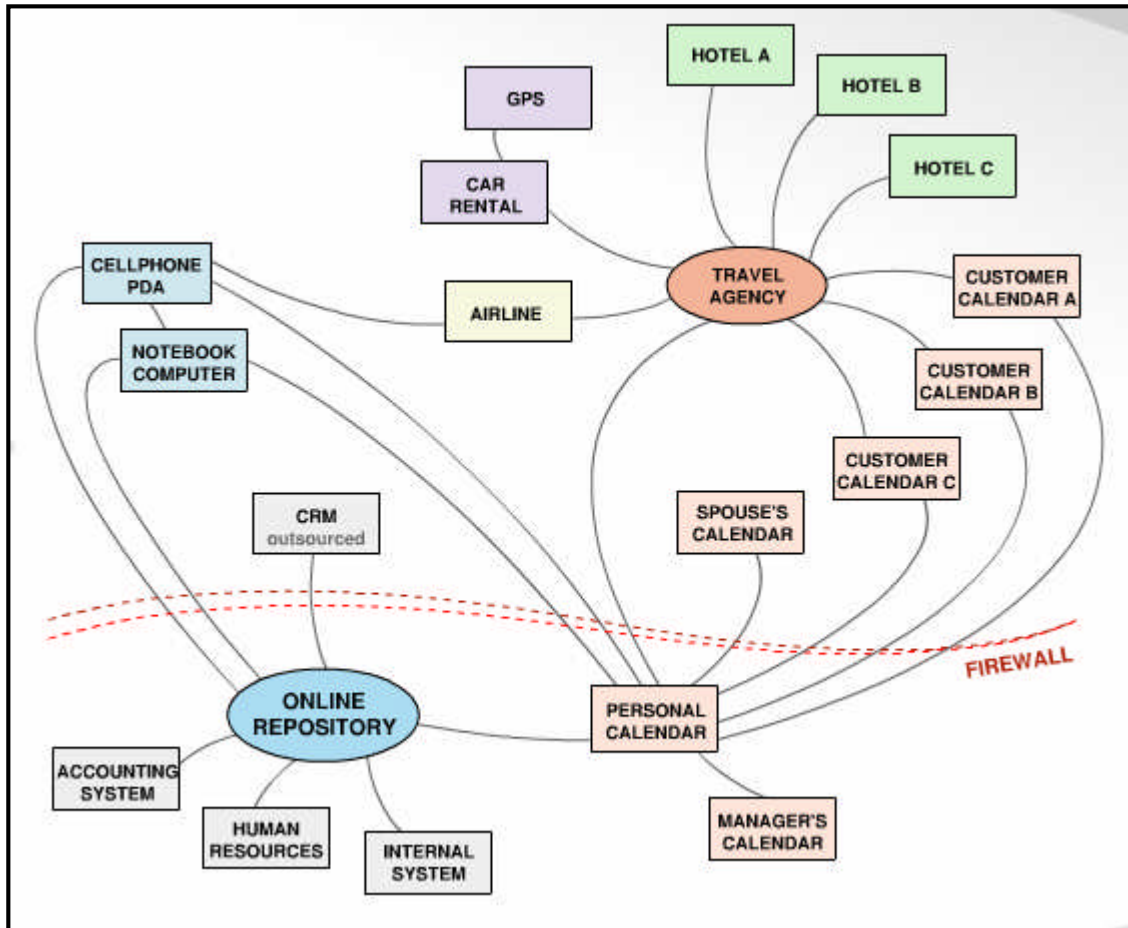
Figure 1-3 A Business Trip Scenario using Services and SOA for Business Collaboration

The day before his trip, David downloads what he needs to his cellular telephone/palmtop computer. This includes the itinerary showing his flights, car reservation, hotel reservations, hotel contact information, details on each customer, a summary of all contacts David's organization has had with each customer, driving instructions from each stop along the way, and maps. David prints out the driving instructions and maps. He likes to have paper copies just in case his rental car does not have a Global Positioning System (GPS) driving assistant or the GPS doesn't work properly. David thinks it's always nice to have a paper map and driving instructions.

When David arrives at his destination airport, he is pleased to see that his rental car has the GPS assistant that his car rental profile requests. He starts the car, and the GPS assistant is already programmed for his first destination that day-one of the customer sites. David's organization recently switched to this car rental company because they offered this feature. It beats having to punch in destination addresses every time. In this story, it was relatively recently that rental companies agreed on the data and the names to use when describing the data used to transmit itineraries for GPS assistants. David's organization switched to the new rental company because of this feature, because the new company provided almost the same rates as their previous ear rental company.

On his way to his first customer visit, David receives an instant text message on his cellular telephone indicating that someone at this customer just reported a significant problem with one of the products from David's organization. This is good to know before going into his first meeting. While in the customer's parking lot before the meeting, David calls the representative who is working on the problem for any additional information before heading into his meeting. David was able to address his customer's concerns on the spot.

Back out at the parking lot, David sees that he has another instant message telling him that his itinerary has changed on the third day and that he should check his calendar. He takes out his palmtop and logs onto his online calendar, downloading what he needs. He sees that the last customer he wanted to see has canceled (an e-mail message explains why) and that two different customers were added to his trip. This change also necessitated changing hotels. Thankfully, David's spouse and manager also received the updates to their calendars automatically. The hotel reservations have been changed appropriately, too. When David started his car the following morning, the updated itinerary was also downloaded to his car's GPS assistant.

Late that night, David was looking over the customer visits for the next day and saw something puzzling in the summary of contacts for one of the customers. For some reason, the same problem appeared to be reported multiple times. He used the monitor and keyboard in his hotel room to get more information on this contact from the online repository that contained all contact information for his organization.

As David meets with customers, he makes notes on his palmtop about each of the meetings. At intervals, his palmtop transmits that meeting contact information and it is added to all the other contact information for each of the customers.

By now, you have probably noticed that David's organization has very current and detailed information on every customer contact. They found that in their industry, this makes a big difference in how well the employees can help their customers. It also identifies any need that the customer may have for additional products or services. This customer information comes from multiple sources, both internal and external to David's organization.

On the last day of his trip, David receives an instant message in the morning that his flight that afternoon has been cancelled, but that the airline has arranged an alternate flight that will leave an hour later. David's calendars were updated to reflect the new arrival time that evening. David also used his palmtop to check any last minute flight change-, with his airline.

A lot of technology is involved behind the scenes in this story. Also, there obviously needs to be agreements and standards among organizations to make this level of data interchange possible. This technology and the standards make it possible for David to be "connected" on his business trip.

1.5 SOA Value Roadmap

A recent survey of Fortune 500 companies indicated that over 80% had altered their business model in a given two-year period. Two thirds of these - roughly half of the total respondents - claimed that this business change had been constrained by inflexible IT. In a survey by IBM Business Consulting Services, 90% of CEOs expect to transform their enterprise to become more responsive, particularly to customer demand, within the next five years. More than half expect to be engaged in significant company-wide transformation initiatives within two years.

A key part of many organizations' transformation program is to reorganize information resources as substantially independent, reusable services that create an inherently adaptable environment. Common practice however is that enterprises often take the easy way out - addressing a smaller set of objectives because it seems too difficult to do the job properly.   Many organizations are now undertaking development of SOAs, but the probability is that most will result in sub-optimal implementation because the relationship to the business requirements is not fully understood and the value proposition not fully communicated. Consequently business management may not see nor realize the value of the SOA.

1.5.1 Enlightening a Business Person to SOA

One of on demand's pivotal success factors is the close interaction between the IT group and the business units. Since SOA is the cornerstone of on demand, this partnership is an absolute necessity for a successful SOA implementation.

Currently in many firms, IT functions as an order taker for the business. Business people, envisioning some business improvement, make a request for IT to build a new solution. IT, understanding technology, proceeds to build what the business asks for. Both sides stay within their own domains with a wall between them over which the business throws projects to IT. The two sides may talk about the perceived benefits of the new system, but no one follows up on it and IT's business understanding is too shallow for collaborative development of the business process. IT has long talked about alignment and partnership with the business but, with limited ability to talk in business terms, IT has been largely unsuccessful in having strategic impact on the business. A company can experiment with a few Web Services applications and they no doubt will be successful, but the real competitive advantage will come when Web Services is married to a full implementation of SOA. Therefore, it is imperative that some way is found to get IT and the business units fully cooperating and that each group is fully respectful of the other.

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Rule of Thumb

If a peer business relationship between IT and the business units cannot be forged, SOA cannot be successful.

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=➔ Start SOA Here – Educating business people on the many business benefits inherent in an SOA is the first step in solidifying an active working covenant between IT and the business units. This relationship is the foundation which all else in SOA (translation: business agility) is built.

1.5.2 Realigning IT Around Services[6]

In starting to pursue a business goal of making the company more responsive to change, the firm needs to represent business interactions as services or components i.e., increments of business functionality performed by the firm's IT applications. Services that can be reused again and again form the basis for an agile business. A company may approach business agility tactically i.e., focusing narrowly on Web services for particular business connections. But services provide the catalyst for a much higher level vision of business value - the responsive, optimized business - where business and IT react quickly to changing business conditions and achieve an ongoing stream of business process optimization. The strategic approach goes beyond Web services connections to partners and it uses SOA to build flexibility end-to-end across internal and external application connections. Incremental business services become the core IT deliverable, enabling IT to more often deliver value on the time scales and increments of business change. *Since services align with business process steps, they can be changed incrementally as processes change, so IT becomes less of a drag on business change*.

Rule of Thumb

In an agile business, incremental business services - mirroring business process steps - become IT's core deliverable.

An aggressive approach to services i.e., a strategic approach, will deeply restructure and realign IT around service design and delivery. In other words, IT becomes a service-oriented business unit. From planning and requirements through project scoping, design, creation, deployment, and governance, IT's work will revolve around service definitions.

1.5.3 Requiring an IT / Business Unit Dialogue[6]

The IT/business unit engaged relationship and the incremental delivery of business process via services enable compound growth of business improvement benefits, one improvement building on another. This combination can produce some powerful results.

- *Faster response to customer priorities and shifting markets*. As competition, customer demand, and regulatory change shift the market and drive change to business processes, a firm with a mature inventory of services is able to more quickly reconfigure its applications to incorporate new and changed business requirements, since there is a high likelihood that a needed service is already available.

- *Faster delivery of business change, both internal and external.*   Besides customer and market-driven changes, services also speed up internally-driven change.

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[6] "The Big Strategic Impact of Organic Business and Service-Oriented Architecture," Randy Heffner, Forrester, June 17, 2004.

- *Higher end-to-end process value.*   When IT responds quickly to internal and external change, the business is encouraged to continually pursue process optimization. When a firm continually adds one process improvement on top of another, the cumulative impact can be huge i.e., lower cost, faster cycle time, and better business results.

- *Reduced cost of change*.   Besides handling change faster with services, IT can also deliver changes at lower cost, which further encourages the business to pursue continual process optimization.

The dialog between business units and IT will be concentrated on the business services IT will deliver, how users will access them, and the measured improvements in business process results that executives can expect.

Rule of Thumb

Business-smart IT architects are the bridge between IT and the company's business units.

Rule of Thumb

Within a business process, each interaction with an IT asset is a potential place for a service.

Rule of Thumb

A service that mirrors (and executes) a business process, can be used to allocate IT costs and provide IT justification by correlating the IT costs with business process results.

1.5.4 Aligning IT with Business via Processes and Metrics[6]

Building on their characteristic of modeling the business, services foster a change in the relationship dynamics between business and IT. IT has long talked about alignment and partnership with the business but, with limited ability to talk in business terms, IT has been largely unsuccessful in having strategic impact on the business. With a strategic approach to services, IT has a chance to change this because:

- *Business happens via business processes*. A simple but important starting point is to recognize that every firm puts business strategy into action at a business process level. Through either well-defined, measured processes, like a manufacturing production line, or uncontrolled, ad hoc processes, like a special project to brainstorm new market opportunities, business processes are the way things get done.

- *Business processes tie to business measurements.* Critical business metrics reflect either the operation of a business process or the results of a process. They measure the cost and cycle time of a process, such as the work effort, resources, and elapsed time required converting a lead into a closed sale, or they measure what the process produces, such as total or average sales. Furthermore, metrics tie to steps in a business process, as in the number of cold calls that turn into prospects or the total sales coming out of the last step in the sales process.

- *Business process steps are delivered via IT applications.* IT delivers all of its solutions - any application, any infrastructure element - to meet the needs of one or more business processes. Specifically, there are places within any business process where process steps interact with IT assets to capture, transform, or report business data. As with processes, it may be structured, defined data, like a new order, or unstructured, ad hoc data, like an email. These interactions are the moments where IT value is delivered to the business.

- *Business process steps align with business services.* Within a business process, each interaction with an IT asset is a potential place for a service. If the interface between the process step and the IT asset is framed in terms of the purpose of the process step, and if the interface is open to being invoked through multiple interaction channels (Web application, desktop application, Web services, interactive voice response, etc.), the IT asset is a business service. Because a business service directly serves the purpose of a process step, it is, in effect, a digital representation of the process step. Furthermore, a service provides important flexibility for a process step because, no matter how the interaction channel of the step may change, the service maintains consistent operation of the process step through its encapsulation of the relevant business rules.

- *Business services create a digital model of the business.* Because individual services model process steps, as you build up an inventory of services, you are building a digital model of your business. This is powerful for two reasons.

  1. As the business changes i.e., as you create new process steps and optimize existing steps by changing who does what when, many of the underlying services are stable and only the method of access needs to change. Likewise, many new business initiatives will highly leverage the existing inventory of services.

  2. The digital model provides a structure to collect, examine, and align business and IT metrics. The pattern, volume, and content of interactions flowing through your services offers insight for measurement of business process efficiency and results. In addition, services provide a place to allocate IT development, infrastructure, and management costs, providing for additional correlation between IT costs and business process results.

IT needs new skills to accomplish the transformation to service-oriented IT. IT cannot expect to insert pure techies and geeks into business discussions and gain any stronger connection with the business. Neither will IT make the connection with a project manager determined to nail down dates and scope and commitments. Creating a partnership with the business requires a quick study who can win business trust by showing keen insight into business issues and clear advocacy for the business. It takes a focused combination of business knowledge, creative thinking, relationship skills, and technology savvy to build and sustain a business partnership. A company may have to look outside for such skills and of course, that's where IBM can be of assistance. Many IT groups have staff that are capable of such relationships yet are constrained by an environment that focuses strictly on IT delivery. Making services the driver of business IT alignment and partnership unleashes their potential by allowing them to put business processes and services at the center of both business design and IT delivery.

Rule of Thumb

Companies committed to SOA will find business processes and services at the center of both business design and IT delivery.

Rule of Thumb

A company's SOA gives IT a definitive way to prove business value through business results measurements.

1.5.5 Gluing it Together – Service Oriented Architecture

Service Oriented Architecture is the technical foundation underneath service-oriented IT. Services provide the incremental building blocks around which business flexibility revolves, but services need a supporting architecture for their deployment, delivery, and management. With an SOA, as the business changes, you implement many changes by configuration within the SOA rather than by changing application code. You use data gathered by the SOA to monitor service operation, gain insight into the related business process, and guide and control decisions on where, when, and how to change - providing both IT-level and business-level control. The applications used by your customers, suppliers, and internal users leverage the SOA's broad connectivity to many access channels to employ services where and when they are needed and with the quality of service required.

Business process competency is critical for SOA. IT must increasingly drive toward, design for, and deliver to business processes. If this can be accomplished then SOA will identify IT projects, applications, infrastructure, and costs with the business processes they support. Key ways to infuse in IT a business process mindset are:

1. Do a business architecture

2. Instill a focus on business processes

3. Identify IT leaders to lead process transformation dialogues with the business units

4. Raise the visibility of every project's process value

5. Develop business smart IT architects

=➔ **End of the Beginning of Implementing SOA** – An IT organization is SOA based when it has the following characteristics:

1. It thinks of its role as delivering two primary categories of value: business services and access channels for services.

2. It pursues service-based design in all its delivery efforts. As opposed to thinking that services are a part time thing, used only in certain situations for certain application connections.

3. It designs nearly all functions as services. Since IT can't predict how the business will change and how it will need to reconfigure services, IT needs to be ready for whatever the business requires and processes executed as services gives it the most flexibility

4. It defines all of its tasks around services.

Rule of Thumb

When a change in business process no longer requires a change to application programming logic (successful SOA), your company has attained competitive business agility.
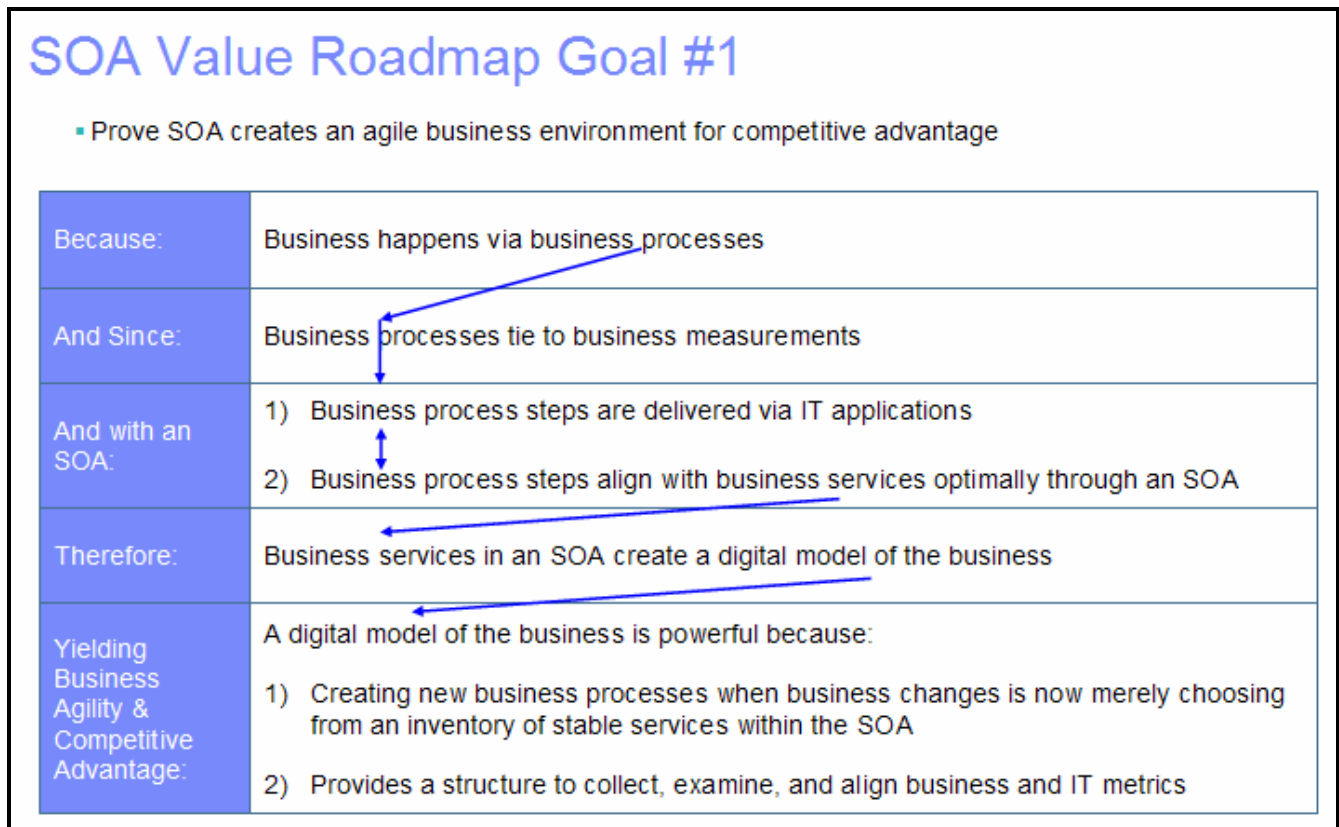

1.5.6 Summarizing SOA Value Roadmap

SOA Value Roadmap Goal #1

- Prove SOA creates an agile business environment for competitive advantage

Because:	Business happens via business processes
And Since:	Business processes tie to business measurements
And with an SOA:	1) Business process steps are delivered via IT applications 2) Business process steps align with business services optimally through an SOA
Therefore:	Business services in an SOA create a digital model of the business
Yielding Business Agility & Competitive Advantage:	A digital model of the business is powerful because: 1) Creating new business processes when business changes is now merely choosing from an inventory of stable services within the SOA 2) Provides a structure to collect, examine, and align business and IT metrics

Figure 1-4

SOA Value Roadmap Goal #2

- Show SOA can reduce or eliminate frustrations with IT and provide a way to quantifiably measure IT business value

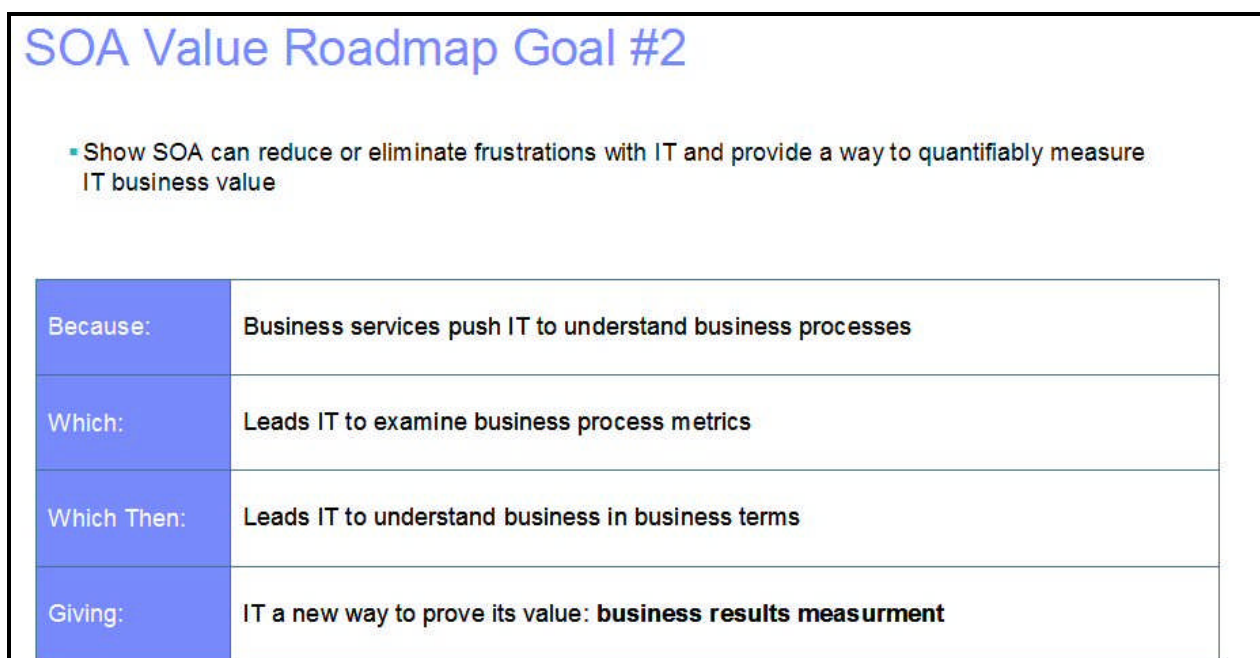| Because:	Business services push IT to understand business processes
Which:	Leads IT to examine business process metrics
Which Then:	Leads IT to understand business in business terms
Giving:	IT a new way to prove its value: **business results measurment**

Figure 1-5

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1.6 Is IBM Committed to SOA?

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In 2004, IBM will spend over a Billion dollars on Web services, SOA and Enterprise Service Bus initiatives.

Over 50,000 developers in 164 countries are actively working on Web Services applications through IBM's Speed Start for Developers program.

IBM has 35,000 industry-oriented consultants with experience and expertise in SOA and Web Services.

Three (3) Web Services Centers of Excellence leverage IBM's deep industry knowledge.

Note: This represents a significant expending of resources. Also the fact that all of our software is being componentized is indicative of how important these models are to the future of IBM.

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The IBM BT/CIO Office has developed a Web Services and SOA strategy for implementation across all of IBM.
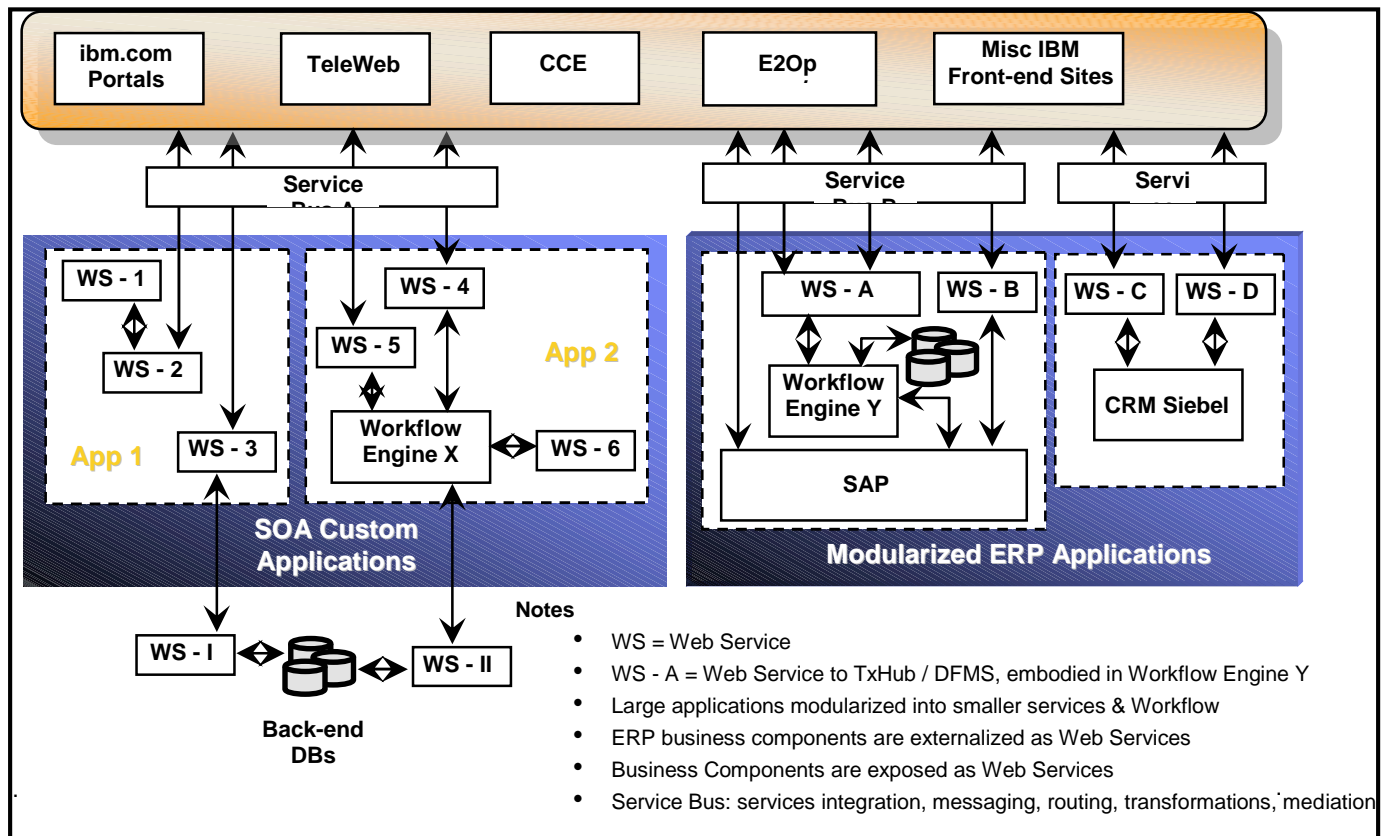

Figure 1-6 shows an IBM SOA environment with Web Services and workflow.

The IBM corporate strategy includes:
- o Accelerate and optimize Web Services deployments through:
- o Encourage reuse
- o Follow industry standards
- o Promote interoperability and consistency
- o Enhance operational efficiencies
- o Prepare for emerging Web Services technologies
- o Integrate into Enterprise Component Business Architecture via SOA
- o Advance Web Services foundation technologies
- o Implement a set of strategic enterprise-wide Web Services initiatives
- o Drive activities through Web Services Guidance Council

IBM is using what we are selling.

It's really quite simple. Without SOA, On Demand is not possible.

2   Business Value of Service Oriented Architectures

Why do some companies survive and others fail?

Corporations are built on the assumption of continuity; their focus is on operations. Capital markets are built on the assumption of *dis-continuity;* their focus is on creation and destruction. The market encourages rapid and extensive creation, and hence greater wealth-building. It is less tolerant than the corporation is of long-term underperformance. Some of the key reasons for failure are; not moving to higher value markets, inability to address more technologically advanced competition, or competition from lower cost sources.

Consider this. In 1917 US Steel lead the Forbes list and employed 268,000 people (see Figure 2.1). Now it is down to about 21,000 employees. In the same year there were eight other steel makers on the top 100 list and 33 other companies in the business of extracting things out of the earth. About 45% of the list was made up of such resource producers.

Figure 2.1

Today, sixty one of these companies no longer exist (i.e. a 61% extinction rate). Some of the key companies that have survived to the present are six oil companies, two automakers (Ford & GM) along with AT&T, Citicorp, DuPont, General Electric, Kodak, Procter & Gamble and Sears.

In 1987 US Steel was still on the list of the 100 most valuable companies but was beginning a gradual decline. One by one, over a period of many years, the other natural resource companies slipped off the list - change was powerful but slow. Examination of the S&P 500 presents a similar story. Of the five hundred companies originally making up the S&P 500 in 1957, only seventy-four remained on the list through 1997 (i.e., an 85% reduction rate). It is interesting to note that such drivers still exist today, however the rate of change has increased. In other words, companies are going out of business at a faster rate.

> *How will companies survive over the long term?*
>
> The answer is in continuous business transformation.
>
> *How can companies effectively execute a business plan incorporating continuous business transformation?*
>
> The answer is by the company becoming as agile as possible, both in business process and IT implementation.
>
> *How can companies achieve the greatest business agility?*
>
> The answer is Service Oriented Architecture (SOA).

2.1 SOA & Web Services Synergy

It would be easy to conclude that the move to Service Orientation really commenced with Web Services about four years ago. However, Web Services were merely a step along a much longer road. What's important to recognize is that Web Services are part of the wider picture that is SOA. In fact Web Services are not a mandatory component of an SOA, although increasingly they will become so. Many companies use the terms SOA and Web Services interchangeably. While technically inaccurate, if a company is looking to attain business agility in order to transform their business to stay competitive, then the two (SOA & Web Services) are inexorably entwined. Another premise is that SOA is new technology – this is not correct. An SOA is a previously proven architectural schema that has been reinvigorated by a new set of technologies that implement it – namely, Web Services. While you can have an SOA without using Web Services or deploy Web Services without the umbrella of an SOA, implementing the two together is far more beneficial that each is individually. In many respects, it's not worth looking at one without the other.

This synergy between SOA and Web Services is highlighted by the following quotes.

_____

"Organizations that have implemented a services oriented architecture will use web services to get more reuse out of the integration already built and be primarily focused on testing the standards and measuring how much they can additionally save in reuse and maintenance.

Those companies that have not implemented a services oriented architecture will be looking to use web services to consolidate systems, build lightweight applications to solve integrated channel management solutions and test standards. From experimenting with web services, those organizations will see the benefits of reuse and move to an SOA to provide business flexibility and lower their cost of ongoing maintenance. The results for both will be the same: web services will enable organizations to migrate to service oriented architectures. It's only a matter of time." [7]

_____

"85% of the firms we surveyed plan on using Web services, up from 71% a year ago (August 2002)… Only 3% of firms stated that they are unlikely to adopt any new Web services." [8]

_____

"Incremental evolution where Web services are leveraged to realize the benefits of low-cost integration and service-oriented architecture (SOA) is what companies have embraced… All of our recent surveys show that the clear majority of those surveyed have adopted the technology. As a result, Web services will become more than just a check-off item for enterprises when evaluating vendor products: Enterprise architects will prefer products that are based on SOA and designed using service-based design." **[9]**

_____

"WS have begun to become mainstream, and the impact of the technology is beginning to be felt outside the world of traditional platforms, developers and integrators – into the world of business, business applications and deployment. The emergence of service-oriented business applications (SOBAs) is driving this. SOBAs can be transformations of existing applications, new applications, and suites of applications or composite groups of applications that incorporate a service-oriented architecture (SOA)-centric design through modular, open and composite-based structures. Thus far, the success of WS has driven the emergence of SOBAs, which will have a significant business impact." [10]

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[7] "Business Value of Web Services," ©2003 CommerceNet, pp. 44-45

[8] "Web Services Reach the Big Time," Forrester Research, September 11, 2003

[9] "Market Overview 2004: Web Services Solutions," Giga Information Group, December 22, 2003
http://w3-3.ibm.com/software/analyst/articles/giga/gigawebsol.html

[10] "Magic Quadrant for WS Major Vendor Influence, 3Q03," Gartner, September 15, 2003.
http://w3-3.ibm.com/software/analyst/articles/gartner/garvendorflumq

"Web services have become the most important technology enabler for SOA. Web services are only one way to implement an SOA, but it is certainly the most important of the several choices." [11]

_____

"Enterprises are under pressure to reduce the cost of applications and to shorten the time it takes to develop or modify applications. This drives increased interest in reusing data and code through service-oriented architecture and Web services." [12]

_____

"Through 2012, Web services will be in production in virtually all Global 2000 organizations. By 2005, Web services standardization will expand in scope to encompass the entire software environment and life cycle, from infrastructure (grid standards) to business process semantic standards, including some development/life-cycle and tool standards, to system and service management standards. Applications of service-oriented architectures using these standards will grow rapidly during 2004-2007." [13]

_____

By year-end 2005

Enterprises will deploy Web Services management platforms in 65% or more of major Web Services implementations (0.7 probability). [14]

_____

By year-end 2006

More than 70% of new applications will use Web Services in some part of their architecture (0.8 probability). [14]

Web Services standards and technologies will influence more than 60% of the $527 billion IT professional services market (0.7 probability). [14]

Note: This represents a CAGR of 7.6% since 2002

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[11] "Market Overview 2004: Web Services Solutions," Giga Information Group, December 22, 2003   http://w3-3.ibm.com/software/analyst/articles/giga/gigawebsol.html

[12] "Client Issues for Application Integration," Gartner, November 13, 2003.
http://w3-3.ibm.com/software/analyst/articles/gartner/garissueclients.html

[13] "Integration & Development Strategies 2004/05 META Trends," META Group Research, January 27, 2004 http://www.metagroup.com requires creating a free ID/password. Then search for document.

[14] "Predicts 2004: Web Services Drive Market Convergence," Gartner, November 4, 2003. For a copy of the document, contact the Information Center at 914-642-6577 (t/l 224), or send an email to MACONSLT@US.IBM.COM
http://w3.marketiq.ibm.com/tmarketiq.nsf/MiscDoc/Information+Center

By year-end 2007

IT professional services will account for more than 50% of the revenue of large enterprise application software vendors, creating a convergence of the software and IT professional services markets (0.7 probability). [14]

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By year-end 2008

Services-oriented development of applications plus SOBAs (Services Oriented Business Application) will enable Type A enterprises to increase programmer productivity by more than 100% (0.8 probability). [14]

"SOA and Web services will be implemented together in more than 75% of new SOA or Web services projects (0.7 probability)." [15]

"SOA will be a prevailing software engineering practice, ending the 40-year domination of monolithic software architecture (0.7 probability)." [15]

"75% of SI projects will use SOBAs in place of traditional enterprise application software (0.8 probability)" [16]

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From the statements above it becomes apparent that in order to justify SOA, we need to consider the justification of Web Services at the same time. Therefore, we will highlight SOA benefits with a Web Services flair.

Rule of Thumb

For the foreseeable future, do not implement SOA or Web Services without the other.

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[15] "Service-Oriented Architecture: Mainstream Straight Ahead," Gartner, April 16, 2003. http://knowledgegate.bitpipe.com/data/proxy?id=1050667244_527

[16] "Service-Oriented Architectures Alter IT Services Market," Gartner, February 3, 2004. http://w3-3.ibm.com/software/analyst/articles/gartner/garaltersoa.html

2.2 Why Industry Needs SOA

Technology innovation fuels economic growth across developed nations, having helped generate productivity gains for the past nine years. IT investments account for about 48% of all US productivity gains and 41% of Japan's economic expansion since 1995.[17] Firms face an innovation "double whammy." While demand for technology-enabled innovation explodes, companies' ability to meet that demand declines. Forrester believes to meet the pressures from customers, competition, and regulations, leading companies are replacing their rigid and restrictive approach to innovation. These firms are adopting a fluid market ecosystem that matches global demand for innovation with worldwide supply. Forrester calls this dynamic market structure "Innovation Networks" in which:

> *Firms seamlessly weave internally and externally available invention and innovation services to optimize the profitability of their products, services, and business models.*

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[17] The US Department of Commerce reports that US productivity grew 2.7% per year from 1995 through 2000, and 3.8% since 2001. And in 2003, Professor Dale W. Jorgenson at Harvard University and Professor Kazuyuki Motohashi at the University of Tokyo found that IT investments accounted for 41% of Japan's economic growth in the '90s.
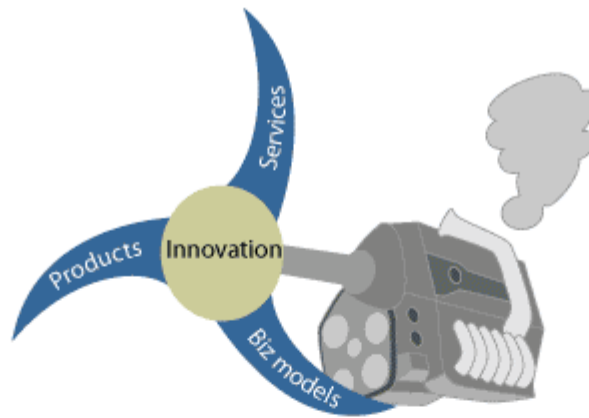
Stifling factor	Impact on product innovation	Impact on service innovation	Impact on business model innovation
One-way customer relationships	Blue-sky inventions substitute instinct for consumer insight — and fail miserably at launch.	Unheeded insights from channel partners and customer support result in lost revenue opportunities.	Rivals exploit customer intimacy to get buy-in for disruptive inventions — obliterating existing business models.
Ivory-towered R&D	Reinvention of the wheel and trial-and-error development hamper discovery and exploitation of original ideas.	Failure to deploy innovative services opens the door for competitors and pure-play providers to gain revenue and market share.	Process-based business model innovation outstrips many product and service inventions for business impact.
Organizational silos	Clumsy knowledge transfer between R&D, sourcing, production, and sales hampers time-to-market.	Product-centric business units fail to exploit cross-unit synergies to invent new product/service "bundles."	"Customer-focused" innovation strategy fails due to misaligned incentives and incongruent goals across divisions.
Risk-averse top management	"Not invented here" mentality prevents experimentation with externally sourced ideas.	Sales and marketing reject breakthrough service innovations that risk cannibalizing existing, still-profitable offerings.	Wall Street-fearing CEOs avoid expensive, "long-shot" inventions with limited short-term revenue potential.
Unskilled partners	Captive suppliers can't rapidly upgrade their assets and skills to meet their customers' innovation requirements.	Dedicated channel partners are unfit to sell and service radically new inventions in new markets.	Competitors outinnovate by plugging talented new suppliers and distributors into their value chain.
Limited pools of local talent	US firms can't find the skills needed to invent — while Japan, Europe, and China outpace the US in creating new Ph.D.s in science and engineering.	Industrial OEMs in Western countries will struggle to extend their product life cycles with value-added services given their aging manufacturing workforce.	US DoD will struggle to implement its Network-Centric-Warfare vision given the paucity of electronics and software talent in its US supply base.

Source: Forrester Research, Inc.

Figure 2-2[18]

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[18] "Innovation Networks," Navi Radjou, Forrester, June 17, 2004.

In Figure 2-2 the "engine of innovation" is stalled. This metaphor accurately depicts the competitive posture of many companies today as their business models and services can't keep up with the pace of change. The "stifling factors" from the table above are producing revenue-robbing issues *(Alarm Phrases)* common among companies right now. SOA can provide real answers *(➔ Solution SOA)* to these vexing problems. The discussion below highlights these issues and provides the areas of SOA that directly address them.

- *One-way customer relationships yield market-irrelevant inventions*. Obsessed with time-to-market, firms fail to capture customer requirements or test market ideas as they evolve - getting the wrong products or services to market fast. For instance, only 31% of firms in European services sector seek customer input when inventing new products.[19] The Alarm Phrases tell us these companies do not have good relationships or connections with their partners and that they lack any kind of agility. Other than face-to-face meetings, SOA is the best way to alleviate these issues.

  Alarm Phrases ➔ Solution SOA
  - o Unheeded insights from channel partners (Extensibility)
  - o Rivals exploit customer intimacy to get buy-in (Loosely Coupled)
  - o Obliterating existing business models (Agility)

- *Ivory-towered R&D labs dampen the rate of invention.* R&D shops' have a tendency to reinvent the wheel and their focus on perfection over practicality sometimes slows their productivity and dampens the innovation quality. For example, 90% of new chemical formulas never make it out of R&D labs.[20] The Alarm Phrases here indicate that SOA reuse of stable services is needed for productivity and to allow business model changes when company leadership changes strategic direction (preferable) or when competition forces it (undesirable).

  Alarm Phrases ➔ Solution SOA
  - o Reinvention of the wheel (Reuse)
  - o Process-based business model innovation outstrips many product and service inventions for business impact (Extensibility)

- *Organizational silos prevent collaborative idea generation.* The cross-pollination of ideas to produce integrated solutions and exploit new markets runs into resistance from organizationally siloed business processes that fail to span product units or divisions. For example, only 35% of multinationals have a central coordination body that formulates innovation strategies to cut through business unit boundaries.[21]

  Alarm Phrases ➔ Solution SOA
  - o Clumsy knowledge transfer (Loosely Coupled)
  - o Product-centric business units fail to exploit cross-unit synergies (Loosely Coupled)

- *Risk-averse top management eschews radical innovation.* Business unit execs avoid disruptive innovations they see as threats to existing product or service lines and business models. And Wall Street's

  Alarm Phrases ➔ Solution SOA
  - o "Not invented here" (Reuse)
  - o Reject breakthrough service innovations (Extensibility)

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[19] The European Union's third round of Community Innovation Surveys (CIS3) provides this information on the sources used by European industrial and service companies in their innovation activities. Source: http://europa.eu.int/comm/eurostat/Public/datashop/print-product/EN?catalogue=Eurostat&product=KS-NS-04-005-__-NEN&mode=download.

[20] Nine out of 10 ideas never make it out of R&D labs, and one-third of launched products eventually fail. See the January 2001, Report "Custom Chemicals Materialize."

[21] Multinationals lack a formal and consistent invention-to-innovation process that cuts across all their global units. Source: Kathryn Troy, "Making Innovation Work: From Strategy to Practice," The Conference Board, April 2004.

short-term revenue expectations drive risk-averse CEOs to deny funding for innovation initiatives that pay off only in the long term or that target non-core markets.

- *Unskilled partners fail to keep pace with innovation.* Suppliers' input and channel partners' selling abilities play primary roles in innovation success. But these value chain partners become bottlenecks instead when they fail to keep up.

Alarm Phrases ➔ Solution SOA
o Competitors out-innovate by plugging talented new suppliers and distributors into their value chain (Loosely Coupled)

- *Limited pools of local talent slow the innovation cycles.* The focus on local, internal talent no longer works. In 1999, the US granted only 61,000 bachelor's degrees in engineering compared with 103,000 in Japan, 134,000 in Europe, and nearly 200,000 in China.[22]

Alarm Phrases ➔ Solution SOA
o US firms can't find the skills needed to invent (Loosely Coupled, Reuse, Extensibility)

The need for businesses to adapt quickly and establish tight integration with their business partners demands a level of IT responsiveness and integration that adoption of an SOA can provide.   We will examine the banking industry but many other industries suffer from the same basics problems described here.

The corporate tendency "to just make it work" has often spawned infrastructures with many applications (and departments) that work separately of each other as independent 'silos. To interconnect these applications and departments, the organization often creates so many separate links across each unit that they look more like a bowl of spaghetti than a structured enterprise-wide system. Untangling this mess causes a "lack of agility" that seriously impacts the firm's ability to grow and compete.

Business realities (see Figure 2-3) are driving each industry's standardization of services that is mirrored and nourished by complementary developments in IT technology. As advances in IT technology make further industry segmentation possible, affordable and common place, industry reconstruction will accelerate. At an enterprise level, industry reconstruction eventually leads to an inspection of the current business model and its components.

Having gained this level of understanding, enterprises can start to prioritize and act on the business and technology opportunities and challenges confronting them. Successful companies typically adopt a portfolio approach, comprised of initiatives that exercise one or more levers of shareholder value:

- Revenue growth opportunities challenged by the inability of existing systems to cope with new circumstances.

- Reducing costs and shifting those costs from fixed to variable. This is doubly challenging when duplicate 'silo' organizations are not best-of-breed from a business or technology perspective.

- Increasing return on invested capital by divesting in non-core capabilities and revitalizing core assets.

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[22] The US accounted 7% of the 868,000 bachelor's-level engineering degrees granted worldwide. Source: National Science Foundation's "Science and Engineering Indicators 2002."
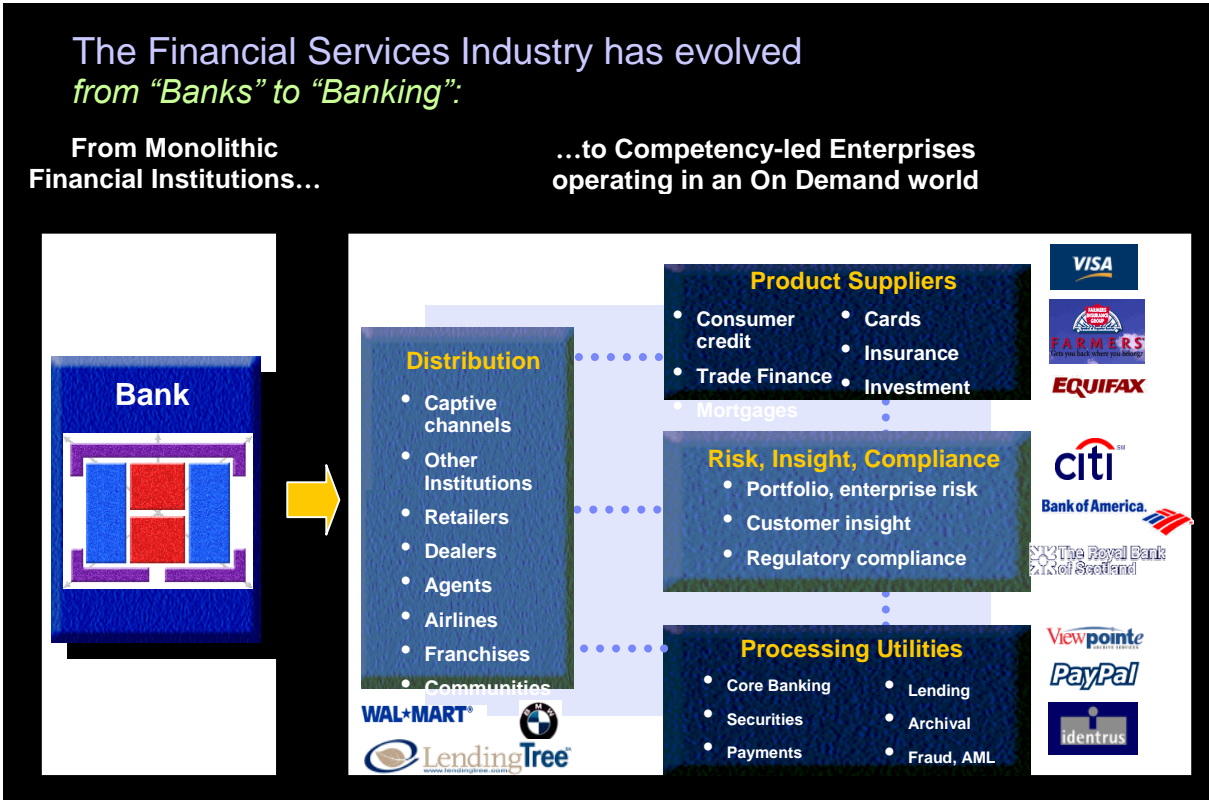
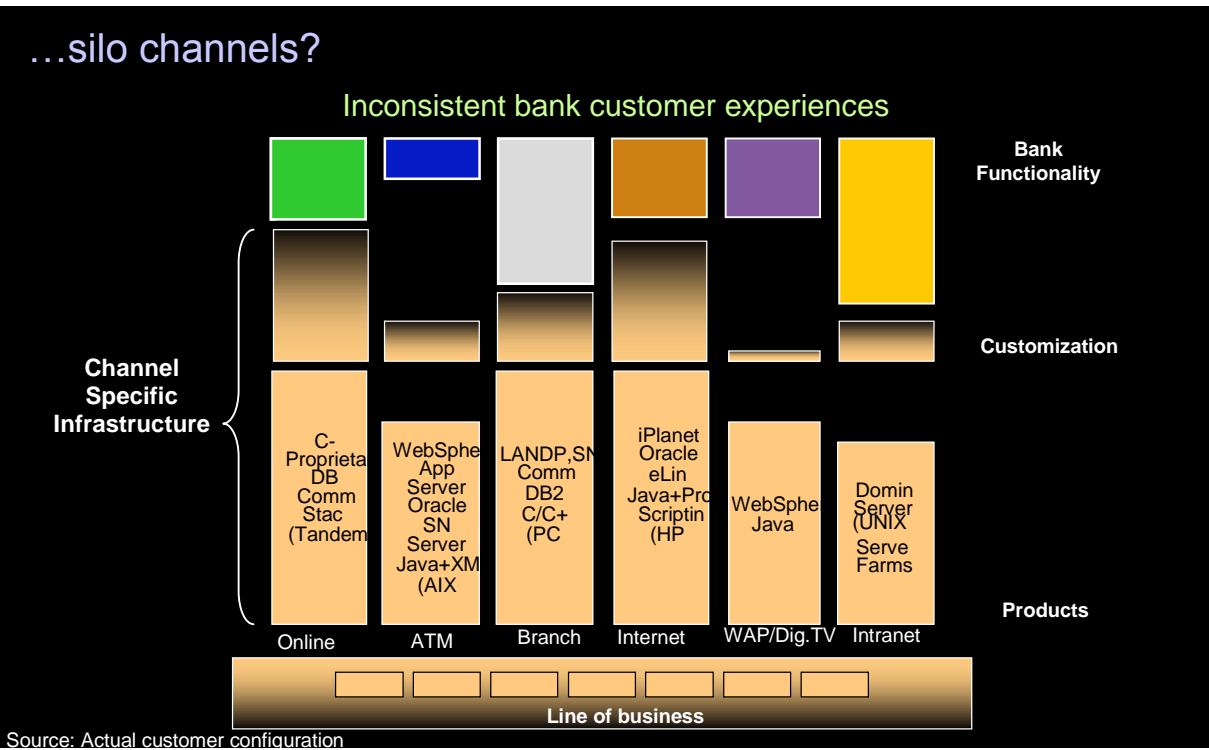Figure 2-3 Evolution of the Financial Services Industry

Figure 2-4 Silo-ed Channels = Multi-Channel ROI Possibilities

Enterprises have added new distribution channels (see Figure 2-4) as new enabling technologies emerged. In banking this is exemplified by the 80's trend of online branch offices and the Web commerce sites of the late 90's. These were built one at a time with the best technologies available. With 20-20 hindsight it would have been preferable if there had been an executable business model and IT strategy that tied them together. However, these silos show us where obvious cost savings can be achieved by normalizing the technologies while adding significant improvements in the customer experience.

These benefits flow directly from the reuse of services and components in the context of a shared services oriented infrastructure (see Figure 2-5). From a development perspective, the shared services oriented architecture translates into an entirely new set of dynamics and economics for how 'applications' are built and maintained.
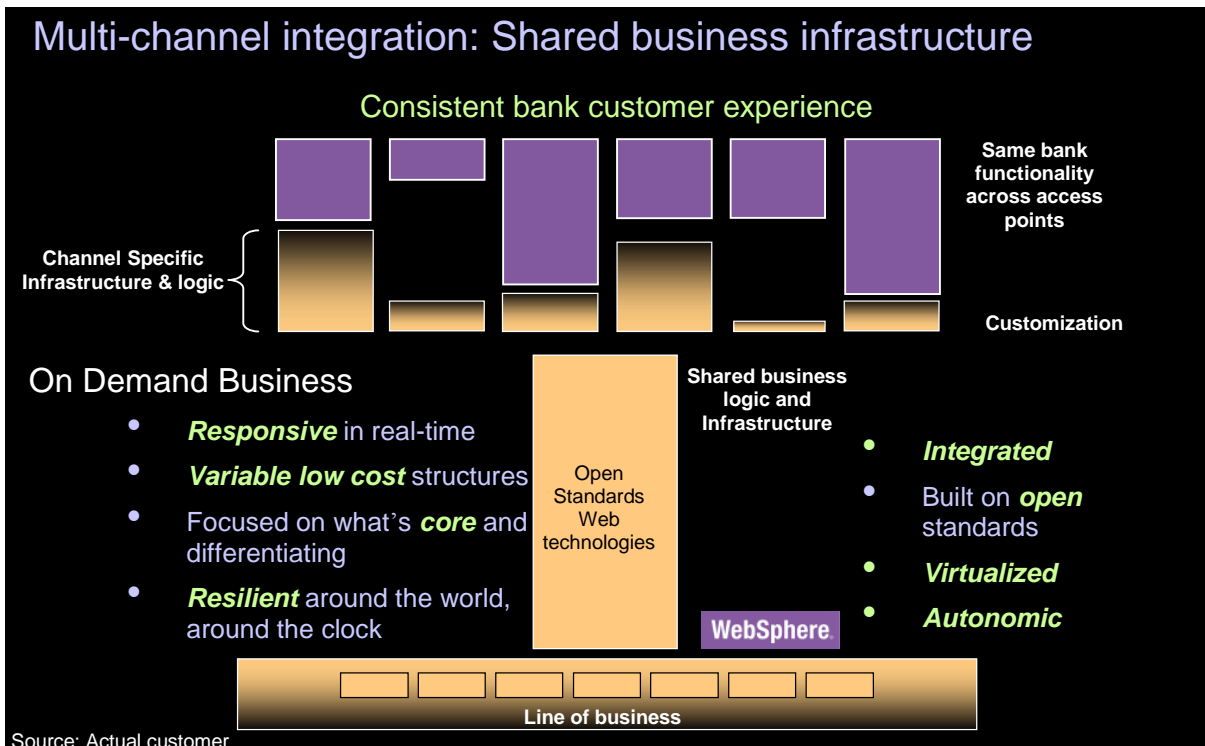

Figure 2-5 Multi-Channel Integration: Shared Business Infrastructure

Once the infrastructure has been installed and customized to fit the non-functional requirements of the enterprise, business functions may be added one at a time, any time and in a well-disciplined manner. (see Figure 2-6).
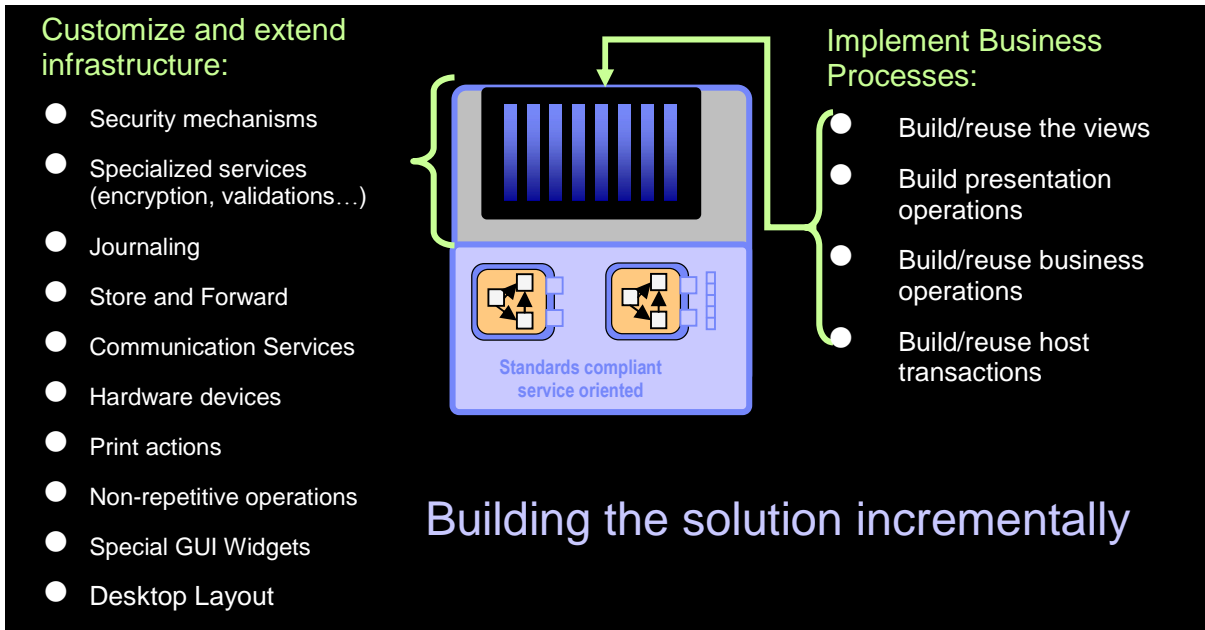
Figure 2-6 Building Incremental Solutions

Since these business functions are built on a shared set of services (SOA implementation), the effort to develop new business functions becomes progressively less. Customers have seen cost and time savings from this development model starting at 10-20% and accelerating to 80%.

2.3 Starting Towards Business Agility

While volatility and the drive for ever-higher productivity are now part of the permanent landscape, it is clear that growth is on the customer's agenda again. A survey of more than 500 CEOs, conducted by IBM's Institute for Business Value over the last six months of 2003, illustrates this shift. Leaders are positioning their organizations for a more dynamic economic cycle.

- Growth is back on the CEO agenda - eight in ten view growth as a key focus area

- CEOs are concerned that their companies are not agile enough - eight in 10 rate "rapid response" as a high or very high priority

- CEOs view product and service innovation as a top priority - nearly two-thirds view products/service improvement as one of the greatest opportunities for revenue growth

- CEOs seek company-wide transformation with a short time horizon - more than 9 in 10 believe they need to achieve their transformation goals in less than 5 years; nearly half think they need to do so in less than two years

IT plays a key role in business transformation as it implements many of the changes a business needs to stay competitive. The more quickly IT can change in reaction to business needs, the faster business transformation can occur. Sam Palmisano, IBM Chairman and CEO, has stated:

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

This dictum describes what an IT organization needs to do to support business transformation. As the business transforms, the IT systems implementing transformations have to be agile enough to change quickly and cost effectively while still performing current business function. Consequently, there needs to be a deliberate and well conceived path to take the company from the as-is state to the to-be goal.

2.3.1 First Step = Componentization

Two major areas IT needs to balance and maximize are business applications and their operating environment. Business applications are the services created or purchased that directly apply to an organization's business functions, for example:

- Customer Relationship Management (CRM)
- Supply Chain Management (SCM)
- Human Resources etc.

The Operating environment is the set of services provided by the underlying IT infrastructure that business applications utilize, for example:

- Operating systems
- Databases
- Networks

For a business to meet the challenge of quick and cost effective business transformations, IT must respond with incredible agility. IT agility can only be attained if IT has given itself the maximum amount of options to solve a problem or business challenge. "Flexible options" are not an inherent quality in legacy applications or dated infrastructures. These huge monolithic systems can be injected with new versatility by breaking them down into more "manageable pieces." These "pieces" can then be reused rather than constantly creating new code to use the required function (see Figure 2-7). These "manageable pieces" are really services or components that are combined and recombined over and over again to form new business processes that efficaciously respond to changing business requirements. Process integration events such as acquisitions, mergers, divestitures and company reorganizations become orders of magnitude easier.

When we build applications, some architecture is always required. But what is the scope of that architecture? This depends on the scope of the solution. Architecture is not just about the finished article, but how the pieces fit together. The larger the structure, the more we need to focus on the interfaces and how the pieces fit together, rather than the pieces themselves.
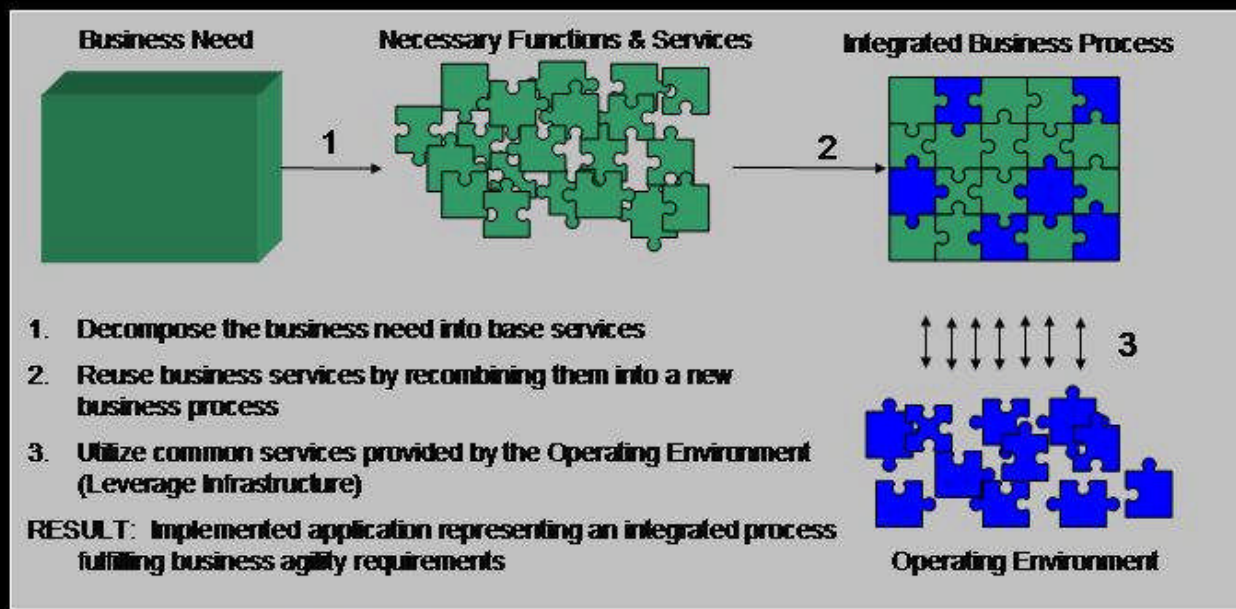
Figure 2-7

What then are the benefits to breaking down these business needs into services?

- *Componentization* – allows the containment of complexity by abstracting it out into interconnected services

- *Reuse* – use of common services, thereby not having to create them again for different environments or platforms

- *Encapsulation* – hides implementation details while exposing well-defined interfaces

- *Decoupling* – makes the new integrated process a new service in itself which is callable by other services

- *Quality* – implementing services in one place by people skilled in that area

2.3.2 Second Step = Integration

As the state of modern IT Architecture evolves, IT organizations find themselves managing large numbers of "legacy" applications developed with different architectures, different products and on different platforms. The most pressing challenge today is to integrate it all. In fact, most CIO's rate integration as the most important challenge facing them today.
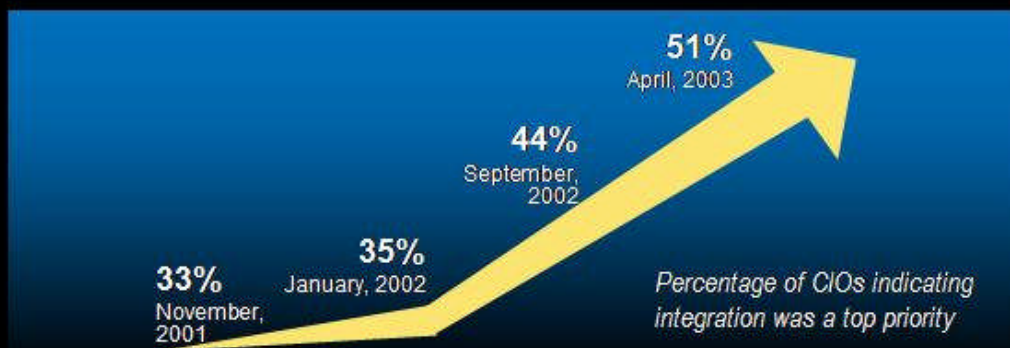
36

Figure 2-8

Conceptually, integration is very simple. In practice, it can become very complex unless there has been a clear "separation of function" defined in the Enterprise Architecture. These "separation of functions" are how the component services are bound in scope. Services, decomposed to the right level, will provide the foundation for effective integration.

Most IT organizations find there is clear justification for application and data integration. So the question becomes, "how do we do it?" According to a Morgan Stanley, only one percent of CIO's have actually completed an integration project. It is a daunting task, to be sure. Most enterprises have decade's worth of data, applications and various "roll your own" integration frameworks. The task of tying it all together must be done in an evolutionary manner so that business value can be reaped early (important for business justification) and so that existing business processes are not affected. Lastly, it must be done dynamically so changes in the business can be accommodated.

A strong enterprise architecture is a prerequisite to building an effective business integration architecture. That is, a well-designed enterprise architecture, with "separation of functions" enforced, will define the foundational services necessary to effectively integrate data and applications as appropriate for your business needs, and the means for communicating between the services. An SOA is today's best practice for building a flexible, extendable enterprise architecture that provides a foundation for incrementally replacing functionality without impacting existing application users.

2.4 Achieving Business Agility: SOA's Competitive Differentiator

SOA & Web services have the potential to free up money within an organization, by driving down integration costs, reducing expensive functionality duplication, and providing new revenue streams from existing functionality or data. Company data and processes can now be the basis for a competitive differentiator and new product or service offerings. In the past, companies wanted to unlock the value of tangible assets by spinning them off. The same can now be done with non-strategic Web service competencies. For instance, new subscription or pay-per-use business models are now possible. Even a project to study the possibility of using an SOA can be of great help to an enterprise because it can aid in:

- Determining the company's core competencies

- Identifying an outsourcing strategy

- Defining a plan to reduce complexity (i.e. cost) of the company's shared IT infrastructure needs with its trading partner community

Change comes in many forms: in the marketplace, in technology, in the world at large. Companies that make effective use of a changing environment compete more effectively and thrive in any business climate. They are particularly adept in tough economic times, often finding opportunities in the midst of chaos.

Information technology is at the center of business agility discussions. Achieving agility begins with removing the bottlenecks that impede it, and IT is usually where the bottlenecks are. In fact, companies are so used to the fact that IT creates a bottleneck within their organization that technology and its limitations often drive business decisions. To meet the needs of the agile enterprise, then, an SOA has the following core principles:

- *The business drives the services and the services drive the technology* - In essence, services act as a layer of abstraction between the business and the technology. From the business perspective, the services represent the available software functionality, so that the line-of-business can focus on business goals, not systems and applications.

- *Business agility is **the** fundamental business requirement* - The ability to respond to changing requirements is the new "meta-requirement" for business. The entire architecture, from the hardware on up, must support the business agility requirement. Any bottleneck in an SOA implementation can substantially reduce the flexibility of the entire IT environment, and hence the business as well.

- *A successful SOA is always changing* – To visualize how an SOA is supposed to work, it is better to think of a living organism rather than the "building a house" metaphor that gave software architecture its name. An IT environment is undergoing constant change, and as a result, the work of the service oriented architect is never done. House-building assumes a state of completion and the ability to craft a design that will hold firm over time. For the architect used to building houses, tending a living organism requires a new way of thinking.[23]

Agility will be enhanced as services are used to remove the constraints of a static IT infrastructure, creating greater flexibility for strategic planning. Over time the world of large, monolithic software

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[23] "Growing an agile Service-Oriented Architecture," Zapthink, September 2003.

installations may well be replaced by *just-in-time* systems implementation, where business applications are implemented using Web services from a portfolio of internally and externally published services.[24]

An SOA provides business agility in three ways: *loose coupling*, *reuse*, and *extensibility*.

2.4.1 Business Agility SOA Catalyst: Loosely Coupled

Loosely-coupled services are ones that no longer require the same technological implementation at each end of the connection. A simple mechanism connects applications regardless of the devices they use or their location.

Business Benefit	IT Benefit
Enables real-time business capabilities	Lowers the cost of connection
Changes the way IT costs are distributed	Reduces complexity of integration
Increases the feasibility of real-time, remote access to original source of information which then provides up-to-the-minute information to the process that called it	Delivers platform and technology independence. No longer will the business need to select a specific platform, in order to integrate with established systems
Leads to a better dialogue between the CIO and line of business executives by forcing IT workers to think in terms of business, and not exclusively the technical, architecture	IT agility is improved by deploying smaller, standards-based business applications only as they are needed and avoiding large, monolithic software applications that often are not fully utilized
Integration projects are driven by business needs rather than technological possibilities	Support for multiple client types
By exposing and sharing information across once-siloed applications/departments, companies can extract more business performance data in real time, improving business intelligence	Building loosely-coupled services enforces a discipline on developers because they can't make assumptions about the system on the other end because they don't control both ends as they once did
Improves time to market as connections to partners and customers can be made faster, even dynamically	Change IT architect's attitude from, "If you've seen one project, you've only seen one project." to "If you've seen one project, then the results may be used in another project."
Makes it easier for partners to do business with your company	Higher availability
Makes it easier for customers to find you and your services	Reduces development effort as consumption of service is largely automated
Makes it easier to find new partners and services	Reduced impact of change
Digital dashboards can provide clear visibility into operating data for executive review	Services can be consumed dynamically without developer intervention
Enables less technical business people (e.g. a business analyst) to "assemble" software	Eliminates need to rip and replace

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[24] "Executive's Guide to Web Services," ©2003, Eric A. Marks & Mark J. Werrell, p. 90.

solutions without the need for coding	
An SOA backbone allows costs to be reported very granularity. Departments can be held more accountable.	Simplified middleware
	Facilitates grid computing. If services are on separate machines in different locations, the workload is being distributed
	Allows for IT governance model that balances centralization with the uncontrolled client-funded approaches
	Better testing with fewer defects
	Enabler for process modeling and automation at an enterprise level
	Data is distributed not duplicated
	Much lower cost of maintenance
	Easily incorporate new technologies into SOA, reducing risk and expense while speeding development of new applications
	Better concurrent development
	Decreased implementation time
	Response to changes can be automated
	Not locked into proprietary technology

Table 2-1 Loosely Coupled Benefits of an SOA[25]

2.4.2 Business Agility SOA Catalyst: Reuse

Reuse is one of the most significant advantages of an SOA. The reuse of software, hardware, processes, code, services and infrastructure provides some of the most measurable factors for an SOA ROI calculation. See "ROI for SOA" section later in this document.

Dr. Jeffrey S. Poulin is a recognized and much quoted authority on software reuse. His book, *Measuring Software Reuse*, is a watershed work in this area. In his presentation entitled, *Selling Software Reuse to Management*, he states;

> *"We believe in "truth in metrics." Realistic and honest assumptions combined with a simple, easy to understand business model provide all the necessary evidence to sell reuse to management.*
>
> *Our model starts by asking "how much effort could you save by reusing something rather than writing it yourself?" The answers might span a wide range, usually from 50-100%, and depend heavily on factors such as the environment and type of application. Based on a plethora of hard data we find a reasonable savings due to reuse to lie right around 80% (allowing 20% effort*

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[25] Excerpts follow from "Web Services Roadmap," CBDI, September 22, 2003, pp. 33-39,   http://w3-3.ibm.com/software/analyst/articles/images/interactlogo.gif

for locating, understanding. and integrating the reused components). At an industry average cost to develop new software at around $100 per line, a Development Cost voidance of 80% will get management's attention every time."[26]

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"Organizations A review of early case studies indicates that organizations that use a service-oriented architecture (SOA) can reduce integration project development and maintenance costs by 30% or more. These savings are made possible by the increased effectiveness of component reuse that SOA enables."[27]

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Business Benefit	IT Benefit
Processes are more consistent	Eliminates need to rip and replace
Increased quality through competition on implementation	Reduced cost through commoditization
A wide choice of suppliers	Cost savings through consolidation
Hardware, software, data and process assets are all reusable	Use industry standard protocols with universal support
Reduced impact of change	Broad applicability reduces the number of protocols, tools, skills, etc. required
Focus is on business processes rather than technical implementation	Consistent approach in all scenarios
Decreased cost of business integration	Common infrastructure can be leveraged across all scenarios – e.g. security
System change is not a constraint on business change	With fewer application interfaces, maintenance is greatly reduced
With an SOA backbone, applications and infrastructure can be viewed as a portfolio of assets	Infrastructure managers can begin to realize incremental value of reuse while offering tangible incentive for developers to begin to use services in their own applications
SOAs new flexibility is an asset for innovation not a constraint on change.	Leverages the Internet and other existing transport mechanisms (whether in-house or external) for low cost communications
Publish once, consume many times	Code is mobile

Table 2-2 Reuse Benefits of an SOA[28]

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[26] "Selling Software Reuse to Management," Jeffrey S. Poulin, 5th International Conference on Software Reuse. http://home.stny.rr.com/jeffreypoulin/Papers/JCIT98/sellingreuse.html

[27] "Integration in a Service-Oriented World," Ken Vollmer & Mike Galpin, Forrester, July 6, 2004

[28] Excerpts follow from "Web Services Roadmap," CBDI, September 22, 2003, pp. 33-39, http://w3-3.ibm.com/software/analyst/articles/images/interactlogo.gif

2.4.3 Business Agility SOA Catalyst: Extensibility

Extensibility is defined by Webster's as "the ability to enlarge scope or operation." One of the primary business benefits of SOA is the ability to easily expand internal operations with new functions and to easily access organizations outside the enterprise.

Over the years the interaction with trading partners has gone thru a few iterations. The goals of B2B have changed from reduced transaction costs to improved process efficiencies to finally the SOA world of connection ease.

Traditional EDI or B2B   Marketplace Architecture   SOA Approach

Integrate point to point   Integrate once to the hub   Integrate once to the Network
                                Subscribe to limited services   Publish service to others
                                                                   Subscribe to others
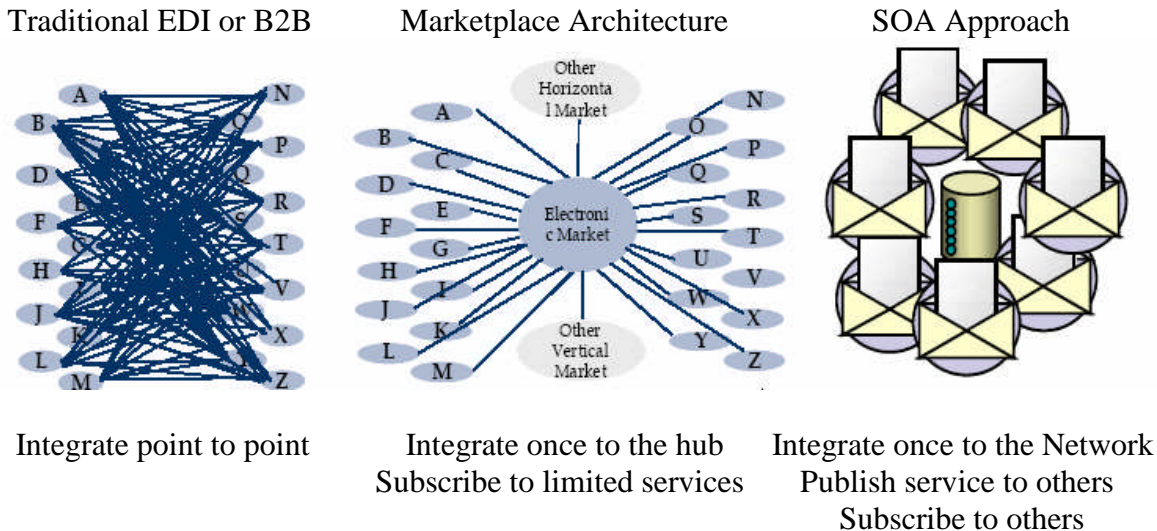
Figure 2-9 Business interaction models approaches compared

Business services are about the provisioning and consumption of business interactions. Understanding what is contextual and what is core is essential. A business service is a process or sub-process within or between enterprises. Defining a service and configuring it to be customer-specific is what business services are about. SOA and Web services technology can be utilized to enable enterprises to provision and consume business services. The technology can be utilized to enable enterprises to:

- Provision: Create business services that leverage existing core competencies of companies that can be offered to existing or new trading partners.
- Consume: Consume business services from another trading partner that they view as better suited to provide such a service.

In extending outward from the enterprise an SOA can significantly aid in reducing costs.

> *"Enterprises attempting to further justify eBusiness initiatives look to web services technologies to enable a lower cost to connect. (SOAs provide up to a 30 percent reduction in B2Bi investment). Examples include driving more transaction throughput from existing trading partners and adding more trading partners to existing processes. Enterprises wanting to create new sources of value and revenue are looking at investment of $250K to 2M to launch new services ventures, either as consumers or producers of outsourced services."* [29]

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[29] "Business Value of Web Services," CommerceNet, March 2003

Business Benefit	IT Benefit
Available to all sizes of organizations, lowers barriers to entry	Same technology can be used for internal or external connections
Not industry specific	Leverage ubiquitous Internet protocols and infrastructure
Country and language requirements eased	Leverage existing transport infrastructure
Low cost means limitless small partners, suppliers or a branch network can now be integrated	Deliver Web services over reliable, well tested, robust, fast transport mechanisms
Supports globalization and the integration of geographically dispersed organizations	Options for both internal and external Web services
Mobile devices with wide or narrow bandwidth can be integrated with established systems or utilized for the first time	
Customer, partner & employee enablement	
Reduce the cost of establishing and using 3rd party marketplaces. Multiple buyers and sellers can congregate at will to exchange goods and services.	
Enables and facilitates new business models	
Transition software deployment models from big-bang, high-footprint implementations to just-in-time applications that are appropriate to the business challenge being addressed.	
Participants can upgrade or introduce new products/services on the fly for an instant or for an extended period	
Makes it easier to add or change partners	
By easing connectivity, data exchange and process integration between disparate systems, Merger & Acquisition activity can be accelerated	
Exposed services bring possibility of new revenue sources	
Transcend organizational and political boundaries	
Companies can integrate on the fly for a single or multiple instances	

Table 2-1 Extensibility Benefits of an SOA[30]

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[30] Excerpts follow from "Web Services Roadmap," CBDI, September 22, 2003, pp. 33-39, http://w3-3.ibm.com/software/analyst/articles/images/interactlogo.gif

SOA allows greater freedom to outsource not only IT functions but also entire parts of the organization to specialized providers, reducing the scope of the organization and enabling it to concentrate on core competencies. Exposing core competencies as services will foster better customer relationships as data is easily viewed and shared.

SOA and Web services make plumbing (infrastructure) ubiquitous. With ubiquitous plumbing, business services can be provisioned and offered to any trading partner. Enterprises are deploying Web services in the context of migrating to an SOA to drive more connections with their trading partners, which can make a better case for ROI. Lower connection costs are driving the case.

One last thought on SOA benefits. Right now the business climate is favorable to Web Services and SOA. Increasing positive (see analyst's research throughout this section) exposure makes getting executive project buy-in simpler. The point is this: now is the time to talk to your customer about SOA.

Rule of Thumb

Business agility for competitive advantage is THE fundamental business requirement and SOA makes it real.

2.5 Justifying SOA

A McKenna Group study found that companies were most successful with Web-based applications when they spent $200,000 or more on their projects. This included the costs associated with hardware, software, and services. It did not include the costs of personnel. McKenna also concluded that there was a definite correlation between the size of the Web investment and the application's return on investment. **In other words, the larger the investment, the greater the probability of a larger return on that investment**. Interestingly, the applications which provided the lowest ROI are the most popular Web-based applications today (e-mail, workflow, product configurators). The applications with the best ROI (Figure 2-10) were those such as an electronic catalog, transaction processing, and legacy integration. These were the most likely to generate revenue.[31]
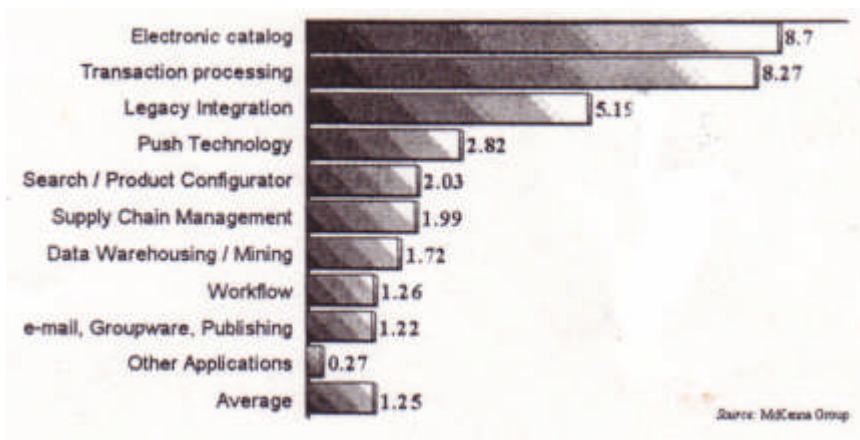

Figure 2-10 Internet Return on Investment for a McKenna Group study

While ROI is an illusive goal, SOA and Web services are producing incredible tangible results.

2.5.1 Customer & Analyst Evaluation of SOA ROI

Here are what some of the analysts, consultants and customers have to say about ROI for SOA and Web services.

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> *"The business value of IT comes from the ability to conduct business processes more reliably, faster and at lower cost, and to control inventories, increase revenue, reduce time to market, improve customer service and provide information that enables better decisions. However, once any new initiative is implemented, the value becomes embedded in the process, and unless pre- and post-implementation metrics are clearly defined, it becomes impossible to measure and report the value of a new application. What remains apparent are the ongoing support costs."* [32]

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[31] "The Business Case for e-business," Keith Rutledge, pp 74-75.
[32] "The Elusive Business Value of IT," Gartner, August 2, 2002. See http://www.gartner.com

More than 20% of enterprises will avoid establishing a strategy for Web services use until the ROI is predictable, even though such procrastination will stifle competitive advantage (0.7 probability)" [33]

"Although leading economists are forecasting a robust economic recovery in the US (projected full recovery in 2H04), CIO's will continue to be under pressure to communicate IT investment value to the business. CIO's should consider the EVA (economic value added) concept to calculate the real costs of IT spending. Integrating the total cost of capital employed by using the EVA formula of WACC (Weighted Average Cost of Capital) x Capital Employed in the IT scorecard can help the business visualize the IT ROI." [34]

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*"Enterprises that want to level the walls separating dissimilar applications in 2004 will turn to service-oriented business applications (SOBAs) to do so. SOBAs are business applications designed to work in and among emerging service-oriented architectures (SOAs)....Type A enterprises (aggressive adopters of technology) will notice the initial benefits of composite SOBAs [Service-Oriented Business Applications] within 6 months of implementation, and **will achieve a rapid ROI within 12 months of investment**"* [35]

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*"Don Buskard, Senior VP & CTO of AXA Financial states "the benefits of easier integration and increased agility lead to greater ROI. Buskard says he's **achieved a 200 percent return on his SOA investment**. One of AXA Financial's most popular SOA-based services is Get Client, in which any front-end app can issue a command and, after probing around the legacy systems, come back with a complete picture of a customer's investments. Buskard says that Get Client is one example of how AXA achieves its ROI – developers design services to be generic enough that they can work with an array of front-facing systems, reducing development time and freeing developers to spend more time on business solutions. In addition, IT workers can easily incorporate new technologies into the SOA, reducing risk and expense while speeding development of new applications"* [36]

"How much effort could you save by reusing something rather than writing it yourself? Typical answers span a wide range (usually from 50% to 100% savings) and depend on factors related to your environment and existing applications.

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[33] "How Web Services Provide ROI," Gartner, May 30, 2003.
http://knowledgegate.bitpipe.com/data/proxy?id=1054555247_702
[34] "Economic Indicators Up, But CIO's Remain Under Pressure," META Group Research, December 23, 2003.
http://www.metagroup.com/us/displayArticle.do?oid=45902
[35] "Service-Oriented Business Applications Break Down Barriers," Gartner, February 17, 2004. See
http://www.gartner.com
[36] "What you need to know about Service-Oriented Architecture," CIO Magazine, Jan 15, 2004.
http://www.cio.com/archive/011504/soa.html

*With this in mind (and based on a lot of hard data), we estimate that a reasonable savings due to reuse is approximately 80% of the cost needed to develop the same software development asset (SDA) for one-time use. At an industry-average cost to develop new software of around $100 per line, **this means that every 1,000 lines of reused code yields a Development Cost Avoidance of $80,000**!....*

A service-oriented architecture requires developers to design services that have the proper granularity and generality for reuse." [37]

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"Take for example a prominent investment firm that built an enterprise-class SOA to expose thousands of mainframe transactions. Instead of gradually rolling out Services, they decided to build an SOA that offered Web Services that were discoverable in a UDDI registry. They coded thousands of Services in directly in COBOL to provide interfaces to existing CICS transactions.

*This company **improved the response times for CICS transactions by 10 to 20 times**, by building a sophisticated caching mechanism that brought information from the mainframes into a centralized location. **They also increased throughput by a factor of 10 times, and reduced the percentage of cost for infrastructure and integration from 90% to 65%,** increasing the percentage devoted to business logic to 35%, by migrating middleware functionality from Intel-based servers to Linux virtual environments on the mainframe. This migration also reduced software licensing costs. Finally, **they reduced the time to write programs to get data off of mainframe from 3-4 months to a matter of minutes**, by exposing CICS transactions as Web Services that were discoverable via a UDDI registry."* [38]

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"A review of early case studies indicates that organizations that use a service-oriented architecture (SOA) can reduce integration project development and maintenance costs by 30% or more. These savings are made possible by the increased effectiveness of component reuse that SOA enables." [39]

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2.5.2 Financial Return

IDC conducted a study in 2002 with in-depth interviews of seven IBM customers implementing Web Services. The overall results of the analysis were:

"*On average, major benefits projected over three years include a reduction in costs of $39.7 million on an investment of $1.8 million, 22% faster time to deployment of key new applications, and an increase of 47% in developer efficiency."*

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[37] "The business case for software reuse," Jeffrey Poulin and Brent Carlson, Computerworld, February 2, 2004, http://www.computerworld.com/managementtopics/roi/story/0,10801,89602,00.html

[38] "The Path to Successful Web Services: Navigating the Pitfalls," Zapthink, October 2003. http://www.zapthink.com/report.html?id=WP-0119

[39] "Integration in a Service-Oriented World," Ken Vollmer & Mike Galpin, Forrester, July 6, 2004

For most, time to market was the key driver. The ability to deliver services online to employees, customers, partners, and suppliers quickly and easily, using simple interfaces across disparate systems, holds universal appeal. In addition, the ability of external parties to manage their own account information via a self-service model was also valued.

The IDC study[40] also found:

- On average, developers became **47% more efficient** and companies were able to **save $2.2 million annually** through reallocation of developer assets or meeting increased demand for applications without hiring additional developers. In addition, companies with call centers were able to **increase the efficiency of their operations by 15%**. Because Web services are standards-based, it also protected prior investments in technology. Companies were not locked into specific service or platform providers.

- Investment estimates from each organization interviewed found that companies spent, on average, $6.76 per user for their Web services projects. Costs ranged from $0.17 to $17.50 per user. Users were defined as anyone in contact with the applications launched via Web services and included employees, partners, distributors, consortia members, customers, and regulated companies.

2.5.3 Documented Savings from IBM Customers

The following are some data collected from IBM customers showing the financial returns of Web services:

- One large financial services company was able to **save three weeks of time (2,700 hours) and $170,000 in costs** by introducing new applications via Web services.

- An online retailer reduced the time required to set up the extranet relationships critical to getting its business off the ground from six months to two months. This time savings allowed the company to **gain four additional months of revenue**. For this online retailer, the competitive advantage came from being first to market.

- A medical service replaced a paper-based forms process where medical forms were sent in for verification. In automating this business process, its partner companies were able to **reduce the time required to process claims by 50%** through the elimination of paper handling. Many members were able to **raise productive time by approximately 2,400 hours annually**, resulting in collective **savings of $1.1 million**. The increase in productivity had other significant benefits as well that could not be measured directly. For example, many clerical errors were eliminated and lost documents due to misfiling and misrouting were reduced. Employees had more time to review forms and implement quality-control measures, which resulted in more accurate work, faster turnaround, and higher customer satisfaction.

- An online retailer estimates that its **revenue increased by 2%** due to its distributors being able to create better B2C applications. The customer has only 10 retail stores, and it generates about 80% of its business from online sales. Web services technology lets the company get its distributors online faster by using simple interfaces, accelerating time to market. **Setup time** for initiating extranet relationships has been **reduced by 33%, going from one year to eight months**. Since Web services can be deployed using industry standards, an added benefit has

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[40] The complete study can be found at
http://www-306.ibm.com/software/solutions/webservices/pdf/May13_IBM_WebServices.pdf

been that the technical staff among its distributors is more eager to build applications than in the recent past.

- A government agency used a Web-enabled e-commerce system to standardize and automate the reporting format and data requirements for the companies that it regulates. In turn, the automation **increased the efficiency** of the government agency and the companies being regulated **by 20–30%**. Today, only 10–25% of the companies are involved, and the government agency estimates that by the time all companies are part of the system, it will have avoided hiring 10–12 people to monitor regulatory compliance

- An online retailer now has more of its distributors using online systems and estimates that a significant portion of its call center operation, about 100 people, are approximately **25% more efficient**. The ability to reuse software through a Web services architecture makes feature exposure easier across company borders for this company's 200 developers. As a direct result, **50 developers will become 30% more productive** over the near term.

- The State of California Franchise Tax Board had an outdated system that couldn't manage taxpayer information, produced inaccurate records and frustrated filers, who often gave up on the process, costing the state revenue. A new Web Services solution that accesses functions in disparate systems automated notifications and streamlined payment processing. **The results were a 10% increase in tax revenue the first year; erroneous contacts reduced by 55%; Web Services implementation ROI in fewer than 12 months**.

- CIBC/President's Choice Financial customers were frustrated by an online banking system that offered only a limited subset of banking functions, so they used more expensive service channels instead. A new Web Services solution made existing call center functions available to online customers. **The results were a $3million (Canadian) annual operational savings; 50% year to year growth for 3 years without increasing call center staff; highest customer satisfaction rating in Canada; project completed months ahead of schedule and under budget**.

2.5.4 Documented Savings from Public Sources

The following are some real numbers from public sources on the financial returns of implementing SOA and Web services:

AXA Financial:

- Industry: $7.5 Billion insurance and financial services company

- Application: Services-based IT infrastructure

- "Sticking to a vision has its rewards. For AXA Financial Services LLc, those rewards add up to about $55 million, which is what IT executives figure they've saved by adhering to a blueprint for the services-based computing architecture the company first laid out in 1990….The bottom line is that AXA has saved a lot of money, says CIO Bill Levine. '**We spent about $35 million on our architecture, and we estimate it would have cost us about $90 million to do the same thing had we not had an architecture in place**,' Levine says." [41]

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[41] "Building an IT architecture for the long term," Computerworld, February 09, 2004.

Providence Health System:

- Industry: 606,000-member system of hospitals, clinics and assisted-living complexes in the Northwest.

- Application: Providence is using Web Services to create "a network of reusable components that likely **will save it more than $1 million per year**, lead to better patient care and potentially save lives…The project will make medical and other records, which are spread across disparate systems, accessible to patients and physicians through portal-based applications."

- The system "pulls together in no more than 3 seconds all the electronic medical records a patient's primary care physician has stored…The system aggregates data from 27 physician offices."

- "'This is more of a business-based ROI based on what this new technology will allow physicians to do,' says Mike Reagin, director of research and development. 'It is significant to say that potentially making this technology available to physician can **save us $700,000 per year**.' That's in addition to savings Providence gets with its Profile Manager Web service introduced two years ago."

- "As its Web services effort has evolved, Providence has created its version of a service-oriented architecture (SOA) built on component collection that provides simple and reusable interfaces for incorporating patient data into an application." [42]

Bekins Company[43]:

- Industry: Moving company

- Application: Logistics management

- Tonnage Broadcast Exchange (TBE)—the focus of this case study—solves a long-standing problem of how to tender shipping jobs to Bekins agents. In the past, jobs had to be tendered by phone or fax, often causing delays and sometimes a feeling of unfairness on the part of the agents. TBE automates this process by offering the opportunity to all qualified agents at the same time and enabling an agent to instantly claim the job (making it no longer available to anyone else).

- **Reduced operating costs results in improving profitability by $1M.** TBE enables Bekins to pass on lower-margin freight more efficiently to its business partners, **reducing its carrying costs up to 2 percent** while maintaining high levels of customer service.

- **Reduced cycle time by 25 percent and improved customer satisfaction and loyalty.**

- Through the use of advanced Web Services tools and technologies from IBM, which provided extensive sample code, **Bekins shaved two thirds off the development cycle. This saved an estimated $100,000** compared to building the solution from scratch. [44]

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[42] "Web services project protects healthcare provider," Network World, March 15, 2004.

[43] More IBM customer references are available at http://www-306.ibm.com/software/solutions/webservices/applicationbriefs.html

[44] IBM Application Brief http://www-306.ibm.com/software/solutions/webservices/pdf/bekins_appbrief.pdf

Nintendo Australia:

- Industry: PC and Video Game creator

- Application: Software maintenance

- "Odyssey has the potential to **save Nintendo around one million Australian dollars** over the course of four to five years," Stroud [information technology (IT) Manager at Nintendo Australia] predicts. **This year, Nintendo Australia stands to save about AUS$20,000 in maintenance costs** alone on ancillary software packages that it no longer needs. For example, the distributor can generate all of its documents electronically, in PDF format, eliminating the need for paper processing, sending, archiving and storage facilities.[45]

Marks & Spencer[46]:

- Industry: Retail merchandise

- Application: Fraud detection

- Result: **Lowered development costs by 66%; 415%-1st year ROI**

Ingram Micro

- Industry: Technology products wholesale distribution

- Application: eCommerce/B2B integration with product retailer

- Result: Lowered **development time by 45%**

FedEx

- Industry: Package delivery service

- Application: Package tracking inquiry

- Result: **Cost of inquiry reduced from $2.14 average to $0.04** (est. volume > 600K tracking inquiries annually)

Dollar Rent-A-Car:

- Industry: Transportation rental

- Application: Connect existing mainframe reservation system to access and integration with business partners (e.g. direct link to Southwest Airlines link)

- Result: Opened up another sales channel that has yielded millions of additional rate requests and resulted in thousands of new rentals per year, **equating too many millions of dollars in additional revenue.**

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[45] IBM Application Brief ftp://ftp.software.ibm.com/software/websphere/webservices/10701281_nintendo_hr.pdf

[46] The next six company experiences come from http://www.rtr.com/Ready-to-Run_Software/Web_Services-ROI_Notes1.pdf

Ceridian:

- Industry: Managed Human Resource services

- Application: Build front-end to its legacy mainframe payroll processing system in 4 months replacing (6) front-end applications and 200 databases with a single user interface into a single Microsoft SQL Server 2000 database containing all customer data

- Result: **Greater than $12M per year savings in mainframe related costs; an additional several million dollars per year in employee productivity; increased customer satisfaction; complete elimination of 100 error-prone, manual processes**.

TSYS, subsidiary of Synovus:

- Industry: Electronic payment processing and financial services

- Application: Workflow management solution

- Result: Built in less than six months based on XML and Web Services, TSYS has **delivered 80 percent lower software costs, 95 percent lower hardware costs, and a 50 percent reduction in time required to bring customers on-line**; in addition, the 600 person **call center achieved a 15% increase in productivity or an equivalent of $2.7M per year**; most importantly, the new application allowed access to new market segments of the $600 billion business process outsourcing space.

Rule of Thumb

A reasonable and justifiable estimate of reduced integration project development and maintenance costs due to SOA is 30%.

2.6 IT/SOA Governance Yields Large Financial Returns

We now know that IT governance is critical to the success of the enterprise. SOA governance is also crucial to the company not only because it mirrors IT governance requirements and results, but because of the cross-organizational traits of SOA.

When a firm establishes SOA as their IT architecture and mode of business process development and execution, governance takes on a new level of importance. This significant increase in governance necessity occurs because of the many groups, both internal and external, that contribute to the execution of the business process. A department will be much more willing to share once-private assets, if it knows they will be protected and their integrity maintained. This also works the other way. A department will be more likely to use (or reuse) a service or process from another group (breaking the not-invented-here syndrome) if it has assurance of that asset's integrity, security, reliability and performance. For example, consider that in an SOA:

- Assets, services and business process are reused across all the company's organizational structures.

- Business processes/services are composed of sub-processes and sub-services from many areas both inside and outside of the company.

- IT costs can be distributed across groups.

- Data is now exposed and shared across once-siloed applications and departments in real time.

- Connections to partners and customers can be made faster, even dynamically.

- Applications and infrastructure are now viewed as a portfolio of assets and services.

- Different size companies with different levels of IT support are connected to your network.

- Changing partners, suppliers or vendors is orders of magnitude easier and therefore can occur more often.

- Companies can integrate on the fly for a single or multiple instances.

But none of this is possible without tried and tested SOA governance.

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"Effective IT governance is the single most important predictor of value an organization generates from IT." [47]

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2.6.1 Increasing Share Price

Producing value for a company's customers and shareholders is the primary reason companies are in business. So what does governance have to do with value? A McKinsey study found that professional investors are willing to pay a large premium for investments in firms with high governance standards. How much more will they pay? As the charts below indicate, the premium investors would be willing to pay for a well-governed company differs by country. For example, investors indicate they would pay 18% more for the shares of a well-governed UK or US company than for the shares of a company with similar financial performance but poorer governance practices. However, they would be willing to pay a 22% premium for a well-governed Italian company and a 27% premium for a well-governed company in Indonesia. [48]

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[47] "IT Governance, How Top Performers Manage IT Decisions Rights for Superior Results," Peter Weill and Jeanne W. Ross, Harvard Business School Press 2004, pp 2-4.
[48] "Three surveys on corporate governance," McKinsey Quarterly, 2000 Special Edition: Asia revalued.

Figure 2-11

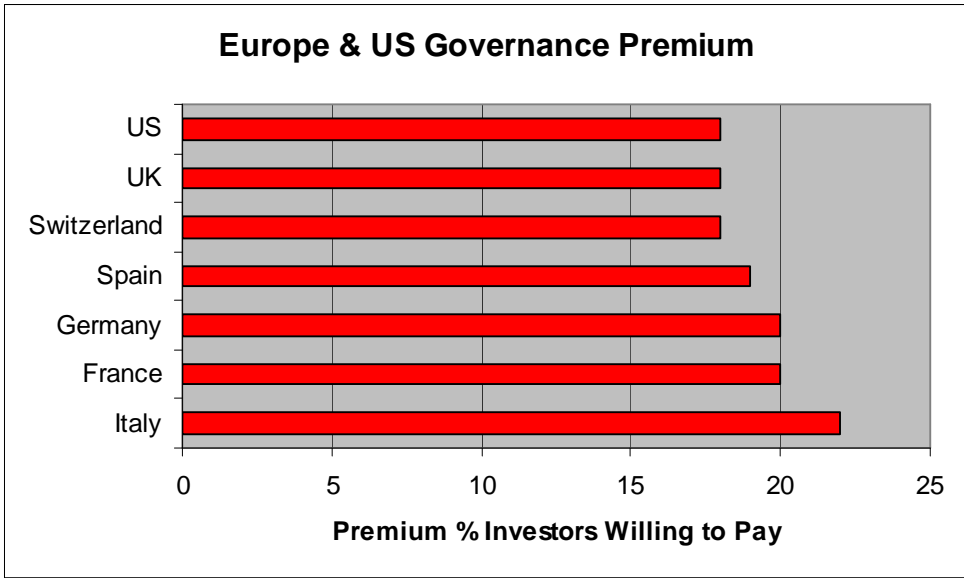Figure 2-12

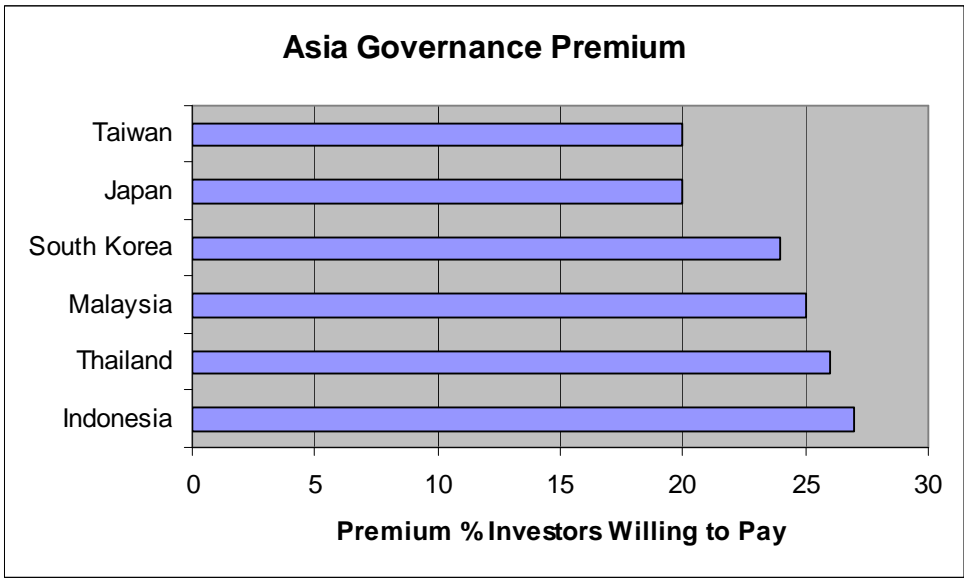**Latin America Governance Premium**
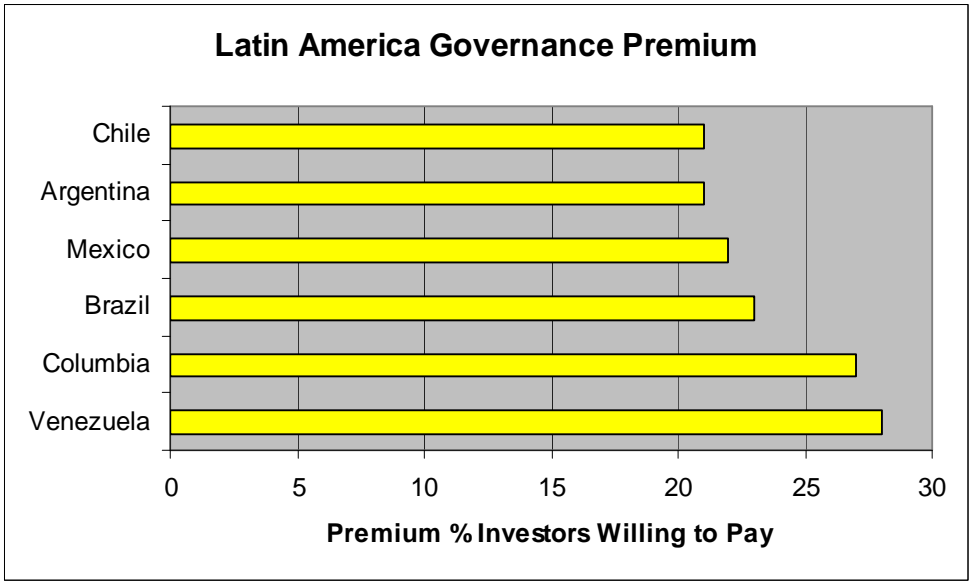
Premium % Investors Willing to Pay

Figure 2-13

These results are significant since the data was gathered from more than 200 institutional investors from around the world, which altogether manage about $3.25 Trillion USD in assets.

2.6.2 Increasing Profits

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*"Top performing enterprises succeed where others fail by implementing effective IT governance to support their strategies. For example, firms with above-average IT governance following a specific strategy (for example, customer intimacy) had more than **20 percent higher profits** than firms with poor governance following the same strategy."*
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2.6.3 Increasing Market Value

_____

*"On average, when moving from poorest to best on corporate governance, firms could expect an **increase of 10 to 12 percent in market value**."* [49]

_____

These are powerful statements describing the incredible business value a well-tuned IT/SOA governance program can provide to a company. These kinds of numbers can only be attained by board and C-level management involvement.

_____

"Leading Global 2000 organizations will dominate their markets through engaged, active governance (e.g., senior management participation versus lists of policies), process, and architecture. Highly distributed organizations will grow in number thought 2005 and be increasingly pressured to deploy governance processes to mitigate inherent cultural conflict" [50]

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Rule of Thumb

Without an IT investment approval process within an enterprise-wide IT governance plan, IT investments invariably build toward localize rather than enterprise goals.

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[49] "A Premium for Good Governance," The McKinsey Quarterly, 2002 Number 3.
[50] "Principles-Based IT: The Role of Governance," Louis Boyle, Meta Group, January 2003.

<div style="border:2px solid black; text-align:center;">

<u>Rule of Thumb</u>

SOA = Business Agility = Competitive Advantage

</div>

3 One-Page Summaries of Important SOA Topics

The one-page summaries cover the following SOA topics
- Executive Overview
- Business Value
- Rules of Thumb
- Governance

They are best viewed/printed in color.

3.1 Executive Overview

Service Oriented Architecture

Executive Overview

> There are many business & technical benefits to an SOA, but none as important as the capability for a company to respond quickly and effectively to business change and to leverage that change to competitive advantage.

What is it?

Business: *SOA is a set of business, process, organizational, governance and technical methods to reduce or eliminate frustrations with IT, quantifiably measure IT's business value and create an agile business environment for competitive advantage.*

Slightly Technical: *SOA is a way for different computers, from different vendors, with different programs, from different functional areas of the business (or externally to customers, suppliers or vendors) to intelligently talk and exchange data with each other.*

Why do I need it?

The combination of SOA & Web Services is close to being the "silver bullet" that companies have been looking for to:

* Realize IT's long-promised potential
* Justify IT expenses and capital outlays
* Provide non-technical people a clear understanding of what IT does, how they do it, and their intrinsic value.

Those "non-compatible" computers can now communicate without the previous technical complexity or high cost of maintenance. SOA has become today's premier method to attain business agility through the reuse of a company's current IT assets & integrated processes.

What benefits will I receive?

* Saves time, money & people
* Eliminates frustrations with IT
* Justifies IT investments
* Eliminates IT's 6-6 answer i.e., "the project will take 6 months & cost 6 figures"
* Provides a business & competitive differentiator

What will I give up if I don't have it?

It is very likely that business transactions will be orders of magnitude easier with an SOA. An SOA could be the difference between the success or failure of the next:

* Department, intra-company or inter-company merger
* Acquisition
* Divestiture
* Product or service rollout
* Business partner, customer or supplier addition
* Geographical expansion
* Competitive onslaught

Is this the next bright idea from the industry?

SOAs are not a new idea – they have been around for at least a decade. SOAs have previously been implemented in proprietary (translation: expensive) ways. That means it was very difficult if not impossible for disparate computers to intelligently communicate with each other. So what's different now?

* SOAs have a long history of successful implementations. Even with their previous high costs they still provided economic value and functional flexibility within the company. The reason the term SOA has become so visible now is because a new implementation technique has arisen to make SOAs much more cost efficient and productive.

* This new technique is called Web Services. It is important because it finally breaks the proprietary barrier between vendors and software programs. Major vendors like IBM and Microsoft have agreed to standards which allow their respective hardware and software to share information and data.

More Information

SOA Business Value White paper
http://www.ibm.com/webservices/eis

EIS Internal Web Site:
http://w3.ibm.com/software/eis

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SOA Value Roadmap

Because:	Business happens via business processes
And Since:	Business processes tie to business measurements
And with an SOA:	1) Business process steps are delivered via IT applications 2) Business process steps align with business services optimally through an SOA
Therefore:	Business services in an SOA create a digital model of the business
Yielding Business Agility & Competitive Advantage:	A digital model of the business is powerful because: 1) Creating new business processes when business changes is now merely choosing from an inventory of stable services within the SOA 2) Provides a structure to collect, examine, and align business and IT metrics

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3.2 Business Value

Service Oriented Architecture

Business Value

Consider this. In 1917 US Steel lead the Forbes list and employed 268,000 people – today 21,000. In the same year there were eight other steel makers on the top 100 list and 33 other companies in the business of extracting things out of the earth. Today, sixty one of these companies no longer exist. Key companies to survive are six oil companies, two automakers (Ford & GM) along with AT&T, Citicorp, DuPont, General Electric, Kodak, Procter & Gamble and Sears.

How will companies survive over the long term?

The answer is in continuous business transformation.

How can companies effectively execute a business plan incorporating continuous business transformation?

The answer is by the company becoming as agile as possible, both in business process and IT implementation.

How can companies achieve the greatest business agility?

The answer is Service Oriented Architecture (SOA).

Customer ROI

Don Buskard, Senior VP & CTO of AXA Financial states "the benefits of easier integration and increased agility lead to greater ROI. Buskard says he's _achieved a 200 percent return on his SOA investment._ [1]

A prominent investment firm that built an enterprise-class SOA to expose thousands of mainframe transactions. This company[2]
* _Improved the response times for CICS transactions by 10 to 20 times_
* _Increased throughput by a factor of 10 times_
* _Reduced the percentage of cost for infrastructure and integration from 90% to 65%_
* _Reduced the time to write programs to get data off of mainframe from 3-4 months to a matter of minutes._

The State of California's Franchise Tax Board created a new Web Services tax application that:
* _Increased tax revenue by 10% the first year_
* _Reduced erroneous contacts by 55%_
* _ROI in fewer than 12 months_

International Data Corporation conducted a study[3] of seven IBM customers implementing Web Services. The overall results of the analysis were, on average:
* _Reduction in costs of $39.7 Million on an investment of $1.8 Million._
* _22% faster time to deployment of key new applications._
* _Developers became 47% more efficient and companies were able to save $2.2 million annually._

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[1] "What you need to know about Service-Oriented Architecture," CIO Magazine, Jan 15, 2004.
[2] "The Path to Successful Web Services: Navigating the Pitfalls," Zapthink, October 2003.
[3] The study can be found at http://www-306.ibm.com/software/solutions/webservices/pdf/May13_IBM_WebServices.pdf

SOA Business Benefits
Quantifiably measure IT's business value
Reduce or eliminate frustrations with IT
Create an agile business environment for competitive advantage
Different computers, from different vendors, with different programs, from different functional areas of the business (or externally to customers, suppliers or vendors) can now intelligently talk and exchange data with each other
IT maintenance costs greatly reduced
Greatly reduce the impact of change
Leads to a better dialogue between the CIO and line of business executives by forcing IT workers to think in terms of business, and not exclusively of the technical architecture
Projects are driven by business needs rather than technological limitations
Improves time to market as connections to partners and customers can be made faster, even dynamically
Digital dashboards can provide clear visibility into operating data for executive review
Enables less technical business people (e.g. a business analyst) to "assemble" software solutions without the need for coding
An SOA backbone allows costs to be reported very granularity. Departments can be held more accountable.
Available to all sizes of organizations, lowers barriers to entry
Not industry specific
Supports globalization and the integration of geographically dispersed organizations
Mobile devices with wide or narrow bandwidth can be integrated with established systems or utilized for the first time
Reduce the cost of establishing and using 3rd party marketplaces. Multiple buyers and sellers can congregate at will to exchange goods and services.
Enables and facilitates new business models
Transition software deployment models from big-bang, high-footprint implementations to just-in-time applications that are appropriate to the business challenge being addressed.
Makes it easier to add or change partners or 3rd party applications
By easing connectivity, data exchange and process integration between disparate systems, Merger & Acquisition activity can be accelerated
Exposed services bring possibility of new revenue sources
Companies can integrate on the fly for a single or multiple instances

More Information

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3.3 Rules of Thumb

IBM Service Oriented Architecture

Rules of Thumb

How will companies survive over the long term?

The answer is in continuous business transformation.

How can companies effectively execute a business plan incorporating continuous business transformation?

The answer is by the company becoming as agile as possible, both in business process and IT implementation.

How can companies achieve the greatest business agility?

The answer is Service Oriented Architecture (SOA).

Rules of Thumb

Rules of thumb are snippets of information that are easy to remember and helpful in making some basic SOA decisions. They are not hard-and-fast rules but guidelines in the search for SOA solutions.

* If a peer relationship between IT and the business units cannot be forged, SOA cannot be successful.
* Architecture is a wager and "bets" are difficult to justify, however, SOA can provide IT justification and business value measures.
* In an agile business, incremental business services – mirroring business process steps – become IT's core deliverable.
* Business-smart IT architects are the bridge between IT and the company's business units.
* Within a business process, each interaction with an IT asset is a potential place for a service.
* A service that mirrors (and executes) a business process, can be used to allocate IT costs and provide IT justification by correlating the IT costs with business process results.
* Companies committed to SOA will find business processes and services at the center of both business design and IT delivery.
* A company's SOA gives IT a definitive way to prove business value through business results measurements.
* When a change in business process no longer requires a change to application programming logic (successful SOA), your company has attained competitive business agility.
* Without SOA, on demand is not possible.
* For the foreseeable future, do not implement SOA or Web Services without the other.
* Business agility for competitive advantage is THE fundamental business requirement – SOA makes it real.
* A reasonable and justifiable estimate of reduced integration project development and maintenance costs due to SOA is 30%.

SOA = Business Agility = Competitive Advantage

SOA Cools Stifling Business Factors

A company's idiomatic traits can produce revenue-robbing issues (Alarm Phrases). SOA can provide real answers (Solution SOA) to these vexing problems.

Revenue-Robbers

One-way customer relationships yield market-irrelevant inventions.

Alarm Phrases → Solution SOA
- Unheeded insights from channel partners (Extensibility)
- Rivals exploit customer intimacy to get buy-in (Loosely Coupled)
- Obliterating existing business models (Agility)

Ivory-towered R&D labs dampen the rate of invention.

Alarm Phrases → Solution SOA
- Reinvention of the wheel (Reuse)
- Process-based business model innovation outstrips many product and service inventions for business impact (Extensibility)

Organizational silos prevent collaborative idea generation.

Alarm Phrases → Solution SOA
- Clumsy knowledge transfer (Loosely Coupled)
- Product-centric business units fail to exploit cross-unit synergies (Loosely Coupled)

Risk-averse senior management eschews innovation.

Alarm Phrases → Solution SOA
- "Not invented here" (Reuse)
- Reject breakthrough service innovations (Extensibility)

Unskilled partners fail to keep pace with innovation.

Alarm Phrases → Solution SOA
- Competitors out-innovate by plugging talented new suppliers and distributors into their value chain (Loosely Coupled)

More Information

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3.4 Governance

Service Oriented Architecture

IBM

Governance

> **"Effective IT Governance is the single most important predictor of value an organization generates from IT."** [1] **(MIT Sloan School of Mgmt)**

What is it?

Definition: *A structure of relationships & processes to direct & control the enterprise in order to achieve the enterprise's goals by adding value while balancing risk versus return over IT/SOA & its processes. It specifies the decision rights and accountability framework to encourage desirable behavior in IT & the SOA.*

Relationship to IT Governance: *SOA governance activities and measurements are the same as traditional IT governance. What makes SOA governance different is the degree to which governance is required.*

Why do I need it?

IT/SOA governance matters because it influences the benefits received from IT investments. Through redesigned business processes, well-designed governance mechanisms, & appropriately matched IT investments, top-performing enterprises generate returns on their IT investments up to 40% greater than their competitors. Other factors are:

* SOA cannot be successful without governance
* Sarbanes-Oxley Act – US law requiring CEOs & CFOs of SEC registered companies to certify controls for each significant business activity.

What benefits will I receive?

* *Increasing Share Price* – Professional investors are willing to pay premiums of 18-26% for stock in firms with high governance.[2]

* *Increasing Profits* –

   "Top performing enterprises succeed where others fail by implementing effective IT governance to support their strategies. For example, firms with above-average IT governance following a specific strategy (for example, customer intimacy) had more than 20 percent higher profits than firms with poor governance following the same strategy." [1]

* *Increasing Market Value* –

   "On average, when moving from poorest to best on corporate governance, firms could expect an increase of 10 to 12 percent in market value." [3]

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[1] "IT Governance, How Top Performers Manage IT Decisions Rights for Superior Results," Peter Weill and Jeanne W. Ross, Harvard Business School Press 2004.
[2] "Three surveys on corporate governance," McKinsey Quarterly, 2000 Special Edition: Asia revalued.
[3] "A Premium for Good Governance," The McKinsey Quarterly, 2002 Number 3.

Rules of Thumb

Rules of thumb are snippets of information that are easy to remember and helpful in making some basic SOA decisions. They are not hard-and-fast rules but guidelines in the search for SOA governance solutions.

* In Governance – Participation breeds Communication, which breeds Comprehension, which breeds Buy-In, which breeds Compliance.
* IT/SOA governance is ultimately the responsibility of the company's board of directors.
* The best predictor of IT governance performance is the percentage of senior managers who can accurately describe the company's IT governance.
* Successful enterprises consistently demonstrate a willingness to sacrifice function to sustain architectural integrity.
* Having the CIO report to the CEO is a best practice in IT/SOA governance.
* SOA brings to a company increased profits as there is a proven correlation between strategic agility & IT infrastructure capability.

Governance Benchmark

The figure[1] below contains benchmark data for best and worst performers in IT governance. Nearly half the managers in the above-average governance performers could describe governance while fewer than 30% of managers in poorer performers could do so. In only 5% of enterprises could 80% or more of managers in leadership positions describe their IT governance. This is an excellent way of measuring a firm's governance performance against statistically significant data.

Benchmarks for Best & Worst Performers – How do you compare?

Governance Performance	Bottom 50% of enterprises (score<69)	Top 50% of enterprises (score>=69)
Percent of executives who can accurately describe governance	29	48
Average number of changes in governance per year	2+ ↑	1 ↓
The percent of new systems with agreed exceptions on at least one component	28 ↑	34 ↑
The percent of projects with renegade exceptions on at least one component	23 →	15 ↓

More Information

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