*"Try not to talk about change, but rather to enable it."*
*– Thorkil Lund, Danish Bank, Director, 1989 (attributed)*

# 2  Business Model Transformation Toward the Service-Oriented Enterprise

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As we discussed in the part introduction, business model innovation and transformation is one of the most vital parts of a company's competitive advantage. But putting business innovation and transformation into practice requires executives to think differently, not only about the construct of the organization but also about the interrelationships and services of the competencies they rely on to create and realize value. Whereas pressure to control costs and maintain operational efficiency is still a priority for businesses of every size and across every industry, most are reporting a renewed emphasis on top-line growth. Globalization and technology advances are giving rise to an unprecedented level of competition while creating extraordinary opportunities to differentiate.

For many companies, growth — perhaps even survival — depends on innovation and transformation of their business model. Business model innovation and transformation is an important widely recognized concept. As already discussed, the majority of CEOs today consider business model innovation and transformation to be an answer to intense business competition, increased customer expectations, and globalization. Enterprise service orientation enables a flexible IT infrastructure and plays a significant role in enabling business model innovation and transformation. This chapter clarifies the role of service-oriented architecture (SOA) in reinventing and transforming business models while we focus on the business perspective.

In this chapter, we start by discussing three selected trends that drive adaptation toward a service-oriented enterprise and thereby enable business innovation and transformation. This chapter also discusses both the business and the IT perspective of companies actively transforming themselves into a service-oriented enterprise. From the business viewpoint, we will discuss, first, trends and thus market forces

driving such a transformation. Second, we will elaborate on the parameters of change in more detail to better understand the deltas between a function-oriented enterprise and a service-oriented enterprise. Third, transformation case studies exemplify the transformation toward a service-oriented enterprise.

We will then adopt an IT perspective and discuss how the service-oriented enterprise can become a reality supported by the use of proper methods and tools of service and process enablement and information technology. First, we will address the question of which methods help us capture business ambitions and intentions so that IT can understand them. Second, we will look into the content elements that flow through these methods. Third, we will address what new capabilities IT needs to use the thus captured content to effectively innovate and transform businesses toward service-oriented enterprises.

## 2.1    Adaptation of the Service-Oriented Enterprise

Innovating, developing, and optimizing your competencies and thereby transforming your business models has historically been considered a slow and arduous process, but a combination of business process management-specific expertise and the enabling technology of service–oriented architecture is reducing the time barriers to change. Business model innovation and transformation is defined as innovation in the structure and/or financial model of the business, and then being able to execute the innovation a transformational way. The focus of business model innovation and transformation is often in one of three areas:

1. **Customer-focused business competency innovation and transformation**
   New collaborative solutions across partners, customer, and suppliers.

2. **Core business competency innovation and transformation**
   Better customer service and more efficient use of resources through new and innovative approaches to internal business processes.

3. **Supplier-focused business competency innovation and transformation**
   New levels of cost efficiency and best-of-breed solution delivery through global services assembly lines and advanced planning and optimization through the value chain.

Generally, business model innovation and transformation can be viewed as transforming various competencies of the extended value chain. The SOA and BPM paradigms can be applied to the business/IT relationship in a twofold way:

1. Using SOA as a paradigm for the design and management of enterprises. Value chains are understood as arrays of recomposable "services" (combining people, processes, and technology to deliver products and services to the business network).

2. Using SOA as a techno-architectural concept based on notions of functional componentization, provider and consumer contracts, and reuse (allowing design technology to take place in a modular way).

This chapter goes on to show that increasing competition is leading to the rise of service-oriented business models and that a purely architectural SOA (focused on smart design of technology) is not enough.

In this context, SOA-enabled business services form the building blocks of a new category of loosely coupled, network-centric business applications. Business services networks help businesses forge robust, loosely coupled connections among competencies that include people, processes, and systems — within an enterprise or across enterprises. SOA enables an incremental, risk-mitigated approach for IT to deliver value to business. This approach is different from the "big bang" approach described in the book *Business Process Management: The SAP Roadmap* [Snabe et al., 2008]. The approach suggested and described in this book uses more of a process-by-process and/or a project-by-project approach. SOA projects focus on the reuse of existing services and the creation of new services that are available to the business for use in new and creative ways to build the next generation of loosely coupled business processes and applications. As a result, companies can derive successively higher value from SOA with subsequent projects. We refer to this as the *value multiplier* of enterprise-wide business services.

Today leading organizations are providers of end-to-end processes optimized around service and efficiently servicing stakeholders. Also, through the services duality, comprised of both business services and information technology (IT) services, the services become a pivotal binding and connecting element. This holds true between the provider and the customer and between the provider and suppliers and partners in the business network for solution creation. In this perspective SOA enables companies to conceptualize and define (business perspective) and to implement and adapt (techno-architectural perspective) business processes with unprecedented speed and ease and to break down processes into smaller process steps for reusable enterprise services that can easily be adapted to changing business needs.

### 2.1.1    Adaptation Driver: Increased Service Orientation

You face challenges that are unique to your industry. You need to overcome the rigid, static nature of inflexible IT methods traditionally used to support business goals, and you need to do so in a way that lets you change rapidly and seamlessly as market forces shift. Service is the new product. For decades we have known that "all industries are, effectively, service industries; some industries merely have greater service components than others" [Levitt, 1972]. Yet today we witness a significant increase in services globally and a shift from services around products toward products around services. So-called hybrids, which are characterized by a tight and effective interplay of product and services, have become the de facto standard in solutions. Due to the duality of services, the rise of business services on the one side is not only mirrored but also accelerated by the diffusion of technical services such IT-based Web services and enterprise services on the other side. As the service complexity increases, we are shifting away from services supporting and differentiating products via services enabling products toward services finally being the product. These factors accelerate the importance of services and ultimately lead to the evolution of an own market for easily consumable services.

### 2.1.2    Adaptation Driver: Networked Business

Networks, with their market coordination, are increasingly replacing hierarchical coordination mechanisms. Companies are focusing on few but differentiating core competences and — due to diseconomies of scale or scope — they are breaking up their value chain into sub elements, handled by separate companies. Traditional industry boundaries are blurring because — in this networked economy — a customer solution can be aggregated across company and industry borders from many providers. The evolving business networks can be characterized as follows: Relationship is an asset, risk is shared, and innovation is driven collaboratively — often based on open architectures.

As a result of the network paradigm, the following questions become central: What do I stand for as a provider? And what is my superior value contribution to the network as a whole? This is applicable to both consumer markets and business-to-business markets. Take Twitter and Facebook, for example, where your attractiveness to others can be directly measured in terms of your number of "followers" or "friends," respectively. Business-to-business markets are all about interaction with business partners to extend and innovate on business processes across company borders. In a networked economy, constellations can arise where

companies must cooperate in one step of the value creation and compete in another, which is referred to as *co-opetition* [Brandenburger and Nalebuff, 1996]. The fundamental idea of a network-based business model is not to grow your own market share only, but to grow the entire market for the business network via network externalities. Hence, in a networked economy business is no longer a zero-sum game [Neumann and Morgenstern, 1928]. The end result is that companies are required to capitalize on relationships to maximize customer value brought together from different contributors across business networks.

### 2.1.3    Adaptation Driver: Power-Shift from Supply- to Demand-Side

Customers in networked markets recognize that they can easily connect to share information, collaborate, and join forces for increasing brain or bargain power. We witness a shift in power from the supply- to the demand-side [Cluetrain, 2000] as represented in the power of the customer. Driven by the power of Internet-enabled networked markets with informed buyers supplied by communities, today's customers' standard for a good-enough solution has significantly increased. Consumers seek tight interaction with their providers, and customers can become co-innovators and co-creators. Increasingly, customers are even willing to take over part of the provider's value chain to create the last mile of the solution customer-individually, what is termed *prosumerism* [Toffler, 1980].

### 2.1.4    Service-Oriented Enterprise as Goal – Transformation as Journey

As companies seek strategic advantage, today's enterprises thrive in a highly networked world, where only the smartest — not necessarily today's largest — companies will survive. Accelerated by the three adaptation drivers outline above, we witness business shifting from top-down, hierarchical ways of working and managing to distributed, agile, collaborative forms of doing business. There is increasing evidence that enterprises are changing gears toward an end-result-orientated solution paradigm, which is centered on the consumption of services from distributed providers in customer-centric networks.

A service-oriented enterprise is characterized by "its ability to reliably deliver new or enhanced services in order to maximize new business opportunities … Service-driven enterprises are optimized around service, around efficiently servicing customers, employees, partners, all the stakeholders; responding rapidly to their needs, and adapting rapidly to new requirements, to changes in the industry,

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to changes in the market" [Gold-Bernstein, 2009]. In this setup, services — in the form of a business and/or technical service (duality of service) — become a pivotal binding element and connector between the provider and the customer and between the provider and suppliers and partners in the business network for solution creation. In addition, providers are bound to comply with service-level agreements (SLAs) that they have agreed upon with their clients and subsequently establish SLAs with their suppliers and partners also. These service-oriented enterprises can act as the orchestrators of networked solutions.

Energized by this ambition, an increasing number of companies are setting themselves the ambitious goal of transforming into a service-oriented enterprise and becoming a provider of networked solutions. Because this signifies a substantial shift in terms of business model and related business processes, such a transformation will not happen overnight; it is, rather, about leading a journey of change.

## 2.2    Business Transformation Change Levers

Successfully transforming a company into a service-oriented enterprise requires solid knowledge of the most relevant change levers and how to manage them effectively. Figure 2.1 contrasts the key characteristics of a function-oriented enterprise with a service-oriented enterprise.

On the left-hand side, the function-oriented enterprise is primarily optimized for singular products and characterized by its focus on excellence per function, for example development, purchasing, procurement, production, marketing, sales, and service. This functional orientation is also organizationally reflected via a hierarchical coordination of vertically focused entities along the activity steps of the enterprise's value chain. Revenue is linked to transactions; profitability depends heavily on efficient production and economies of  scale.

On the right-hand side, the service-oriented enterprise provides (networked) solutions, which are often consumed as a service by the customer (SLA) and orchestrated from distributed contributors. These various solution contributions can stem from both own functions and divisions and can be externally sourced from other suppliers, partners, and third-party providers, all again linked by service levels in a business network. When done right, the higher service portion of the solution offering and consumption-based pricing mechanisms can lead to predictable recurring revenues and service-driven profitability.

| Functional-Oriented Enterprise | Service-Oriented Enterprise |
|---|---|
| | |
| **Customer Offering** ■ Optimized for Products ■ Complemented by not overly complex, product-related after-sales-services | ■ Optimized for Services ■ Service level agreement for managing end-to-end business process |
| **Business Model** ■ Product Revenues linked to transactions; also economic cycles customer industry ■ Profitability depends heavily on efficient production and economies of scale | ■ Predictable, recurring revenues linked to higher service portion and consumption-based pricing models ■ Profitability driven by higher margins of value-added services |
| **Value Creation Coordination** ■ Excellence per vertical functions, e.g. development, purchasing, procurement, production, marketing, sales, services ■ Hierarchical Coordination with emphasis of internal innovation ■ Proprietary Business Architecture | ■ Excellence in horizontal end-to-end process orchestrationfrom own contributors and external parties ■ Network Coordination withemphasis of collaborative Innovation ■ Open Business Architecture |

**Figure 2.1**    Change Levers for a Service-Oriented Enterprise    Transformation

After this brief overview, we will discuss three change levers in more detail in the following sections (Section 2.2.1, Section 2.2.2, and Section  2.2.3).

## 2.2.1    Change Lever: Customer  Offering

In a function-oriented enterprise the offering portfolio — to solve a customer problem — often has a certain product focus typically complemented by not overly complex, product-related after-sales services such as guarantee, inspection, maintenance, and spare parts. Because the targeted market is anonymous and standardized, we witness a primarily transaction-based low-touch customer engagement aiming for high volume. Differentiation relies on new and unique features and functions and their combination.

In a service-oriented enterprise the provider can design and manage an end-to-end business process on behalf of their customer and often commits its delivery against a specific service-level agreement. With the holistic solution in focus, the provider

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aims for the end result of the "job to be done" [Johnson et al., 2008] or, in other words, the root cause of the customer problem to be resolved. Both the integrated view of tightly integrated services and products in the form of a hybrid and the lifecycle perspective are pivotal to meeting the total solution value or *problem coverage* expected by the consumer. In this context, service excellence can be understood as offering high-value services from plan to run, which make up a unique selling proposition for the provider. Leading service-oriented enterprises invest where they can excel in more advanced solution dimensions such as consumability, adoption experience, and lifecycle cost (total cost of ownership [TCO]).

When transforming from a function-oriented enterprise into a service-oriented enterprise, direct customer access with tight provider-consumer collaboration and even co-creation, differentiating service capabilities, and leading project management skills for customer-individual business problem resolution are required.

## 2.2.2    Change Lever: Business Model

In a function-oriented enterprise the product-driven revenues are transaction-based and rather volatile because they are somehow linked to the economic cycles of the served customer industry. The profitability ceiling can be reached when economies of scale are fully exploited in standardized production because the service profitability is rather low due to its product-support and commodity character. Because mass products are sold to an anonymous market in a low-touch transaction fashion, the prevailing huge marketing investments with their bottom-line impact can be explained.

Following the paradigm of a service-oriented enterprise, an increase in the provider's profitability is linked to differentiating by better satisfying the end-to-end business process requirements of a specific customer with the provided solution. Service-driven revenue flows prevail, which are recurring and thus predictable. Pricing is increasingly linked to the effective consumption of a service level (pay as you go). Besides the impact on the top line, a stronger margin position is achievable, driven by unique high-value-added services and their higher profitability. Based on the SLA, the customer now finds a supplier, which is strategically aligned with their own goals. This can entail a strategic relationship with recurring engagements based on a joint roadmap and a multiyear contract framework, in which the provider ultimately can become the customer's trusted advisor.

When transforming from a functional-oriented enterprise into a service-oriented enterprise, appropriately managing the balance between scope and scale — solution individualization and reuse/standardization — becomes pivotal. This is also referred to *mass customization* [Pine, 1992]. This also holds true regarding professional services. Optimizing the whole and avoiding sub-optimization is the strategic imperative in a service-oriented enterprise.

## 2.2.3 Change Lever: Value Creation Coordination

In a function-oriented enterprise, vertically integrated value chains prevail. Separate functions and often also processes for development, production, sales, and support are optimized per area and therefore require top-down hierarchical coordination to optimize for the overarching strategic intent of the enterprise. Despite partnerships, the business architecture tends to be closed, assets are self-owned, and physical assets such as production sites play a major role — also in terms of indicators of firm-internal importance.

In the service-oriented enterprise, keeping the SLA commitment requires orchestrating an end-to-end business process on behalf of their customers across their own functions and divisions and across suppliers, partners, and third-party providers within a business network. The required horizontal organizational layer for end-to-end process orchestration is the result of an open business architecture — and thus rather network-based and best-described as loosely coupled with the provider's incumbent organization. Every provider from the network delivers directly or indirectly against the common goal of the SLA, which ultimately ties the various solution contributions together. A portion of the providers are expected to be "virtual," (*cloud-based*) because they provide highly automated and specialized solution contributions without being an enterprise in the traditional sense. Generally, innovation is driven in a more distributed or even open manner relying on the talents of contributors from outside corporate boundaries [Chesbrough, 2003; Surowiecki, 2004; Hippel, 2006]. Ultimately, relationship assets dominate over owned assets, and the management of the service-oriented enterprise's ecosystem becomes a major source of competitive advantage.

When transforming from a function-oriented enterprise into a service-oriented enterprise, the provider requires a profound understanding of all relevant building blocks to deliver an optimally orchestrated solution to the customer, whether these building blocks stem from their own functions and divisions or those from third-party providers or even competitors. As a consequence, integration competencies

are pivotal in a solution business to secure interoperability. To achieve this goal, the solution architecture becomes central because it is the company's reusable blueprint of how all required building blocks fit together for a specific customer solution. Due to the heterogeneity of today's customer landscape, the demand for open standards and architectures increases.

## 2.3    Business Transformation Case Studies

So far, we have studied the drivers of the adaptation of the service-oriented enterprise and how to manage the change levers effectively. To make a transformation toward the service-oriented enterprise more tangible, in the following sections three business-to-business case studies — Rolls Royce Total Care, Arvato Lead Logistics Services, and Hewlett Packard Managed Printing Solutions — outline how they have proactively driven such a business model transformation.

### 2.3.1    Case Study: Rolls Royce Total Care

With Rolls Royce's Total Care offering, an airline can buy "operating aircraft miles" as holistic solution instead of purchasing engine products, paying maintenance fees, and investing in infrastructure [Rolls Royce, 2010; Linz, 2009c]. The airline orchestrates the customer problem resolution process end-to-end across functions, divisions, partners, and so on to deliver against a service-level agreement with their customer/consumer. To achieve this, Rolls Royce has transformed itself from a product company with loosely coupled functional silos into a services-driven, SLA-oriented provider for total solutions and integrated firms (see the transformation in Table 2.1).

|  | **Function-Oriented Enterprise** | **Service-Oriented Enterprise** |
|---|---|---|
| Customer offering | Product-oriented with engine, aftermarket spare parts, and support | Solution/ SLA-centered via operating aircraft miles ("power-by-the-hour") |
|  | Independence from effective usage, product purchase and recurring support costs occur, and investment in support infrastructure is required | Price linked to effective consumption of service level (pay as you go) leads to more manageable expense stream |

**Table 2.1**    Rolls Royce Function-Oriented vs. Service-Oriented Enterprise

| | Function-Oriented Enterprise | Service-Oriented Enterprise |
|---|---|---|
| Business model | Volatile top line because product revenues are directly linked to economic cycles of airline industry | Predictable revenue flows and a stronger top line and margin position due to higher service profitability |
| Value creation coordination | Hierarchy with loosely coupled functional silos<br><br>Maintenance's job was to maintain, support's job to support, manufacturing's job to build, and so on | Integrated firm orchestrating a business network for end-to-end-process performance<br><br>Measurement and analytic capabilities to monitor and proactively respond to changes that could affect their SLA |

**Table 2.1**    Rolls Royce Function-Oriented vs. Service-Oriented Enterprise  (Cont.)

## 2.3.2     Case Study: Arvato Lead Logistics Services

Arvato Logistics Services is a subsidiary of Arvato AG, the international media service provider of the Bertelsmann Group. As a lead logistics provider (also a fourth-party logistics provider), they design, orchestrate, and manage significant portions of the outsourced supply chain on behalf of their customers [Arvato, 2010; ARC, 2005].

The goal was to benefit from blurring the borders between the out-sourcing manufacturer, in-sourcing logistics service providers, and their partner/supplier ecosystem and move into more sophisticated, more complex, higher-margin logistics services (refer to Table 2.2).

Arvato Logistics Services was founded in 1964 as Bertelsmann Distribution. They have transformed their business model and now act as a global supply chain manager. Their service offering comprises end-to-end supply chain solutions including customer service, sourcing, production, procurement, warehousing, order-entry, distribution, after-sales services, and financial services. Their core competency is the orchestration of various logistics offerings (transportation, warehousing, value-added services) from several specialized providers without necessarily owning the related assets. Customer value is created through end-to-end process visibility and orchestration.

| | Function-Oriented Enterprise | Service-Oriented Enterprise |
|---|---|---|
| Customer offering | ▸ Regional offering specialized in one category of basic services (e.g., transportation, warehousing); partly extended into more complex services (e.g., fulfillment, global trade, value-added services)<br><br>▸ Short-term, tactical focus on transaction costs | ▸ Global end-to-end supply chain solution (one-stop shop)<br><br>▸ Arvato Logistics coordinates various logistics and information-intensive services including product development, sourcing, financing, and logistics<br><br>▸ Deep relationships with their customers and long-term contract based over multiple years |
| Business model | ▸ Transaction-driven revenue portions<br><br>▸ Commodity services with low margin due to both high price pressure and asset and people intensity | ▸ Predictable revenue flows and a stronger margin position due to higher profitability driven by supply chain design and management and related value-add services<br><br>▸ Created new business models and revenue sources through increased flexibility |
| Value creation coordination | ▸ Specialized logistics provider with typically vertically integrated value chain delivered via own people and assets | ▸ Arvato Logistics manages a worldwide business network (ecosystem) of partners and suppliers along the value chain to accomplish end-to-end supply chain processes for a specific customer |

**Table 2.2**  Arvato Function-Oriented vs. Service-Oriented Enterprise

## 2.3.3  Case Study: Hewlett Packard Managed Printing Solutions

Hewlett Packard, as a provider for managed printing services today, runs on behalf of their customers complete office solutions over a one- or multiyear contract period out-of-one hand [HP, 2006, 2010; IDC, 2010]. This entails the management of fleets of printers, scanners, copiers, and facsimile machines and includes value-added services — beyond simple break-fix and ink/toner supplies replenishment—such

as installation services, lifecycle management, device usage monitoring/reporting, help desk support, and consulting/implementation services.

Hewlett Packard has transformed itself from a vertically integrated producer and seller of primarily hardware devices into a solution provider that integrates work-flow knowledge and technical competencies for holistic and customer-individual office printing solutions (see Table 2.3).

| | Function-Oriented Enterprise | Service-Oriented Enterprise |
|---|---|---|
| Customer offering | ▶ Device-oriented with (personal) printers, peripherals including device guarantee<br>▶ Installation and maintenance of infrastructure not in scope but locally managed by customer organization | ▶ Printing solution/workflow-centered including value-added services and on-site personnel.<br>▶ With Printing Payback Guarantee, HP commits against projected efficiency increase |
| Business model | Blade-and-razor-type business model with recurring cash streams from (relatively expensive) genuine spare parts and expendable items | ▶ Predictable revenue flows and a stronger margin position due to higher profitability, especially of value-add services<br>▶ Plannable one- or multi-year contract for the outsourced management |
| Value creation coordination | ▶ Product-focused organizational entities optimized for economies of scale<br>▶ Different sales and go-to-market organizations address large enterprise customer with their printing and imaging offerings | Integrated business unit enterprise printing and imaging solutions since 2006, which orchestrates customers' end-to-end business process requirements across specialist centers in technology, services, and workflows and vertical applications and HP capabilities |

**Table 2.3** HP Function-Oriented vs. Service-Oriented Enterprise

## 2.3.4 Lessons Learned from the Cases

Rolls Royce Total Care, Arvato Logistics Services, and Hewlett Packard Managed Printing Solutions have provided three case studies, in which these companies have transformed themselves into service-oriented enterprises. Despite the fact

that all of these cases stem from different industries and vary slightly in terms of business model, they all rely on the same pattern: Management of end-to-end processes by SLA is at the core of the service-oriented enterprise. Now the question remains: How can such a transformation be enabled? What role does IT play, and do the typical business characteristics of the service-oriented enterprise, such as service orientation, horizontal network orchestration, and open architecture, also apply on the IT-side?

From these cases we can extrapolate that service and process automation enables businesses to bring the strategic context as well as the organizational processes and technology context together for cost optimization and agility:

▶ Strategic context: Extends the value of your previous asset investments.

    ▶ Reduces unnecessary redundancy and complexity.

    ▶ Removes inefficiencies.

    ▶ Optimizes costs.

    ▶ Ensures compliance.

    ▶ Boosts productivity.

▶ Organizational context: Enables efficiency through interaction and collaboration.

    ▶ Connects with fixed and mobile people and systems beyond the traditional organizational perimeter.

    ▶ Pulls out reusable business functions from your application portfolio.

▶ Technology context: Enables access to complex, heterogeneous data sources.

    ▶ Enables information.

    ▶ Enables flexible, no boundary, any-to-any connectivity.

    ▶ Builds IT capabilities to match changing business needs using shared information and application investments.

▶ Process context: offers tools and services to help streamline business process management.

    ▶ Through processes, the different services are choreographed across disparate applications, people, and systems.

    ▶ Process automation provides complete flexibility including ad hoc tasks, ability to handle complexities of human workflow, and enforcement of workplace management policies.

▶  Continuous improvement context:

  ▶ Links people, processes, and information for your business in creating new untapped business performance and value.

  ▶ Enables various business competencies, critical for competitive advantage and differentiation, to share information and services and thereby create a new form of continuous improvement and competitive  advantage.

This list provides the means to dramatically increase the alignment and value of IT to the business. Service orientation changes the way we approach and meet the changing needs of the business — providing the basis for working smarter in relation to IT, business processes, and overall business model.

## 2.4    Information Technology as Dynamic Capability of Business  Enablement

As we have seen so far, the management of end-to-end processes by SLA is at the core of the service-oriented enterprise. Ideating such a vision is one thing; effectively implementing it in a company, however, is another. So let's look at the ambition of the service-oriented enterprise from the perspective of how it can be enabled technologically. Let's start with managing the process by SLA. Doing so requires that we define the right kinds of service levels and then associate them with every level of the process landscape. Business service levels, in turn, need to be translated into IT service levels that can be used to control IT assets throughout the entire lifecycle, from design to operations to improvement, for example, the selection of applications, the availability of information services, their performance during execution, and so  on.

The translation of business service levels to IT terms is, however, not a simple forward-mapping exercise: First, we need a common language between the two, which we will call the *translation framework*. The translation framework allows us to represent the business reality including goals, needed enterprise capabilities, business services and their SLAs, and so on at all levels of the company. Second, we want the capabilities of IT, in particular the information services provided by applications, to be exposed in that framework so that the business can "see them" and choose them according to its needs. This bottom-up projection from IT to business terms will help make the top-down mapping from business demands to IT solutions easy. Third, the IT solutions identified by this business-to-IT translation process have to be viable (it must be possible to realize them) from planning  via

implementing to operating and continually improving — within the given business constraints on time and costs.

The idea of translating business needs to IT based on business concepts, such as goals and metrics, is not new per se. In fact, enterprise resource planning (ERP) was launched as a means to address the business problems by providing off-the-shelf business solutions to the enterprise that were expected to run the business. The translation was sought by reframing the use of IT in functional business terms: Applications were named after functional areas of the enterprise, and the aspiration was to make each of them run better as a whole: logistics, accounting, and so forth.

The challenge of this concept for the service-oriented enterprise is that ERP was designed based on the assumption that once you implement it, the enterprise never stops using it — which is right because its needs are now carved in stone; however, the assumption that this can or will never change is wrong. Today, change is the only constant in business. But change is costly to digest for ERP: By being encompassing and integrated, it was relatively hard to customize at granular levels, so rather than being a friend of change, ERP has in some cases become a resistance factor. As an out-of-the-box solution to bring about change for the better, it turned against later, incremental change.

Fast-forward to the days of the service-oriented enterprise: Pressure on IT is mounting as the speed of change is incessantly increasing. Change is, in particular, not confined to the single enterprise anymore, and therefore dealing with change is not a matter of choice but of need. Today's business processes are not confined to single companies; they have been blown to bits by the pervasive presence of the Internet in the business world and now stretch across multiple companies and even time zones and continents. These days, the typical value chain comprises more than a dozen companies. Thus, the limitations of ERP have become contagious beyond the value chain of the enterprise to the whole value web spanning our business networks.

As a consequence, today's challenge for IT is that it needs to sort out how to map business to IT while dealing with the change of business models and the scalability of the business partner network or, put differently, how to make value, material, and information flow through living multipartner supply and demand networks.

To live up to such expectations, IT needs to reinvent itself. The remainder of this chapter will show us the way to this goal.

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### 2.4.1    Requirements for a New, Process-Centric IT Paradigm

Let's start by looking more closely at the two key requirements for a successful business-to-IT-translation process: accurate communication and fast    translation.

IT and business need to be learn how to accurately communicate. The still pervasively practiced methods for requirement gathering and translation — involving expert interactions and the creation of written specifications — get lost in an ocean of stakeholders and iterative translations. In that process, the business reality represented losses to make business sense and becomes unduly "technified." IT needs to ensure that business objectives drive the communication end to end for the service-oriented enterprise.

Beyond accurate communication, we need fast translation. Expect that the demands on the responsiveness of IT to changing business conditions will be no less than exorbitant. For example, consider WYSIWYG-type business modeling and the processing of what-if alterations in real time. This requires that the translation framework be algorithmic; that is, it can be processed automatically, possibly even without human intervention.

Both outlined requirements can be addressed by realizing a translation framework that shows how the business perspective and the IT perspective can be mutually mapped. The ideal vehicle for mapping the two perspectives onto one another is the layer of business processes: It is in the process landscape where business strategy meets execution. If we are to improve the execution of the strategy, we should t improve the value contribution and effectiveness of its execution through supporting processes. This holds true independent of whether a given process is executed manually or in an automated way, with a supporting IT solution. In the latter case, and taking our translating framework perspective, the supported processes become the linchpin between the business strategy and IT sustaining its execution: It is at the level of processes where our preferred translation framework understands where and how IT should be employed for the support and execution of the business strategy.

This leaves us with the question of how we represent this business-to-IT linchpin in the translation framework. We must go back to our requirement for a fast translation framework; we will represent process models in a formal way, using a formal language with established modeling conventions suited to describing processes such that they can be processed by machine.

In summary, the translation framework at the heart of the new IT therefore has to be implemented in a modeling language with process definitions in its center (see Table 2.4).

| Real Entity | Modeled Aspects | Example |
|---|---|---|
| Business goals | Objectives and measures | External drivers |
| Business competencies | Service levels to customers | Service performance |
| **Business process** | **Internal and external structures** | **Activities, events, actors, inputs, outputs** |
| Supporting IT capabilities | Service levels to p | Service availability |
| Technical landscape | Elementary IT components | Existing applications |

**Table 2.4**  Levels of the Business-to-IT Translation Framework

Providing a translation framework with the above modeling elements in order to represent the essential layers of business and IT, and ensuring that the models can be read and processed by machine is not enough. As we said, we need the framework to be business-fluent such that it can capture requirements *intuitively*. This requires that all aspects of business reality (goals, capabilities, and processes) are captured at the right level of our framework. But just representing them is not sufficient; they also need to be connected in the right way. Let's break down this linkage from the top.

As elaborated in Chapter 1, when you analyze business models, you find that they contain information on future revenue, gross margin, working capital, investment, and so on. Consider these types of information as stated business ambitions. Each of those ambitions corresponds to a set of business *capabilities* that define what the enterprise needs to be capable of doing in order to fulfill them.

For our purpose, it is crucial to understand which competencies are the essential ones to have in place. Beyond listing and classifying enterprise competencies, you must identify which CCCs are crucial to realizing the strategy and separate them out from those that only support NCCs. By identifying the CCCs and NCCs and understanding what's essential versus supporting the list of business competencies, we establish a top-level criterion for qualifying how the enterprise should operate (selection and execution of processes) in light of what it should be doing to support its business model (fulfilling its strategy).

To break down this criterion to lower levels from business model to business execution, described in Part III Chapter 13, and in Chapter 3 on value drivers, one

would introduce a value-driven model that aligns metrics across the entire business lifecycle of planning the strategy, aligning the organization, aligning operations, executing processes and initiatives, monitoring them, improving them, and finally kicking off the next iteration of the overall strategy management lifecycle. With this value-driver-based coupling of strategy to operational plans and processes, and the linking of operational metrics to strategic metrics, we have made the translation framework truly business-fluent. With the systematic association of value and process that we have described on the business side, the service-oriented enterprise can manage its SLAs from the process level, up.

Finally, going from the process level down into IT, we need to equally link business-service-level requirements (e.g., to execute a given automated activity within a defined process) to the functions and competencies that IT provides (e.g., an on-demand information service).

That mapping of business competencies into IT capabilities is the scope of BPM and enterprise architecture: to define a consistent projection of the requirements of the business that have been pinned down in process definitions (selected following business criteria to provide business SLAs as described above), IT capabilities, and their enabling technical components.

## 2.5    Process-Centric IT Lifecycle Management

Let's briefly recap what we have discussed so far: In an effort to enable optimal IT support for the execution of business strategy, we have described the traits of a translation framework that establishes top-down alignment in principle. At the core of this framework, process models are the gateway for the connection of metrics for strategy to those for execution, including execution enabled by IT.

Our translation framework is complete; it has the power to truly put the process in the center of a tool-based lifecycle that embeds metrics and execution models, with a consistent, bidirectional mapping from the business strategy, via process definitions to execution in IT. Let's now look at how IT needs to manage the content provided by our framework.

### 2.5.1    Closing the Loop of Business Process Management

Going back to our comments on the increasing impact of change on the modern enterprise, the question is: For how long did we solve the problem? How do

we sustain the alignment that the translation framework has so nicely provided for us? All alignment, once established, will be challenged by business change, entailing a possible disconnection of strategy and execution and a break in value contribution. We still need to equip IT with the capacity for ongoing realignment to strategy. Without this dynamic capability, the ideation and adoption of new business models could easily become pointless because enterprises would risk operational paralysis.

With the framework as "plumbing" in place and content (metrics) flowing through it, we only achieve top-down mapping and alignment. The role for IT in this mapping process is to support the effective creation and maintenance of models that describe the enterprise (people, process, technology). Now, what about the execution of the modeled process? What about the monitoring?

The capabilities to analyze the modeled reality, create formal models, adjust and refine them, deploy and run them, and monitor them in execution are, taken individually, gambling table stakes for contemporary IT. Rather than creating process descriptions in a modeling environment that is solely used to capture and maintain them and then moving on to implement the processes by configuring and enhancing business applications, for the business-IT alignment to be sustainable, as we are now considering, we need IT to act not as an array of tools but as a one entity, as a type of flexible skeleton of the translation framework, enabling not only tool-based business modeling but also model-based execution including all analytics.

This requires taking the defined business process and natively representing it in IT terms such that it can run the content. Here is where IT needs to evolve from present business process management, where IT receives the information from the business and then separates out the modeling from the execution of information functions. Due to this separation, what should be a closed-loop cycle revolving around a business perspective ends up being broken into pieces that show the factual limitations of IT tooling and applications in use. Such process management only occurs in sections limited to only those part of the cycle that the specific applications and IT services can actually support.

The transformation framework that we have described here allows us to go past the present state of affairs and truly put the process in the center of a tool-based lifecycle that embeds metrics and execution models.

Providing models for execution that can also be edited and changed is not something new. However, we are aiming for a framework that provides a template of the enterprise that can be easily adjusted to changing needs, one that does not require

restarting the top-down requirements translation but is sufficiently prepared to be modified in the area that requires the change.

Again, such delta-modeling can now be achieved thanks to the business representation that includes performance goals (SLAs) at all levels and is mapped into pertaining IT elements at all levels (including the most granular IT services). Handling change here becomes a matter of testing and adopting a variant of an already existing model. A "what-if" simulation can be achieved by altering a parameter (business metric) of the already established model. In both cases, through the aligned content, an organization benefits from an automatic identification of affected and required IT elements and chooses what to do with them. With a content-rich framework, you can close the gaps in business process management that separate modeling and simulation from implementation and performance measurement and achieve true closed loop behavior, where processes iterate through analysis, design, implementation, and running/monitoring.

## 2.5.2 Accelerating the Process Lifecycle

Closed-loop business process management will still not happen unless it has acceptable parameters of cost, speed, and quality for the entire effort needed to improve the process lifecycle. We still need to understand how the new IT of the service-oriented enterprise can manage the application landscape process on faster cycles and at lower costs for change without compromising on the quality of the solution.

To answer that, let's us look at where IT can go from here. First, what are the alternatives to the existing ERP paradigm to address the cost/time challenge? One direction is to give up on the ambition of being holistic and integrated and instead focus on providing point solutions for pain areas. Adding to the idea of reducing granularity, a company should add loose coupling of solutions and obtain an on-demand cloud architecture for point solutions that would give them the "ability to use components from different cloud resources and mix and match the solutions they are seeking" [Linthicum, 2009]. Using easily consumable services of various dedicated solutions, be they on-demand or on-premise, could indeed signify a dramatic improvement in the focus areas considered.

There are two things to consider: First, the grindstone of unpredictable business change will end up challenging the selection of the problem (pain spot) and therefore the usefulness of the solution. New business requirements may render the point solution equally useless and outdated. Even if a point solution is cost-

effective when looked at in isolation, having to change it will drive up the costs of integration and cause operational problems of huge dimensions. Nimble IT like this alone won't do. It is still fundamental that the deployment speed achieved be balanced with the ability to achieve overall consistency. Point solutions lack the ability to integrate into that flux of top-down metrics-managed strategy to execution alignment, the life stream of closed-loop process management that spans the enterprise. To give a negative example, the proliferation of point solutions results in adoption of minimum standards for data exchange with other applications and, over time gives rise to *dirty data* that spreads across the application landscape and reduces the reliability and thus usability of IT.

Second, static and siloed systems that can't expose their competencies to the network of solutions will not be able to be part of the process orchestration and rapidly become a repository of legacy functionality in maintenance mode. An overarching portfolio of business content holds the key to entering into this process orchestration. Applications consistently exposed as executable models possess the right modularity to be rearranged as business and process models change.

Therefore, an IT approach needed for the service-oriented enterprise fuses the best insights from the tradition of ERP (business fluency and integration) and the still-maturing era of modularity and virtualization (service orientation, loose coupling, cloud computing). The solution is for the service-oriented enterprise to *combine* the two elements to achieve end-to-end business fluency in a network of solutions that leaves room for rapid and economical change and introduction of point solutions in a cloud that are the missing piece of the puzzle. See Table 2.5 for an example evolution of IT for the service-o enterprise.

| | Function-Oriented Enterprise | Process-Oriented Enterprise | Service-Oriented Enterprise |
|---|---|---|---|
| Main goal | Productivity | Excellence and agility | Excellence, agility, collaboration |
| Value chain | ▶ Monolithic structure of domains<br>▶ Static domains integration | Value webs spanning multiple enterprises with described interfaces | Value webs spanning multiple enterprises; loosely coupled and dynamic |
| Managerial focus on BPM | Business process engineering and management | Business process innovation | Business model innovation |

**Table 2.5**   Evolution Toward IT for the Service-Oriented Enterprise

|  | **Function-Oriented Enterprise** | **Process-Oriented Enterprise** | **Service-Oriented Enterprise** |
|---|---|---|---|
| Process landscape | Defined processes; hard to change | Defined processes; managed for change | Situational business processes |
| IT buyer | IT as buying center | IT as buying center | LOB as buying center |
| IT paradigm | System integration | Service-oriented architecture | The cloud |
| IT components managed | Systems and applications | Layers of applications | Pluggable process elements and user interfaces |

**Table 2.5**  Evolution Toward IT for the Service-Oriented Enterprise  (Cont.)

If IT has largely been about productivity, it is now about innovation through collaboration, based on an overarching information base supporting the management of business service levels: the wisdom of crowds, social networking, and cloud-sourcing. Companies must now learn how to survive and thrive in a world transformed by social technologies that are outside any one company's firewall. With such an IT department, the service-oriented enterprise can become a bold reality, clearly offsetting it from its predecessors.

## 2.6    Reaping the Promised Value of Reusing Information and Services

To wrap up the possible benefit/value discussion we will show how process- and value-centric IT lifecycle management enables us to take full advantage of one of the central tenets of SOA: reuse.

When designing IT services for a service-oriented enterprise, it makes sense to break functionality down into smaller pieces, provided that the pieces or building blocks can be reassembled, rearranged, and reused easily. This often means that more time is spent up front in designing for reuse. However, a bigger payback awaits downstream as time and budget are freed to focus on innovation, differentiation, and the overall return on investment (ROI). However, traditional development paradigms might tempt programmers to code process variation and complexity into the service itself. In doing so, the programmers make it less and less reusable over time and more and more costly to maintain, putting your devel-

opment team right back where they started. With process service enablement, business rules connections, and policies, complexity can be abstracted from the process and the services, maximizing reuse. Figure 2.2 shows how reuse and ROI build over time with an SOA approach to design.
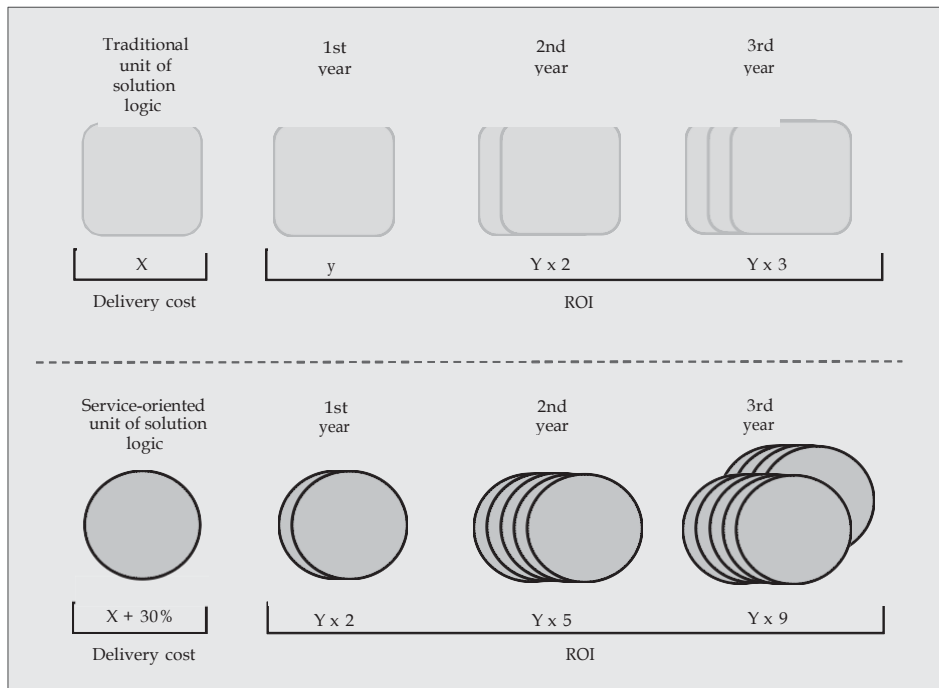


**Figure 2.2**    Formulas to Calculate ROI for SOA  Projects

Duplicate functionality and duplicate processes tend to exist almost everywhere in the average enterprise. As processes are improved by using a service-oriented approach to IT, expensive and inconsistent duplicate functionality can be diagnosed and replaced with a single reusable service. To support such an analysis for reuse in terms of tools, service registries and repositories, which are used to manage and govern service reuse, can be queried to determine whether an existing service is an appropriate candidate for saving time and money and speeding up implementation. Business process and SOA teams are perfectly positioned to guide this as they work on their improvement and design projects. As a consequence, business process logic will no longer be deeply embedded in application code, where it is locked away and expensive to change. Instead, process logic will exist in the form of high-value business services that are reusable. Processes that  use

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these services will be much more flexible and cheaper to maintain over time. They will allow businesses to achieve significantly better results in responsiveness, cost effectiveness, and profitability, as the following list of benefits shows:

▶ Reuse common functions to encourage repeatable business behavior and reduce the chance of errors in process execution or data capture.

▶ Reduce the amount of new code that must be created for business initiatives.

▶ Lower maintenance costs by eliminating redundant systems.

▶ Expedite the roll-out of new business functions by creating shareable composite services and functions from within your applications.

▶ Integrate tasks performed by your legacy applications into broader business functions to establish a simple and effective means to enhance the usefulness of backend-based information and provide the capability across more of the business.

▶ Identify already existing functions such as CRM access in existing applications and processes.

▶ Extend green-screen applications to the Web or to an SOA to realize immediate payback in reduced end-user training and improved staff productivity.

▶ Resolution through faster, simple responsiveness challenges such as technology obsolescence, skills scarcity, or significant business events including merger or acquisition.

▶ Enhance business flexibility and provide a return on investment by maximizing the reuse of services.

## 2.7    Summary and Recommendations

In times of accelerated change and increased uncertainty, a growing number of companies are increasing the service portion in their offerings, running pay-as-you-go and consumption-based business models, and creating value in customer-centric business networks together with contributing stakeholders. In other words, more and more, companies are adopting ingredients of the service-oriented enterprise paradigm.

The service-oriented enterprise needs to be supported by an IT department that is explicitly and consistently aligned to the services of the business at all levels. That is accomplished through the adoption of an end-to-end translation framework

that allows you to define enterprise goals, processes, and metrics and derive supporting business information services. Therefore, the IT organization needs to learn to execute the outputs of business process management in a native environment. If this business-IT alignment is given process management and SOA through the combination of business model, greater overall benefits can be achieved in a shorter period of time with an increased focus on projects that produce clear and measurable business results such as:

▸ Proven problem-solving tools and techniques speed analysis and technical requirements definition.

▸ Process simulation allows alternatives to be more thoroughly evaluated and tested with limited risk and without more costly real-world experiments.

▸ Reusable process and service components become business focused and, as a result, reuse increases over time, further accelerating improvements and innovation.

▸ New improvement options such as business policies, rules, workflow, and process monitoring result in more innovative and flexible improvement and design alternatives and solutions.

▸ Process measures are more predictive, results are focused, and included escalations and alerts are designed to head off problems before they grow.

With the reuse of services and the connection to processes, proposed improvements and process models can be published and shared with process workers by using a browser with embedded discussion capability. By using this discussion capability, feedback can be gathered, even remotely, prior to coding and piloting, which reduces risk and cost and facilitates buy-in and change management.

The set up for the improvement solution should include a business model, a business process linked to services, a definition of attached business rules, automated workflows with built-in escalations and alerts, and integration that automatically passes data from one participating application to another, eliminating rekeying and the associated errors. It might also include user-maintainable business rules that automate decisions and approvals and value and performance drivers. Such value and performance drivers would, as described in Chapter 3, include key performance indicators (KPIs), dashboards that link to critical success factors (CSFs), and strategic business objectives (SBOs).

Furthermore, the improvement solution should provide visibility into individual transactions that make it easier to manage running processes and guaranties greater

flexibility, which can be built into the improved process, enabling it to respond to changing conditions either automatically or manually by allowing the process owner to modify business policies or rules through a browser interface. To incorporate this flexibility in an improved or new process, process variation (which is within different business competencies and their service needs) is identified. In addition, business rules are defined in the process model. Rules and policies are expressed in business terms that are easy to understand and change with little or no IT involvement. Table 2.6 shows the as-is process and the to-be process when it is improved by using BPM and SOA technologies.

| Current State Process | Future State Process |
|---|---|
| ▶ Bottlenecks and constraints | ▶ Streamlined with automated workflow |
| ▶ Rework, errors, and exceptions | ▶ Exception-based, including alerts and escalation (out-of-bounds conditions and time-triggered) |
| ▶ Missing, incomplete information | |
| ▶ Fragmented processes that are held together through spreadsheets, rekeying, and informal workarounds | ▶ Improved access to accurate information through integration |
| ▶ Numerous approvals and audits | ▶ Rules-driven approval and routing |
| ▶ Sequential activities that create delays | ▶ Use of managed parallel activities |
| ▶ Paper-based processes | ▶ Dashboard monitoring and decision-making based on real-time KPIs linked to CSFs and SBOs |
| ▶ Lack of measures and performance indicators (decisions based on feelings vs. facts) | |
| ▶ Lack of documentation | ▶ Improved ability to respond to and implement required regulatory controls |
| ▶ Processes that are too slow and costly to be competitive | ▶ Reusable business services |

**Table 2.6**   BPM- and SOA-enabled Process Improvement

Reusable services are added to the future-state model from the service repository (service reuse accelerates implementation while reducing risk and cost). Technical attributes can be added to the process model by making it immediately usable by the applications. The model serves as a requirements contract. It is imported directly into the application development environment, creating clarity and speeding deployment of a limited-scope pilot project and eventually production implementation. PPIs, KPIs, and measures dashboards are integrated into the solution user interface, allowing all process components (applications, workflows, measures, alerts, and email) to be accessed from a single window or interface.

As illustrated in Figure 2.3, knowing which processes are the sources of differ-entiation and how they fit into the business architecture is critical to remaining competitive. Therefore, it is necessary to view the business competencies as a value-producing whole and to recognize where organizational structure either gets in the way or adds unnecessary costs. Look closely at the business model and the connected processes in a view of process architecture, as they cross organizational boundaries, and use simulation to test for the impact of improvements upstream and downstream. Connect PPIs and KPIs that measure the result of the defined CSFs and SBOs of the organization (versus the department or function alone). Deploy dashboards early on to provide needed information visibility and alert process owners to changing conditions and problems. Using an approach that aligns the business model, the business process linked to services, the definition of attached business rules, automated workflows, and value and performance drivers, you can establish the service-oriented enterprise and reach a cohesive yet agile alignment of business and IT (see Figure 2.3).

As shown in Figure 2.3, business model innovation and transformation, and the service-oriented enterprise, needs to be supported by IT that is aligned to the services of the business. There are specific tasks that must be completed by the business before successful implementation:

▶ Define business competency service needs, as described in Chapter 1, Section 1.7.

▶ Identify services that will add value to your business competencies.

▶ Define value drivers when cascading your SBOs and CSFs to measurable per-formance drivers that define operational and financial KPIs that should be mea-sured through PPIs such as efficiency, volume, cost, time, and quality.

▶ Map existing service technologies to business processes.

▶ Link processes with their respective architectures:

  ▶ Business architecture

  ▶ Information architecture

  ▶ Data architecture

▶ Develop and apply governance principles.

▶ Set implementation priorities and assess the impact of the new SOA environ-ment on legacy systems.

▶ Providing an efficient, reliable repository for process artifacts.

▸ Support real-time continuous improvement.

▸ Translate design into execution.

**Business Architecture**

| Business Administration | | | | Business Operations | | | |
|---|---|---|---|---|---|---|---|
| General Administration | Human Resource Management | Information Technology | Operations Support | Business Development | Operations | Distribution | Marketing, Sales and Service |

Business Process Performance Monitoring and Optimization

Strategic Business Objectives | Strategic Business Objectives

Critical Success Factors | Critical Success Factors

| Strategi Planning | Organizational Planning | IT Planning | Operations Support Planning | R&D Planning | Operations Planning | Distribution Planning | Segmentation Planning |
|---|---|---|---|---|---|---|---|
| Legal & Regulatory Affairs | Recruitment | Deployment | Assets | Product Design | Component Manufacture | Scheduling | Selling |
| Information Analysis | Administration | IT Business Management | Quality | Research | Operations Procurement | Order Fulfillment | Market Analysis |
| Project Management | Benefits | Risk & Compliance | Environment & Health | Production Setup | Product Manufacture | Transportation | Channels |
| Finance | Performance Evaluation | Information Management | Sourcing & Procurement | Intellectual Property | Inbound Inventory | Import & Export | Brand Management |
| Facility Management | Compensation | Service Delivery | Safety & Security | Product Deployment | Product Assembly | Distribution | Customer Account |
| Accounting | Education | Development | Equipment & Plant | Content | Refining | Finished Goods Inventory | Customer Acquisition |
| Travel Management | Payroll | Support & Relationship | Data Management | Product Maintenance | Packaging | Costing | Servicing |

**Process Architecture**

Key Performance Indicators

Business Process Modeling and Analysis

Process Performance Indicators

**Information Flow**

Business Rules Management

Enterprise Business Process — Business Service / Business Service — Business Process — Business Component / Business Component — Business Goal

(Enterprise) Services Repository

Metadata Repository
- Category
- Version
- Cost
- Any SLA's

Process Automation and Service Orchestration

Review / Evaluate / Store / Process / Inform

**Service Flow**

SOA and ESB

Connectivity to and from implementation services | Routing | Pub/Sub | Transformation | Mediation
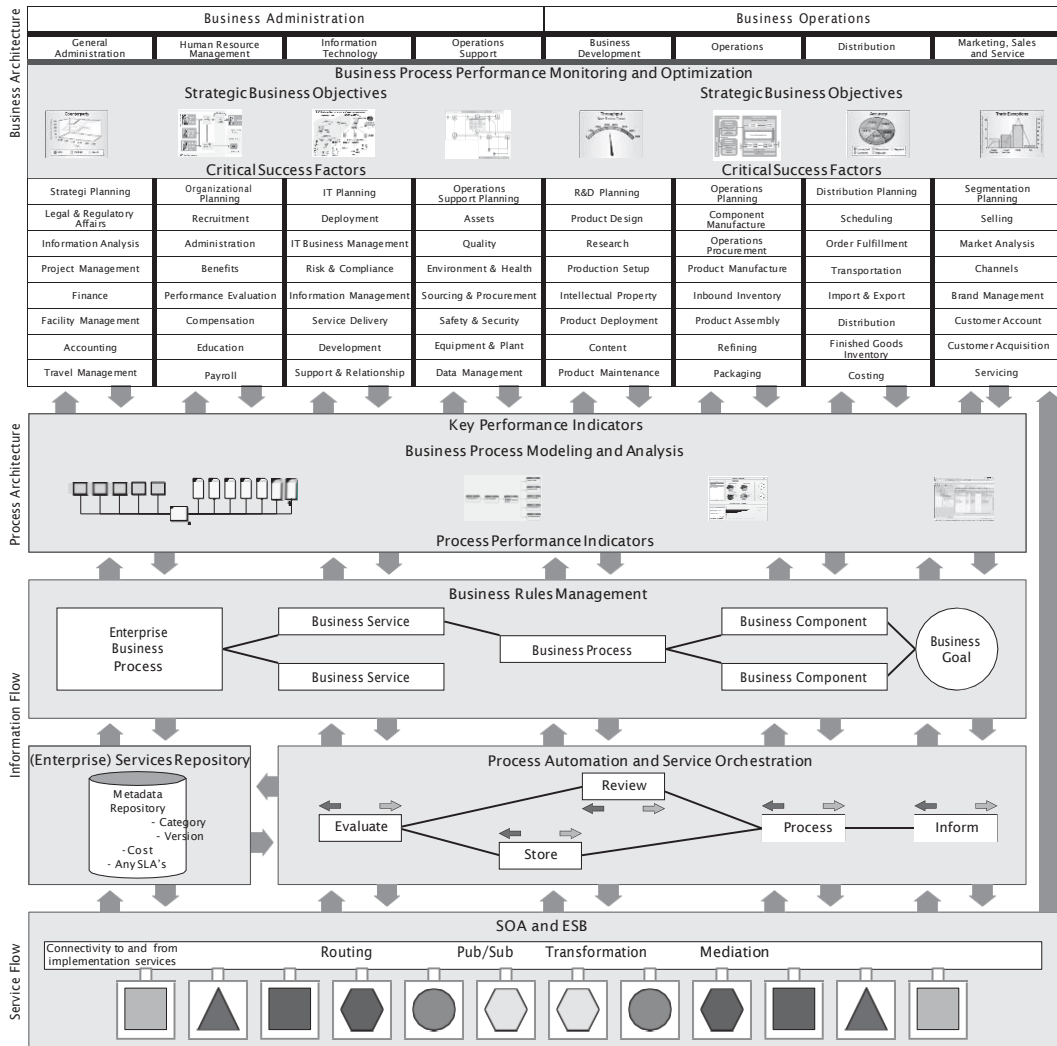
**Figure 2.3** Framework for Alignment of Business and IT

We can conclude that enabling business competencies with services built on SOA-based processes and backed by process-centric IT lifecycle management can dramatically increase the rate of operational improvement while freeing time and

resources to focus on new opportunities, business innovation, and growth. In the end, service-oriented enterprises are not just rewarded with affordable and reusable technology; they achieve the process flexibility needed to quickly serve new customers and launch new lines of business.