

"A must for those who want to jumpstart their learning of SOA. A great starting point in SOA for any IT architect, designer, or developer."

—**Claude Baillargeon**,
Senior IT Architect, La Capitale

"This book will be an invaluable guide as I continue my journey along the service-orientation path."


—**Christian Garcia**,
Vice President, Conning

Next Generation SOA

A Concise Introduction to Service Technology & Service-Oriented Architecture

Co-Authored and Edited by Thomas Erl, World's Top-Selling SOA Author
Co-Authored by Clive Gee, Jürgen Kress, Berthold Maier, Hajo Normann,
Pethuru Raj, Leo Shuster, Bernd Trops, Clemens Utschig-Utschig, Philip Wik,
Torsten Winterberg

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Praise for this Book

“A must for those who want to jumpstart their learning of SOA. A great starting point in SOA for any IT architect, designer, or developer.”

—*Claude Baillargeon, Senior IT Architect, La Capitale*

“What a monumental achievement! This book provides practical insights into next generation SOA for practitioners and newbies. It is a must-have compendium for anyone in the field of SOA.”

—*Jean Bernard Mathias, Tolmai*

“SOA makes the world go round! Even more so, with the recent explosive growth of cloud computing and the billions of connected devices and apps. *Next Generation SOA* gives excellent, practical guidance on envisioning, architecting, and designing innovative service-oriented solutions in this new, always-online era.”

—*Gijs in 't Veld, CTO and Cofounder, Motion10*

“This is the perfect book for anyone who wants to refresh or get a handle on the foundations of SOA without delving into the deep technical details and implementation specifics. By working from the principles, the book shows how the SOA concepts and goals have matured, influenced, and grown with technologies such as master data, virtualization, and cloud. The book points to other volumes in the series for the depth of detail and technicalities, allowing you to get the broad picture view without any vendor coloration.”

—*Phil Wilkins, Enterprise Integration Architect*

“*Next Generation SOA* elucidates the foundational principles of service-orientation in a concise and insightful manner. The core concepts presented within its pages are indispensable for gaining the insight and understanding to become a competent SOA practitioner. This book will be an invaluable guide as I continue my journey along the service-orientation path.”

—*Christian Garcia, Vice President, Conning*

“An excellent source for next generation SOA architectural patterns and solution orchestration, reflecting the perceptual mapping and processing of business patterns in alignment with the emerging technological transformation holistically.”

—Ahmed Aamer, *Sky Computing Pvt. Ltd.*

“Whether you’re a business decision maker or technologist, this book is a great read for those needing to grasp the complexities of SOA and its evolution to today’s emerging architecture landscape with real scenarios demonstrating the application of service-orientation.”

—Neil Walker, *Enterprise Architect/SOA Specialist, Mindtree*

“A power-packed introduction for newbies and a great reference for SOA practitioners. This book does it all and explains further in a concise manner the relevance of the service-orientation design paradigm for next generation architectures.”

—Abhijit Karode, *Head of Architecture (AST), iNautix Technologies India Pvt. Ltd. (a BNY Mellon company)*

“This book is a clear, concise, and very concentrated resource for relevant vendor-neutral service principles and technologies, for API and cloud, and definitely beyond. What I like especially is that this is finally a book that incorporates the heritage of the SOA Manifesto to complement the traditional theoretical approach that many books expose, with real-life mechanisms to bring balance (choosing the right priorities) to the decision-making involved with service architecture and service-orientation.”

—Roger Stoffers, *Senior Solution Architect, Hewlett Packard*

“The SOA landscape is changing so fast. With cloud, mobile, and social media so prevalent today, the conversation about SOA needs to go beyond the basic web service. In *Next Generation SOA*, Erl and his team explore the new frontier and introduce the technologies we all need to leverage to stay agile in this fast-paced IT world, which is really what SOA is all about!”

—Karen Patton, *Manager Solution Architecture, Shaw Communications*

“This book gives a clear overview of what makes SOA stand out now and in the future, while at the same time putting focus on those details that matter. This makes it not only a perfect starting point for novice people in our field, but also a great companion to the other books in the *Prentice Hall Service Technology Series from Thomas Erl* for the more experienced SOA professionals.

“Finally, its relatively small size and price make it an ideal give-away present to those who may not be directly involved in SOA projects but still are or should be interested in the subject at hand.”

— *Marco Fränkel, Service-Oriented Architect, The Future Group*

“Get an overview of how the SOA landscape has changed recently due to the advent of virtualization, cloud computing, big data, and mobile computing. Without getting into the intricacies of implementation, it provides a quick walk-through of concepts required for executives and IT professionals for their next SOA initiative.”

— *Sanjay Singh, Certified SOA Architect, VP Engineering, ATMECS*

“*Next Generation SOA* offers a fresh perspective on core SOA design and technology topics and affirms their relevance for modern industry operating models. It is a must-read for any enterprise looking to maximize existing or future investments in SOA technology.”

— *Nicholas Bowman, Independent SOA Architect*

“As I started reading *Next Generation SOA*, I went through a personal confusion in the contradiction I felt between ‘Next Generation’ and the fact that the book is a ‘Concise Introduction to Service Technology & Service-Oriented’. I found that contradictory until it clicked: The next generation SOA is an SOA that has freed itself from its initial dependence on vendor platforms. From then on, it all made sense. As an SOA Certified Professional I have found repeatedly, in the multiple workshops I have led, that there is a loud cry for an SOA workshop for IT top management. Analysts and architects all complain about the same thing: Top management just does not understand SOA and thinks it is just a new coat of paint on an old building.

“Well, this book fills this gap to a high extent: It is short and concise enough to be read by decision makers but gives enough basic concepts on many aspects of SOA to actually understand why things in the IT department—and in the business—just will not be the same.

“The case study at the end of the book—mainly oriented at legacy issues but useful even for eGov—is superb and will give enough material for study and discussions to a generation of SOA analysts, architects, and governance specialists. It even covers SOA governance nicely.

“Just the book you needed for your boss’s birthday.”

—*Yves Chaix, Independent SOA Certified Consultant, Analyst, Architect, and Governance Specialist*

“Nowadays, various web-based service technologies have expanded and emerged, offering options to industry practitioners to choose the best-fitting technology for their organization. This book helps you to understand and find out in a comprehensive way the variety of emerged service technologies, along with their importance, key elements, and how service-orientation became the fundamental pillar. This remarkable book, Thomas Erl’s *Next Generation SOA: A Concise Introduction to Service Technology & Service-Oriented Architecture*, is an accurate and complete reference of knowledge for those who are passionate to explore and exploit the latest emerged service technology.”

—*Masykur Marhendra Sukmanegara, Advanced Technology Architect*

“I recommend this book both for SOA professionals who want to keep abreast of market trends and for professionals who wish to have their first contact with this universe. It is a very enriching and enjoyable reading.”

—*Claudia Charro, SOA/BPM Professional*

“Very good job on publishing/divulging these innovative concepts. As with Thomas Erl’s previous SOA books, this one will help people gain a better understanding of the need for service-orientation (not only in IT, but in every aspect of work life).”

—*Diego V. Martínez, IT Architect, Zurich Financial Services Argentina*

Next Generation SOA

*A Concise Introduction to Service
Technology & Service-Oriented*

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Jasper Paladino

Photos

Thomas Erl

Graphics

Jasper Paladino

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Spencer Fruhling

Briana Lee

KK Lui

Tami Young

“To my family and friends for their support.”

—Thomas Erl

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Chapter 6



A Look at Service-Driven Industry Models

The Enterprise Service Model

The Virtual Enterprise Model

The Capacity Trader Model

The Enhanced Wholesaler Model

The Price Comparator Model

The Content Provider Model

The Job Market Model

The Global Trader Model

The convergences of modern SOA practices with service technologies have been creating opportunities to form new business relationships and operational models. Intended to inspire the construction of custom models for organizations in any industry, a series of innovative models that highlight the potential of next generation SOA is explored in this chapter.

The Enterprise Service Model

The enterprise service model combines capability, business processes, organization models, and data models into a single unified view of the business and its development priorities. All of the industry models described in the upcoming sections rely on the participation of one or more service-enabled organizations and, correspondingly, the existence of one or more enterprise service models.

As a conceptual simulation of how an enterprise operates, this type of model can be applied to any organization. Developing such a model for an enterprise is valuable because any of the services contained therein can be delivered directly by IT assets using automated business processes or delivered as transactional units of business logic.

A unified model defines a physical inventory of services for implementation as IT assets and provides a common language that can be used by both business and IT professionals to better understand the other's priorities, needs, and expectations. This alignment of IT and business encourages the development of IT solutions that can map accurately to and better support business processes, which in turn enhances business efficiency in the ability to capitalize on new opportunities and respond to new challenges. While next generation service-oriented enterprises already tend to use some service technologies to optimize business operations and achieve strategic business goals, new business opportunities can uniquely drive IT to embrace other, more diverse service technologies in an effort to leverage best-of-breed offerings.

Enterprises can have a large inventory of shared and deployed business services ranging from basic business transactions to automated, complex, or long-running business processes. With a well-defined enterprise service model of primary business activities, enterprises can prioritize solutions and leverage business models that provide the

foundation for reusable services. Solutions might include discovering new potential business partners, comparing vendor deals, and on-boarding new vendors. A well-defined service model offers a service consumer-service provider approach to conducting business between operating units within the enterprise and between the enterprise and its business partners.

Next generation SOA allows for the creation of a complete ecosystem that connects and supports both business and IT, providing full integration of business objectives, operations and processes, standards, rules, governance, and IT infrastructure and assets. Enterprises can base their information models on industry standards to facilitate the interoperability of custom services with business partners and other third parties.

The first step in developing an enterprise service model is to define high-level services that are then decomposed into progressively finer-grained services representing business activities, processes, and tasks. The service inventory contains all of the services from the service model that have been physically realized as IT assets. These services can be purchased commercially, developed internally, or provided by third parties.

The service approach readily identifies repeated tasks that are common to multiple different business units and business processes. Reusable services that perform these repeated tasks should undergo automation only once to avoid unnecessary duplication and simplify the overall complexity of the IT domain. Some utility-centric services, such as those that provide security, monitoring, and reporting-related processing, are highly reusable across all business domains. Since the physical services in the inventory mirror business processes, activities, and tasks, monitoring their execution can provide a real-time picture of how the enterprise is performing relative to its business targets, which is generally unachievable with commercial application packages.

The Virtual Enterprise Model

In the virtual enterprise model, companies join together in a loose federation to compete with major players in the same industry. The virtualization of a collective enterprise enables the member enterprises to collaborate on a specific business opportunity, and affords them the freedom of rapidly disbanding with relatively little impact on the individual enterprise. A virtual enterprise is a dynamic consortium of small and medium enterprises (SMEs) that have agreed to combine efforts to create a joint product or to bid for a major contract. Large corporations may also form consortia for large-scale projects. By leveraging cloud computing advances, virtual enterprises can become indistinguishable from physical enterprises as far as externally-facing customers and

users are concerned, since they typically have minimal physical presence and often little to no in-house infrastructure.

Members of the consortium may compete with each other outside the agreed scope of the virtual enterprise's area of operations. This model allows small businesses to compete for major contracts or create products of higher complexity. Each consortium member contributes their existing skills and capabilities, and benefits from the ability to collectively achieve a result that none could accomplish individually. Opportunities, profits, and risks are shared across the consortium.

In this highly flexible model, virtual enterprises can form, expand, contract, and dissolve rapidly and inexpensively to meet market opportunities after establishing collective trust. Effective governance is required to coordinate the efforts of individual consortium members, and SOA technology can enable the integration of supply chains across the entire virtual enterprise. Service contracts and interfaces provide for clear communication between consortium members, while facilitating the addition and withdrawal of members to and from the virtual enterprise without requiring major changes to their infrastructure.

Many cross-enterprise business processes can be automated. The monitoring and reporting of automated processes and transactional service executions provides consortium members with accurate, realtime data on the state and operations of the virtual enterprise. This business model is mainly relevant for the manufacturing, distribution, retail, and service industries, as well as business opportunities provided by one-time events like the Super Bowl or Olympic Games.

A simple but promising variant of this approach would be an entrepreneurial organization whose business model is to act as a virtual holding company. A virtual holding company creates and manages virtual enterprises without being an active participant in the manufacturing of products or service offerings.

The Capacity Trader Model

In the capacity trader model, IT capacity is sold to customers as a commodity in a cloud computing environment. Parties with spare IT capacity sell to clients who require extra capacity. IT capacity traders buy and sell IT capacity to commercial users. Typically, these users operate in a different time zone and will use the purchased capacity outside of the capacity trader's normal working hours. Capacity may also become available as the result of an oversized data center, a reduction in processing demand caused by business losses, or an overt business strategy.

Some organizations use the capacity trader model as a foundational business model to create IT capacity for sale to commercial users, while others offer capacity brokerage services and sign up multiple small capacity traders to create a high-capacity bundle that can be marketed at a premium. The capacity trader model is the 21st-century equivalent of the data center of the 1970s. Amazon.com, Inc. was the first company to sell its extra computing capacity, and many large computer companies have adopted this model to follow in its footsteps.

The Enhanced Wholesaler Model

According to the enhanced wholesaler model, the high speeds at which service-oriented automation enables wholesalers to receive contract bids from suppliers allow the wholesalers to respond more dynamically to demand, reduce, or even eliminate storage costs, and maximize profits. Traditional wholesalers buy products from multiple suppliers to sell to individual customers. The enhanced wholesaler model relies on one-stop shopping to meet customer needs for a range of products and reduce unit costs by purchasing large quantities from individual suppliers.

This model is in sharp contrast to the base wholesaler business model, where the wholesaler purchases goods or services from suppliers to sell them to customers at a profit. The enhanced wholesaler can secure the best deals from many potential bidders, and, if necessary, combine their offerings to meet each customer's requirements. It can further charge a commission for locating and introducing customers to suppliers.

Service technology improves on the enhanced wholesaler model by enabling the wholesaler to expand its network of suppliers and customers. The creation, enforcing, and monitoring of formal contracts helps the wholesaler maintain multiple business relationships, while the global nature of the Web has increased opportunities to trade over great distances. Warehousing costs may be eliminated in some cases by using drop shipping, where the manufacturer delivers the goods directly to the end user.

The Price Comparator Model

The price comparator model is where a commercial organization compares the bids of multiple competing suppliers to find the best possible deal for a potential customer. Price comparators perform the service of requesting and managing quotes from multiple competing companies for common commodities, such as insurance, hotel accommodation, or rental cars. Profits are based on commission per sale and a commission fee is typically charged to the successful vendor.

In many cases, price comparators give potential customers access to multiple quotes for common goods or services through a dedicated Web site. The visitor first enters their details to contact multiple potential vendors for different quotes before selecting a preferred option based on a combination of features and price and making the purchase. In such instances, the price comparison site takes a commission on the purchase.

Unlike enhanced wholesalers, price comparators never own the products they market, but simply act as intermediaries between the buyer and seller. Setup costs are low, but a substantial investment is required for advertising if the site targets private customers, as there is massive competition in some industries. Service technology enables price comparison sites to contact many potential providers in parallel and then rank and display their offerings in realtime. Financial details of the purchase transaction can be exchanged securely and promptly. This model adapts to any industry that markets goods and services to the general public.

The Content Provider Model

Content providers create information feeds containing textual, pictorial, and multimedia data for service consumers to access. Increasing availability of high-bandwidth communications has resulted in significant growth in the amount of electronically transmitted information, including items like sports feeds and movies. A content provider supplies information feeds to information aggregator organizations, such as telephone companies, the press, and commercial Web sites, that make such content available to customers for a direct fee or through funding from advertisers. The owner of an electronic asset can make that content available to a wide number of information integrators.

Piracy can be an issue, especially in the software and entertainment industries. Services provide a secure channel between the content provider and the content aggregator, while service monitoring can be implemented to automate the billing process and provide an audit trail. Multimedia, software, and e-books currently dominate the content provider model. Some content providers deal directly with retail customers rather than through content aggregators.

The Job Market Model

In the job market model, enterprises locate and hire contractors that possess the skills suitable for specific tasks. In recent years, the job market has become more dynamic and fluid. It was once common for new graduates to have a single career specialization

and to even be employed by the same company their entire working life, while graduates nowadays are generally expected to have multiple specializations, employers, and careers. Increasingly more professionals are working as short-term contractors rather than as long-term employees. The job market model is a specialized form of the employment agency that maintains a database of contractors with different skill sets and qualifications to meet the specific needs of employers.

The principal differences between the job market model's contractor job center and an employment agency is that the positions filled are short-term rather than permanent, and that the contractors may be any combination of individuals and subcontracting companies. Using a contractor job center allows both the employer and the contractor to be part of a global marketplace without having to invest in infrastructure enterprises, which can reduce per-capita employment overheads and physical infrastructure costs. Business flexibility and agility can also be increased through the use of subcontractors rather than full-time employees. The number of contractors can be rapidly scaled up or down to dynamically meet business demands.

The increasing availability of high-bandwidth connectivity will enable many employees to work from rural or suburban locations, requiring a change in culture for many traditional businesses which will now need to employ individuals that they may never physically meet. Services provide a secure and precise means of communication between all parties. Service contracts provide information about the timing of requests and responses, and service interfaces allow software developers to remotely test and integrate systems code.

Service technology can automate the bidding process for each opportunity. The SOA infrastructure can use the agency to notify individuals of all of the opportunities for which they are qualified via a variety of channels, such as e-mail or instant messaging.

Most administrative processes can be automated to reduce setup and operating costs for the agency. While particularly appropriate for IT consultants, this model is likely the future of work for many professionals and administrative staff in many industries, who will either work from home or for small businesses. Contractor agents can be considered to be subcontractors in their own right. In addition to providing prospective employers with a list of candidates, they also employ the contractors themselves and are responsible for their performance. An alternative approach is to create a consultant market in which individuals or organizations bid against each other for specific contract opportunities. In this model, the contractor agency manages the bidding and vetoes or rates the bidder.

The Global Trader Model

The global trader model allows for an international marketing reach. While the Internet has certainly been successful at increasing the globalization of trade, some inhibitors still remain. The key issues involve trust, differences in commercial law and enforcement of those laws, and non-existent international standards.

Issues of trust exist whenever two organizations do business with one another. While Web standards help to provide secure communications, proof of identity, and an audit trail, they do not provide the ability to guarantee that each organization will fulfill contractual promises or that the quality of goods delivered or services performed will be satisfactory. This is especially problematic when the two organizations operate in different countries.

Differences in commercial laws and law enforcement are a problem for both enterprises and governments. Generally, enterprises cannot be confident that a foreign supplier's government will take appropriate action if that supplier breaches a business contract. Government bodies, especially those involved in customs and taxation, want to be sure that they are kept well-informed of all transfers of goods and chargeable services into and from their countries, which can be difficult to achieve if the transfers are performed electronically.

Few industries have standards that are truly international, and many countries handle business accounting and taxation quite differently. Addresses, for example, can take many different forms around the globe, while certain countries do not use a social security number or other unique identifier for each citizen. Two types of organizations known as industry watchdogs and guarantors have been established to address various inhibitors to global trade.

Industry Watchdogs

An industry watchdog is a trusted third party that has the authority to certify companies that have met a recognized set of performance standards. This helps to promote free trade by reducing the risk of dealing with unknown suppliers. On the other hand, certification is not a guarantee of quality, and certified companies that commit a breach of trust may lose their status. In some countries, the capacity of watchdogs is limited to the regulation of companies within borders, while most regulators in the United States can only operate within an individual state.

Guarantors

Guarantors use the insurance model to provide more active protection of individual business transactions, ensuring that each of the parties involved in a specific single contract fulfills its obligations. A guarantor acts as an intermediary for commercial business transactions and reimburses the customer in the event that the supplier fails to meet contractual obligations. A common method of reimbursement is for the guarantor to act as an escrow account, taking payment from the customer but not paying the supplier until the goods or services have been provided.

The guarantor can profit from this approach by earning interest on the fees held in escrow. However, reimbursing customers for high-value business transactions gone awry without a relatively high volume of business can present a risk, and excessive reimbursement can damage the guarantor's profitability. A relationship of trust with both clients and suppliers first needs to be established in order for the escrow model to succeed. A standalone retail transaction insurer could also use this business model.

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