

Combining the Service Oriented Modeling Framework™ (SOMF™) with the Business Process Modeling Notation™ (BPMN™)



By Frank Truyen
frank.truyen@cephas.cc



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Introduction

In support of the service-oriented paradigm, the service-oriented modeling framework (SOMF) defines the term “service” as a holistic entity that may encapsulate business requirements and, from a technological perspective, is identified with a software component. The “service” entity that is subject to modeling activities may be any software construct that the enterprise can draw upon, such as application, software system, system software, Web service, software library, store procedure, database, business process, enterprise service bus, object, and more.

The BPMN notation, on the other hand, is the current industry standard for modeling enterprise business processes, be it for documentation, analysis, improvement or re-engineering purposes.

The value of a service resides in addressing either business or technology needs. The focus in this paper is on the business side, specifically mapping service functionality expressed in SOMF to business process constructs modeled using BPMN. The document demonstrates the crafting of a modeling environment in which both business processes and service definitions are captured and interrelated.

Integrating the SOMF and BPMN notations is greatly assisted by the rich feature set of Enterprise Architect, the modeling tool provided by Sparx Systems.

Why BPMN + SOMF?

Consider the chief benefits of integrating these notations:

- Allows for the emergence of a modeling viewpoint wherein business process activities are directly related to the services that realize them. The current common practice of tracing process steps to systems and applications allows the business stakeholder to measure technology impacts of process changes, but does not offer the ability to analyze the consequences in terms of specific, operational, capabilities. Nor does it allow the easy detection of redundant functionality or opportunities for reuse. The introduction of services as a layer of abstraction in between process activities and technology solutions closes this semantic gap.
- In a Greenfield project, promotes the early identification of services and their functionality during the software development life cycle. This early discovery of organizational core entities --services that offer solutions to organizational concerns-- can be leveraged to promote architecture loose coupling, reduce functionality redundancy, and improve time-to-market. It also introduces the service-oriented modeling environment early in the development life cycle.
- Clarifies the direction and scope for impending software development projects.

- Enables practitioners to employ the SOMF transparency model to trace modifications to business processes and keep track on return on investments (ROI).

Pre-requisites

The reader is assumed to have a basic understanding of the [BPMN™](#) notation. For background on SOMF™, please refer to the white paper [Enacting the Service-Oriented Modeling Framework using Enterprise Architect](#) and the [series of tutorials](#) published by Lisa Gore, CTO of Methodologies Corporation on the [Sparx Community Web site](#).

Trademarks

OMG™, Object Management Group™, UML™, Unified Modeling Language™, Model Driven Architecture™, MDA™, Business Process Modeling Notation™, BPMN™, OMG Model Driven Architecture™, OMG MDA™ and SoaML™ are trademarks of the Object Management Group. Service-Oriented Modeling Framework™ and SOMF™ are trademarks of Methodologies Corporation. All other products or company names mentioned are used for identification purposes only, and may be trademarks of their respective owners.

Integrating the SOMF and BPMN Notations

Relating BPMN Constructs to SOMF Service Assets

A service can be correlated with one or more BPMN constructs at one of three levels:

1. At the *business process* element level. Such a process is executed (instantiated) as the result of a trigger event, independently of any other ongoing processes.
2. At the *sub-process* element level. Sub-processes can only come into existence as children of a higher level parent process (which itself can be a sub-process).
3. At the individual, atomic *activity* element level.

Exhibit 1 offers a sample BPMN diagram containing all three levels: the containing *business process* (highlighted in green), two *sub-processes* (yellow) and two atomic *activities* (grey). Also note the “Client Profile” and “Reservation Data” Data Objects used as process step inputs.

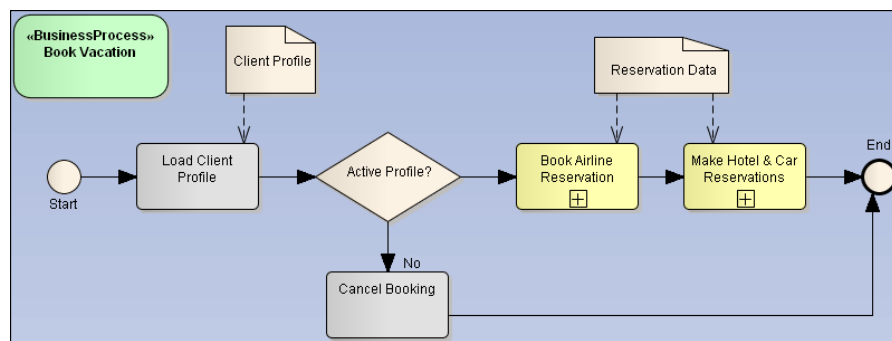


Exhibit 1: Sample BPMN diagram

Before mapping a business process, sub-process, or an activity to a SOMF service the modeler should analyze the service’s level of granularity to ensure proper integration. This granularity examination typically identifies a service with three types of granularity scales:

1. Fine-grained service: a service that is sought to contain a limited number of business functionalities –typically an atomic service.
2. Coarse-grained service: a service that may incorporate a large number of business functionalities –typically a composite or service cluster.
3. Mid-level granularity: an “in-between” fine-grained and coarse-grained service.

After performing such granularity analysis, a modeler may prefer to establish one-to-one correlation between a high level business process and a composite service or a service cluster, either of which may encapsulate a large chunk of business functionality. Accordingly, an atomic service may be mapped to a sub-process or even to a business activity.

Consider Exhibit 2 where three BPMN business processes (highlighted in green) are mapped one-to-one to corresponding services, and one child sub-process (in yellow) is linked to a fine-grain atomic service. In this example the services are in an exploratory phase, their implementation not yet concretized.

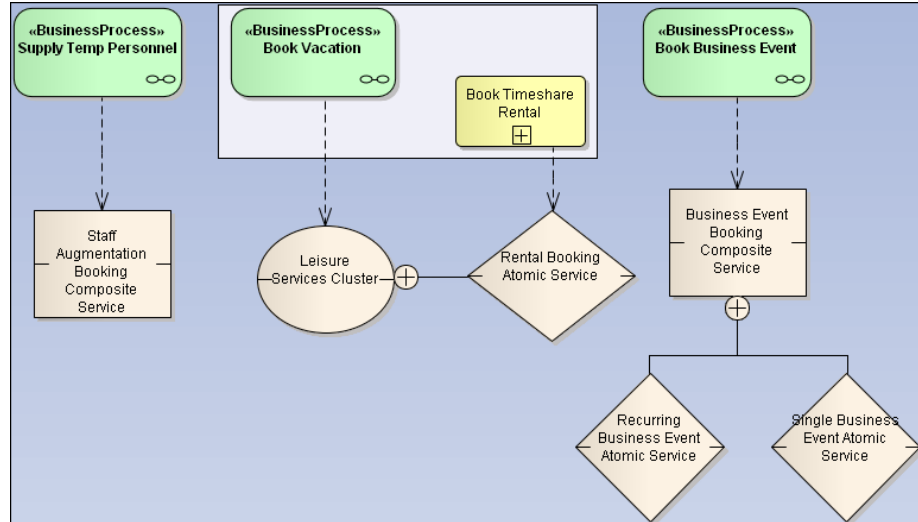


Exhibit 2: One-to-one mapping between BPMN constructs and SOMF assets

A single business process can also be mapped to multiple services, as illustrated in Exhibit 3 (in this case to one cluster and three composite services). Note that this high level mapping exercise does not preclude the option of building further traceability from its sub-process and/or activity elements down to specific finer grained service elements.

SOMF AND
BPMN
INTEGRATION

In this Exhibit the traceability is at the design level (notice the dot in the middle of each service symbol), depicting a scenario where the services have either been implemented or are nearing final specification status. To decide whether to link BPMN artifacts with analysis level versus design level services consider the following guidelines:

- Link at the analysis level when new (to-be) services are being defined. In a later development stage, design level services can be traced back to their analysis counterparts, thus completing the traceability hierarchy.
- Link at the design level when mapping to existing services.

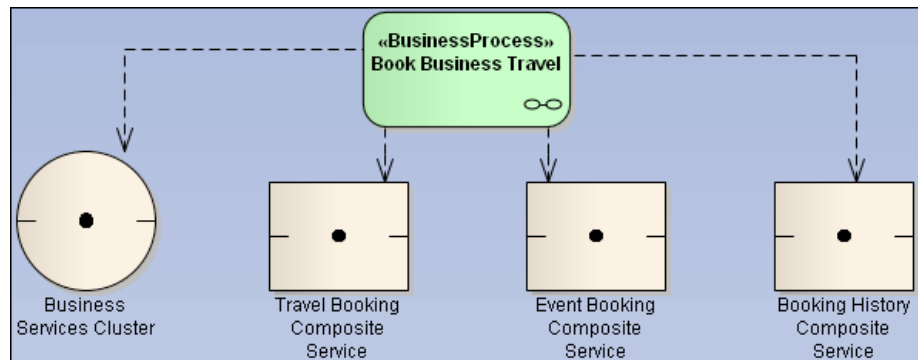


Exhibit 3: One-to-many mapping between a BPMN construct and SOMF assets

Conversely a service may also link to multiple BPMN constructs. In Exhibit 4, a single cluster service is traced to three BPMN sub-processes that will contribute to its realization.

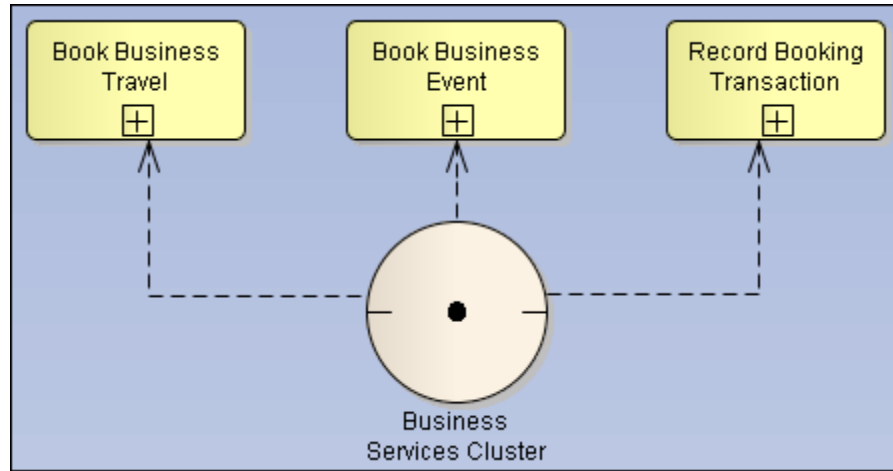


Exhibit 4: One-to-many mapping between a SOMF asset and BPMN constructs

Modeling Process Orchestration using SOMF

The SOMF Transaction Diagram can be used to depict the sequence in which business processes (mapped to services) are invoked, something that in a complex BPMN process model is difficult to represent visually.

In Exhibit 5, building on the process-to-services link shown in Exhibit 3, we now associate child sub-processes to the dependent services, leveraging the power of the SOMF Transaction Diagram to illustrate the sequence in which these processes will execute for a given scenario.

Additionally, if the business modeler defined BPMN data objects (see Exhibit 1) to document the inputs and outputs of each process, then these artifacts can be matched against the arguments of each SOMF activity connector.

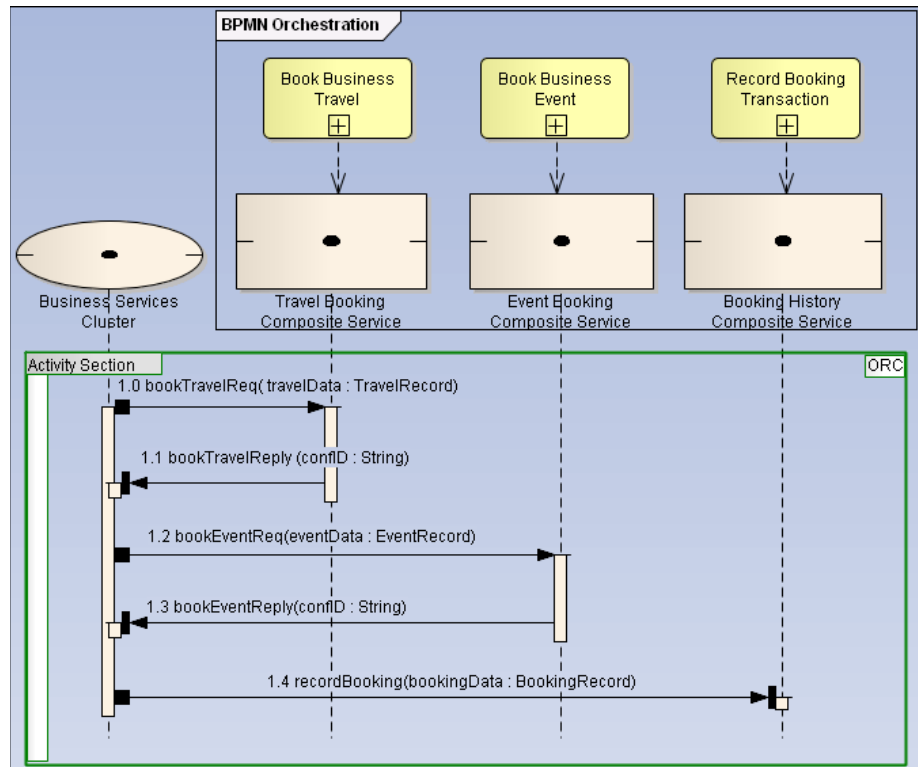


Exhibit 5: Mapping BPMN constructs to SOMF Transaction Diagram elements

Aggregating Processes using the SOMF Business Integration Viewpoint

The SOMF business integration perspective provides an opportunity for associating business process definitions with their corresponding enterprise-level business tiers, business layers, and business domains. This coupling can be used to categorize and classify processes, establish business process ownership, assign business processes to proper business organizations, and integrate services with their corresponding lines of business.

The association between process elements (highlighted in green and yellow in the Exhibits) and their business environment can be:

- direct, as shown in Exhibit 6 (business process “Book Vacation” is classified under the “Leisure Tier”, sub-process “Book Business Event” is assigned to the “Event Bookings Domain”, and business process “Book Business Travel” is assigned to the “Travel Bookings Domain”);
- or derived in an indirect way through the links between these elements and services, as illustrated in Exhibit 7 (where the domain classifications of both “Book Business Event” and “Book Business Travel” can be traced via their link to composite service “Business Event Booking”).

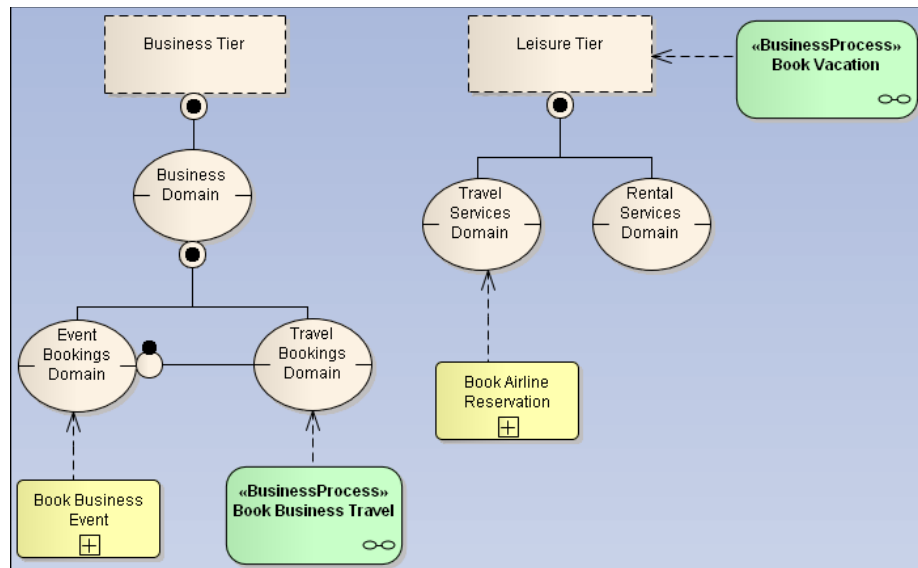


Exhibit 6: Direct BPMN construct mapping to SOMF Business Integration elements

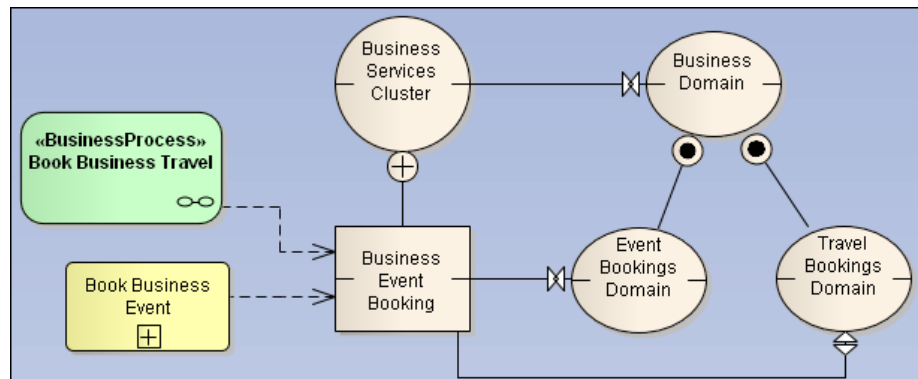


Exhibit 7: Indirect BPMN construct mapping to Business Integration elements

Documenting Process Realization using the SOMF Transaction Directory Diagram

The SOMF Transaction Directory Diagram, part of a service based logical architecture viewpoint, documents the packaged technological assets that are used to execute either business or technology processes.

To enable the conversion of abstract process models into their executable counterpart (e.g. their representation in BPEL), the BPMN 2.0 notation includes an *Interface* element for encapsulating discrete units of service behavior.

This provides yet another opportunity for smoothly integrating the SOMF and BPMN notations, as exemplified in the Transaction Directory diagram of Exhibit 8: at the top, four *Interface* elements are mapped to technological assets, while at the bottom the executable business processes are traced back to their definitions modeled in BPMN.

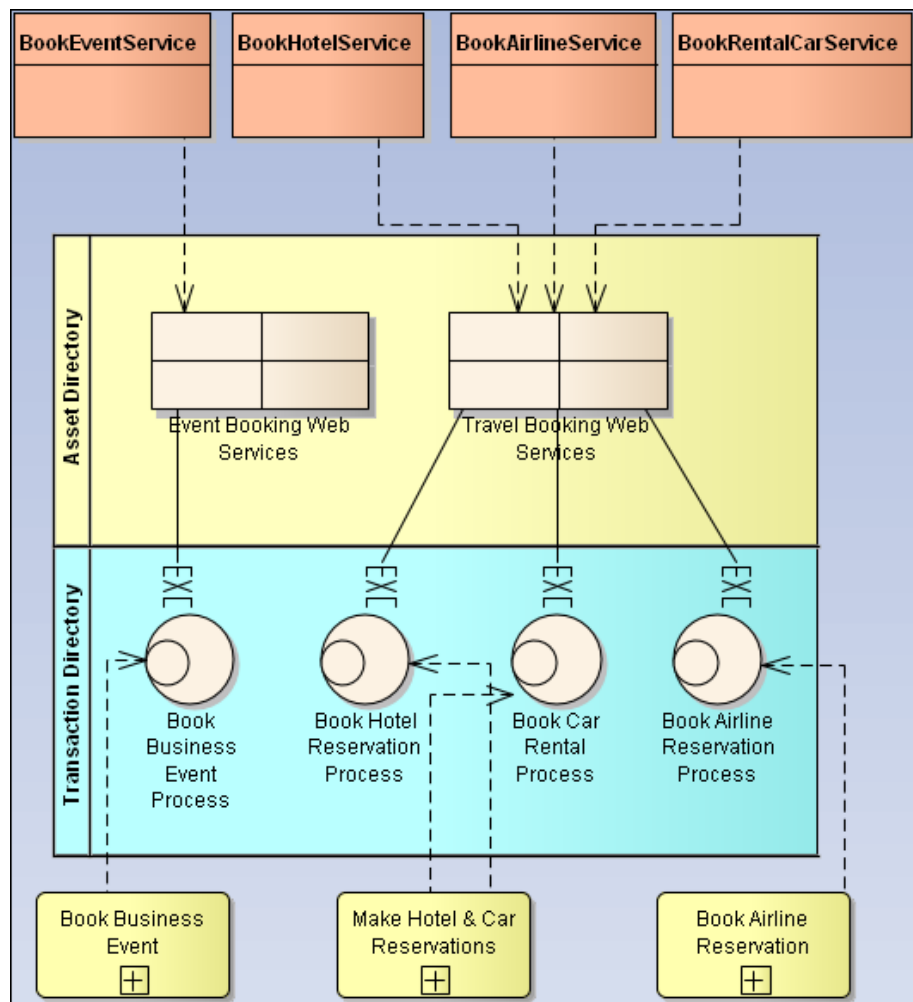


Exhibit 8: BPMN constructs mapped to the Transaction Directory Diagram

Modeling Process and Service Evolution

Over time, new business goals, compelling technologies, evolving markets and changed environmental constraints motivate reevaluation and adjustment of enterprise business processes and their enabling services.

This leads stakeholders to analyze the impact of new or updated business strategies, policies, procedures, tactics, and rules to determine the scope of future software re-engineering efforts. These activities can be accomplished in two different methods: top-down and bottom-up. The top-down approach advocates documenting the required business process changes and then applying the updates to the service portfolio. On the other hand, the bottom-up method requires re-designing the service landscape and then revising the corresponding business processes.

Process changes can be subtle, with just minor alterations to their internal flow, or quite radical when a large number of processes are re-architected, retired, merged, split, etc. The BPMN notation does not provide the means for tracking the evolution of business processes over time. SOMF, once again, comes to the rescue by offering a transparency model that can be employed to trace alteration to service functionality, service capabilities, architecture decisions, software design, and even record trends of return on investments (ROI).

Moreover, the SOMF transparency model offers analysis capabilities that can record modeling operations and actual modifications to a service and its related environment. Aggregation, subtraction, unification, decomposition, or transformation are a few alterations that may be applied during service-oriented analysis. These alterations typically will be reflected in the internal workings of the business processes.

To better understand the SOMF transparency model, Exhibit 9 provides two examples of major process and service evolution:

1. On the far left two atomic services are rolled up into a large-grain “Business Event Booking” composite service. At the process level this change is mirrored by two sub-processes (in yellow) being lifted out of their respective parent and merged into a new “Book Business Event” high level business process.
2. On the far right, a “Car Reservation” composite service is decomposed into two finer grain atomic services to facilitate their independent evolution. As a corollary, the “Make Car Reservation” business process is split into two new process elements. Further analysis, not visualized in the diagram, may determine that the composite service no longer provides any business value and that it can be retired along with its corresponding business process.

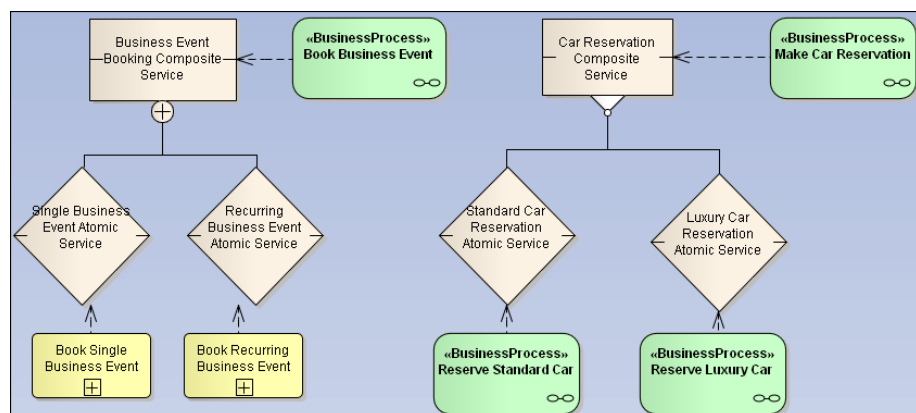


Exhibit 9: Examples of Process and Service Evolution

Conclusion

This brief foray into the touch points between the BPMN and SOMF notations should be sufficient to highlight their seamless complementarities and the good value proposition of their combined use. This blending not only empowers business stakeholders during their re-engineering work by allowing cost-benefit analysis to occur concurrently at both process and service levels, but also gives architects better visibility on how process changes will impact the service portfolio and its underlying technological infrastructure.

Finally, the flexibility of the Enterprise Architect tool comes through once again by permitting the combined use of multiple modeling notations to achieve comprehensive, high quality modeling artifacts – exactly what the User community ordered!

About Cephass Consulting Corp.

C O M P A N Y
B A C K G R O U N D

Since 2001 Cephass Consulting Corp. has been active helping its corporate clients introduce state of the art information technologies. We offer expertise in the areas of:

- . Modeling business applications using object oriented techniques
- . Building distributed component infrastructures
- . Introducing formal software development processes
- . Migrating development organizations into Model Driven Architecture (MDA)
- . Providing advanced training and mentoring

C O M P A N Y
F O C U S

Cephass specializes in introducing formal modeling practices into organizations via training and mentoring. The team of consultants and architects at Cephass draw on many years of experience working with to offer a one-stop solution addressing all aspects of managing the enterprise meta-data:

- . Training and mentoring from beginner to expert level
- . Migrating meta-data out of legacy environments
- . Setting up complex multi-User/multisite deployment environments
- . Customizing the modeling tool to respond to unique client requirements
- . Providing expert level tool support and maintenance

As a contributing OMG member, Cephass Consulting is committed to help expanding the adoption of modeling standards in the marketplace.

Our highest commitment is in achieving success through quality, and we take pride in the accomplishments of our clients.

C O N T A C T
D E T A I L S

Website : <http://www.cephass.cc>

General inquiries: cephass.contact@cephass.cc

Author inquiries: frank.truyen@cephass.cc

About SPARX Systems

COMPANY
BACKGROUND

Established in 1996 by Geoffrey Sparks, Sparx Systems is an Australian company based at Creswick, Victoria. With over a decade invested in the development of Enterprise Architect, the company's motivated team of engineers are dedicated to the ongoing development and support of modeling tools and object-oriented methodologies.

COMPANY
VISION

Sparx Systems aims to satisfy the growing needs of business and IT Users involved in software and systems development, by providing immediate delivery and ongoing support of affordable, productive and user-friendly modeling software.

Sparx Systems believes that a complete modeling and design tool should be used throughout the full lifecycle of software development. Our subscription plan reflects this, and our belief that "life-cycle" software should be as dynamic and modern as the systems you design and maintain.

Sparx software is intended for use by analysts, designers, architects, developers, testers, project managers and maintenance staff - almost everyone involved in a software development project and in business analysis. It is Sparx Systems' belief that highly priced CASE tools severely limit teams, and ultimately organizations, by narrowing the effective user base and inhibiting access to important model information. To this end, Sparx Systems is committed to both maintaining an accessible pricing model and to distributing a 'Read Only' (EA Lite) version of Enterprise Architect for use by those who only need to view modeling information.

USER BASE

Enterprise Architect is used by companies ranging from large, well-known, multinational organizations to many smaller independent companies and consultants. The Sparx discussion forum confirms a solid and active user base.

Sparx software is used for the development of various kinds of software systems for a wide range of industries, including: aerospace, banking, web development, engineering, finance, medicine, military, research, academia, transport, retail, utilities (gas, electricity etc.), electrical engineering and many more. It is also used effectively for UML and business architecture training purposes in many prominent colleges, education facilities and universities around the world.

CONTACT
DETAILS

Website : <http://www.sparxsystems.com>

Sparx Systems can be contacted at the following email addresses:

Sales inquiries: sales@sparxsystems.com.au

Support inquiries: support@sparxsystems.com.au

About Methodologies Corporation

COMPANY
BACKGROUND

Established in 2001 by Michael Bell, Methodologies Corporation is a leading business and technology modeling company that offers modern approaches to reduce enterprise expenditure, and increase profitability. These goals are achieved through adoption of state-of-the-art technologies, such as business process modeling, service-oriented architecture (SOA) modeling, and Cloud Computing modeling.

COMPANY
VISION

Methodologies Corporation facilitates business growth by providing strategy, assessment, training, and implementation services. These offerings are devised to foster enterprise assets reusability and consolidation, expenditure reduction, increase productivity and efficiency, and accelerate time-to-market through modern business and technology modeling methods.

SERVICES

Methodologies Corporation offers modeling services in the following chief categories:

- Enterprise Architecture
- Application architecture
- Business Architecture and Business Process Automation
- Service-Oriented Architecture (SOA) Modeling
- Cloud Computing Modeling
- Training

Methodologies Corporation offers business and technology modeling services to a wide range of industries, such as investment banking, trading and brokerage, insurance, government, credit card, retail, manufacturing, pharmaceutical, and publishing.

CONTACT
DETAILS

Website : www.modelingconcepts.com.

General Information: info@ModelingConcepts.com

Sales: sales@ModelingConcepts.com

Partnerships: partnerships@ModelingConcepts.com

Jobs: jobs@ModelingConcepts.com

Office: 1(866) 357-6248

Write to: Methodologies Inc. P.O Box 6586, Monroe NJ 08831