

# BPMN 2.0 HANDBOOK

Authored by members of WfMC, OMG and other key participants in the development of BPMN 2.0, the **BPMN 2.0 Handbook** brings together industry thought-leaders and international experts in this space.

Exclusive and unique contributions examine a variety of aspects that start with an introduction of what's new in BPMN 2.0, and look closely at interchange, analytics, conformance, optimization, simulation and more from a technical perspective.

The authors also address the business imperative for adoption of the standard by examining best practice guidelines, BPMN business strategy and the human interface including real-life case studies. Other critical chapters tackle the practical aspects of making a BPMN model executable and the basic timeline analysis of a BPMN model.

This book is for **business** people who want to understand the how and why of BPMN 2.0 in simple non-jargon terms and the strategy and motivation for its adoption within the corporation.

It is also for the **technical** practitioner seeking current insights into the BPMN 2.0 standard and how to take advantage of its powerful capabilities.

## Guide to BPMN 2.0 Technical Aspects

- Admission Process Optimization with BPMN
- Analytics for Performance Optimization of BPMN2.0 Business Processes
- Bespoke Enterprise Architecture: Tailoring BPMN 2.0 using Conformance Classes
- BPMN 2.0 Interchange
- Collaborative Activities inside Pools
- Making a BPMN 2.0 Model Executable
- Multi-faceted BPM
- New Capabilities for Process and Interaction Modeling in BPMN 2.0
- Refactoring BPMN Models
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- Workflow Patterns using BPMN 2.0

## Guide to the Business Imperative for BPMN

- Best Practice Guidelines for BPMN 2.0
- BPMN for Business Strategy: One Size Does Not Fit All
- BPMN for Business Professionals: Making BPMN 2.0 Fit for Full Business Use
- Business Process Integration in a Defense Product-focused Company
- Human-Readable BPMN Diagrams

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BPMN 2.0 HANDBOOK

FUTURE STRATEGIES INC.

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Nathaniel Palmer, Michael zur Muehlen PhD,  
Thomas Allweyer, Denis Gagné *et al*

# BPMN 2.0 HANDBOOK

Foreword by Bruce Silver

EDITED BY

LAYNA FISCHER

Published in association with the  
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# BPMN 2.0 Handbook

Methods, Concepts, Case Studies and Standards  
in Business Process Management Notation

Foreword by

**Dr. Bruce Silver**

Published in association with the  
Workflow Management Coalition

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*Workflow Management Coalition*



**17 Years of Thought-Process Leadership**

Edited by

**Layna Fischer**

**Future Strategies Inc., Book Division**

**Lighthouse Point, Florida**

## **BPMN 2.0 Handbook**

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Fischer, Layna (editor)

# Foreword

Finalization of the BPMN 2.0 standard in OMG marks a major milestone in the evolution of business process modeling. We now have a tool-independent graphical process definition language that is widely adopted by both business and IT for purposes ranging from basic process documentation to detailed performance analysis, requirements specification, and executable design. While the notation on the diagram surface seems little changed from BPMN 1.2, under the covers there is much that is new: a formal UML metamodel, more precisely defined operational semantics, and an XML Schema and conformance classes supporting model interchange. As such it represents “something new” for a broad spectrum of process modelers, from business process analysts and architects to BPM academics to process automation engine designers.

The *BPMN 2.0 Handbook* illustrates this diversity of interest in the new standard. In addition to discussion of BPMN 2.0’s technical features, we have examples of its application in business and government, its relation to SOA and process execution, and its suitability as a business-readable communication tool. We also have many suggestions for how BPMN could be extended, improved, or enhanced to meet the broader goals of business process management.

One thing you won’t read much about in the Handbook is the arduous path and hard work it took to complete the BPMN 2.0 specification. I was a “fringe” member of the BPMN 2.0 team from the fall of 2008 until publication of the beta spec and launch of the Finalization Task Force (FTF) in the summer of 2009. As such I got to see for myself how this sausage was made, and as you might suspect, it was not a pretty sight. I tried to represent the interests of the majority of existing BPMN users, typically business process analysts and architects modeling non-executable processes, and I often felt overwhelmed by the focus on process execution. But however frustrating the process seemed at times, it was ultimately “fair” and achieved a remarkable result. For that we owe a debt of gratitude to the managers of the BPMN 2.0 spec development effort in OMG. We owe an equally large debt to two Handbook authors, Robert Shapiro and Denis Gagné, who succeeded where I could not in two critical parts of the spec—process modeling conformance classes and a proper XML schema for diagram graphics information—developing and driving them from near-oblivion at the start of FTF to inclusion in the final standard. When model interchange among BPMN tools eventually becomes commonplace, we will all have Robert and Denis to thank.

What most people fail to realize is that a specification as wide-ranging as BPMN 2.0 is of necessity a “political” document as much as a technical one. It is a negotiated settlement of competing interests and aims. In this case, OMG initially tried to take its abstract, language-independent Business Process Definition Metamodel and simply rebrand it BPMN 2.0, even though its graphical notation, almost an afterthought, had only passing resemblance to BPMN 1.2 and its terminology no similarity at all. While that may have served the purposes of OMG’s broader Model Driven Architecture effort, it was a bit too abstract for BPM tool vendors looking to bridge the gap between business-oriented process modeling and executable process design. Led by IBM, Oracle, and SAP, a competing BPMN 2.0 proposal was put forward. In the end the two efforts were merged, although the IBM-Oracle-SAP ideas, which took the existing BPMN notation and armed each shape with execution-oriented semantics, mostly carried the day.

So, in the end, BPMN 2.0 had to accommodate and harmonize the needs and interests of three constituencies: one group thinking about executable BPMN, another thinking about a way to link BPMN to other OMG standards under the MDA banner, and a small but insistent minority pleading with the team not to forget about the vast majority of existing BPMN users, who cared little about either of those things. That might explain the seemingly odd choice of what to put in and what to leave out of the standard. There is no doubt some “pork” in there, included to win the support of some particular interest group, while something like simulation—a mainstay of most process modeling tools today and a topic covered in the Handbook—was left out entirely. But BPMN 2.0 never aspired to cover all the modeling needs of BPM. If it had tried to include the wishlists of some authors in the Handbook, I doubt we would have gotten any spec at all through the committee. BPMN 2.0 exists because it doesn’t try to do too much. Like all negotiations, it achieved as much as it possibly could get agreement on.

An unfortunate consequence of the focus on execution semantics in the spec is a bit of a backlash against BPMN 2.0 from business-oriented practitioners. We sometimes hear that BPMN is too complicated for business users, and that it mainly serves the needs of BPMS vendors. That’s too bad, because in my experience most BPMN users today are not trying to automate anything, but simply document and analyze their existing processes. The BPMN spec could have addressed that issue, but did not consider that its mission. For example, there are no rules, best practices, and diagram examples intended to promote “good” BPMN—clear, business-readable, and well-structured—anywhere in the spec. For that reason I am particularly interested in the Handbook articles by Allweyer, Silingas and Miliviciene, Kuehn et al., and Navarro-Suarez et al., all of which touch on the topic of making BPMN more consumable by business.

The good news is that we don’t have to change BPMN 2.0 in order to create “good” process models. The spec provides room to create good models just as easily as bad ones, and offers plenty of “value-add” opportunity for both tool vendors and service providers to promote (and even enforce) best modeling practices for business and technical users within the confines of the spec as it is. As BPMN 2.0 tools are only beginning to enter the marketplace, this Handbook is not the last word on BPMN 2.0, but the start of a long and lively discussion.

***Bruce Silver, Principal, Bruce Silver Associates***

# Introduction

**Layna Fischer, Future Strategies Inc. USA**

Authored by members of WfMC, OMG and other key participants in the development of BPMN 2.0, the **BPMN 2.0 Handbook** brings together industry thought-leaders and international experts in this space.

Exclusive and unique contributions examine a variety of aspects that start with an introduction of what's new in BPMN 2.0, and look closely at interchange, analytics, conformance, optimization, simulation and more from a technical perspective. The authors also address the business imperative for adoption of the standard by examining best practice guidelines, BPMN business strategy, the human interface and real-life case studies. Other critical chapters tackle the practical aspects of making a BPMN 2.0 model executable and the basic timeline analysis of a BPMN 2.0 model.

## FOREWORD

**Bruce Silver, Principal, Bruce Silver Associates**

The *BPMN 2.0 Handbook* illustrates this diversity of interest in the new standard. In addition to discussion of BPMN 2.0's technical features, we have examples of its application in business and government, its relation to SOA and process execution, and its suitability as a business-readable communication tool. We also have many suggestions for how BPMN could be extended, improved, or enhanced to meet the broader goals of business process management.

## SECTION 1—Guide to BPMN 2.0 Technical Aspects

### NEW CAPABILITIES FOR PROCESS AND INTERACTION MODELING IN BPMN 2.0

**Stephen A. White PhD, International Business Machines, and Conrad Bock, National Institute of Standards and Technology, USA**

This paper provides a high-level introduction to new features in processes and interaction diagrams in the Business Process Model and Notation (BPMN) Version 2.0. BPMN 2.0 expands the capabilities of BPMN 1.x Process diagrams, and adds Choreography diagrams and Conversations to BPMN 1.x Collaborations for business interaction modeling. Half of the paper covers new elements in Process diagrams, including non-interrupting Events and Event Sub-Processes. The other half will cover new capabilities for modeling interactions, including the use of interactive Processes with Collaborations.

### BPMN 2.0 INTERCHANGE

**Denis Gagne, CEO & CTO, Trisotech, Canada**

Interchange (via some form of serialization) was one of the most cited shortcomings of the first version of BPMN. With the advent of BPMN 2.0 it is now possible to interchange BPMN process models and diagrams. In this chapter, we abstract away from the technical details of BPMN 2.0 interchange serialization to explore BPMN 2.0 interchange from a business perspective. We start by providing some insight as to WHY BPMN 2.0 interchange is desirable. We then postulate as to WHO benefits from such interchange and what kind of benefits each stakeholder obtains from the open interchange of BPMN 2.0. We then present in simple terms WHAT can be interchanged using the various types of BPMN 2.0 models and diagrams cautioning the reader of the pitfalls from what we call the BPMN 2.0 devil's quadrants. We then argue that while BPMN 2.0 interchange standardization is required, it is not sufficient, and explain HOW interchange conformance verification and validation can act as a catalyst to universal BPMN interchange. We conclude by postulating that the answer to "WHEN will BPMN 2.0 interchange be feasible?" is *now*.

### SIMULATION FOR BUSINESS PROCESS MANAGEMENT

**John Januszczak, Vice President, Meta Software Corporation, USA**

Simulation is a traditional analysis technique in operations management. In the context of Business Process Management (BPM), simulation models can be used to perform "what-if" analysis of process designs before they are implemented, or test changes to processing parameters before they occur, such as an increase in the volume of work to be processed. Simulation in some form is supported by many Business Process Management Suites (BPMS), as well as other process oriented analysis tools. Besides process definitions, simulation models require additional data to define a scenario such as volumes of work and arrival patterns, task processing times, resource levels and availability, and descriptions of other external events that impact the work flow. Currently there are no specific standards for business process simulation. This paper provides an overview of business process simulation, the types of information required to define a business process scenario for the purpose of simulation, and a proposed standard for defining simulation scenarios that is compatible with the Business Process Modeling Notation (BPMN and XML Process Definition Language (XPDL). The article also describes how a RESTful web services API can be developed to support the standard. By providing a standard interchange format and/or a standard API, various artifacts currently available in the event logs of BPM systems could be used to generate baseline simulation scenarios useful in operational decision making and addressing near term processing issues, as well as long term process design.

### COLLABORATIVE ACTIVITIES INSIDE POOLS

**Michele Chinosi, Grantholder, European Commission, Joint Research Centre (JRC), Italy**

Choreographies and Conversations, introduced with BPMN 2.0, will make modelers able to describe interactions among different Participants as well as messages exchange. Often enough different Participants have to accomplish the same task. This can be now easily and clearly represented using BPMN 2.0. BPMN 2.0 does not specify the usage of Lanes neither their meaning. However, Lanes are sometimes used to specify internal roles or departments. In this context it could happen that modelers want to represent an Activity performed by different roles or offices together (e.g., attending the same meeting, collaborative writing of a document). Such situation has been modeled so far by using merging Gateways placed before the activities, but this patch does not solve a related problem. BPMN forces to draw elements within Lanes boundaries. This means that, at least conceptually, one Activity is lead by the subject which the containing Lane is linked to, which is not necessarily true. Some experiments revealed how much the means to model such inner collaboration is a desirable feature.

### MULTI-FACETED BPM

**Marco Brambilla, Researcher, Politecnico di Milano, Italy and Stefano Butti, CEO, Web Models S.r.l. - WebRatio, Italy**

We propose an integrated design approach to BPM that comprises modeling of business processes, application structure, master data, and user interaction, together with automatic model transformations among them. In this way, it is possible to work at different levels of abstraction and get quick prototypes to be discussed with the customers, but also generate production applications to be delivered as finalized systems. Indeed, the models allow the designers and analysts to work on orthogonal aspects of the design, and to fine tune the final application in several ways, e.g., by integrating the visual identity of the organization, plugging in new components, or connecting the business process to legacy applications via Web Services. The paper presents the different models that we deem essential for complete enterprise application design together with the model transformations among them and the benefits obtained by adopting the approach.

We describe which peculiar aspects of BPMN 2.0 have proven useful in our approach and we explain their role. We also mention which ones we decided not to support and why. To demonstrate the feasibility and advantages, we show the approach at work on a set of real industrial applications.

### REFACTORING BPMN MODELS

***Darius Silingas, Principal Consultant and Edita Mileviciene, Cameo Business Modeler Product Manager, No Magic Europe, Lithuania***

BPMN is already acknowledged as a de facto standard for business process modeling. However, it still takes a long journey to raise the maturity of business process modeling practice. The notation, examples, fundamental process patterns, and basic style guidelines are already covered in BPMN books and articles. However, in practice most business process modelers do a lot of mistakes that make their BPMN models over complex, difficult to understand and maintain. There is a lack of discussion on “bad smells” in BPMN models, and how to apply business process patterns in order to make the BPMN models compliant with the best practices. This paper is filling in this gap by identifying and analyzing the most typical BPMN “bad smells”, explaining what best practices are violated, and demonstrating how to refactor BPMN models to get rid of the “bad smells”. Each of the presented BPMN “bad smells” is illustrated by two BPMN 2.0 diagrams – the original version and the refactored version. The paper is based on extensive authors’ BPMN consultancy in banking, telecommunication, defence, and software domains.

### ADMISSION PROCESS OPTIMIZATION WITH BPMN (CASE STUDY)

***Jack Xue, Butler University and Manager of IT Architecture, Conseco Service LLC, USA***

The Business Process Modeling Notation (BPMN) is an increasingly important standard for business process design and optimization and has enjoyed high levels of attention in academic research and business practice. In this paper, experiences are shared from a project using BPMN to design and optimize an online admission process. This process is optimized by choosing a subset of incoming requests such that the revenue of the service provider is maximized. The admission decision is based on an estimation of requests’ service times, and the rewards associated with serving these requests within their Quality of Service (QoS) bounds with respect to a limited resource. Experiments demonstrated the effectiveness of the admission process in a middleware service.

### WORKFLOW PATTERNS USING BPMN 2.0

***Vishal Saxena, Founder and CEO, Roubroo, USA***

Over the past few years, workflow patterns have become a touchstone of workflow standards and products. The Workflow Patterns initiative is a joint effort of Eindhoven University of Technology (led by Professor Wil van der Aalst) and Queensland University of Technology (led by Professor Arthur ter Hofstede) which started in 1999. The aim of this initiative is to provide a conceptual basis for process technology. In particular, the research provides a thorough examination of the various perspectives (control flow, data, resource, and exception handling) that need to be supported by a workflow language or a business process modelling language. In this paper we would present how these workflow patterns can be modeled using BPMN 2.0. We will identify what are the advantages of using BPMN 2.0 when modeling these patterns. Further, we will focus on specific constructs in BPMN 2.0 that let the users extend the workflow patterns if required. Our initial intent is to target the various control flow patterns. We would cover data flow patterns as well.

### ANALYTICS FOR PERFORMANCE OPTIMIZATION OF BPMN 2.0 BUSINESS PROCESSES

***Robert Shapiro, SVP Research, Global 360, USA and Hartmann Genrich, Consultant, Germany***

We describe a new approach to process improvement based on the combined use of statistics and simulation to study the structural aspects of process models. Past efforts to use simulation focused on resource optimization have led to some significant successes when coupled with Workforce Management scheduling technology, but that approach has not been particularly successful in making structural improvements in the actual processes. The difficulty of preparing satisfactorily detailed schedules, combined with the structural complexities introduced in particular by the event and looping structures in BPMN, requires a fresh look at the problem.

### MAKING A BPMN 2.0 MODEL EXECUTABLE

**Lloyd Dugan, Senior Project Director/CTO, Information Engineering Services, Inc., and Nathaniel Palmer, Executive Director, WfMC, USA**

The advent of BPMN 2.0 provides a breakthrough in bridging the communication divide through two notable advances. One is an expanded iconic set offering more procedural and message-level behavior than before. The other, and most controversial, is a new serialization format containing implementation details for an executing platform. This chapter proposes a set of minimum characteristics for an executable BPMN 2.0 model as well as modeling guidelines that ensure modeled elements map to executing components. This approach applies to all areas of BPMN modeling, but is also necessary for leveraging the emerging class of BPMS environment where processes orchestrate services within a Service Component Architecture (SCA) composite. The result is a design pattern for implementing BPMN processes that is particularly applicable to applications that run as services and leverage SOA components.

Yet the advent of a serialization format does not alone resolve the issues otherwise surrounding executable models. Well-designed models require the first principles of modeling to ensure that design-time BPMN constructs follow the necessary characteristics of an executable model. This is particularly important for environments that purge the BPMS layer of most (if not all) core business logic, instead orchestrating invoked services that components of capabilities. In the examples that follow, this approach is illustrated by using specific task types and swimlanes to map to SCA components. Also presented is the recommended approach for mapping an XML expression of BPMN, either the serialized version of BPMN or XPD, to and from an XML expression of an SCA composite.

### BESPOKE ENTERPRISE ARCHITECTURE: TAILORING BPMN 2.0 USING CONFORMANCE CLASSES

**Dennis E. Wisnosky, Office of the Deputy Chief Management Officer, Department of Defense, and Michael zur Muehlen Ph.D., Center for Business Process Innovation, Stevens Institute of Technology, USA**

Government agencies have to fulfill their mission while being fiscally responsible and maintaining customer focus. Understanding the agencies' end-to-end processes and mission threads is essential to ensure that both performance and compliance objectives are met. Increasingly, Enterprise Architectures are used to document end-to-end business operations and to prove compliance to rules and regulations. Enterprise Architecture covers the creation of analytical or prescriptive models of organizations to understand, manage, or change the enterprise. The models that describe different architecture facets are typically organized according to the views they describe, such as process, data, rules and organization models, among others. For organizations that engage in multiple architecture projects, a systematic organization of these views is essential; only if the views and their representations are consistent across different projects can an organization efficiently identify organizational and technical interfaces, streamline cross-functional operations, and assert compliance to rules and regulations.

A number of obstacles to consistent architecture efforts exist to date: Divergent viewpoints, different frameworks, multiple modeling methods, and inconsistent interpretations of individual methods. This paper reports on the development of a methodology for the creation of architecture models that is centered around BPMN and is based on the notion of a common vocabulary.

## SECTION 2—Guide to the Business Imperative for BPMN

### BEST PRACTICE GUIDELINES FOR BPMN 2.0

**Gerardo Navarro-Suarez, Jakob Freund and Matthias Schrepfer, camunda services GmbH, Germany**

In practice modeling projects often tend to be quite large. Adopting BPMN 2.0 eases the creation of process models for business and technical projects. However, the creation of models in large modeling projects is still not a trivial task. The introduction of modeling guidelines guides and supports modeling projects. This article introduces an approach to

establish such modeling guidelines for individual modeling projects using BPMN 2.0 as modeling notation. The article discusses the concept of modeling guidelines and shows why their application can help to apply BPMN 2.0 in practice. A framework for the creation of guidelines is described in detail. Real-world examples illustrate the use of modeling guidelines and constitute the effectiveness of best practice guidelines.

### **BPMN FOR BUSINESS PROFESSIONALS: MAKING BPMN 2.0 FIT FOR FULL BUSINESS USE**

***Tobias Rausch, Harald Kuehn, BOC AG, Marion Murzek, BOC GmbH, Austria and Thomas Brennan, BOC Ltd, Ireland***

Addressing users throughout the business is one of the key goals of BPMN 2.0. At the same time “BPMN is constrained to support only the concepts of modeling that are applicable to business processes. This means that other types of modeling done by organizations for business purpose is out of scope for BPMN.” While this is understandable when defining a standard, it is essential for organizations to have support for BPM scenarios such as work instructions, organizational analysis, process costing, ICS/ERM etc.

This paper shows how BPMN 2.0 could be extended with business relevant concepts to support business-analysis (e.g. creating risk reports by assigning risks/controls to tasks). This will be demonstrated by looking at different real-life scenarios and how BPMN processes are linked with organizational data, resources, information, risks and controls and thereby allowing rich business analysis, reporting and simulation. There has been much discussion about BPMN’s first letter and this paper illustrates how users are offered both a standard for describing process models and support of their key business application scenarios.

### **BPMN AND BUSINESS STRATEGY: ONE SIZE DOES NOT FIT ALL**

***Lionel Loiseau, Head of BPM Competency Center, BNP Paribas and Michael Ferrari, Independent BPM Consultant and Business Analyst, France.***

In BPM, we would like to conciliate the management-oriented abstraction necessary to fully grasp the essence of a process with the exhaustiveness and realism that are essential to an automated solution. But one size does not fit all!

This led us to develop a classification of the various business process modeling plans and a gradual approach aimed at defining how to move smoothly from one plan to another. Our classification takes into account the required levels of abstraction, the legacy notations, the significant number of existing process models as well as the contribution of the BPMN notation.

While traditional BPMN approaches present three levels of process modeling, respectively descriptive, analytic and exhaustive, our classification connects BPMN to strategy, indicators, business rules and risks, and breaks down further the separation between general process models and organized process models. In this paper, we detail and justify our approach and our classification, as well as explain how they are used in our company. We also shed a new light on the role of the BPM analyst, an emerging position blending several skills, notations, and collaborative tools.

### **HUMAN-READABLE BPMN DIAGRAMS**

***Thomas Allweyer, Professor, University of Applied Sciences Kaiserslautern, Germany***

The Object Management Group has published a useful non-normative document for BPMN modelers: “BPMN 2.0 by Example”. While the specification of the BPMN standard describes the BPMN diagrams, elements, and their meanings, the examples document provides suggestions of how to use BPMN for modeling real processes. The reader can get valuable insights and hints for his own modeling practice. This paper discusses one of the models, the E-Mail Voting Example. The E-Mail Voting Example describes how a distributed working group discusses issues and votes on them by e-mail. This process was used during the development of BPMN. The authors claim that “This process is small, but fairly complex [...], and it will help illustrate that BPMN can handle simple and unusual business processes and still be easily understandable for readers of the Diagram”.

### BUSINESS PROCESS INTEGRATION IN A DEFENSE PRODUCT-FOCUSED COMPANY (CASE STUDY) **Kerry M. Finn, Enterprise SOA Lead and J. Bryan Lail, Chief Architect, Raytheon Company, USA**

A common language for integrating processes across silos is a significant enabler in ways both obvious and subtle. Once the business organizations that touch a product or execution life cycle can agree on the first priorities where tighter integration is very clearly going to yield measurable benefits, then the common process language immediately leads to communicating one shared model across leadership and stakeholders. From there, modern methods and tools lead to validated processes, key performance indicators that can be tracked during execution, behavior and cultural changes, and executable processes that automate and parallelize legacy practices. This paper describes how BPMN 2.0 can promote a balance of business agility and enterprise efficiency. The approach takes two tiers to execute for a product-focused company, which the authors call horizontal and vertical integration. The methods and common language around BPMN apply to internal business operations for any sizeable company; however, the approach for applying the methods to the actual products of a defense company is different. The dual benefits come from focusing on the information management for those products in either the battle-space or the business space; this paper will study both areas and deliver a common theme for BPI.

### SECTION 3—Reference and Appendices

#### REFERENCE GUIDE—XPDL 2.2: INCORPORATING BPMN 2.0 PROCESS MODELING EXTENSIONS **Robert M. Shapiro, WfMC Chair XPDL Technical Committee, USA**

XPDL2.2 is intended as a preliminary release which supports the graphical extensions to process modeling contained in BPMN2.0. In fact, the BPMN specification addresses four different areas of modeling, referred to as Process Modeling, Process Execution, BPEL Process Execution, and Choreography Modeling. In this reference guide, we focus only on Process Modeling. Within that we define several sub-classes to support process interchange between tools. This is discussed in a later section of this paper. Here we discuss significant additions in XPDL 2.2.

#### **Appendices**

- Authors' appendix
- BPMN 2.0 Supporting organizations
- XPDL Implementations
- BPMN 2.0 Glossary
- Index
- Further Reading in BPM and BPMN

#### BPMN 2.0 HANDBOOK COMPANION CD **Additional Material**

A Companion CD is planned for release in early 2011 which will contain, in addition to the full *Digital Edition of the BPMN 2.0 Handbook*, substantial material on BPMN 2.0 helpful to readers. This includes free BPMN and XPDL Verification/Validation files, webinars, videos, product specs, tools, free/trial modelers etc.

Several Handbook authors have contributed additional files and explanatory diagrams to the CD. This additional material gives readers exposure to a larger resource on BPMN 2.0 and XPDL than a book alone can offer.

An early mock-up of the CD has been posted to <http://bpmnhandbook.com/>

## Section 2

# Guide to the Business Imperative for BPMN

The following chapter is an approved excerpt from "BPMN 2.0 Handbook" published by Future Strategies Inc. It is fully copyrighted internationally and is protected by international copyright law and the Digital Millennium Copyright Act ("DMCA").

# Best Practice Guidelines for BPMN 2.0

**Gerardo Navarro Suarez, Jakob Freund  
and Matthias Schrepfer  
camunda services GmbH, Germany**

## INTRODUCTION

In practice modeling projects often tend to be quite large. Adopting BPMN 2.0 eases the creation of process models for business and technical projects. However, the creation of models in large modeling projects is still not a trivial task. The introduction of modeling guidelines guides and supports modeling projects. This article introduces an approach to establish such modeling guidelines for individual modeling projects using BPMN 2.0 as modeling notation. The article discusses the concept of modeling guidelines and shows why their application can help to apply BPMN 2.0 in practice. A framework for the creation of guidelines is described in detail. Real-world examples illustrate the use of modeling guidelines and constitute the effectiveness of best practice guidelines.

## WHAT ARE MODELING GUIDELINES?

Modeling guidelines are documents which collect and provide best practices for modeling projects. In the context of modeling guidelines, best practices are techniques, methods or examples to support process modeling. If applied in modeling projects, best practices illustrate effective ways to capture real-world scenarios in process models. These best practices derive from experience as well as from academic research. Modeling guidelines cover best practices in form of instructions or rules which should be followed while modeling business processes in BPMN 2.0. Modeling guidelines guide and influence process modelers to use best practices for process modeling. Additionally, best practice guidelines can be used to enforce specific instructions in projects.

## WHY DO WE NEED BEST PRACTICE GUIDELINES?

Modeling projects usually require the creation of several process models. These models often tend to be quite complex and large. This complexity must be dealt with by process modelers who map real-world process into process models. In real projects, modelers often lack knowledge in process modeling. Thus, they need guidance for the modeling process in order to create high quality processes. Best practice guidelines compensate these issues by guiding modelers with examples. Best practices assist modelers especially while mapping real-world processes and knowledge into process models. Furthermore, best practices help to manage and govern modeling projects especially if many models need to be created. Best practices further contribute to achieve higher quality of process models. Process modelers are advised to use modeling and visualization styles that are superior to others. This leads to more sophisticated model representations which in turn positively affect the readability and understandability of the created process models. The number of errors in process models decreases due to the increased comprehensibility. Model viewers understand the models faster and better. In addi-

tion, the purpose of process models, most often the communication between project stakeholders, is achieved at a higher degree.

### CONTENT OF BEST PRACTICE GUIDELINES

Modeling projects differ in their purposes and goals. Due to this the contents of best practice guidelines also varies. The establishment of modeling guidelines requires the availability of the scope definition of the modeling project. The guideline content should be based on this definition so that users can apply the guideline to support the project-specific goals. In practice the guideline content is divided into categories. These categories assist organizations to develop individual guidelines. Best practice examples are put into categories based on their scope. In the following we introduce and define the categories that best practice guidelines should contain. Examples illustrate the application of guidelines.

#### ***BPMN 2.0 Symbol Set***

The specification of BPMN 2.0 defines the symbols to be used for creating process models. The specification describes the syntax and semantics of all symbols. In practice, process modelers are free to choose symbols to map real-world situations into process models. Therefore, we recommend you to define the symbol set which you want to use within projects. Based on the scope of the modeling project the set of symbols should be chosen. An agreed set of symbols helps to avoid misinterpretations of symbols and supports the harmonization of process models. The symbol set in modeling guidelines is divided into two sub-categories: symbols and artifacts. Both categories are defined as follows.

#### ***BPMN Symbols***

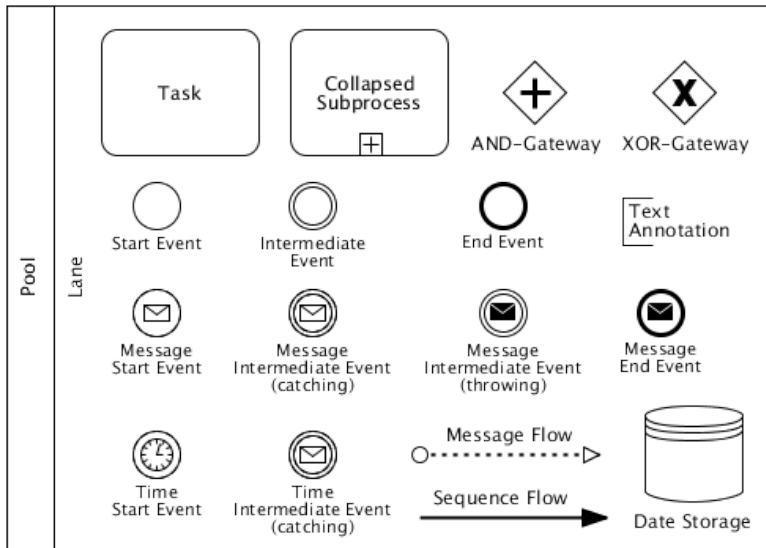
As mentioned before the BPMN 2.0 specification defines the symbols. Due to the large amount of symbols in BPMN 2.0 some elements are seldom used in actual modeling projects. The large set of BPMN symbols might be too large. Then a subset of symbols might be convenient. The restriction decreases the number of symbols which helps process modelers to focus on the actual modeling goals. However, for creating such subsets the project purposes and goals must be known. Thus, the symbol subset can differ among projects. The category contains all specified BPMN 2.0 elements except the so-called artifacts. To illustrate the application of symbol sets we describe how to define such subsets.

#### ***BPMN Symbols – Examples***

A subset defines the BPMN 2.0 symbols which can be used in modeling projects. The elements of a subset must be suitable to capture all situations of the project in process models. The subsets must be designed carefully so that they fit the projects. The BPMN 2.0 specification already provides three predefined subsets, so called conformance sub-classes: descriptive, analytic, common executable. The descriptive and the analytical sub-classes focus on process elements and a small amount of attributes. The common executable sub-class concentrates on executable process models. It contains all BPMN 2.0 symbols and a large number of attributes of process elements to prepare models for their automatic execution. In case these classes do not meet the purpose of modeling projects, individual subsets can be created. Establishing such subsets works as follows. Symbols of the specified BPMN 2.0 symbol set that are suitable for the project are taken and grouped as subset.

In order to illustrate the application of symbol subsets, the following example is used: The goal of a modeling project is to create process diagrams with the objective to document processes suitable for the management level of an organization.

To actually model such high-level processes, the full symbol set of BPMN 2.0 is not needed. Thus, we define a small subset that contains the necessary symbols. The subset reduces the amount of symbols and helps the process modeler not to get lost in details. The modeling guideline for the project describes the symbols of the subset. In Figure 1 the subset is depicted. The subset is suitable to create models that are intuitively understandable to the management level without showing too many details of the processes.



**Caption 1: A Symbol Subset for Documenting High-level Processes**

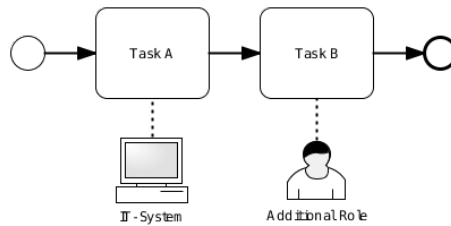
**BPMN Artifacts**

The BPMN 2.0 specification defines so-called artifacts. Artifacts can be used to provide additional information within process diagrams. They are connected to flow elements, e.g. tasks, with the help of associations. The specification allows the user to create customized artifacts which can be added to the standard symbol set. The specification defines the syntax of using artifacts so that the semantics of process diagrams is kept correctly. Modelers are free to define customized artifacts and use them within process models.

For individual modeling projects, customized artifacts are useful to highlight certain meanings within process models. The definition of customized artifacts helps to emphasize specific information in models. In such cases it improves the comprehensibility of process models. Customized artifacts help to present situations visually in a clearer and more precise way. The definition of artifacts must be based on the project purposes and chosen on individual basis. However, if artifacts are customized, their semantic meaning must be defined properly.

**BPMN Artifacts – Examples**

Figure 2 shows a process model where two customized artifacts are used. An artifact depicts an IT system, e.g. Salesforce or a SAP system, and is associated to task A. The second artifact expresses an organizational role and is associated with task B. Both artifacts add additional information to the model. The IT system expresses that task A uses the system to fulfill the task. The role associated to task B expresses that an additional participant takes part in task B.



**Caption 2: Two Customized Artifacts**

### **Modeling Styles**

The category of modeling styles contains rules that are generally known and accepted. These rules apply to all modeling projects. This type of styles does not rely on specific modeling situations or contexts. Modeling styles are also not dependent on actual modeling goals and purposes. The styles assist process modelers by guiding them with general instructions on how to create process models more effectively. Modeling styles restrict the freedom of process modelers to draw models as the modelers must apply the style definitions. These restrictions support the governance and standardization of process models. Modeling styles influence the modeling behavior of modelers which often leads to an increase in the comprehensibility of process models.

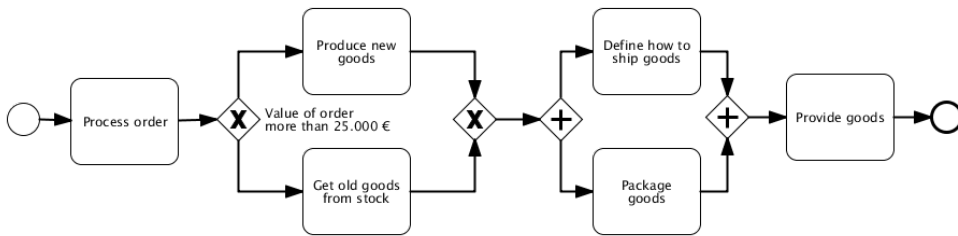
### **Modeling Styles – Examples**

In order to illustrate the use of general modeling styles we propose three examples and explain them in detail.

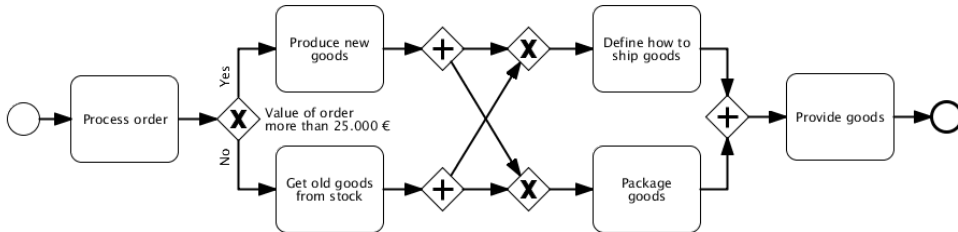
- You should model in a structured and symmetric way.
- You should decompose models with a large number of activities.
- You should use as few symbols in models as possible.

The first modeling style deals with structured and symmetric modeling. A process model is structured and symmetric if every split gateway has a respective join gateway of the same type. This modeling style leads to formations in process models that are known as blocks. Process models that incorporate block structures are easier to understand due to their increased comprehensibility. Empirical studies showed that people have difficulties to understand unstructured process models because they expect every split gateway to match its respective join gateway. Furthermore, it is more likely that unstructured process models contain more errors, e.g. deadlocks or livelocks. It must be mentioned that certain situations cannot be captured symmetrically. In such cases process models incorporate unstructured parts.

The next two figures present a scenario that is modeled in a structured and an unstructured way. Figure 3 shows the structured and symmetric process model. Notice that every opening gateway has its corresponding closing gateway. Figure 4 shows the same situation in an unstructured model. The model in Figure 4 is less comprehensible as model viewers do not recognize the model structure easily. Therefore, process modelers are advised to model as symmetric as possible.



**Caption 3: Structured Process Model**



**Caption 4: Unstructured Process Model**

The second modeling style limits the number of elements in process models. Empirical studies showed that the larger a model the more difficult it is to understand. The size of process models is thus directly connected to the understandability and error probability of a process model. Therefore, the modeling style advises to decompose process models when the number of process elements reaches a certain limit. The limit depends on a number of factors, however, we recommend to set it lower than 50. Large models should be decomposed into smaller ones with the help of sub-processes.

The third modeling style advises modelers to use a few elements as possible in process models. This style is based on similar reasons as the second one. However, as few elements as possible means that a process modeler should only use BPMN 2.0 symbols if really needed. There should be no superfluous elements in models. Process models should only contain elements that focus on the control flow in the model or those that add value to the model, e.g. in the form of additional information. Although the modeling style sounds trivial, in practice this style is not always met by modelers.

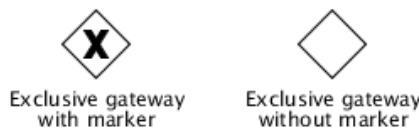
**Layout Styles**

The layout of process models is important when it comes to read and comprehend the model content. Models with improved layouts are easier to read than those whose layouts are obfuscated by means of visual cues, e.g. color or line width. Layout styles define rules that influence how modelers draw process models. Modeling notations do not define how to place elements within process models. Modelers are generally free to place symbols anywhere within the modeling canvas. Layout styles restrict this freedom by enforcing rules that define how process models should be visualized. Layout rules do not change the graph structure of process models so that the semantic meaning of them remains the same. Layout styles can be divided into two groups: general and optional layout styles. General layout styles should be applied to all modeling projects. Optional layout styles are recommendations to further improve visual representations. They should be fol-

lowed but they are not mandatory. In practice there are a number of rules in both categories.

**Layout Styles – Examples**

In the following two examples for layout styles are shown. To illustrate the use of layout styles, there will be one example for each category. One general style concerns the representation of the exclusive gateway (XOR). The specification allows the user to draw the gateway with and without an internal marker. Although it advises to use only one representation within a single process model, process modelers can change their style according to their modeling behavior. In practice this can lead to different layouts which might confuse model viewers. Therefore, it is advisable to stick to the representation of the exclusive gateway with internal marker (shown on the left side of Figure 5). Enforcing this general layout style leads to the harmonization of process models with respect to this visual cue.

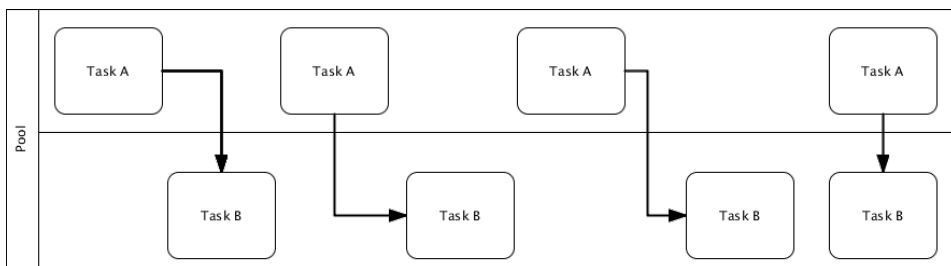


**Caption 5: Representation of the Exclusive Gateway**

An optional layout style is to enforce rules for the drawing of sequence flows between symbols. BPMN 2.0 does not define the way of drawing sequence flows. Process modelers are free to choose the way to draw the flows. Figure 6 shows several but not all ways for connecting two symbols with a sequence flow. All representations are semantically equivalent but they differ in placing the flows. In modeling projects where a large number of models is created, the enforcement of best practice rules for placing sequence flows in models contributes to increase their comprehensibility. For this optional layout style we recommend the following two rules.

- Incoming sequence flows should enter a symbol from the left, top or bottom side.
- Outgoing sequence flows should leave a symbol from the right, top or bottom side.

Organizations should introduce general as well as optional layout styles to control and harmonize the visual representations of process models to increase their comprehensibility.



**Caption 6: Drawing of Sequence Flows between Symbols**

### ***Modeling Alternatives***

Process modeling is a task where humans usually judge real-world situations and map them into models. The mapping often leads to different representation of the same situations. Although the representations differ, the information of the models is semantically identical. The differences occur due to the freedom of process modelers to use symbols from the given symbol set and to connect them according to the underlying syntax. Especially in large projects with a lot of modelers the representations for one situation usually differ. If modelers use different symbols, the visualizations of the models change which immediately affects the comprehensibility of the underlying models. If there are no rules or recommendations, modelers base their decision on intuition which is often known to be wrong, especially for novice modelers. In order to govern situations where alternative process models represent the same information, organizations should provide best practices for certain situations.

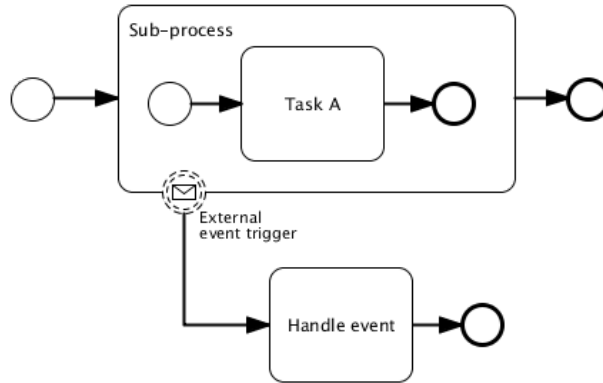
The category of modeling alternatives presents those best practices. It describes the alternatives and recommends the best one for a specific situation. The recommendations can be used in several contexts. The best practices guide process modelers to choose the best representation for specific situations.

### ***Modeling Alternatives – Examples***

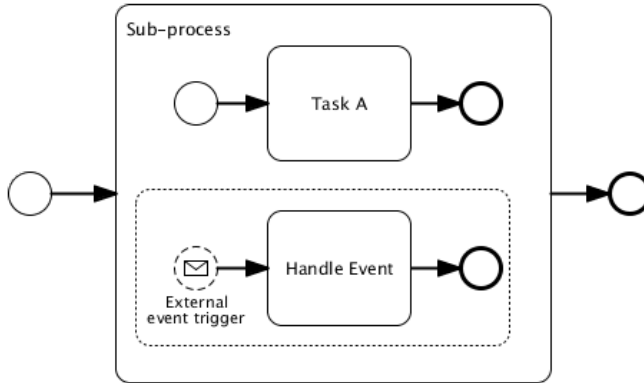
In order to illustrate the concept of modeling alternatives two examples are given. The first example deals with non-interrupting message events. The second one shows alternatives for the modeling of conditional flows.

Figure 7 depicts a sub-process that has a non-interrupting intermediate event attached to its boundary. The event is triggered by an external event. Figure 8 displays the same situation but uses different BPMN 2.0 symbols. In Figure 8 an event sub-process is modeled which starts the event handling if it is triggered by the external event. Both alternatives are identical from a control flow perspective. Therefore, modelers can choose between the alternatives. Organizations should focus on one alternative and enforce it in all process models if possible.

It must be noted that the alternatives differ in their data handling if they are executed in process engines. The event handling in Figure 7 runs in the scope of the main process. Thus, the event handling cannot access the data used within the scope of the sub-process. In Figure 8 the event sub-process runs in the scope of the sub-process. It has full access to the data used by the sub-process. With respect to reusability, the two alternatives can differ. If sub-processes are marked as call activity, the alternatives differ. Process modelers must be aware of these details and take appropriate actions. The figures shown below are identical with respect to usability as sub-processes are not marked as call activity. The modeling guideline should definitely point out these details to advice the readers.

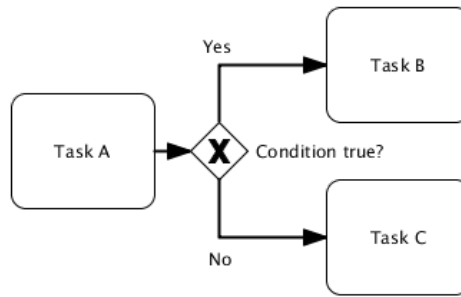


**Caption 7: Sub-Process with Non-Interrupting Message Event**

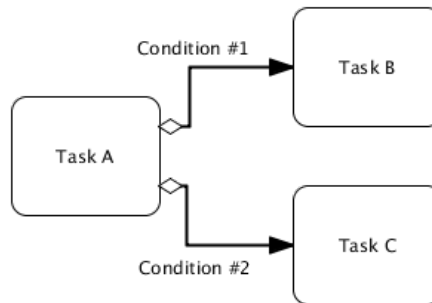


**Caption 8: Sub-Process with Event Sub-Process**

The second example is concerned with the modeling of conditions. Figure 9 depicts a common decision using an exclusive gateway. The gateway decides on the path that is activated based on the outcome of the decision. The same situation is modeled differently in Figure 10. The decisions to activate the outgoing paths are made separately with the help of two conditions. For each path a condition is attached and shown as small diamond leaving the task A. Both situations are semantically equivalent if the conditional flows in Figure 10 incorporate the same conditions as in Figure 9. However, in order to comprehend this information the model viewer has to understand the semantic meaning of the conditional sequence flows. It is advisable to use the alternative shown in Figure 9 as this version is easier to comprehend. Organizations should choose this alternative and enforce it for all process models.



**Caption 9: Exclusive Gateway**



**Caption 10: Implicit Decisions with Conditional Flows**

**Design Patterns**

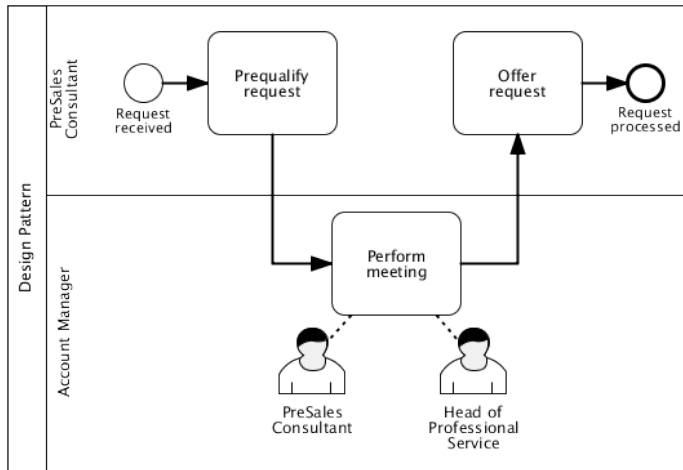
Design patterns are based on specific situations or contexts which should be captured in process models. Design patterns rely on these contexts or situations. Patterns can only be used if the real-world scenario matches the context of the pattern. Thus, process modelers have to check whether they can use design patterns for a given situation. Design patterns describe best practices for specific situations. They show the most intuitive and comprehensible version to model. Best practices are especially useful at the beginning of modeling projects. They help novice modelers to become familiar with process modeling. In certain situations design patterns are also applicable to other contexts. However, process modelers must check these situations to ensure the proper application of design patterns. Modelers must have modeling expertise to perform such checks. With the help of design patterns organizations influence and improve the way modelers capture situations in process models.

**Design Patterns – Examples**

Design patterns are applicable for specific contexts. The use of design patterns is illustrated in two examples. The first example focuses on the modeling of a meeting where several people participate. Although the context seems trivial, capturing this situation often leads to different process models. Figure 11 shows a design pattern to model such situations. The PreSales Consultant triggers a meeting which is held by the Account Manager. Although the task “Perform Meeting” is shown in the lane of the Account Manager, additional resources participate in the meeting. These additional roles are shown as customized artifacts and associated with the meeting. In total, three roles participate in the meeting as shown in the

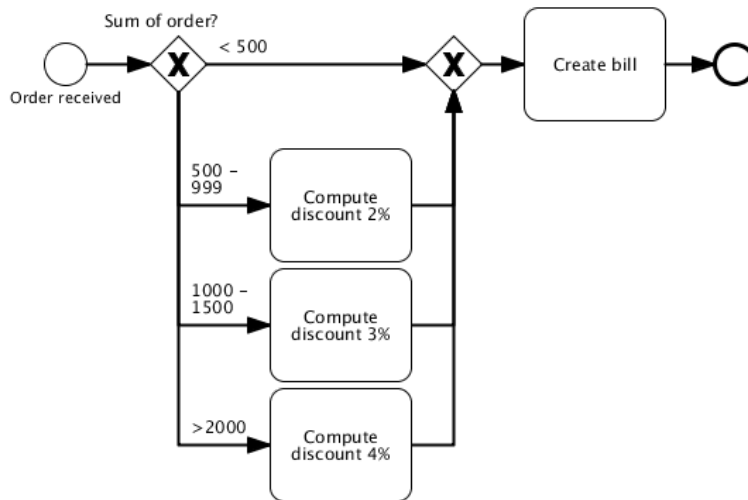
example. The pattern can be reused for other meeting situations or collaborations. It shows an effective way to capture the situation in the model.

Another possibility to capture the meeting in a model is the creation of lanes for all meeting participants. All participants execute the task “perform meeting” in parallel. This representation requires a lane for each participant, the duplication of the meeting task as well as the parallel execution of the task and the corresponding synchronization. Summing up, the design pattern shown in Figure 10 is a superior representation of the meeting context and easier to comprehend.

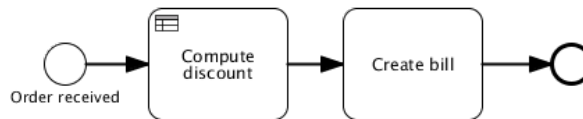


**Caption 11: Modeling Meetings**

Another example for a design pattern is the use of business rule tasks. Modelers can represent rules explicitly in models as shown in Figure 12. However, in case the rules get updated, extended or deleted, the whole process models must be changed in order to capture the changes. Thus, the process model in Figure 12 should be used with care when depicting business rules. A better representation for business rules is shown in Figure 13. The computation of the discounts is done in the task “Compute discount”. The task is marked as a business rule task as described in the BPMN 2.0 specification. The marking means that the rules are stored in an external container, e.g. a file or a table. It must be mentioned that the container is not shown in Figure 13. The model in Figure 13 is easier to read and comprehend than the one in Figure 12. Additionally, business rules can be modified or changed without changing the process models. This becomes especially important if processes contain several business rule tasks. Process models that explicitly capture rules in the model tend to get large and complex. Additionally, model viewers face difficulties to focus on individual rules. The pattern shown in Figure 13 is recommended to avoid these drawbacks. The pattern for business rules can be applied to similar situations where rule tasks are applied.



**Caption 12: Business Rules explicitly modeled**



**Caption 13: Business Rule Task**

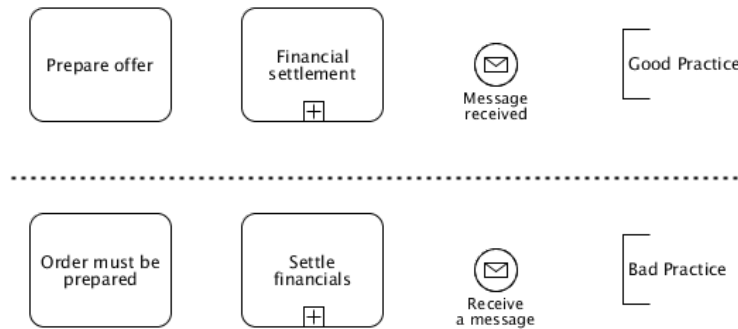
**Naming Conventions**

Process models exhibit the control flow of processes. In order to add semantic information to symbols, e.g. tasks, they get labeled. The naming usually relies on the process modeler and his naming style. The semantic information given by labels is important when it comes to the verification of process models. The verification checks how well process models capture real-world scenarios. Thus, labels should be present in models. The quality assurance of name tags is important for verification tasks. It is advisable to propose naming conventions to guide the labeling of process elements. The standardization of name tags assists the governance of models.

The labels of process elements are typically chosen according to their actual types. Name tags of tasks differ from those of events. The labels of tasks are chosen with the help of the verb-object style. This style enforces modelers to choose a verb together with a business object. The verb-object style is known to be less ambiguous and easier to understand. Naming conventions describe the styles to propose labels for different element types.

**Naming Conventions – Examples**

Labeling process elements is an important feature. In practice, the names of elements are often chosen freely which can lead to misinterpretations. Figure 14 shows how labels for different process elements can be chosen. The upper part of the figure depicts labels that can be understood well. The lower part illustrates the same element types but shows labels which should be avoided. Organizations should describe how labels for elements are chosen.



**Caption 14: Naming Conventions**

#### HOW TO DEVELOP BEST PRACTICE GUIDELINES?

Best practice guidelines should be individually developed for modeling projects. Each modeling project has its own characteristics, purposes and goals. Modeling projects can largely differ in their purpose, e.g., process automation projects vs. process documentation. Thus, these differences should be taken into account when developing best practice guidelines. It is important to tailor best practices to the unique purposes of process models and the project roles involved. Of course, certain best practices can be used in all modeling projects but must still be checked. The introduction of modeling guidelines should be done by expert modelers who do have large expertise and experience. Best practice guidelines should also be updated if new best practices arise or existing ones change due to project-specific requirements.

In order to develop best practice guidelines you can use the framework described in this paper. Along with the categories you should focus on your individual modeling project and collect best practices to meet your goals. The categories capture characteristics of modeling projects that influence the modeling behavior and, thus, the creation of process models. The categories guide the development of best practice guidelines. The content of the categories should be proposed by the organization and process modelers involved in the project. We suggest to define modeling guidelines before the actual modeling in projects takes place. This avoids misinterpretations especially at the beginning of modeling projects. Modeling guidelines can be updated

#### SUMMARY

The establishment of modeling guidelines for specific modeling projects requires proper planning. Guidelines should contain best practices that fit the purposes and goals of the actual projects. The introduction of modeling guidelines enables organizations to govern and manage process models as well as process modeling more efficiently. Best practice examples guide process modelers to create models that meet agreed specifications. Especially novice modelers are supported by modeling guidelines. Best practice guidelines further assist the validation of process models which in turn helps to avoid semantic problems in models.

In this paper we presented a framework to develop best practice modeling guidelines. The framework is suitable to establish guidelines that meet the individual purposes of modeling projects. Best practice guidelines for BPMN 2.0 incorporate best practices that often also fit for BPMN 1.x. Existing guidelines for BPMN 1.x can be reused while creating guidelines for the BPMN 2.0. We recommend an

agile development of modeling guidelines. The management and enforcement of best practice guidelines plays an important part in modeling projects. If organizations introduce best practice modeling guidelines for their modeling projects, they have to keep their guideline up to date. If they do so, they gain effective measures to manage their modeling projects more successfully.

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Jakob Freund is Co-Founder and CEO of the camunda services GmbH. He worked with Ivana Trockovich and Denis Gagné in OMG FTF for BPMN 2.0. Jakob is co-author of the OMG document “BPMN 2.0 by Example” and author of "Praxishandbuch BPMN", a German book about BPMN. He is also founder of "BPM-Netzwerk.de", a German online-community about BPM with more than 7,000 members.

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## BPMN 2.0 Specification

### SUBMITTING ORGANIZATIONS (RFP PROCESS)

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Bruce Silver Associates	Nortel
Capgemini	Red Hat Software
Enterprise Agility	Software AG
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IDS Scheer	Vangent

### ***Finalization Task Force Voting Members***

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BAE SYSTEMS	MITRE
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CA Inc.	No Magic Inc.
Camunda Services GmbH	oose Innovative Informatik GmbH
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France Telecom R&D	Red Hat
Fujitsu	SAP AG
Global 360 Inc.	Softteam
Hewlett-Packard	Software AG Inc.
iGrafx	TIBCO
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Intalio	Visumpoint
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### A

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- Amazonas Workflow is a Java based workflow engine which supports XPDL
- Arachnea EverSuite supports XPDL
- Appian Enterprise and Zynium's Byzio use XPDL for interchange of Visio process models
- Ascentn AgilePoint Server is a .NET-based BPMS that supports XPDL
- Aspose's Aspose.Workflow is a .Net workflow engine using XPDL
- Assetlink Corporation uses XPDL to define and store processes in Marketing Workbench

### B

- BOC ADONIS 3.7(and higher) supports XPDL export
- BEA Systems supports XPDL in the AquaLogic Enterprise Repository and BPM Suite
- Brein VB's InProces uses XPDL 2.0
- Bonita is an open source workflow solution using XPDL
- ProEd Workflow Editor is a XPDL compliant design tool on top of Bonita

### C

- Canto CanFlow uses XPDL within this Digital Asset Management solution
- CapeVisions supports XPDL including a free plugin to Visio that edits XPDL
- CHALEX BPM Framework supports XPDL
- ComActivity supports XPDL in its process design tool and runtime engine
- Cordys BPMS supports XPDL for process definition important and export
- COSA Designer and the COSA BPM engine support XPDL
- Cubetto Toolset is a generic modelling tool which can export XPDL

### D

- Documentum, see "EMC"

### E

- Eclair Group Lynx Flow Designer supports XPDL
- EMC Documentum ApplicationXtender Workflow supports import and export of XPDL
- EMC Documentum Process Suite supports XPDL
- Enhydra Shark is an open source XPDL workflow engine in Java
- Enhydra JaWE an openSource graphical XPDL workflow editor

## ACKNOWLEDGEMENTS: XPDL IMPLEMENTATIONS

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### F

- First Trace's Kinnosa Workflow supports XPDL for process model exchange
- Finantix Studio FXS supports BPMN and XPDL for Business Process Modelling
- Fujitsu Interstage BPM (i-Flow) supports XPDL and BPMN
- FileNet Business Process Manager 4.0 supports XPDL 1.0 and 2.0 as well as BPMN

### G

- Global 360 Business Optimization Server (BOS) supports XPDL 2.0 and BPMN
- GlobalSight, see "Transware"

### H

- HOGA.PL'S intraDok supports import and export of process definitions in XPDL

### I

- IBM FileNet Business Process Manager 4.0 supports XPDL 1.0 and 2.0 as well as BPMN
- IDS Scheer Business Architect supports export of process models to XPDL through an optional add-on
- iGrafx supports XPDL 2.1 within iGrafx 2009 (import and export)
- Interwoven WorkRoute MP supports XPDL for both import and export.
- Infinity Process Engine supports XPDL for import/export and Wf-XML 2.0 deployment
- Infor (formerly SSA Global) supports XPDL in a BPM engine within its ERP suite
- ITP-Commerce Design provides a XPDL 1.0 validation module

### J

- jawFlow is an open source workflow engine supports XPDL
- Jenz & Partner's BPEdit is an ontology-based business process editor that supports XPDL

### K

- KAISHA-Tec's ActiveModeler Advantage supports XPDL 2.0

### L

- Lombardi's Blueprint supports XPDL 2.1 and BPMN

### M

- Metoda S.p.A OpenMet BPMF supports XPDL
- Mono-sys's Tigris BPM solution supports XPDL 2.0 as well as BPMN

### N

- Nautica uses XPDL process definition data with GUI based definition editor

### O

- Open Business Engine is an open source Java workflow engine based on XPDL

## ACKNOWLEDGEMENTS: XPDL IMPLEMENTATIONS

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- OpenPages Governance Platform solution for enterprise-wide business governance using XPDL
- Openwork is validating support for XPDL and Wf-XML
- Oracle 9i Warehouse Builder 9.2 saves process definitions in XPDL

### P

- Pentaho's B1 Platform uses an XPDL-based workflow engine to execute activities within the system
- Projekty Bankowe Polsoft's BPB Workflow supports import/export in XPDL 2.0

### Q

- QualiWare supports XPDL 2.1 for both import and export of process models

### R

- R-Data's E-SOD business process export using XPDL 2.0 and import using version 1.0 and above
- Rodan Systems OfficeObjects Workflow is an embedded, commercial workflow engine using XPDL

### S

- Savvion supports XPDL for import and export of process models through its Process Modeler
- Simprocess from CACI supports XPDL for simulation models
- Software AG's Crossvision BPM supports XPDL 1.0 and XPDL 2.0
- SpeechCycle's LevelOne virtual CSR platform uses XPDL
- SSA Global, see "Infor"

### T

- Tell-Eureka, see "SpeechCycle"
- TIBCO iProcess Suite supports XPDL
- Together Workflow Editor is a graphical XPDL-based workflow editor
- Transware Ambassador embeds an XPDL-compliant workflow engine

### U

- Unisys has done significant BPM development using XPDL

### V

- Vignette Process Workflow Modeler supports XPDL

### W

- W4's W4 BPM Suite supports XPDL
- WfMOpen is an open source workflow engine that uses XPDL
- Workflow::WfMC is an OpenSource lightweight Workflow Engine in PERL based on XPDL 2.0

### Z

- Zynium's Byzio is a Visio plugin enabling two-way transformation of Visio diagrams and XPDL

## **XPDL is the Serialization Format for BPMN**

BPMN is a visual process notation standard from the OMG, endorsed by WfMC, and broadly adopted across the industry. But the BPMN standard defines only the look of how the process definition is displayed on the screen. How you store and interchange those process definitions is outside the scope of the standard, and this is where XPDL comes in.

XPDL provides a file format that supports every aspect of the BPMN process definition notation including graphical descriptions of the diagram, as well as executable properties used at run time. With XPDL, a product can write out a process definition with full fidelity, and another product can read it in and reproduce the same diagram that was sent.

### ***XPDL Enables a Process Definition Ecosystem***

XPDL is used today by more than 80 different products today to exchange process definitions. As a greater percentage part of the organization starts to use process tools for everyday work, it will become less and less reasonable to take a single-vendor strategy to process definition work.

Users need to go beyond the vendor lock-in, and take a "best of breed" approach that allows the use of their favorite process technology to accomplish specific process oriented tasks, such as simulation and optimization, and future tasks that we can only dream of today.

XPDL is extensible so that it allows each different tool to store implementation specific information within the XPDL, and have those values preserved even when manipulated by tools that do not understand those extensions. This is the only way to provide for a "round trip" through multiple tool and still be able to return to the original tool with complete fidelity.

### ***How Does XPDL Compare to BPEL?***

BPEL and XPDL are entirely different yet complimentary standards. BPEL is an "execution language" designed to provide a definition of web services orchestration.

It defines only the executable aspects of a process, when that process is dealing exclusively with web services and XML data. BPEL does not define the graphical diagram, human oriented processes, subprocess, and many other aspects of a modern business process: it simply was never defined to carry the business process diagram from design tool to design tool.

### ***XPDL 2.1 Approved by WfMC Membership***

Following a 60-day review and comment period, as well as voting by member, the WfMC Steering Committee voted on 23 April 2008 to approve version 2.1 of XPDL. This release includes all new functionality that was submitted to the working group and accepted by the working group.

Also included is new functionality to update the BPMN to version 1.1 as well as specific descriptive material on BPMN as well as the BPMN E-Mail Voting process<sup>1</sup>, plus an extended section on conformance to support portability of BPMN design-level models.

For additional information: <http://wfmc.org/xpdl.html>

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<sup>1</sup> [BPMNExamples, p. 35 See BPMN 2.0 Companion CD available from the publisher, Future Strategies Inc. [www.FutStrat.com](http://www.FutStrat.com)

# BPMN 2.0 Glossary

## A

**Activity** Work that a company or organization performs using business processes. An activity can be atomic or non-atomic (compound). The types of activities that are a part of a Process Model are: Process, Sub-Process, and Task.

**Abstract Process** A Process that represents the interactions between a private business process and another process or participant.

**Artifact** A graphical object that provides supporting information about the Process or elements within the Process. However, it does not directly affect the flow of the Process.

**Association** A connecting object that is used to link information and Artifacts with Flow Objects. An association is represented as a dotted graphical line with an arrowhead to represent the direction of flow.

**Atomic Activity** An activity not broken down to a finer level of Process Model detail. It is a leaf in the tree-structure hierarchy of Process activities. Graphically it will appear as a Task in BPMN.

## B

**Business Analyst** A specialist who analyzes business needs and problems, consults with users and stakeholders to identify opportunities for improving business return through information technology, and defines, manages, and monitors the requirements into business processes. **Business Process** A defined set of business activities that represent the steps required to achieve a business objective. It includes the flow and use of information and resources.

**Business Process Management** The services and tools that support process management (for example, process analysis, definition, processing, monitoring and administration), including support for human and application-level interaction. BPM tools can eliminate manual processes and automate the routing of requests between departments and applications.

**BPM System** The technology that enables BPM.

## C

**Choreography** An ordered sequence of B2B message exchanges between two or more Participants. In a Choreography there is no central controller, responsible entity, or observer of the Process.

**Collaboration** Collaboration is the act of sending messages between any two Participants in a BPMN model. The two Participants represent two separate BPML processes.

**Collapsed Sub-Process** A Sub-Process that hides its flow details. The Collapsed Sub-Process object uses a marker to distinguish it as a Sub-Process, rather than a Task. The marker is a small square with a plus sign (+) inside.

**Compensation Flow** Flow that defines the set of activities that are performed while the transaction is being rolled back to compensate for activities that were performed during the Normal Flow of the Process. A Compensation Flow can also be called from a Compensate End or Intermediate Event.

**Compound Activity** An activity that has detail that is defined as a flow of other activities. It is a branch (or trunk) in the tree-structure hierarchy of Process activities. Graphically, it will appear as a Process or Sub-Process in BPMN.

**Controlled Flow** Flow that proceeds from one Flow Object to another, via a Sequence Flow link, but is subject to either conditions or dependencies from other flow as defined by a Gateway. Typically, this is seen as a Sequence flow between two activities, with a conditional indicator (mini-diamond) or a Sequence Flow connected to a Gateway.

D

**Decision** A gateway within a business process where the Sequence Flow can take one of several alternative paths. Also known as "Or-Split."

E

**End Event** An Event that indicates where a path in the process will end. In terms of Sequence Flows, the End Event ends the flow of the Process, and thus, will not have any outgoing Sequence Flows. An End Event can have a specific Result that will appear as a marker within the center of the End Event shape. End Event Results are Message, Error, Compensation, Signal, Link, and Multiple. The End Event shares the same basic shape of the Start Event and Intermediate Event, a circle, but is drawn with a thick single line.

**Event Context** An Event Context is the set of activities that can be interrupted by an exception (Intermediate Event). This can be one activity or a group of activities in an expanded Sub-Process.

**Exception** An event that occurs during the performance of the Process that causes a diversion from the Normal Flow of the Process. Exceptions can be generated by Intermediate Events, such as time, error, or message.

**Exception Flow** A Sequence Flow path that originates from an Intermediate Event attached to the boundary of an activity. The Process does not traverse this path unless the Activity is interrupted by the triggering of a boundary Intermediate Event (an Exception - see above).

**Expanded Sub-Process** A Sub-Process that exposes its flow detail within the context of its Parent Process. An Expanded Sub-Process is displayed as a rounded rectangle that is enlarged to display the Flow Objects within.

F

**Flow** A directional connector between elements in a Process, Collaboration, or Choreography. A Sequence Flows represents the sequence of Flow Objects in a Process or Choreography. A Message Flow represents the transmission of a Message between Collaboration Participants. The term Flow is often used to represent the overall progression of how a Process or Process segment would be performed.

**Flow Object** A graphical object that can be connected to or from a Sequence Flow. In a Process, Flow Objects are Events, Activities, and Gateways. In a Choreography, Flow Objects are Events, Choreography Activities, and Gateways.

**Fork** A point in the Process where one Sequence Flow path is split into two or more paths that are run in parallel within the Process, allowing multiple activities to run simultaneously rather than sequentially. BPMN uses multiple outgoing Sequence Flows from Activities or Events or a Parallel Gateway to perform a Fork. Also known as "AND-Split."

I

**Intermediate Event** An event that occurs after a Process has been started. An Intermediate Event affects the flow of the process by showing where messages and delays are expected, distributing the Normal Flow through exception han-

ding, or showing the extra flow required for compensation. However, an Intermediate Event does not start or directly terminate a process. An Intermediate Event is displayed as a circle, drawn with a thin double line.

## J

**Join** A point in the Process where two or more parallel Sequence Flow paths are combined into one Sequence Flow path. BPMN uses a Parallel Gateway to perform a Join. Also known as "AND-Join."

## L

**Lane** A partition that is used to organize and categorize activities within a Pool. A Lane extends the entire length of the Pool either vertically or horizontally. Lanes are often used for such things as internal roles (e.g., Manager, Associate), systems (e.g., an enterprise application), or an internal department (e.g., shipping, finance).

## M

**Merge** A point in the Process where two or more alternative Sequence Flow paths are combined into one Sequence Flow path. No synchronization is required because no parallel activity runs at the join point. BPMN uses multiple incoming Sequence Flows for an Activity or an Exclusive Gateway to perform a Merge. Also known as "OR-Join."

**Message** An Object that depicts the contents of a communication between two Participants. A message is transmitted through a Message Flow and has an identity that can be used for alternative branching of a Process through the Event-Based Exclusive Gateway.

**Message Flow** A Connecting Object that shows the flow of messages between two Participants. A Message Flow is represented by a dashed lined.

## N

**Normal Flow** A flow that originates from a Start Event and continues through activities on alternative and parallel paths until reaching an End Event.

## P

**Parent Process** A Process that holds a Sub-Process within its boundaries.

**Participant** A business entity (e.g., a company, company division, or a customer) or a business role (e.g., a buyer or a seller) that controls or is responsible for a business process. If Pools are used, then a Participant would be associated with one Pool. In a Collaboration, Participants are informally known as "Pools."

**Pool** A Pool represents a Participant in a Collaboration. Graphically, a Pool is a container for partitioning a Process from other Pools/Participants. A Pool is not required to contain a Process, i.e., it can be a "black box."

**Private Business Process** A process that is internal to a specific organization and is the type of process that has been generally called a workflow or BPM process.

**Process** A sequence or flow of Activities in an organization with the objective of carrying out work. In BPMN, a Process is depicted as a graph of Flow Elements, which are a set of Activities, Events, Gateways, and Sequence Flow that adhere to a finite execution semantics.

## R

**Result** The consequence of reaching an End Event. Types of Results include Message, Error, Compensation, Signal, Link, and Multiple.

S

**Sequence Flow** A connecting object that shows the order in which activities are performed in a Process and is represented with a solid graphical line. Each Flow has only one source and only one target. A Sequence Flow can cross the boundaries between Lanes of a Pool but cannot cross the boundaries of a Pool.

**Start Event** An Event that indicates where a particular Process starts. The Start Event starts the flow of the Process and does not have any incoming Sequence Flow, but can have a Trigger. The Start Event is displayed as a circle, drawn with a single thin line.

**Sub-Process** A Process that is included within another Process. The Sub-Process can be in a collapsed view that hides its details. A Sub-Process can be in an expanded view that shows its details within the view of the Process that it is contained in. A Sub-Process shares the same shape as the Task, which is a rectangle that has rounded corners.

**Swimlane** A Swimlane is a graphical container for partitioning a set of activities from other activities. BPMN has two different types of Swimlanes. See "Pool" and "Lane."

T

**Task** An atomic activity that is included within a Process. A Task is used when the work in the Process is not broken down to a finer level of Process Model detail. Generally, an end-user, an application, or both will perform the Task. A Task object shares the same shape as the Sub-Process, which is a rectangle that has rounded corners.

**Token** A theoretical concept that is used as an aid to define the behavior of a Process that is being performed. The behavior of Process elements can be defined by describing how they interact with a token as it "traverses" the structure of the Process. For example, a token will pass through an Exclusive Gateway, but continue down only one of the Gateway's outgoing Sequence Flow.

**Transaction** A Sub-Process that represents a set of coordinated activities carried out by independent, loosely-coupled systems in accordance with a contractually defined business relationship. This coordination leads to an agreed, consistent, and verifiable outcome across all participants.

**Trigger** A mechanism that detects an occurrence and can cause additional processing in response, such as the start of a business Process. Triggers are associated with Start Events and Intermediate Events and can be of the type: Message, Timer, Conditional, Signal, Link, and Multiple.

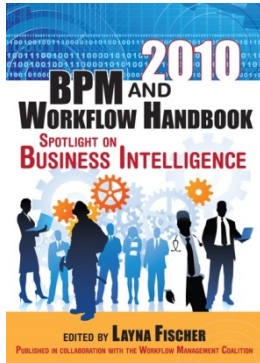
U

**Uncontrolled Flow** Flow that proceeds without dependencies or conditional expressions. Typically, an Uncontrolled Flow is a Sequence Flow between two Activities that do not have a conditional indicator (mini-diamond) or an intervening Gateway.

NOTE

Excerpted from the BPMN 2.0 Specification from OMG™  
<http://www.omg.org/spec/BPMN/2.0/Beta2/PDF/>

## FURTHER READING AND RESOURCES



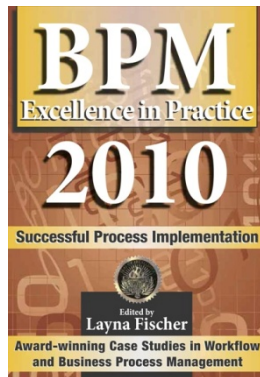
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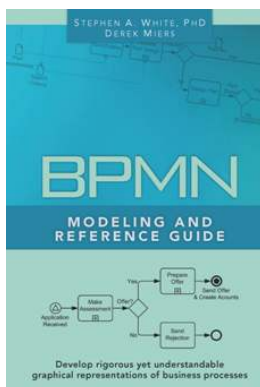
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#### **Stephen A. White, PhD, Derek Miers**

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## FURTHER READING AND RESOURCES

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### BPMN 2.0 HANDBOOK COMPANION CD

#### **Additional Material**

A Companion CD is planned for release in early 2011 which will contain, in addition to the complete *BPMN 2.0 Handbook Digital Edition*, substantial material on BPMN 2.0 helpful to readers. This includes free BPMN and XPDL Verification/Validation files, webinars, videos, product specs, tools, free/trial modelers etc.



<http://bpmnhandbook.com/>

Several BPMN 2.0 Handbook authors have contributed additional files and explanatory diagrams to the CD. This important material gives readers exposure to a larger resource on BPMN 2.0 and XPDL than a book alone can offer.

An early mock-up of the CD has been posted to <http://bpmnhandbook.com/> together with information on sponsorship of tools, trials and other BPMN-related products, including product demo videos.

#### Contents

- Specifications and Examples  
BPMN  
XPDL
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## NON-PROFIT ASSOCIATIONS AND RELATED STANDARDS RESEARCH ONLINE

- AIIM (Association for Information and Image Management)  
<http://www.aiim.org>
- BPM and Workflow online news, research, forums  
<http://bpm.com>
- BPM Research at Stevens Institute of Technology  
<http://www.bpm-research.com>
- Business Process Management Initiative  
<http://www.bpmi.org> see Object Management Group
- IEEE (Electrical and Electronics Engineers, Inc.)  
<http://www.ieee.org>
- Institute for Information Management (IIM)  
<http://www.iim.org>
- ISO (International Organization for Standardization)  
<http://www.iso.ch>
- Object Management Group  
<http://www.omg.org>
- Open Document Management Association  
<http://nfocentrale.net/dmware>
- Organization for the Advancement of Structured Information Standards  
<http://www.oasis-open.org>
- Society for Human Resource Management  
<http://www.shrm.org>
- Society for Information Management  
<http://www.simnet.org>
- Wesley J. Howe School of Technology Management  
<http://howe.stevens.edu/research/research-centers/business-process-innovation>
- Workflow And Reengineering International Association (WARIA)  
<http://www.waria.com>
- Workflow Management Coalition (WfMC)  
<http://www.wfmc.org>
- Workflow Portal  
<http://www.e-workflow.org>