

Introduction

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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

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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 expands the capabilities of BPMN 1.x Process and Collaboration diagrams, and adds Choreography diagrams 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 covers new capabilities for modeling interactions, including Conversations, and interactive Processes in Collaborations. The paper assumes familiarity with earlier versions of BPMN.

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

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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 BPMN2.0 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

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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

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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

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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/>