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# BPMN 2.0 Handbook

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**Launch date:** December 2-3, 2010 at the **BPMN for XDPL User Group** event in Santa Clara, CA. All users, supporters and practitioners are welcome to attend. Registration is [here](#)

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.

## Guide to BPMN 2.0 Technical Aspects

NEW CAPABILITIES FOR PROCESS AND INTERACTION MODELING IN BPMN 2.0

**Conrad Bock, U.S. National Institute of Standards and Technology, USA and Stephen A. White PhD, IBM, 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 will cover 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.

ANALYTICS FOR PERFORMANCE OPTIMIZATION OF BPMN2.0 BUSINESS PROCESSES

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

We have developed a tool that can do basic timeline analysis of a BPMN model. It is aligned with Bruce Silver's modeling methodology. Not a resource schedule simulation engine, but an analysis engine that is much simpler to use but gives good results for a broad class of processes. Most simulation tools are too focused on the resource bottleneck problem but not so useful (and too hard to use) for the much more common process structure problem, in which resources spend a small fraction of their time on process tasks.

Extensive use is made of spread-sheets both to prepare simulation inputs and work with the analysis. Our major target is business analysts who will be comfortable with the spread-sheet approach. This is a much easier and more efficient way of setting up simulation runs and doing analysis.

Targeting the Analytic conformance class: Boundary event simulation properties include probability of occurrence and time of occurrence. Like all simulation parameters, they can be expressions, not just constants. Timer event is determined by the duration parameter (in combination with the activity's duration). Error event on sub-process is determined by hitting the error end event.

Inputs and outputs for task are similar to what is done in typical Lean process improvement/redesign projects. Inputs for tasks include: PT (processing time) is the active time per instance, with no interruptions; LT (lead time) is the additional time, after starting to work on it, for interruptions. Also important, is the batch time (BT), since work is often batched and forwarded N times a day instead of immediately. The Wait time (WT) is the time before the performer begins work on it. In BPMN terms, the activity is started but the performer has not started work on it yet.

BPMN 2.0 CONFORMANCE CLASSES: WHAT DOES CONFORMANCE WITH BPMN 2.0 MEAN?

***Ivana Trickovic, Standards Architect, SAP AG, Germany***

The BPMN 2.0 specification aims to consolidate and unify modeling of different types of business processes, ranging from workflows and automated processes to choreographies used to specify business contracts in terms of a set of requested interactions among business partners. Furthermore, the specification addresses different scenarios: modeling of business processes, exchange of process definitions and process execution. It is to expect that not all tools will aim to support all these different dimensions. For example, some tools may offer modeling of workflows and not choreographies, or vice versa. In order to support these different dimensions and lower adoption barriers, the specification introduces a number of conformance classes. This paper discusses the BPMN 2.0 conformance classes, requirements that need to be considered, and potential extensions to the proposed approach.

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 both BPMN process Models and BPMN process Diagrams. In this article, we abstract away from the technical details of BPMN 2.0 interchange serialization and rather 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 will benefit from such interchange and what kind of benefits each stakeholder may obtain 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 devils quadrant. 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 with the existence of a BPMN 2.0 interchange standard, the broad intended adoption from the tool vendors' community, and the availability of interchange conformance verification and validation, now is WHEN for BPMN.

COLLABORATIVE ACTIVITIES INSIDE POOLS

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

Choreographies and Conversations, introduced with BPMN 2.0, will make modellers 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 modellers want to represent an Activity performed by different roles or offices together (e.g., to attend the same meeting, collaborative writing of a document). Such situation has been modelled 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 led by the subject which the containing Lane is linked to, which is not necessarily true. Some experiments revealed how much a mean to model such inner collaboration is a desirable feature.

In this paper the problem analysis results and some proposals on how to extend BPMN will be presented.

MULTI-FACETED BPM

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

We claim that business process models per se are not enough for representing the complexity of real world applications and therefore other dimensions must be taken into account in the analysis, design, and implementation of applications.

We propose an integrated design approach to BPM that comprises modeling of business processes, master data, application structure, and user interaction, together with automatic model transformations among them. This is in line with the vision of BPM+MDM design (see Clay Richardson, BPM10 and Rick Hull, ICDT09).

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, the model transformations and the tool suite WebRatio that supports our approach. We describe which peculiar aspects of BPMN 2.0 have proven useful in our approach (and which ones we decided not to support). We show the approach at work on a running case and validate it upon 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.

#### 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, resources 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 article 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 Modelling Notation (BPMN) and XPDL. The article also describes how a RESTful 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.

#### WORKFLOW PATTERNS USING BPMN 2.0

***Vishal Saxena, Vice President Engineering, Intalio, 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. The results can be used for examining the suitability of a particular process language or workflow system for a particular project, assessing relative strengths and weaknesses of various approaches to process specification, implementing certain business requirements in a particular process-aware information system, and as a basis for language and tool development. These workflow patterns cover a majority of use cases that BPM modelers would need. Most workflow standards have been evaluated against these patterns.

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.

#### MAKING A BPMN 2.0 MODEL EXECUTABLE

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

Support for BPMN by BPMS vendors still lags behind the evolution of the standard itself. This has allowed its realization in products to be increasingly proprietary while practitioners have focused on increasing the power of its iconic set. The resulting divergence has made the concept of an executable model increasingly problematic. This paper attempts to define an executable model in light of the advent of BPMN 2.0 and the maturation of service component architecture (SCA). The goal of this paper is to stimulate R&D into making models more executable while also linking BPMN and SCA.

First, a brief overview of the BPMS market examines the nature of this divide, and characterizes the current limitations to making models executable. Next, a primer is offered on how to rationalize a BPMN model such that it is implementable within a SOA framework. This includes defining first principles for thusly refining a model, as well as showing how this helps achieve the desired abstraction and orchestration of back-office functionality. Finally, a comparison of BPMN modeling and SCA composite diagramming is performed to show how a model can be used to generate an equivalent technical architecture. This includes constructing a crosswalk from XPD to an equivalent composite, as well as identifying steps that can be taken to make models more executable. A BPMN model and UML use case are used to illustrate these points.

## Guide to the Business Imperative for BPMN

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

**Harald Kuehn, Marion Murzek, Thomas Brennan, and Tobias Rausch, Management Consultants, BOC ITC AG, Austria**

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. [...] other types of modeling done by organizations for business purposes is out of scope for BPMN.” [OMG, 2010]. While this is understandable when defining a standard, it is essential for organizations to have BPM scenarios such as Work Instructions, Org. Analysis, Process Costing, ICS/ERM, etc. supported.

This paper shows how BPMN 2.0 might be extended with business relevant concepts to support business-analysis (e.g. 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, (IT) resources, information, risks and controls and thereby allowing rich business analysis, reporting and simulation. The application of the proposed extensions will be illustrated using the BPM tool ADONIS.

There is 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.

#### BEST PRACTICE GUIDELINES FOR BPMN 2.0

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

BPMN 2.0 is powerful, yet a rough diamond if it comes to using the standard in practice. This article is based on massive project experiences in using BPMN for process documentation, requirements engineering and developing process applications with process engines.

The article provides a selection of the best practices we have developed in our BPMN projects, and recommends a basic structure and simple tooling for developing your own guidelines.

#### HUMAN-READABLE BPMN DIAGRAMS

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

This paper provides suggestions for creating BPMN diagrams which are easily understandable and thus can be used for explaining processes to business users without a deep process modeling background. This approach is demonstrated by re-designing the model of an e-mail voting process, published in the non-normative OMG document “BPMN 2.0 by Example”.

The changes made to the original model include:

- splitting it into smaller processes
- creating fewer, but more comprehensive tasks
- reducing the number of tasks

- simplifying complex sequence flow structures
- uniform modeling styles for loops, branching and merging etc.
- replacing non-intuitive BPMN elements
- adding helpful annotations
- moving complex decision logic into a separate documentation
- using a simple and consistent layout including colors
- creating separate diagrams which provide different views on the model, e.g. showing the message flow or data flow in context

The paper explains all modifications of the e-mail voting process and presents the resulting models. It also discusses problems in creating diagrams that are easily readable and still comply with the BPM specification; and it provides suggestions for solving these problems.

TRANSPARENT AND AGILE ENTERPRISE WITH BPMN 2.0 AND SEMANTIC TECHNOLOGY

***Dennis Wisnosky, CTO and Chief Architect, DCMO, US Department of Defense, USA, Linus K Chow, Principal Consultant,, Oracle and Michael zur Muehlen, Director, Center for Business Process Innovation, Stevens Institute of Technology, USA***

BPMN 2.0 is a ground breaking standard finally bringing business modeling, machine portability, and execution together in one standard. It has come together through the evolution and convergence of technologies and methodologies to provide a path towards true Enterprise Agility and Transparency. As a new standard its true impact on the Enterprise and ability to combine with other technologies has not been testing. A US DoD Proof of Concept on a real life business process using both BPMN 2.0 and Semantic Technologies documents the Strategic impact these technologies provide and the lessons learned bringing concept to reality.

BUSINESS PROCESS INTEGRATION IN A DEFENSE PRODUCT-FOCUSED COMPANY (CASE STUDY)

***Bryan Lail, Chief Architect and Kerry Finn, Enterprise SOA Lead, Raytheon, USA***

Aspects of Business Process Integration have been around for many years, with a known value statement in terms of business efficiency and cross-functional lifecycle improvements. The essential concept is that when a business can agree on and build a common model for key business processes that span across functional organizations, followed by supporting organizational, user process, and technology changes, then very significant lifecycle improvements in cost, cycle time, manpower, etc. can be achieved well beyond the scope of process improvements internal to one business function or organizational element. The new element built over the last three years, with a leap in business impact with a powerful new version in 2010, is the existence of a globally-recognized, strongly vendor-supported Business Process Modeling Notation.

Having a common language to integrated processes across silos is a significant enabler in obvious ways and in many subtle fashions. Once the business organizations that touch a product or execution lifecycle 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 live, behavior and cultural changes, and executable processes that automate and parallelize legacy practices. This paper will cover the benefits, overview the methods, and relay the results for a product-focused defense company in achieving business benefits.

The business imperative is achieved through two levels of integration. The first is the horizontal integration achieved through instituting a common process language, using it as an anthropological tool to draw together disparate business functions, and sharing validated models to drive technology solutions. The second is vertical integration, achieved through building BPMN into the compliance requirements for the company's enterprise architecture, working from the business user level through process logic and service execution to automate and enforce the new integrated processes. Clear examples will be provided where this is happening in the challenging environment of a company known for defense weapon systems, but not for business process integration.

ADMISSION PROCESS OPTIMIZATION WITH BPMN (CASE STUDY)

***Jack Xue, Mgr 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.

## 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 article, we intend to detail and justify our approach and our classification, as well as explain how they are used in our company. We also intend to shed a new light on the role of the BPM analyst, an emerging position blending several skills, notations, and collaborative tools.