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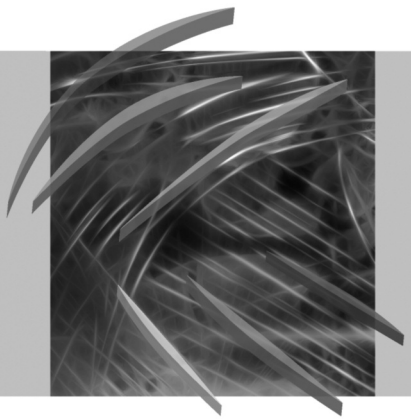

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Information Systems in Business

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OVERVIEW OF BUSINESS PROCESS MODELLING SOFTWARE

Abstract: BPMN aims at consolidating and unifying the modelling of various business processes, from workflows and automated processes to designing choreographies used in determining commercial relations between business partners. What is more, the specification may refer to different scenarios: modelling business processes, the exchange of processes definitions or process execution. It is obvious that not every tool supports all the functions. Some tools offer only modelling processes, others allow process simulation and analysis. Seventeen tools for the support of BPMN modelling have been chosen for the purpose of this article. The author analyses their functionalities, presents some leading software producers and looks at the results of a survey on the usability of the tools among consultants and other people utilizing BPMN modelling.

Keywords: Business Process Modelling, Business Process Modelling Notation, BPMN software, BPMN vendors.

1. Introduction

The Business Process Modelling Notation – BPMN – is the first standardized notation supported by a large number of companies which operate mostly as information technology vendors (IBM, Oracle, Intalio, etc.). Because BPMN creates a standardized bridge between a business process design and process implementation, these vendors are particularly interested in providing technical solutions that support the execution of business processes. In order to ensure standardization, they have joined the Object Management Group, Inc. (OMG), which produces and maintains computer industry specifications for interoperable, portable and reusable enterprise applications in distributed, heterogeneous environments.

The OMG BPMN specifies graphic elements of the notation and necessary technical properties and information needed by business processes implementers. Since its inception, the notation has evolved to translate easier business processes models into a standardized executable language.

In addition, it introduces new concepts like the Choreography and Conversations. BPMN 2.0 adds and completes the previous version with new topics like non-interrupting events, a callable activity, new activity types, a parallel event-based gateway, an event sub-process, an escalation and parallel multiple event types together with a new data types definition, etc. These improvements allow a business analyst to cover a large number of situations [Briol 2010]. This article describes a software tool for BPMN modelling and simulations. The author focused on the tools which support standard BPMN 2.0. There are over 77 vendors which are currently supporting the BPMN standard, but for the purpose of this article, only 17 most popular vendors and their tools have been chosen.

2. The history and versions of BPMN

Originally, BPMN was developed by the Business Process Management Initiative (BPMI), a consortium which consisted mainly of software companies. In the beginning, the purpose was to provide a graphic notation for process descriptions expressed in BPML (Business Process Modelling Language). Comparable to BPEL, BPML was used for specifying process descriptions which could be executed by BPMS. BPML is no longer being developed; it has been given up in favour of BPEL.

The first version of the BPMN specification was developed by the team led by Stephen A. White from IBM. It was published in 2004. In the meantime, BPMI has become a part of the Object Management Group (OMG). This organization is known for several software standards, such as the aforementioned UML (Unified Modelling Language) [Shapiro 2010].

In 2006, BPMN version 1.0 was officially accepted as an OMG standard. In 2008, version 1.1 followed. It contained some changes in graphical representations.

The next version (1.2) contained only a few editorial corrections and clarifications, the contents as such did not vary comparing to version 1.1.

The current version (2.0) was officially released in January 2011, but the first beta version standard was published in 2009. In the new version, the graphic notation has been extended by various constructs and a few types of models. Thus, the existing models based on BPMN 1.2 are forward compatible, which means they do generally also correspond to version 2.0.

Version 2.0 contains the following extensions of the existing diagram types for process and collaboration modelling:

- new event types: parallel multiple events and escalations,
- parallel event-based gateway to initiate a process,
- not interrupt a particular activity,
- event sub-processes that are only carried out when defined events occur and which run in parallel to a surrounding process or interrupt it,

– extended options for the modelling of data in processes, for example data storage and data objects representing lists,
– upgrades of collaboration modelling such as for example multi-instance participants, and the representation of messages by envelope symbols,
– symbols for different types of tasks,
– new ways of modelling how to call activities that are defined somewhere else,
– different marking of multi-instance activities depending on their execution in parallel or in a sequence,
– in addition, there are two completely new diagram types added to the bpmn 2.0 standard,
– choreography diagram: modelling of the data exchange between different partners, similar as in collaborations; however, each data exchange is modelled as an activity, so that on this level it is possible to visualize splits, loops, etc.,
– conversation diagram: a conversation diagram is an overview of several partners and their communication links.

Although the innovations mentioned above are very prominent in BPMN 2.0, the majority of the alterations took place behind the scenes of the graphic model representation.

BPMN 2.0 is the first one to receive a formal definition in the form of a metamodel. The specifications of the previous versions contained only verbal descriptions of the graphic notation elements and modelling rules. The new version's specification document has got comprehensive UML class diagrams that show graphically all the features of different BPMN constructs and their relationships. Such a metamodel is more accurate and definite than strictly verbal descriptions. The metamodel has also got additional language constructs that cannot be represented in graphic models. Such constructs are required, for example, by process engines to capture necessary additional information for the process execution.

A typical modeller does not need to work with the metamodel. Normally, they will use a modelling tool that only allows the creation of models complying with the specification, and thus with the metamodel. Therefore, it is rather the vendors of modelling tools, process engines and similar software, who have to deal with the metamodel.

BPMN 2.0 now provides its own standardized exchange format and many vendors will support this standard format. Then it will finally be possible to exchange BPMN models not only between different modelling tools, but also between a modelling tool and a BPMS, for example.

Different types of software tools in the scope of BPMN require the definition of various types of BPMN conformance. Pure modelling tools may be process modelling conformant or choreography modelling conformant. Process engines should comprise process execution conformance or BPEL process execution conformance. In the future these criteria could be decisive in the choice of software. Since many software vendors are certainly interested in reaching BPMN conformance, these

criteria should also lead to a comprehensive implementation of BPMN in a large number of tools [Allweyer 2010]. Table 1 describes subsequent versions of BPMN standard.

Table 1. Comparison of BPMN versions

	BPMN 1.0	BPMN 1.1	BPMN 1.2	BPMN 2.0
Consortium	BPMI	OMG	OMG	OMG
Date of release	May 2004	January 2008	January 2009	August 2009 (beta) January 2011 (officially)
Number of all elements	48	55	55	116

Source: [http://en.wikipedia.org/wiki/BPMN].

3. Comparison of leading software developers to the language of BPMN

The main goal of this article is to compare software tools for modelling and simulating business process in BPMN standard. In Table 2 the most important producers of software for BPMN tools are presented.

Table 2. BPMN tools – major producers

Vendor	Software name	Platform/OS	First public release	Latest stable release	Software license
BOC AG	Adonis	Windows	2010	2010-06	freeware/ commercial/ academic
Signavio	Signavio	Cross-platform (browser based)	2009	2011	commercial/ academic
IDS Scheer	Architecture of Integrated Information Systems	Cross-platform (browser based)			commercial
Corel	iGrafx	Windows		2009-05	commercial/ academic
IBM	WebSphere Business Modeler	Windows	1998	2010-01-29	commercial/ academic
Interfacing Technologies	Enterprise Process Center Free BPMN Modeler	Windows + Visio			freeware
Metastorm / OpenText	ProVision	Windows	1994	2011	commercial
Microsoft	Microsoft Visio 2010	Windows		2010	commercial
No Magic	MagicDraw	Windows, Linux, Mac	2007-09	2010-04-26	commercial/ shareware
Oracle	Oracle BPM Suite	Windows, Linux			commercial

Table 2 (cont.)

Vendor	Software name	Platform/OS	First public release	Latest stable release	Software license
Orbus softwaere	iServer	Windows + Visio		2009-11-23	commercial
Sparx Systems	Enterprise Architect	Windows (Linux and Mac supported)	2000	2011	commercial
Casewise	Casewise Corporate Modeler Suite	Windows,		2011	commercial
Sybase	PowerDesigner 12	Windows	2006-01	2008-10	commercial/ shareware
Tibco Software	Business Studio	Windows, Linux		2009-07	freeware
Visual Paradigm	Visual Architect	Windows, Linux, Mac, Unix	2006-03-08	2010-03-29	commercial/ shareware
yWorks	yEd	Windows, Mac, Linux		2011-04-19	freeware

Source: based on: [http://en.wikipedia.org/wiki/Comparison_of_Business_Process_Modeling_Notation_tools].

Manufacturers which were selected have the biggest share in the global market.

It is also worth looking at the Gartner's report (Figure1) which shows the potential of software vendors [Blechar 2008].

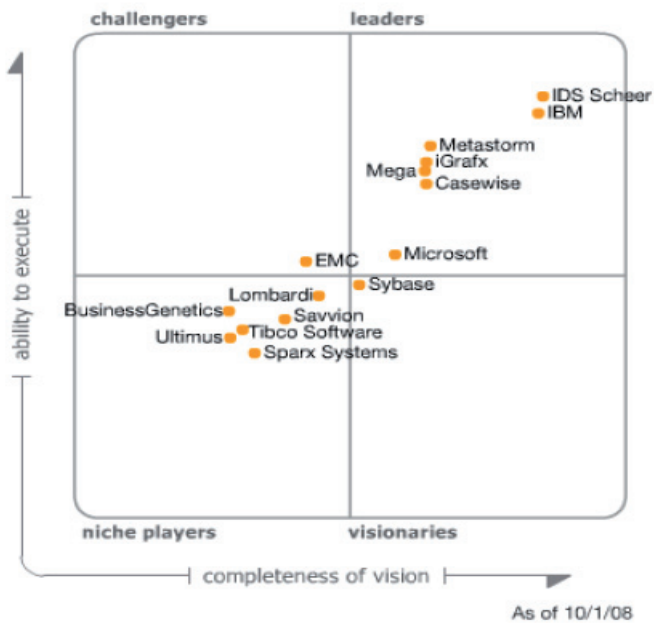

Figure 1. Magic quadrant for business process analysis tools

Source: [Blechar 2008].

4. The analysis software for editing and simulation models in BPMN standard

Table 3 compares BPMN tools software (Vendors from Table 2). The comparison in the table is focused on:
– BPMN Version Compatibility,
– model Editor and Validator (for validity of the model),
– simulator module (for simulated models),
– stepper module (imaging next steps of running model),
– collaborative functionality (modules to share, manage and collaborate in teams),
– import/export formats.

Summary of significant information about the software

Adonis software provides both a commercial and free model (community). The Community Edition (CE) is a fully functional version for business use with a simulator and stepper module. The main difference is the lack of module for collaborative work in the community edition. Adonis software is also the only vendor which gives a simulation module in the freeware version of the software.

Adonis simulator module offers the following algorithms:
– path analysis,
– analysis of the possibilities – checks how many resources (participants of the process) are needed to implement a process in a given period of time,
– workload analysis – determines the number of cycles or how long the execution of the process at a given number of available participants and machinery takes.

The typical and popular software only for drawing models is Microsoft Visio or MagicDraw if we make sure that we do not need to export these models. It is also possible to use the 3rd party software for Visio like Enterprise Process Center Free BPMN Modeler.

For simple modelling yEd software can be a good freeware alternative to Visio and MagicDraw especially that yEd has better importing possibilities.

Most advanced platforms with simulations and steppers are: Corel iGrafx, IBM WebSphere, ProVision and IDS Scheer (compare with Figure 1).

There is some software with academic license (free for academic but not commercial use): Signavio, WebSphere Business Modeler, Igrafx, Oracle BPM Suite.

Table 3. Comparison of BPMN tools

Software name	BPMN Version Compatibility	Model Editor / Model Validate	Simulator	Stepper	Collaborative functionality	Import formats	Export Formats	More informations
Adonis	1.2/ 2.0[a)]	X/X	X	X	X/N[b)]	ADL, XPDL, XML	ADL, XPDL, BPEL, XML,	PDF[c)]
Signavio	2.0	X/X	N	N	Y	XPDL, ARIS®, BPMN2 XML	XML, SVG, PNG	WWW[d)]
Architecture of Integrated Information Systems	2.0	X/X	X	N	Y	XMI, WSDL, XSD, XPDL, BPEL, BPML Export, Visio, txt and Excel	XML, BPEL, Excel, XPDL2.0.	PDF[e)]
iGrafx	2.0	X/X	X	X	X	WSDL XPDL 2.2 BPMN XML	WSDL XPDL 2.2 BPMN XML	PDF[f)]
WebSphere Business Modeler	2.0	X/X	X	X	X	XML, XPDL, Visio, Excel	XML, XPDL,	WWW[g)] or WIKI[h)]
Enterprise Process Center Free BPMN Modeler	2.0	X/X	N	N	N	Visio	Visio	PPT[i)]
ProVision	2.0	X/X	Y[j)]	N	Y	XML, XMI, BPEL, WSDL, XPDL and CADM	XML, XMI, BPEL, WSDL, XPDL and CADM, Visio, Sharepoint	PDF[k)]
Microsoft Visio 2010	2.0	X/X	N	N	N		HTML, Sharepoint	
MagicDraw	2.0	X/N	N	N	N	XMI 2.1	BPEL	WIKI[l)]
Oracle BPM Suite	2.0	X/X	Y	Y	Y	XPDL 2.0	XPDL 2.0, BPEL	PDF[m)]
iServer	2.0	X/X	X	N	X	Visio	Visio	WWW[n)]
Enterprise Architect	2.0	X/X	X	N	X	XMI, CSV	XMI, CSV	PDF[o)]
Casewise Corporate Modeler Suite	2.0	X/X	X	X	X	Excel, XML	BPEL, XPDL, XMI (beta), Excel, CSV	PDF[p)]
PowerDesigner	2.0	X/X	Y[r)]	N	N	UML, XML	XML	PDF[s)]
Business Studio	2.0	X/X	Y	N	N	Aris XML,	XML	PDF[t)]
Visual Architect	2.0	X/X	Y[u)]	N	N	XML, Excel, Visio, BizAgi	BPEL[v)], XML, Excel	HTML[w)]
yEd	1.2	X/N	N	N	N	Excel, XSLT	SVG, Flash, GML	

Legend: X – present, N – none; [a)] the commercial version is supported only 1.2 BPMN version. The 2.0 BPMN is supported only in community version and will be supported in next release of commercial version; [b)] collaborative server is available only in commercial (and academic) version; [c)] http://www.bptrends.com/publicationfiles/2010%20BPM%20Tools%20Report-BOCph.pdf; [d)] http://www.signavio. com/en/products/process-editor-as-a-service.html; [e)] http://www.bptrends.com/publi cationfiles/04-08-PR-BPM-Tools%20Report-IDS%20Scheer.pdf; [f)] http://portal.igrafx.com/downloads/ documents/iGrafx_2011_BPEL_Implementation_Guide.pdf; [g)]http://www-01.ibm.com/software/integration/webphere-business-modeler/advanced/features/; [h)] http://en.wikipedia.org/wiki/IBM_WebSphere; [i)] http://interfacing.com/uploads/File/Presentations/FreeBPMNModeler_PPT.ppt; [j)] in Metastorm Advanced Simulation modules; [k)] http://www.metastorm.com/products/product_sheets/Metastorm_BPM_Product_Overview.pdf; [l)] http://en.wikipedia.org/wiki/MagicDraw; [m)] http://www.oracle.com/us/corporate/analystreports/infrastructure/mwd-bpm-vendor-capability-oracle-071444.pdf; [n)] http://www.orbussoftware.com/business-process-analysis/solutions/business-process-analysis-solution/rules-driven-bpmn-20-environment/process-analysis-tools; [o)] http://www.sparxsystems.com/downloads/whitepapers/EAReviewersGuide.pdf; [p)] http://www.bptrends.com/publicationfiles/11-07-Casewise%20BPTrends%202007%20EA%20and%20BPA%20Modeling%20Tools%20%20Report-final2.pdf; [r)] simulations by external Simul8 software – http://en.wikipedia.org/wiki/Simul8; [s)] http://infocenter.sybase.com/help/topic/com.sybase.infocenter.dc00121.1520/doc/pdf/reqmodelpd1520.pdf; [t)] http://developer.tibco.com/resources/business_studio/tib_bs_modeler_user.pdf; [u)] in additional module Simulacian (http://www.visual-paradigm.com/support/documents/bpvauserguide/606/644/34055_whatissimula.html); [v)] in extra paid Executable module; [w)] http://www.visual-paradigm.com/support/documents/bpvauserguide.jsp.

5. Conclusions

In conclusion, it is interesting to present the statistics of how and to what extent world users can utilise the tools described in the article. Jan Recker's questionnaire responded to by 590 BPMN modellers from all over the world (see Table 4) shows which tools are the most popular [Recker 2008].

Table 4. The statistics of BPMN tools used

Type of tool used	Usage (%)
Microsoft Visio	18.2
itp-Commerce Process Modeler	7.8
Sparx Systems Enterprise Architect	6.9
Visual Paradigm Visual Architect	6.2
Telelogic System Architect	5.7
Intalio BPMS	5.0
ILOG Jviews	3.8
IDS Scheer ARIS	3.3
Casewise Corporate Modeler	3.3
Holocentric Modeler	2.8
iGrafx FlowCharter	2.4
MagicDraw	1.9
Inhouse solution	1.9
Savvion Process Modeler	1.4
Tibco BusinessStudio	1.4
Appian BPM Suite	1.4
Other	15.6
Various	10.9

Source: [Recker 2008].

BPMN tools hugely differ in their functionality. The simplest tools provide only a basic modelling support for BPMN. More complex, often commercial products may have BPMN in their software just to extend their Business Process software. Quite often, companies which make commercial products do not provide much or any technical information on tools or the information is relatively difficult to get. For

example, a personal demo needs to be requested or information needs to be found from 3rd parties.

Some vendors provide freeware and commercial versions of their products. The best example is ADONIS. The company gives us a fully functional product for free (including commercial use) and it is the only product on the global market which gives us a simulations and stepper module. No one else offers simulations functionality in freeware software.

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PRZEGLĄD OPROGRAMOWANIA DO MODELOWANIA PROCESÓW BIZNESOWYCH W STANDARDZIE BPMN

Streszczenie: Język BPMN ma na celu skonsolidowanie i ujednolicenie modelowania różnych procesów biznesowych, począwszy od przepływów pracy i zautomatyzowanych procesów do projektowania układów używanych do określenia relacji handlowych między partnerami biznesowymi. Ponadto specyfikacja może dotyczyć różnych scenariuszy: modelowania procesów biznesowych, wymiany definicji procesów i realizacji procesu. Nie każde oprogramowanie wspiera wszystkie te funkcje. Niektóre narzędzia oferują tylko procesy modelowania, inne pozwalają na przeprowadzenie symulacji i innych analiz tych procesów. W artykule przedstawiono siedemnaście wybranych narzędzi wspomagających modelowanie w języku BPMN i przeanalizowano możliwości tych narzędzi. Przedstawiono również wyniki ankiety używalności narzędzi wśród konsultantów i innych osób modelujących procesy w BPMN.