

BPMN Model Interchange

The Quest for Interoperability

Abstract. BPMN is the prevalent standard for modeling business processes. In order to facilitate working with BPMN processes, businesses must be able to exchange process models across tools from various vendors. The BPMN Interchange Working Group (BPMN MIWG) which is part of the Object Management Group's (OMG) effort to improve model interchange proposes a demonstration showcasing the current state of interoperability of BPMN processes by conducting a series of imports, refinements, and exports across tools from several vendors.

1 Introduction

With the increasing adoption of Business Process Model and Notation (BPMN) [1], businesses are more and more using tools supporting BPMN. In order to avoid recreating processes for each tool, it is imperative to have a standard format for exchanging processes modeled using BPMN [2, 3]. This includes not only being able to export processes from one modeling tool to the next but also from modeling tools used by business users to more complex execution environments which provide automation or analytical capabilities.

This article first introduces the capabilities and current limitations of interchange of BPMN processes. Sections 2 and 3 introduce the BPMN Model Interchange Working Group (BPMN MIWG) along with its activities and results. Based on this background information, section 5 introduces the planned demonstration which showcases the stepwise exchange and refinement of BPMN processes across tools from multiple vendors.

2 Interchange Capabilities¹

In BPMN 2.0, processes comprise two aspects: (1) Process models contain the semantics and (2) Process diagrams store the visual representation of the process models. In order to exchange processes between tools, both aspects have to be contained in a BPMN file storing both the model and the diagram. Beyond the semantic richness introduced with the latest version, BPMN 2.0 defines standardized formats for creating XML files which contain both aspects. This allows exchanging BPMN processes between tools of different vendors.

Mirroring the two aspects of BPMN processes, these XML BPMN files comprise two parts: (1) One or more process models containing the semantics and (2) One or more process diagrams store the visual representation of the process models. In the

¹ This article is based in parts on [3] and [2]. Particularly, sections 2 and 3 are taken from [3].

BPMN specification, this latter part is referred to as BPMN Diagram Interchange (BPMN DI).

BPMN 2.0 offers two XML formats for storing BPMN processes: (1) A format defined using XML Schema Definition (XSD) and (2) a format defined using XML Metadata Interchange (XMI). Both formats provide essentially the same expressive power. However, with the XSD-based format being more popular, this demonstration focuses on the XSD-based format.

3 Interchange Limitations

Even though the BPMN 2.0 Diagram Interchange supports exchanging BPMN process models, there are still currently some limitations on the success of interchange.

The BPMN Diagram Interchange (BPMN DI) provides mechanisms for specifying the basic **visual layout** of BPMN diagrams. However, the BPMN DI provides no mechanisms for the following aspects of a BPMN diagram (as they are intentionally not covered by BPMN 2.0 specification): (1) Colors of shapes and text, (2) Shape decorations like shadows, gradients, or backgrounds, (3) Text wrapping, and (4) Thickness (in pixels) and style of the lines. Therefore, the same BPMN diagram may be rendered somewhat differently in different tools without violating BPMN compliance.

Besides the visual aspects of process diagrams, there are some **semantic** aspects (i.e. places where BPMN specification left room for selecting way to add implementation related details e.g. several languages with different semantics can be used) which are also not covered by BPMN interchangeability. First, elements that are specified in BPMN models using proprietary extensions may cause problems when exchanging these models between tools. Among others, this includes: (1) The script of a script task, (2) the implementation of a user task, and (3) the implementation of a global user task. Furthermore, elements that are not contained within but referred to by a process model are not guaranteed to be interchangeable. This primarily applies to web services which are referenced by service tasks, send tasks and receive tasks.

BPMN allows tool vendors to add proprietary information to the XML serialization of a BPMN process model using **vendor-specific extensions**. This is particularly useful for business process management systems (BPMS) that may require additional information (e.g. information about forms shown to users for a specific task). Although extension elements are a standard way to add proprietary information to a BPMN file, this added information is vendor-specific. Therefore, users cannot expect that information contained in extension elements will always be uniformly interpreted by different tools.

4 BPMN MIWG

Even though the BPMN 2.0 specification contains definitions for the diagram interchange, practice showed that in some cases there are ambiguities or even contradictions in the specification document, and there was no “single source of truth”. Be-

cause of this, various tool vendors interpret parts of the specification differently and thus tool implementations of the BPMN standard varies. Also, different vendors choose to implement different subsets, without a commonly agreed upon conformance sub-classes or “basic subsets” of BPMN.

In order to resolve this problem, the BPMN Model Interchange Working Group (BPMN MIWG) was set up as a part of OMG [4]. Being a joint effort of many vendors interested in diagram interchange, the initiative's goal is to guide and support vendors in creating standard-compliant BPMN tools, identify issues in the BPMN specification, and facilitate model interchange. The group's guiding principles are: transparency, inclusion, collaboration, and openness.

The BPMN MWIG currently provides eight carefully designed test cases for testing the interchange of BPMN processes. As these test cases encompass an increasing degree of complexity based on the BPMN conformance levels defined in [5], they allow vendors to increase the interchange of their tools step by step.

Using these test cases on a regular basis is sometimes a time-consuming task. In order to reduce the amount of time for identifying potential interoperability, parts of these test cases can be checked automatically by using open source tools provided by BPMN MIWG [6].

In order to spread out the word about the relevancy, capabilities, and limitations of BPMN interchange, the BPMN MIWG initiates and maintains a number of activities:

- It actively contacts and invites tool vendors to participate in the common effort.
- It conducts own tests of a selection of tools. These results are then published in a publicly available issue tracker (cf. [7])².
- It educates practitioners about BPMN interchange. An important example for this is the OMG Certified Expert in BPM (OCEB) curriculum which now includes [2] as a recommended reading.
- It develops proposals for the upcoming BPMN revision based on the experience gained during conducting tests with various tools (cf. [8]). These proposals aim at clarifying interoperability issues but do not suggest fundamental changes to BPMN.
- It participates in major BPMN and BPMN events and conferences. This paper is an example of these activities.

5 Demonstration

In the proposed demonstration, representatives from multiple tool vendors which participate in the BPMN MIWG joint effort will incrementally open, extend, and export BPMN process models in their respective tools. That way, the demonstration will give an insight in the degree of interchange which is already possible using commercial and open source tools.

² Please note that the number of issues for a given tool allows no to infer the level of BPMN compatibility directly. Instead, a large number of issues for a given tool usually indicates that a tool is thoroughly tested.

The demonstration will comprise three phases. Following the structure of the BPMN MIWG test cases, each phase will focus on different aspects on BPMN interchange:

- The *Diagram Interchange* demo aims to show that the vendors can interchange a BPMN diagram (image).

This demo consists of progressively building the diagram from tool to tool. Starting with a blank page and finishing with a completed BPMN diagram.

- The *Hidden Attribute* demo aims to show that tools can interchange BPMN attributes that are not visible in the diagram but nonetheless part of the BPMN Model, and that hidden attributes entered from other tools are maintained during the interchange.

This demo will start with a completed BPMN diagram, and then each tool will add hidden attributes to it. Each tool will show that the attribute(s) from the previous tool(s) are maintained before passing it to the next tool.

- The *Execution* demo aims to show that tools can interchange executable BPMN models while maintaining all hidden and extended attributes without compromising the execution of the model

Starting with a BPMN model that contains all executable parameters of various execution engines, modeling tools will one after the other change the name of task before passing the model to the next tool. This will showcase that although the model was modified the execution capability is preserved. At the end various execution engines will execute the model in parallel. Each execution engine will show the completion of a different specific task of the same model.

Table 1 provides an overview about which tools and vendors will be showcased

Table 1. Demonstration schedule

Tool	Diagram Interchange	Hidden Attribute	Execution
ADONIS (BOC Group)	X	X	X
camunda bpmn.io	X	X	X
camunda Modeler	X	X	X
Signavio Process Editor	X	X	X
Trisotech BPMN Modeler	X	X	X
Trisotech BPMN Visio-Add-In	X	X	X
W4 BPMN+	X	X	X
YaoQiang	X	X	X

6 Findings

The preparation for this demonstration as provided mixed experiences.

First, it is shown that interoperability between tools is already possible even for non-trivial processes. Particularly the challenging execution interchange demonstra-

tion shows that also the subsequent construction of executable business processes using several BPMN tools is possible.

On the other hand, the amount of preparation necessary suggests there is still a good way to go. During preparation, several bugs had to be ironed out by the vendors before being able to run this demonstration successfully. However, the fact that most of these bugs were rather minor indicates that there are already several tools available on the market which have no fundamental problems in exchanging even executable business processes.

7 Conclusion and Outlook

With the ever-increasing relevancy of BPMN, it becomes more and more important to share and exchange processes across organizations and tools. BPMN already provides a solid foundation for exchanging BPMN processes. However, due to the expressive power and the resulting complexity of BPMN, many aspects are unclear and non-obvious interchange issues arise. Therefore, using carefully designed test cases helps in finding these aspects.

A number of proposals for the further development of BPMN have been created. These proposals have the potential to improve the interoperability of BPMN business processes substantially. However, during the design process of BPMN, several key decisions have been made. For example, model elements like expressions are intentionally not standardized in order to ensure BPMN applies to a wide area of scenarios. As these decisions are the result of a carefully crafted compromise between interoperability and flexibility, this type of limitation is likely to stay for the foreseeable future.

Nevertheless, the BPMN MIWG initiated an ongoing process for developing test cases, methods, and tools which assist both vendors in improving the compatibility across tools. The interoperability demonstrations are a good indicator that this process already provides substantial benefits for the BPM and BPMN community.

BPMN MIWG is an open group. All interested parties – and particularly solution developers – are very much invited to contribute towards better BPMN Interoperability. Similarly, academic research projects and companies interested in BPMN interchange are invited to contribute to this effort as well.

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