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The National Consortium for Justice Information and Statistics

Modeling Exchange Requirements: Justice Information Exchange Model and Business Process Modeling Notation

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Overview

Modeling exchange requirements is an important precursor to defining information exchange specifications within an information sharing environment. The success of information sharing initiatives usually depends on multiple independent partners, each with their own mission and capabilities, creating a shared vision for their common enterprise. They must build this shared vision on the basis of well-understood, clearly documented requirements. It is the partners' consensus of these requirements that provides a stable foundation for designing, implementing, and deploying information sharing solutions.

Many complementary mechanisms exist that can be used for modeling exchange requirements, two of which are the Justice Information Exchange Model (JIEM)¹ Methodology and Tool, and Business Process Modeling Notation (BPMN). JIEM and BPMN present two views of the same information, which can be used in different contexts and for different purposes.

The purpose of this *Technical Brief* is to articulate the complementary relationship between JIEM and BPMN.

What is JIEM?

JIEM is comprised of three integrated components: the JIEM Methodology, JIEM Tool, and JIEM Reference Model.

¹ For more details about JIEM, see <http://www.search.org/programs/info/jiem.asp>.

JIEM Methodology. The JIEM Methodology is a structured, formally documented approach for defining and capturing information exchange requirements. It provides the steps necessary to capture both the:

- **Content of the exchange** – the information being exchanged.
- **Context of the exchange** – who is involved in the exchange, the factors determining when the exchange should occur, and the reasons that prompted the exchange, as well as what event will happen next.

In addition, JIEM captures critical policy requirements such as privacy, security, and the priority and frequency/urgency of the exchange. The goal is to build consensus among business partners.

The JIEM Methodology is premised on the notion that all information exchanges can be described by identifying five dimensions of requirements. By carefully defining the five dimensions for each information exchange, the content and context is documented.

The JIEM Methodology provides the guidance necessary to capture and organize critical exchange information using the following three steps:²

Step 1: <i>Analyze exchange requirements</i>	Step 2: <i>Document basic rules of the exchange</i>	Step 3: <i>Document additional policy and operational requirements</i>
<p>1. Process: Series of logically related events and exchanges that achieve some business purpose or milestone</p> <p>2. Event: Decisions or actions that trigger information exchange</p> <p>3. Agency: Business partners that exchange information</p> <p>4. Condition: Decision points or “gates” that define when information exchange happens</p>	<p>Context: <i>Why</i> (As part of what business process?)</p> <p><i>Who</i> (What parts of the enterprise?)</p> <p><i>When</i> (Under what conditions? After which events?)</p> <p><i>What happens next?</i></p>	<p>Policy Requirements:</p> <ul style="list-style-type: none"> – Privacy – Security – Priority – Frequency/Urgency – Complexity – Confidentiality – Duration
<p>5. Information: The content of the information exchanged—the “payload”</p>	<p>Content: The actual information being exchanged</p>	

² For more details on the JIEM Methodology, see <http://www.search.org/programs/info/jiem-methodology.asp>.

JIEM Tool. The JIEM Tool is an easy-to-use software package that enables justice system practitioners to build a model of their “as-is” and “to-be” information exchanges.

Using the Tool, practitioners apply the JIEM Methodology, documenting requirements for electronic information sharing, capturing both the information content and business context of information exchanges.³

JIEM Reference Model. A reference model is a set of information exchanges regarding business functions that are common to most jurisdictions and that have been defined and honed by other JIEM users. Having reference models available allows users of the JIEM Tool to leverage key exchanges of relevance to their site, reducing the time it takes to develop requirements while producing results that are more consistent with those of other jurisdictions.

The existing JIEM Reference Model is based on the Adult Felony judicial process. SEARCH is expanding this resource by developing additional reference models that go beyond the Adult Felony process.⁴

JIEM Key Characteristics

The following are considered to be key characteristics of JIEM and the JIEM Tool:

- JIEM is a widely accepted and familiar approach to the national justice community for modeling exchange requirements. SEARCH has trained more than 1,000 users and 86 jurisdictions have used JIEM for exchange analysis.⁵
- JIEM is based on an easy-to-use user interface and terminology familiar to practitioners. JIEM does not involve a complex notation; instead it uses simple concepts expressed in text form. Because of this, JIEM requires a shallow learning curve.
- JIEM is ideal to use in a facilitated session with business process experts around the table.
- JIEM allows users to focus in on one exchange at a time to explore and define the detailed requirements for that exchange.
- JIEM provides a structured methodology, which makes defining information exchange requirements straightforward.
- JIEM enables a dimensional analysis of business processes. Processes can be viewed from the point of view of agencies involved, events involved, documents involved, and the processes themselves.

³ For more details on the JIEM Tool, see <http://www.search.org/programs/info/jiem-tool.asp>.

⁴ For more details on JIEM reference models, see <http://www.search.org/programs/info/jiem-referencemodel.asp>.

⁵ JIEM Production Server statistics.

- National standards such as the National Information Exchange Model (NIEM) can be used to define the content of an exchange within JIEM.
- JIEM has the ability to leverage reference models, which accelerates the gathering of requirements and aligns requirements models with national best practices.
- JIEM is integrated with the NIEM Information Exchange Package Documentation (IEPD) lifecycle (and the integration is improving as a NIEM tools strategy unfolds).

What is BPMN?

BPMN⁶ is a standardized modeling notation for illustrating business process within a workflow. BPMN provides a graphical notation that is intended to be easily understood by all project stakeholders. It is designed to coordinate the sequence of processes and messages that flow between different processes or process participants. Another intention of BPMN is to close the gap between gathering requirements and implementation by being mappable to certain executable languages such as Business Process Execution Language (BPEL).⁷

The BPMN specification defines three types of business processes that can be conveyed through BPMN:

- **Private** – represents processes and activities internal to a specific organization.
- **Abstract** – represents interactions between a private business process and another process or process participant. Abstract processes only include the activities that communicate outside of the private process. Internal activities are not shown.
- **Collaboration** – represents interactions between two or more processes or process participants. Each interaction is defined as a sequence of activities that represents message exchange between processes or process participants.

The complementary relationship between JIEM and BPMN is most relevant to collaboration processes, as these processes are focused on information exchange between autonomous organizations.

BPMN Key Characteristics

The following are considered to be key characteristics of BPMN:

- BPMN provides a graphical approach to modeling business processes.
- BPMN has the ability to illustrate an entire workflow in a single illustration.
- BPMN has the ability to produce executable models; in certain cases this requires vendor-proprietary extensions and tools.

⁶ For more details on BPMN, see <http://www.bpmn.org/>.

⁷ For more details on BPEL, see <http://en.wikipedia.org/wiki/BPEL>.

- BPMN is an open standard, but by no means is the leading or only standard. XML Process Definition Language (XPDL)⁸ is another open standard currently being developed to define business workflows.

The BPMN standard governs what BPMN models look like—that is, how the graphics appear. The standard does not address the underlying “structure” or information contained within a BPMN model, so the information is proprietary to each vendor solution. As a result, there is no way of opening a BPMN model created in one tool in another tool, and no way to extract the information/structure of a BPMN model for use in other tools.

JIEM and BPMN: Complementary Approaches

JIEM and BPMN are both powerful tools for modeling information exchange requirements. Though each tool has a different focus, JIEM and BPMN can be used in conjunction to give users a more complete view of their information exchange environment.

The JIEM Tool and Methodology are to be used when the user is interested in focusing on defining explicit context and content for each information exchange. Defining exchange content in JIEM flows nicely into the exchange content modeling step of the NIEM IEPD process.

BPMN provides a more process-focused approach because it illustrates business processes that occur in a workflow. BPMN should be used if the user is concerned with process flow and an overall view of collaboration between processes or process participants. BPMN may also be used in cases where an agency has adopted a vendor-specific workflow tool based on BPMN.

There is no clear rule as to which should be used first: JIEM or BPMN. This choice is up to project participants. The important concept to understand is that JIEM and BPMN provide alternative views to the same exchange requirements. More specifically, BPMN provides an overall view of process flow and interaction and can show where collaboration between processes occurs. However, it does not show a more granular level of detail about the content of those collaborations. JIEM defines exchanges at this more detailed level and defines the context of each information exchange as well.

BPMN should not be mistaken as a replacement for JIEM or vice versa. JIEM and BPMN are two of many methodologies available for documenting exchange requirements. Each approach accomplishes different results that clearly can work together to facilitate the outcome of an information sharing initiative.

A Real-World Example

SEARCH conducted an information sharing project with the Pennsylvania Commission on Crime and Delinquency (PCCD). Prior to this project, PCCD had adopted a vendor-specific workflow tool based on BPMN. The goal of the project was to create BPMN

⁸ For more details on XPDL, see <http://www.wfmc.org/standards/xpdl.htm>.

models that could be executed with proprietary extensions using this vendor-specific workflow tool.

Going into this project, PCCD asked SEARCH to use the JIEM Tool and Methodology to capture all exchange requirements from each county in Pennsylvania. By entering this information into the JIEM Tool, project stakeholders were able to continuously vet the content to ensure accuracy. SEARCH leveraged the explicit information collected through the JIEM Tool to construct equivalent BPMN collaboration models, which present an alternate view that can be executed using the vendor-specific workflow tool chosen by PCCD.

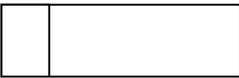
Technical Concepts: Mapping JIEM to BPMN

SEARCH has conducted extensive research focused on mapping JIEM Methodology concepts to BPMN concepts. This research is in support of possibly generating BPMN models, or other workflow models such as XPDL, from a JIEM site model where the alternative view would introduce a value-add to JIEM users.

The following section is devoted to associating JIEM Methodology concepts to BPMN concepts.

JIEM Concept	Event
JIEM Definition	Something that happens instantaneously or in a slice of time. A JIEM Event can be either triggering or subsequent.
BPMN Equivalent	Event
BPMN Symbol	
BPMN Definition	Something that “happens” during the course of a business process. Events affect the flow of the process and usually have a cause (trigger) or an impact (result).
Justification	These are two semantically equivalent concepts.

JIEM Concept	Condition
JIEM Definition	A factor that affects the content or direction of the information exchange.
BPMN Equivalent	Gateway
BPMN Symbol	
BPMN Definition	A decision point that controls the divergence and convergence of sequence flow. Thus, it will determine branching, forking, merging, and joining of paths.
Justification	Though these concepts are not 100% semantically equivalent, a JIEM condition is essentially a decision point resulting in divergence of sequence flow.

JIEM Concept	Agency
JIEM Definition	A criminal justice or justice-related entity that sends or receives information.
BPMN Equivalent	Pool
BPMN Symbol	
BPMN Definition	Represents a participant in a process. It also acts as a “swimlane” and a graphical container for partitioning a set of activities from other pools.
Justification	In JIEM, an agency is the sender or receiver of information. In BPMN, the pool serves as the participant that performs activities resulting in the sending or receiving of information.

JIEM Concept	Process
JIEM Definition	A group of logically related events.
BPMN Equivalent	Process
BPMN Symbol	N/A
BPMN Definition	Work performed within an organization; this is represented by a graph of BPMN flow objects.
Justification	Though it is possible to derive a BPMN process from a JIEM process, this should not be considered a one-to-one mapping. In JIEM, several organizations can contribute to a process, whereas BPMN defines a process as work performed by a single organization.

JIEM Concept	Information
JIEM Definition	The actual data that is exchanged between the sending and receiving agencies, this dimension consists of documents and data elements.
BPMN Equivalent	N/A
BPMN Symbol	N/A
BPMN Definition	N/A
Justification	BPMN does not get to the level of defining the specific content being exchanged between processes or process participants. When mapping from JIEM to BPMN, this information would be lost.

JIEM Concept	Exchange Label
JIEM Definition	This is the name of the exchange.
BPMN Equivalent	Activity
BPMN Symbol	
BPMN Definition	A generic term for work that a company performs.
Justification	Though there is no specific rule for naming exchanges in JIEM, if the exchange is labeled in terms of activity being performed by the sending agency, mapping to a BPMN activity is relatively straightforward.

JIEM Concept	Exchange
JIEM Definition	An exchange consists of <i>context</i> (Processes, Events, Agencies, and Conditions) and <i>content</i> (Documents and Data Elements).
BPMN Equivalent	Message Flow
BPMN Symbol	
BPMN Definition	The flow of messages between two participants that are prepared to send and receive them.
Justification	Semantically equivalent concepts.

Example

The following is an example of information from a JIEM site model being used to construct a BPMN diagram.

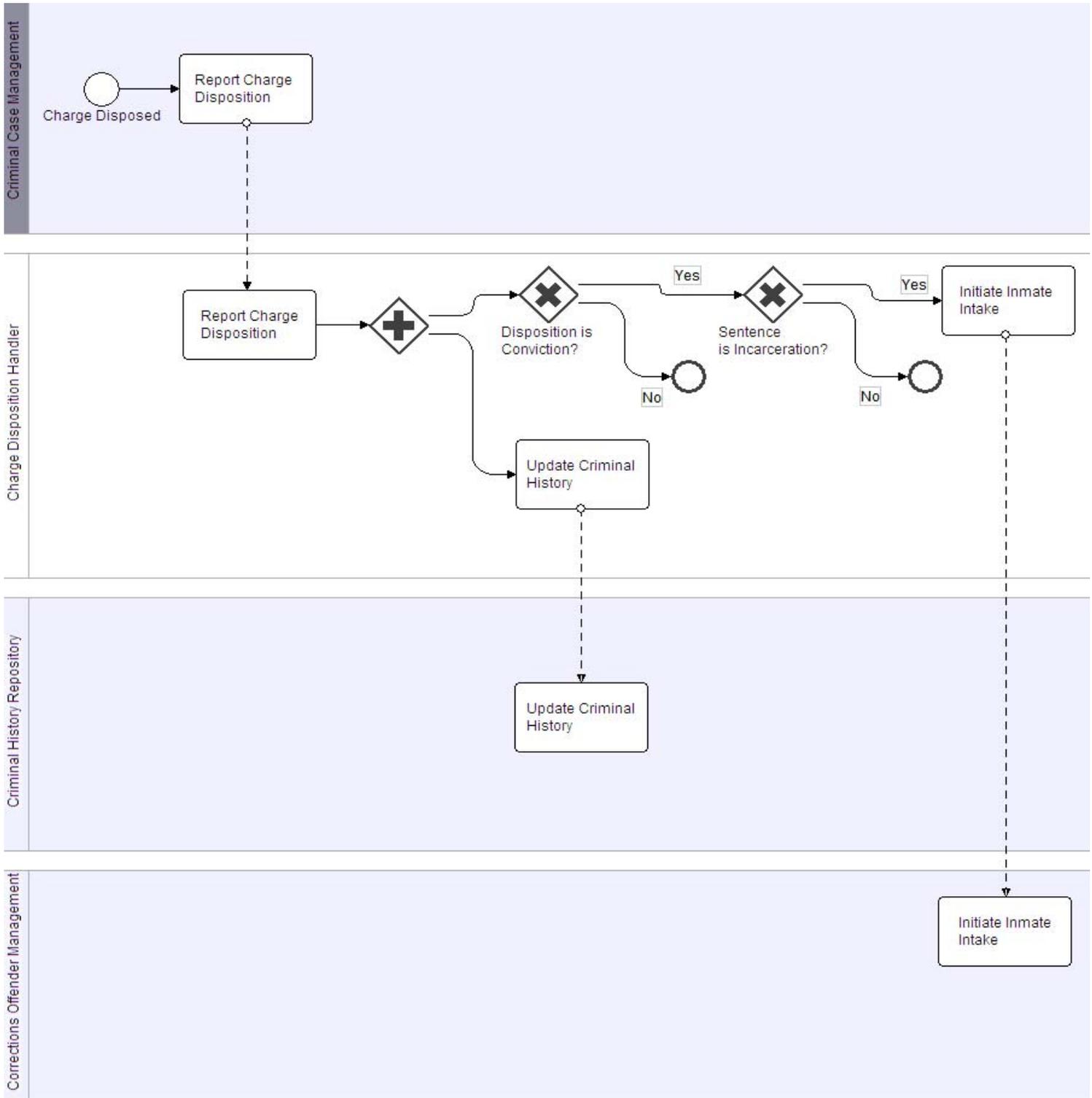
The example JIEM site model contains the following three exchanges:

Exchange: Report Charge Disposition	
Prevailing Process	Post-Disposition Court
Subsequent Process	Undefined
Triggering Event	Charge Disposition
Subsequent Event	Undefined
Sending Agency	Criminal Case Management
Receiving Agency	Charge Disposition Handler

Exchange: Update Criminal History per Disposition	
Prevailing Process	Post-Disposition Court
Subsequent Process	Undefined
Triggering Event	Charge Disposition
Subsequent Event	Undefined
Sending Agency	Charge Disposition Handler
Receiving Agency	Criminal History Repository

Exchange: Initiate Inmate Intake	
Prevailing Process	Incarceration
Subsequent Process	Undefined
Triggering Event	Charge Disposition
Subsequent Event	Undefined
Sending Agency	Charge Disposition Handler
Receiving Agency	Corrections Offender Management
Conditions	<ul style="list-style-type: none">• If disposition is conviction• If sentence is incarceration

The information from the above JIEM site model was used to create the following BPMN diagram:



Frequently Asked Questions

How mature is BPMN?

BPMN, originally developed by the Business Process Management Initiative (BPMI), has been under development since 2001. In November 2002, a draft of BPMN 0.9 was released for public review; 10 months later a draft of BPMN 1.0 was released for public review. The current version of BPMN—BPMN 1.0—was officially released in May 2004. In June 2005, BPMI merged with the Object Management Group (OMG), making BPMN intellectual property of OMG. In February 2006, OMG adopted BPMN 1.0 as an OMG specification.

In June 2007 OMG released a request for proposal for the development of BPMN 2.0.⁹ BPMN 2.0 will serve as a reconciliation of BPMN and Business Process Metamodel Definition (BPMN). BPMN 2.0 will address some shortcomings of BPMN 1.0, such as support for exchanging business process models and diagram layouts between modeling tools.

Are there other techniques like BPMN that I should be considering?

There are several tools and methodologies available for the modeling of business processes, including JIEM, BPMN, Unified Modeling Language (UML), and XML Process Description Language (XPDL). Choosing among these alternatives is a decision that should be made based on project objectives and desired outcomes, as each approach has advantages and disadvantages. Earlier sections of this paper describe the differences between and advantages to using JIEM and BPMN. A comparative analysis inclusive of UML and BPMN is outside the scope of this document; however, there are online resources that help make this comparison. In many cases, a combination of techniques is appropriate. Some worth mentioning are JIEM, UML,¹⁰ Business Process Execution Language (BPEL), and XPDL.

Do JIEM and BPMN accomplish the same outcome?

JIEM and BPMN present two views of the same information: How a group of business partners share information in order to respond to common business events and achieve a shared business objective. Because it is often desirable to present this information to different audiences, it can be advantageous to use both techniques together.

While JIEM and BPMN are tools used together to achieve the same outcome, it is important not to mistake BPMN as a replacement for JIEM or vice versa. JIEM is focused on showing the context and content for each exchange, whereas BPMN shows the entire process flow, start to finish, in one view.

⁹ The BPMN 2.0 RFP is available for download from <http://www.bpmn.org/Documents/BPMN%202-0%20RFP%2007-06-05.pdf>.

¹⁰ For more details on UML, see http://en.wikipedia.org/wiki/Unified_Modeling_Language.

Can I automatically create BPMN models from my JIEM site model, or vice versa?

No. The current version of the JIEM Tool, JIEM 4.0, does not currently support the automatic generation of a BPMN model from a JIEM site model. Nor can BPMN-based business modeling tools support the automatic generation of a JIEM site model based on a BPMN model.

Exchanging information between BPMN modeling tools and other tools, such as JIEM, is difficult because the BPMN standard does not require model structure or content to be stored in any particular format. Each BPMN tool stores model information in a manner specific to that tool. Some tools provide easy access to this information (e.g., in XML form), while other tools completely obscure the information. The OMG has identified correcting this problem as a priority for BPMN 2.0, but it will be some time before BPMN 2.0 is available and implemented in tools.

Alternatives to BPMN, such as XPDL, provide direct access to model structure and content, and may be a better choice if automated exchange of information between business modeling tools or approaches is important to your project. The next version of XPDL (2.1) is likely to include features that support BPMN concepts. To the extent these features are implemented by BPMN tools, in the near future it may be possible to exchange BPMN model structures between tools, and for JIEM to export site models as BPMN. SEARCH continues to monitor developments in this area.

I'd like to model business processes. Which do I choose, JIEM or BPMN?

The answer to this question depends on objectives and desired outcomes. The JIEM Tool and Methodology are to be used when the user is interested in focusing on defining explicit context and content for each information exchange. Defining exchange content in JIEM flows nicely into the exchange content modeling step of the NIEM IEPD process.

BPMN illustrates business processes in a workflow. BPMN should be used if the user is more concerned with process flow and an overall view of collaboration between processes or process participants. Also, BPMN may be used in the case when an agency has adopted a vendor-specific workflow tool based on BPMN.

Which approach, JIEM or BPMN, works best with NIEM and the NIEM IEPD lifecycle?

While JIEM and BPMN both can assist with the Scenario Planning and Requirements Analysis phases of the NIEM IEPD lifecycle, in most cases JIEM better supports those phases because it more explicitly models both the content and context of information exchanges. In the near future JIEM will support XML Metadata Interchange¹¹ (XMI)-based integration of exchange models with UML modeling tools and the NIEM IEPD tools used in the next phase of the lifecycle. (BPMN does not currently support this kind of integration.)

¹¹ For more information on XMI, see <http://www.omg.org/technology/documents/formal/xmi.htm>.

Does BPMN support the concept of reference models?

It is possible to create a BPMN model, representing a generic business process that can be reused by multiple users, but reference models are not a part of the BPMN specification.

There are no known BPMN reference models for justice. An advantage of JIEM is that it allows practitioners to develop requirements models quickly by using reference models that are based on best practices.

What is SEARCH doing to improve integration of JIEM with business process modeling tools and technologies?

SEARCH continues to conduct extensive research on how JIEM relates to business process specifications such as BPMN and XPDL. SEARCH is exploring the possibility and viability of automatically generating BPMN and XPDL models from JIEM site models. The recent transition of the JIEM Tool to the Eclipse¹² open tools platform will allow JIEM to take advantage of the growing ability of Eclipse to support business process modeling, such as the Eclipse SOA Tools Project.¹³

Where can I learn more about JIEM?

For information about JIEM, see <http://www.search.org/programs/info/jiem.asp>.

Where can I learn more about BPMN?

For information about BPMN, see <http://www.bpmn.org/>.

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¹² For details about Eclipse, see <http://www.eclipse.org>.

¹³ For details about the Eclipse SOA Tools Project, see <http://www.eclipse.org/stp/>.