Business Process Standards and Modeling

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STANDARDS
Standards Organizations

  - Business Process Modeling Notation (BPMN)
  - Business Process Definition Metamodel (BPDM)
- Workflow Management Coalition ([www.wfmc.org](http://www.wfmc.org))
  - XML Process Definition Language (XPDL)
- OASIS ([www.oasis-open.org](http://www.oasis-open.org))
  - Driving the adoption of global e-business standards
  - ebXML
  - Business Process Execution Language (BPEL)
- W3C ([www.w3c.org](http://www.w3c.org))
  - Open, collaborative review process
  - SOAP, WSDL, core XML specifications
  - Web Services Choreography Description Language (WS-CDL)
- WS-I ([www.ws-i.org](http://www.ws-i.org))
  - Interoperability of WS technologies and standards
  - WS-I Basic Profile
Business Process Execution Language (BPEL)

- An orchestration language for specifying business process behavior based on Web Services
- Executable vs. abstract business processes
- XML-based business process models that can be executed, stored, and exchanged
- No graphical notation
- Originally called Business Process Execution Language for Web Services (BPEL4WS)
- Convergence of XLANG and WSFL
- BPEL 1.0 jointly developed by IBM, BEA, SAP, Siebel, and Microsoft – published August 2002
- BPEL 1.1 submitted to OASIS in April 2003
- BPEL 2.0, OASIS standard April 2007
XML Process Definition Language (XPDL)

- Workflow Management Coalition (WfMC) standard
- A format for business process definition interchange
- Addresses both the graphics and the semantics
- XML-based business process models that can be executed, stored, and exchanged
- Currently the best file format for exchange of BPMN diagrams
- XPDL 1.0 was ratified by the WfMC in 2002
- XPDL 2.0 was ratified by the WfMC in Oct 2005
- XPDL 2.1 was ratified by the WfMC in Apr 2008
Business Process Modeling Notation (BPMN)

- A standardized graphical notation for drawing business processes
- Currently no definition for storage or exchange of business processes
- Started within the Business Process Management Initiative (bpmi.org)
- BPMI merged with OMG in mid 2005
- OMG Final Adopted version of BPMN published February 2006
- BPMN 1.1: OMG Specification, Feb 2008
- BPMN 2.0: Business Process Model and Notation
  - Will also define a metamodel and interchange format
**Business Process Definition Metamodel (BPDM)**

- Provides abstract concepts to express business process models
- Intended as a medium of exchange between different business process description languages
- Unification of orchestration and choreography
- Designed to represent concepts from a business perspective
- Specifies a mapping between BPDM and BPMN
- Version 1.0, Beta 1: July 2007
- Version 1.0, Beta 2: May 2008
Levels of Abstraction: MOF

M3: Meta-Metamodel

M2: Metamodel

M1: Model

M0: Instance

Notation

instance-of

instance-of

instance-of

describes

describes

describes

expresses

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## Horizontal and Vertical Abstraction

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<tr>
<th>Level</th>
<th>Process Perspective</th>
<th>Information Perspective</th>
<th>Organization Perspective</th>
<th>Operational Perspective</th>
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<tr>
<td>M2</td>
<td>Process metamodel</td>
<td>Data meta model</td>
<td>Organization metamodel</td>
<td>Interface Definition Languages</td>
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<tr>
<td>Notation</td>
<td>Process notation</td>
<td>Data model notation</td>
<td>Organization model notation</td>
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<td>M1</td>
<td>Process model</td>
<td>Data model</td>
<td>Organization model</td>
<td>Interface definitions</td>
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<td>M0</td>
<td>Process instance</td>
<td>Data values</td>
<td>Persons</td>
<td>Executing software</td>
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</table>
PROCESS MODELING METHODS
Process Modeling Methods

- Process Map
- Value Chain Analysis
- Process Models
  - UML Activity Diagram
  - Business Process Modeling Notation (BPMN)
- (Extended) Event-driven Process Chain (EPC/eEPC)
- Function Allocation Diagram (FAD)
- ICAM Definition 0 (IDEF0)
Process Map

- Describes the core functions and core processes of an (extended) enterprise
- Does not provide a solution but a management tool for re-engineering
Value Chain Analysis

- Basic method for modeling the core processes
- Starting point for identifying various opportunities and consequences
- Wide perspective
- Represents holistic systems thinking
- Particularly suitable for inter-organization logistic processes
Process Models

- Depict the process flow as a series of activities
- Two levels
  - Free-form: basis for defining metrics
  - Standard: basis for subsequent implementation
- Two standard notations
  - UML Activity Diagrams
  - BPMN (Business Process Modeling Notation)
Activity Diagram

- Flowchart like diagram that also allows depiction of parallel processing
- Can be used to define business processes but is not specifically designed for the purpose
Business Process Modeling Notation (BPMN)

- New notation standard for specifically depicting business processes
- Best practices from prior notations
- Only one diagram type
# UML vs. BPMN

<table>
<thead>
<tr>
<th>UML</th>
<th>BPMN</th>
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<tr>
<td>12 distinct diagram types</td>
<td>Only one diagram type</td>
</tr>
<tr>
<td>Used by system architects and software engineers</td>
<td>Used by business analysts</td>
</tr>
<tr>
<td>Objects as first-class citizens</td>
<td>Processes as first-class citizens</td>
</tr>
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</table>
Event Driven Process Chain

- Describes triggering events, functions and rules
- Underlies IDS Scheer ARIS
- Widely used in business reference models
Extended Event-Driven Process Chain

- Like EPC but also shows the resources used
Function Allocation Diagram

- Shows the resources allocated to each function

SoberIT
Software Business and Engineering Institute
IDEFO

- Decomposes the process model to the level of individual activities
- Shows process logic, input and output
MODELING BUSINESS PROCESSES IN BPMN
Modeling Business Processes in BPMN

- Four basic categories of elements:
  - **Flow Objects**: event, activity, gateway
  - **Connecting Objects**: sequence flow, message flow, association
  - **Swimlanes**: pool, lane
  - **Artifacts**: data object, group, annotation
BPMN Event

- Event: Something that happens during the course of a business process
  - Notation is a circle: ○
  - Affects flow of the process and usually has a cause (trigger) or an impact (result)
- Flow Dimensions:
  - Start ○
  - Intermediate ○
  - End ○
BPMN Event — Type Dimension

- Most Start and Intermediate Events have “Triggers”
- Most End Events define a “Result”
BPMN Activity

- Activity: Work performed
- Can be atomic or non-atomic (compound)
- Types of activities:
  - Task
  - Sub-Process
  - Process
- Notation is a rounded rectangle for Tasks and Sub-Processes
- Processes are unbounded or contained within a pool
Task Markers

- BPMN specifies three types of markers for Task: a Loop Marker or a Multiple Instance Marker and a Compensation Marker. A Task may have one or two of these markers.
BPMN Gateway

- Gateway: Controls the divergence and convergence of Sequence Flow
- Notation is a diamond
- Internal Markers will indicate the type of behavior control
Exclusive Data-Based Decision
Exclusive Gateway Merging the Sequence Flow (Prior To an Parallel Gateway)
Event-Based Decision
Inclusive Decision

Using Conditional Sequence Flow

Using an OR Gateway
Complex Gateway
Parallel Gateway
BPMN Connector Objects

- Normal Flow
- Uncontrolled Flow
- Conditional Flow
- Default Flow
- Exception Flow
- Message Flow
- Compensation Association
BPMN Pools and Lanes

- Pools and Lanes are used to group the primary modeling elements through “Swimlanes”
- Pool
  - Represents a Participant in a Process
  - Usually used in a B2B context
- Lane
  - A sub-partition within a Pool
  - Is used to organize and categorize activities
Message Flow Connecting Pool Boundaries and Flow Objects
Other BPMN Objects

- **Data Object**
  - Provides information about what activities require to be performed and/or what they produce

- **Transaction**
  - A Sub-Process in which all parties involved have a complete agreement that the activity should be completed or cancelled

- **Group**
  - Groups activities for documentation or analysis purposes
Data Objects Shown as Inputs and Outputs
A Transaction Expanded Sub-Process
A Group Around Activities in Different Pools

- Patient:
  - Illness Occurs
  - Send Doctor Request
  - Receive Appt.
  - Receive Medicine
  - Handle Medicine
  - 1) I want to see doctor
  - 5) Go see doctor
  - 9) need my medicine

- Receptionist:
  - Receive Doctor Request
  - Send Appt.
  - Receive Medicine Request
  - Send Medicine
  - 10) Here is your medicine
Other BPMN Objects (2)

- Off-Page Connector
  - Shows where the Sequence Flow leaves one page and restarts on the next page

- Association
  - Used to associate text and graphical information with Flow Objects

- Text Annotation
  - A mechanism for providing additional information
  - Attached with an Association