Business Process Mapping using the BPMN 2.0 Modelling Notation

Tutorial
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The Business Process Model and Notation

◆ Syntax only
◆ Process independent
◆ Tool independent
◆ Developed by the OMG
◆ Also responsible for
  ◆ UML
  ◆ SysML
◆ Version 1.0 - May 2004 - adopted 6/2/06
◆ Version 1.1 - Feb 2008
◆ Version 2.0 - Jan 2011 - current
Business Process Diagram (BPD)

- Private Process
- Start and End Events
- Activities

- Sequence Flows
- Exclusive Gateways
- Intermediate Events

Sell Vehicle

Customer Enquiry Received → Handle Enquiry → Make Offer → Offer Accepted → Process Order → Process Payment → Sale Complete

- Run Pre-Delivery Check
  - new vehicle → Register Vehicle
  - pre-owned vehicle → Tax Vehicle

- Tax Vehicle → Deliver Vehicle
- Offer Accepted → payment accepted
- payment rejected
Private Processes

◆ Internal to a specific organisation
◆ Does not show explicit interaction with external entities
◆ Non-executable
  ● Modelled for the purpose of documenting process behaviour at a modeller-defined level of detail
◆ Executable
  ● Modelled for the purpose of being executed in business process management or other system
Start and End Events

◆ An event is instantaneous
  ● Mostly a status phrase e.g.
  ● “Customer Enquiry Received”
  ● “Sale Complete”
  ● Maybe a command e.g.
  ● “Start Process”
  ● Often associated with the arrival or sending of information

◆ Start Event
  ● Indicates where a process will start
  ● Optional but recommended
  ● No incoming sequence flows
  ● May be more than one

◆ End Events
  ● Indicates where a path of a process will end
  ● No outgoing sequence flows
  ● Optional but recommended
  ● May be more than one
Activities and Sequence Flows

- An activity is work that is performed within a business process
- A sequence flow shows the order in which activities will be performed in a business process
- It defines the end of one activity and the beginning of the next
- No activity occurs on the sequence flow
- Think of a sequence flow as the thread of activity
- A sequence flow is normally only named if it is the outgoing flow from a gateway
- Use an event or a conditional sequence flow to qualify it
Exclusive Gateways

- Gateways control the flow of the thread of activity
  - 1-N sequence flow in (‘merging’ of flows)
  - 1-N sequence flow out (‘switching’ of flows)
  - Can be named with a question
  - Can occur sequentially
- No work is done in a gateway
- A simple gateway is exclusive by default
- An exclusive gateway has non-overlapping conditions defined for each possible exit
- Think of it as switching the flow
- If no condition is met the thread is held up
Intermediate Events

- Indicate where something happens between the start and end of a process.
- Indicate the termination of the previous activity or the start of the next.
- All events are instantaneous and no work is done.
- May occur as the result of receiving or sending data (message flows).
- May be ‘throw’ or ‘catch’.
- Activity edge event is catch only.

Common Variants:
- Make Offer
- Message Received
- Message Sent
- Timer Event
- Offer Accepted
- Process Order
Public Processes

◆ Pools, lanes and message flows

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Pools and Lanes

- Pools represent participants in a collaboration
- Pools may be empty (black box), or show a process
- A public process shows external entities as empty pools with messages to and from the pool
- Lanes may be used to organise activities within a pool
- The meaning of the lanes is up to the modeller
- Lanes may be nested e.g. a role within a department
- The assignment of an activity to a pool or lane indicates the allocation of responsibility
Message Flows

- are used to show the flow of messages between two participants in a collaboration
- must connect two separate pools and not two objects within the same pool
- connect either to the pool boundary or to flow objects within the pool
- may have an attached message
Collaboration Process

Customer

Handle Enquiry → Make Offer → Offer Accepted → Process Order

Customer Enquiry Received

Salesperson

Offer Customer Response → Payment

Payment rejected → new vehicle → pre-owned vehicle

Run Pre-Delivery Check

Mechanic

Registration Application → Payment

Registration Document

Customer

Customer Enquiry

Enquiry Received

Customer Response

Process Order

Handle Enquiry

Make Offer

Process Payment

Register Vehicle

Tax Vehicle

Deliver Vehicle

Sale Complete

Car Dealership

Accounts Clerk

Vehicle Licensing Authority

Registration Application

Handle Registration Request

Registration Document

Tax Application

Process Tax Application

Tax Disc Sent

Registration Document

Tax Application

Tax Disc

Offer Accepted

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**Collaboration Process**

- Shows the internal processes of more than one participant (pool) in the collaboration.
- The participants can be different organisations or different departments within the same organisation.
- Message flows can cross the pool boundary to attach to the appropriate activity or event in another pool.
- Start and end events for each pool.

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Process with Sub-Processes

- ‘Take Order’ and ‘Prepare Vehicle’ are collapsed sub-processes
- A collapsed sub-process can be “opened up” to show a lower-level process either as a separate process diagram, or on the parent process diagram
- The events starting and ending the parent activities should be consistent with the child diagrams
Concurrency: Parallel Gateway

- Splits thread (token) into parallel paths
- Following activities all start immediately
- Each prior state must be complete at the merging gateway for the thread to continue
- Re-sync the threads with a parallel gateway before leaving the diagram
Tasks are activities that do not decompose
User task is performed by a human with the assistance of an application
Service task uses a web-service or automated application
Business rule task provides input to and gets output from a business rules engine
Script task executed by a business process engine
Human versus System Pools

- Optional grouping of user/automated tasks into a system pool
- May show data flow between user and system for each step
Choreographies and Conversations

- Added in version 2.0
- Choreography emphasises the messaging between pools in a collaboration process
- Conversations show collections of choreographies
Business Process Execution Language (BPEL)

- Allows the process to be exported as source for Business Process Management system
- Also WS-BPEL for Web Services
- Not all BPMN processes will map to BPEL
- The process must be sound (executable)
  - No deadlocks
  - No lack of synchronisation

```xml
<wsdl:portType name="[if-name]">
  <operation name="[op1-name]">
    <wsdl:input message="[msg1i-name]" />
    <wsdl:output message="[msg1o-name]" />
    <wsdl:fault name="[error1a-faultname]"
      message="[error1a-name]" />
  </operation>
  ...
</wsdl:portType>
```