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Pathway in Enterprise Systems Engineering (PENS)

BPMN at a glance

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Wednesday, 25/07/2018

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Agenda

- BPMN explained
- BPMN notation
- Video tutorials
- Examples

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What is BPMN ?

- Business Process Modeling Notation
- Developed by Business Process Management Initiative (BPMI), and is currently maintained by the Object Management Group since the two organizations merged in 2005
- Supports business process management for technical and business users
- Bridge communication gap between business process design and implementation

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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BPMN characteristics

- BPMN is simple
- Process diagrams business people like
- Less complex (business likes that too)
- Under the covers, technical enough for techies

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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BPMN does not do

- State transitions
- Functional decomposition
- Organizational hierarchies
- Data modeling

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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BPMN may remind you of...

- Similar to flowcharts and UML Activity diagrams
- Flow of activities with various messaging and data
- Can be used for service orchestration in SOA

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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BPMN specification describes

- How the elements of a process diagram have to look like (**notation**),
- How these can be combined with each other (**meta model / syntax**),
- What a diagram means (**semantics**) and
- How diagrams can be transferred from one tool to another (**XML interchange format**).

Source: http://www.bpmn-tool.com/en/tutorial/

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Process modelling using BPMN

- What **triggers** (start events) a process and what **results** are produced (end events)?
- Which **steps** (tasks, subprocesses) are necessary?
- Which **dependencies** exist between activities (sequence flow)?
- Which **alternatives** (XOR gateways) are there and where can activities can happen in **parallel** (AND gateways)?
- Who is **responsible** for carrying out an activity (pools, lanes)?
- Which **informationen** (data objects) are relevant within a process?
- Where are **interaction points** (message flow) with suppliers and customers or with other processes?

Source: http://www.bpmn-tool.com/en/tutorial/

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Why BPMN

- Standard notation
- Model concepts and/or implementation of business process
- Models high-level process concepts
- Notation is not complex

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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Issues With BPMN

- Limited complexity
- Process/conversation oriented
- Very high level
- Cannot see details of tasks or data

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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Solving BPMN issues with UML

- BPMN as an extension to UML
- Enhanced ability to implement complexity
- Link implementation with orchestration
- Greater tool support
- Fill in gaps with details state, decomposition, data, implementations

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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BPMN key components

Activity  An Activity is work that is performed within a Business Process

Event  An Event is something that "happens" during the course of a Process

Gateway  A Gateway is used to control the divergence, and convergence of Sequence Flows in a Process

Flow  Two major flow elements are core to BPM:

- A Sequence Flow is used to show the order that Activities will be performed in a Process
- A Message Flow is used to show the flow of Messages between tw Participants of a Process

Source: https://www.process.st/bpmn-tutorial/

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Video: What Constitutes a BPMN Process Diagram

Source: https://www.process.st/bpmn-tutorial/

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Activities

- Activities represent tasks
- Activities are simple for most purposes. Just a rectangle with rounded corners. They represent work to be done, like a checkbox on a checklist or an item on your to-do list.

Source: https://www.process.st/bpmn-tutorial/

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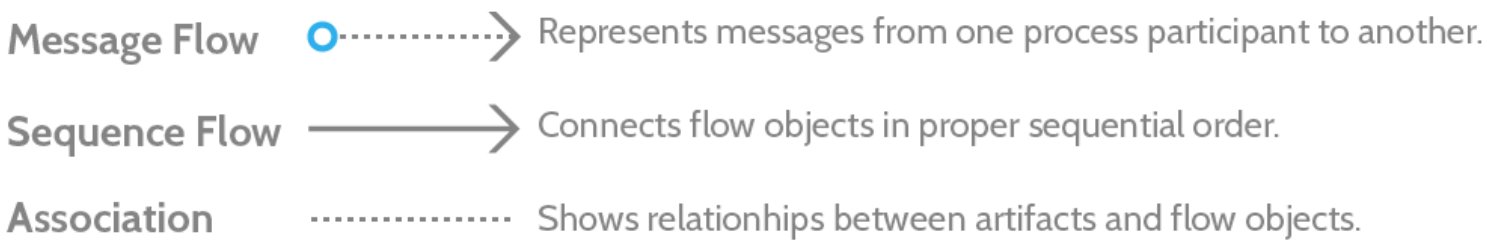
Flows

- Connecting objects show associations and the flow of work/information
- Since BPMN aims to show the flow of activities, it uses three different kinds of connecting objects that show how the activities are related to each other:



- **Sequence flow** the basic line that connects together elements of your map. It shows the flow of work, and is necessary for connecting together activities. Without a sequence flow, your map is invalid.
- **Message flow** is used when different departments or organizations send information between each other. Since you don't get up and go and oversee the work in different departments when you want a task done, message flow represents a request or the sharing of information, not a strict action. It's the only kind of flow that can take place between pools or lanes (organizations or departments).
- **Association** is used to tie documents, databases, and other artifacts together with activities. For example, if you had an activity to sign off on a purchase order, you'd use a document symbol and an association line to link the two together.

Source: https://www.process.st/bpmn-tutorial/

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Gateways

- Similar to diamonds in regular flow charts, gateways represent a split or convergence in the process chart.

Source: https://www.process.st/bpmn-tutorial/

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BPMN elements

Task		A task is a unit of work – the job to be performed. It is an atomic activity within a process flow.
Collapsed Subprocess		A collapsed subprocess is a decomposable activity. It can be linked to another process diagram.
Expanded subprocess		An expanded subprocess is a decomposable activity. It contains a valid BPMN diagram.
Collapsed Event-Subprocess		An event-subprocess is placed within another subprocess. It becomes active when its start event gets triggered and can interrupt the subprocess context or run in parallel (non-interrupting). It can be linked to another diagram.
Event Subprocess		An event-subprocess is placed within another subprocess. It becomes active when its start event gets triggered and can interrupt the Subprocess context or run in parallel (non-interrupting), depending on the start activity.

Source: http://www.bpmn-tool.com/en/tutorial/

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BPMN elements

Data-based exclusive (XOR) gateway		When splitting, it routes the sequence flow to exactly one of the outgoing branches based on conditions. When merging, it awaits one incoming branch to complete before triggering the outgoing flow.
Event-based Gateway		Is always followed by catching events or receiving tasks. Sequence flow is routed to the subsequent event/task which happens first.
Parallel Gateway		When used to split the sequence flow, all outgoing branches are activated simultaneously. When merging parallel branches it waits for all incoming branches to complete before triggering the outgoing flow.
Inclusive Gateway		When splitting, one or more branches are activated based on branching conditions. When merging, it awaits all active incoming branches to complete.
Complex Gateway		It triggers one or more branches based on complex conditions or verbal descriptions. Use it sparingly as the semantics might not be clear.

Source: http://www.bpmn-tool.com/en/tutorial/

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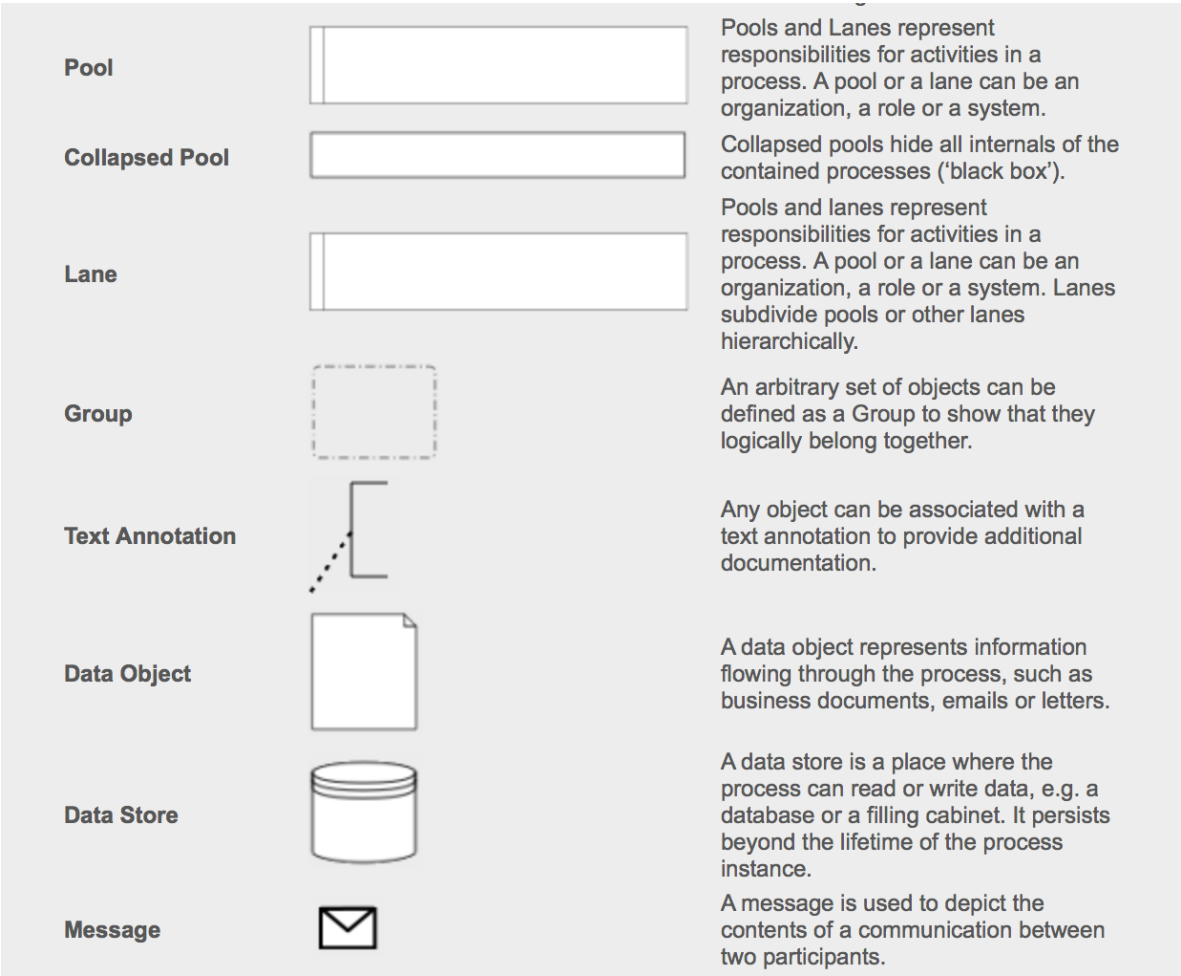
BPMN elements



Source: http://www.bpmn-tool.com/en/tutorial/

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BPMN elements

Start Event		Untyped start event that triggers a new process instance.
Start Message Event		A process instance is started on receipt of a message.
Start Timer Event		A process instance is started on cyclic timer events, points in time, after time spans or timeouts.
Start Escalation Event		Reacts on an escalation to another role in the organization. This event is only used inside of an event subprocess.
Start Conditional Event		A process instance is started based on changed business conditions or matching business rules (i.e., 'S&P 500 changes by more than 10% since opening' or 'Temperature above 300C').
Start Error Event		Catches named errors. This event is only used inside of an event-subprocess. An event-subprocess with an error trigger will always interrupt its containing process.
Start Compensation Event		Compensation handling. This event is only used inside of a event subprocess.
Start Signal Event		A process instance is started based on signaling across different processes. (One signal thrown can be caught multiple times)

Source: http://www.bpmn-tool.com/en/tutorial/

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BPMN elements

Start Multiple Event		A process instance is started upon occurence of one out of a set of possible events.
Start Parallel Multiple Event		A process instance is started upon occurence of all possible events.
Intermediate Message Event		This event reacts on the arrival of a message.
Intermediate Timer Event		Process execution is delayed until a certain point in time is reached or a particular duration is over.
Intermediate Escalation Event		This event reacts on the escalation of a case. It needs to be attached to the boundary of an activity.
Intermediate Conditional Event		Process execution is delayed until a changed business condition or business rule matches.
Intermediate Link Event		Off-page connectors. Two corresponding link events correspond to a sequence flow.
Intermediate Error Event		Catches a named error, which was thrown be an inner scope (e.g. subprocess). This event needs to be attached to the boundary of an activity.

Source: http://www.bpmn-tool.com/en/tutorial/

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BPMN elements

Intermediate Cancel Event		Reacts only on a transaction, which was canceled inside an inner scope (e.g. subprocess). This event needs to be attached to the boundary of an activity.
Intermediate Compensation Event		Compensation handling in case of partially failed operations. This event needs to be attached to the boundary of an activity.
Intermediate Signal Event		Process execution is delayed until a particular signal is catched. Signalling can happen across different processes.
Intermediate Multiple Event		Process execution is delayed until one out of a set of possible events is triggered.
Intermediate Parallel Multiple Event		Process execution is delayed until all possible events have been triggered.
Intermediate Event		This event marks the occurrence of a particular business event. Process execution is not delayed.
Intermediate Message Event		The throwing message event sends a message to a communication partner and afterwards continues process execution.
Intermediate Escalation Event		This event triggers the escalation of the case to another role in the organisation. After this, process execution is resumed.

Source: http://www.bpmn-tool.com/en/tutorial/

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BPMN elements

Intermediate Link Event		Off-page connectors. Two corresponding link events correspond to a sequence flow.
Intermediate Compensation Event		Triggers a compensation.
Intermediate Signal Event		The throwing signal event fires up a signal. Afterwards it continues process execution. One signal thrown can be caught multiple times by different catching signal events. Signalling can happen across different processes.
Intermediate Multiple Event		The throwing multiple event throws one out of a set of possible events. Afterwards it continues process execution.
End Event		The untyped end event typically marks the standard end of a process.
End Message Event		At the end of the process, a message is sent.
End Escalation Event		The case is escalated with the end of the process.
End Error Event		The process ends in an error state. As result a named error is thrown.

Source: http://www.bpmn-tool.com/en/tutorial/

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BPMN elements

Cancel End Event		Triggering cancellation of a transaction.
End Compensation Event		Triggering compensation as final process step.
End Signal Event		At the end of the process, a signal is thrown. (One signal thrown can be caught multiple times)
End Multiple Event		At the end of the process, one out of a set of possible events is triggered.
Terminate End Event		Triggering the immediate termination of a process instance. All steps still in execution in parallel branches are terminated.

Source: http://www.bpmn-tool.com/en/tutorial/

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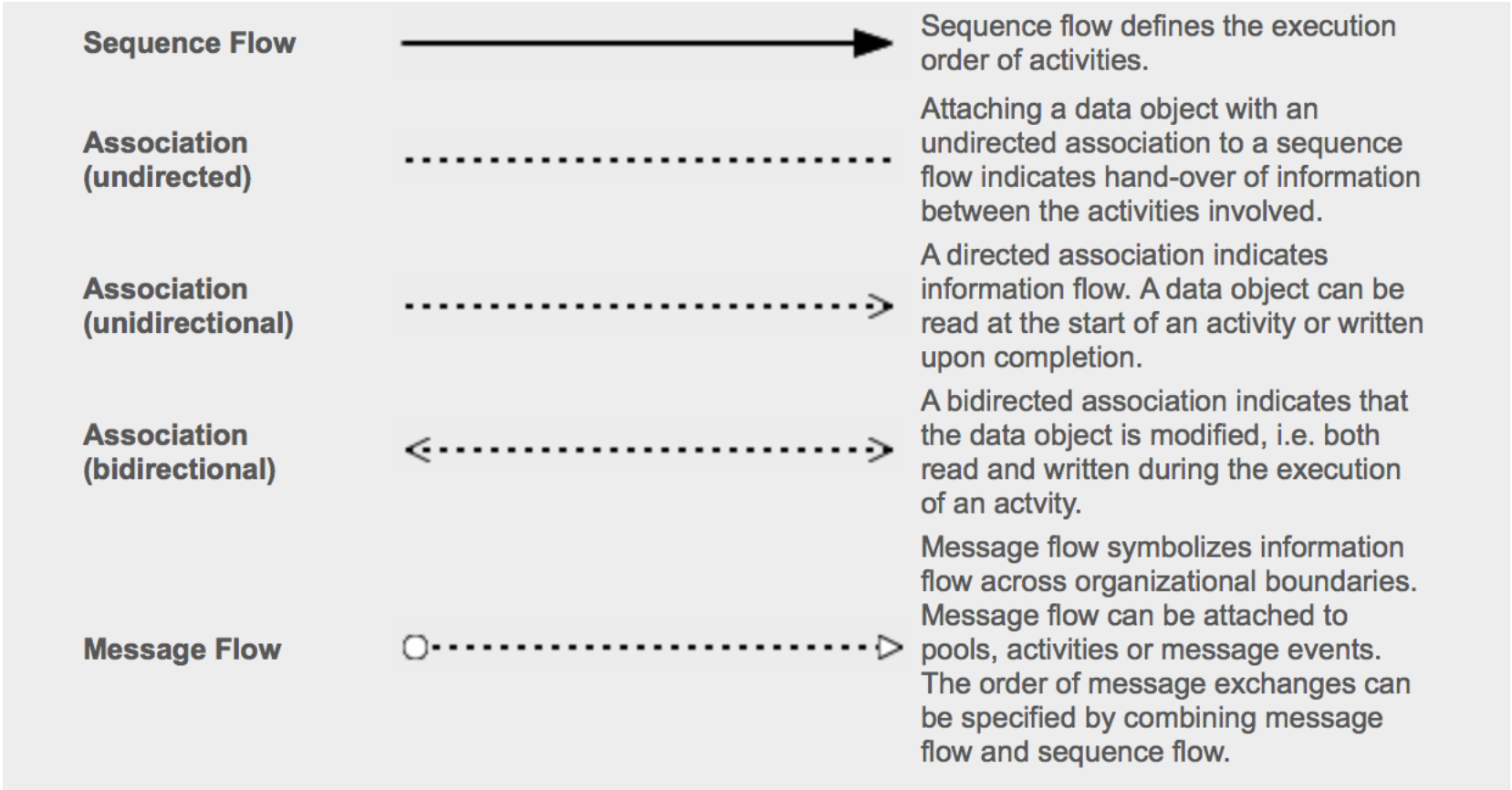
BPMN elements



Source: http://www.bpmn-tool.com/en/tutorial/

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BPMN diagrams

- Process – Flow of activity, decisions, data and events
- Collaboration – Conversations and interactions (also process)
- Choreography – Tasks performed by participants and how participants coordinate interactions via messages

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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BPMN Choreography

- Sequence of interactions between Participants.
- Choreographies exist outside of or in between Pools.
- A Choreography Task is an atomic Activity in a Choreography Process.
- The task represents an Interaction, which is one or two Message exchanges between two Participants.
- Helps to show who initiates the activity and the first message.

Source: https://www.omg.org/news/meetings/workshops/SOA-HC/presentations-2011/14_MT-2_Brookshier.pdf

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Video: BPMN tutorial - pools and lanes

Source: https://www.process.st/bpmn-tutorial/

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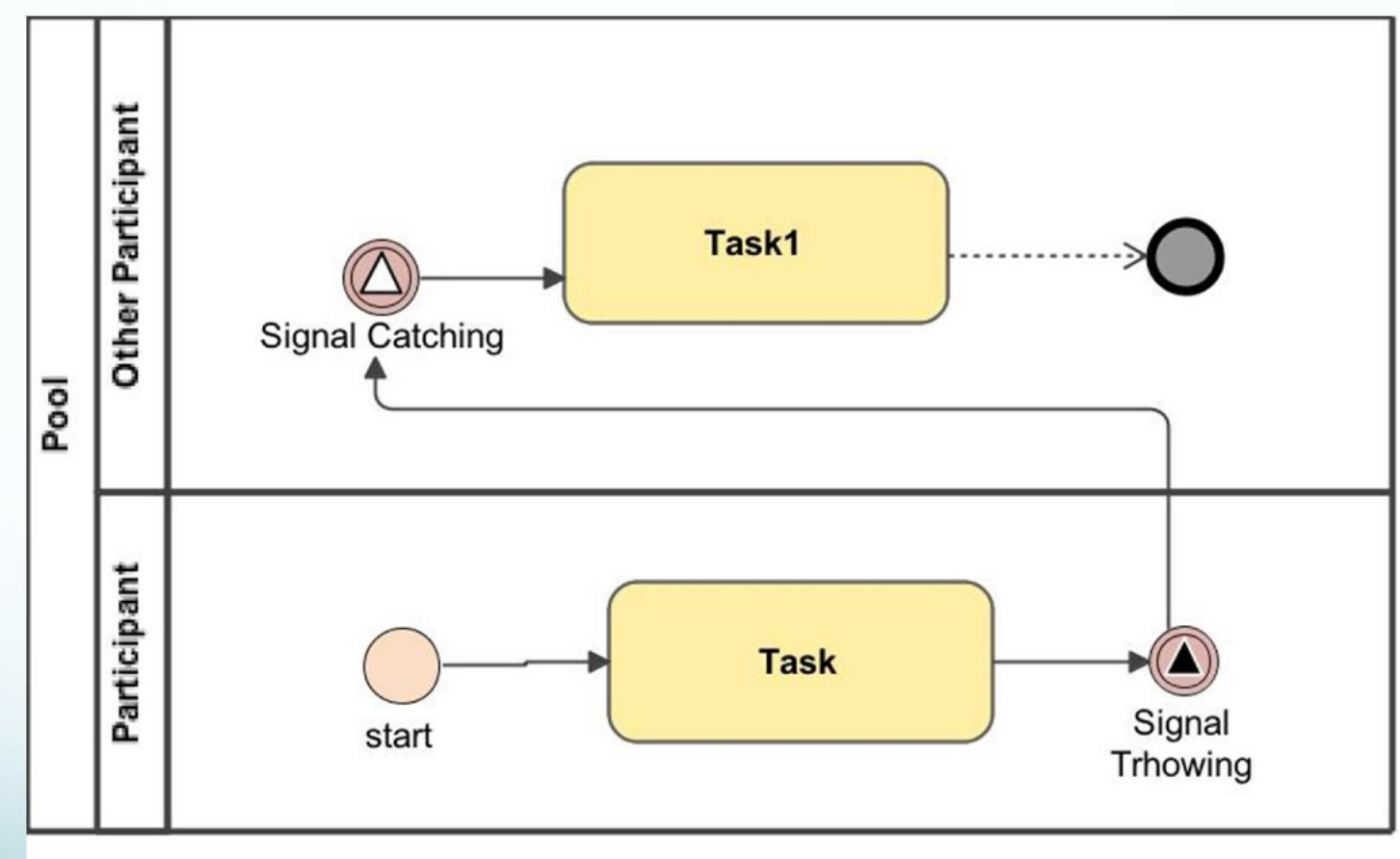
Process diagram



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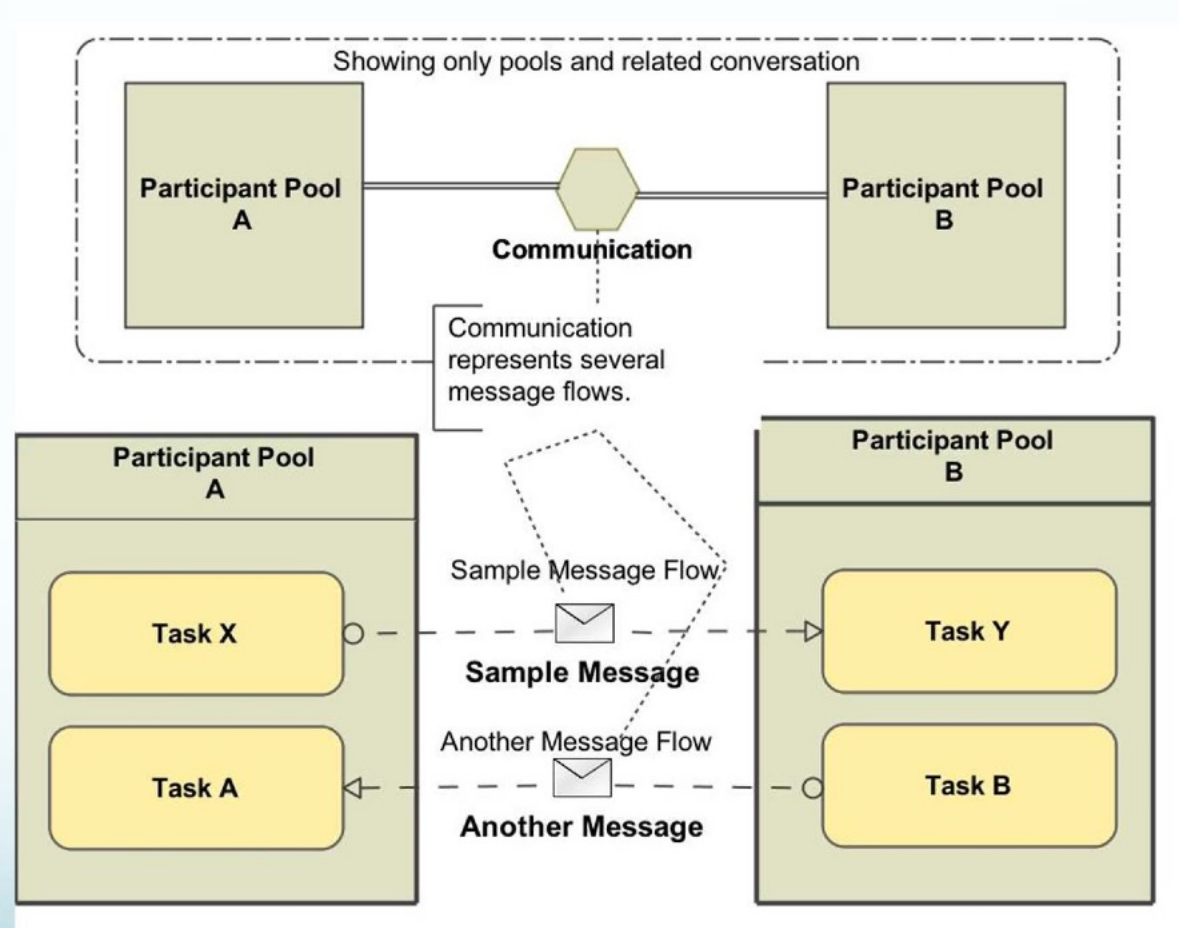
Collaboration diagram



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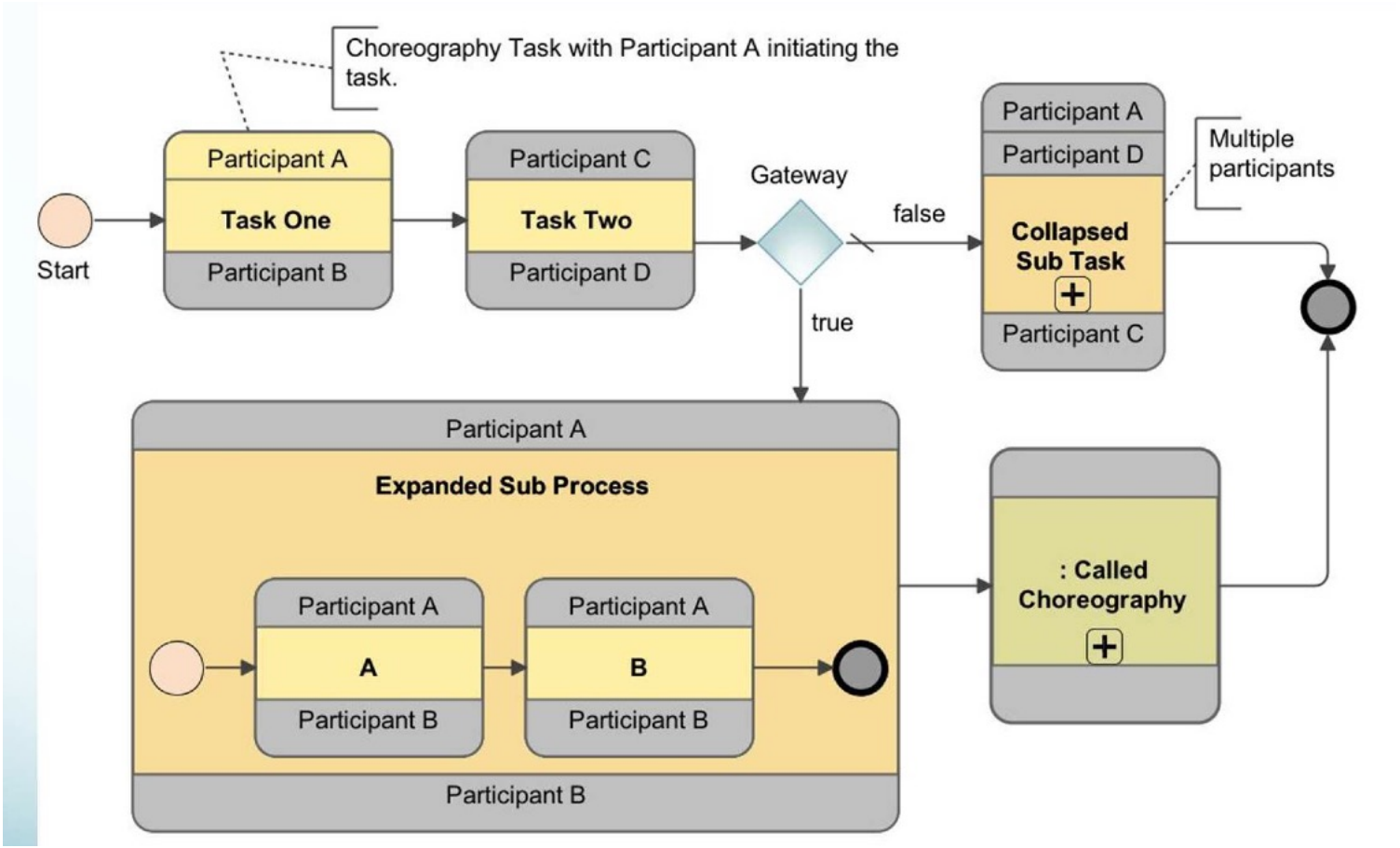
Choreography diagram



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