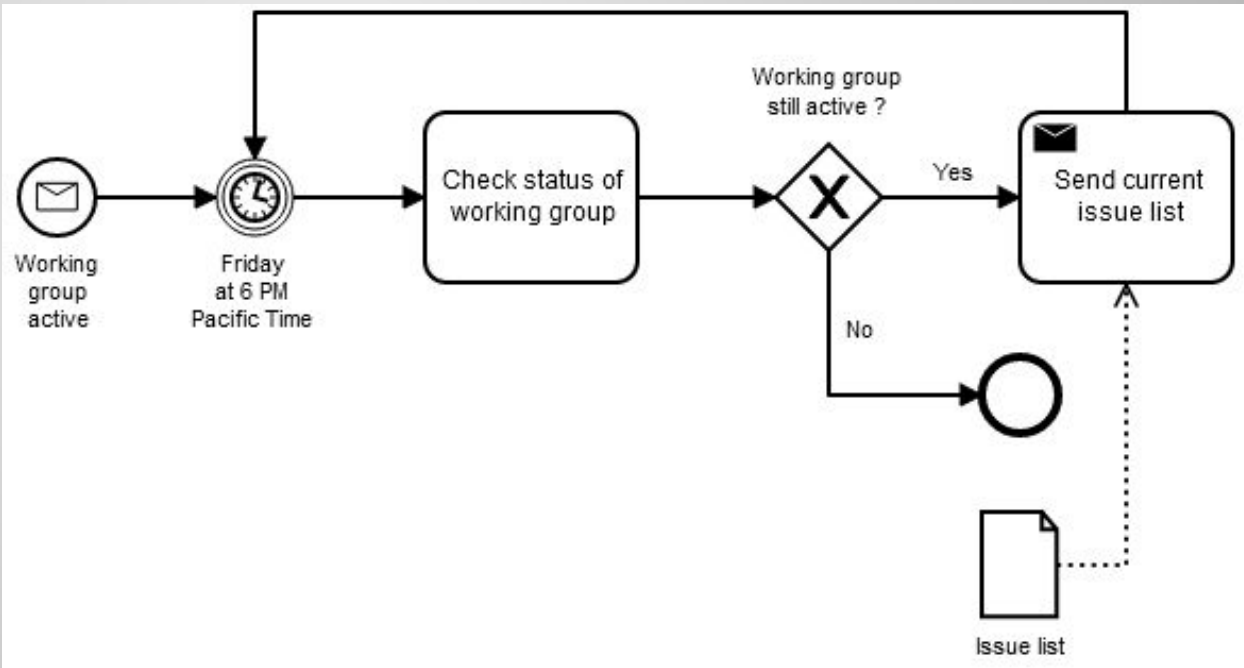
Business Process Model and Notation

Business Process Model and Notation (BPMN) is a graphical representation for specifying business processes in a business process model.

Example of a Business Process Model and Notation for a process with a normal flow.



Overview

Business Process Model and Notation (BPMN) is a standard for business process modeling that provides a graphical notation for specifying business processes in a Business Process Diagram (BPD), based on a flowcharting technique very similar to activity diagrams from Unified Modeling Language (UML). The objective of BPMN is to support business process management, for both technical users and business users, by providing a notation that is intuitive to business users, yet able to represent complex process semantics. The BPMN specification also provides a mapping between the graphics of the notation and the underlying constructs of execution languages, particularly Business Process Execution Language (BPEL).

BPMN has been designed to provide a standard notation readily understandable by all business stakeholders, typically including business analysts, technical developers and business managers. BPMN can therefore be used to support the generally desirable aim of all stakeholders on a project adopting a common language to describe processes, helping to avoid communication gaps that can arise between business process design and implementation.

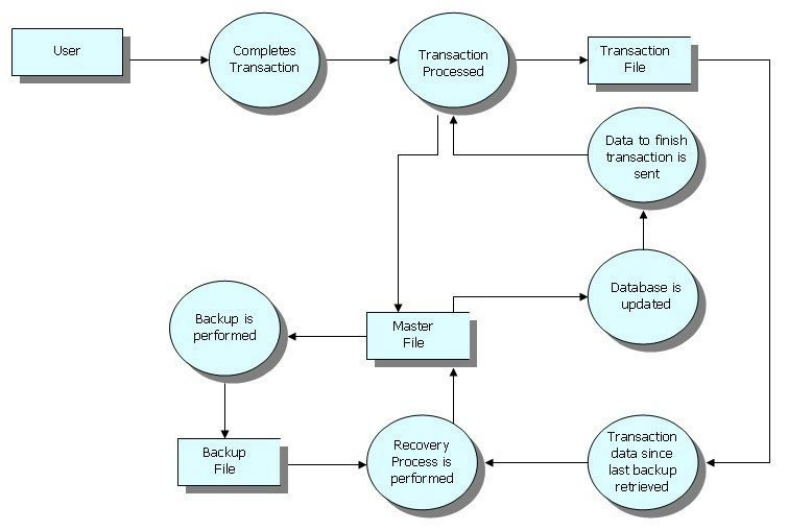
BPMN is one of a number of business process modeling language standards used by modeling tools and processes. While the current variety of languages may suit different modeling environments, there are those who advocate for the development or emergence of a single, comprehensive standard, combining the strengths of different existing languages. It is suggested that in time, this could help to unify the expression of basic business process concepts (e.g., public and private processes, choreographies), as well as advanced process concepts (e.g., exception handling, transaction compensation).

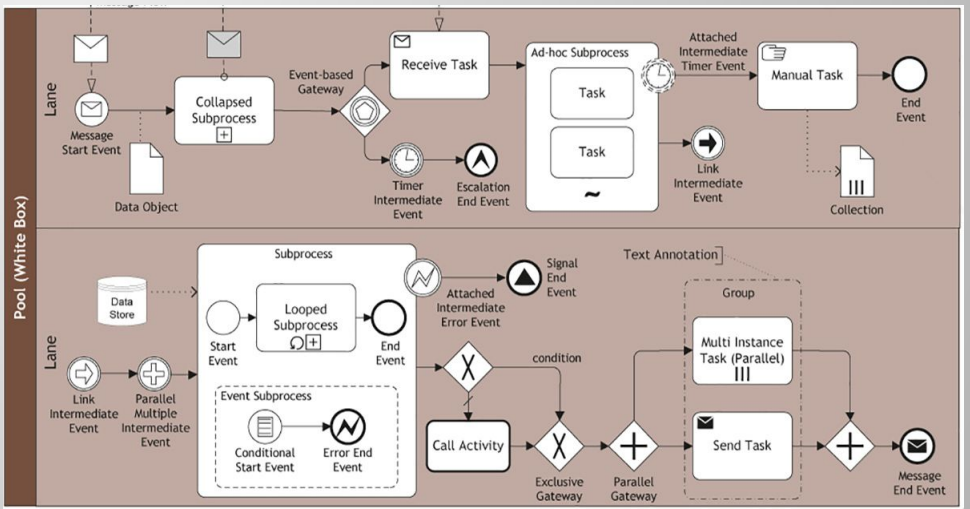
Two new standards, using a similar approach to BPMN have been developed, addressing case management modeling (Case Management Model and Notation) and decision modeling, the (Decision Model and Notation).

BPMN is constrained to support only the concepts of modeling applicable to business processes. Other types of modeling done by organizations for non-process purposes are out of scope for BPMN. Examples of modeling excluded from BPMN are:

-Organizational structures
-Functional breakdowns
-Data models

In addition, while BPMN shows the flow of data (messages), and the association of data artifacts to activities, it is not a data flow diagram.





Elements

BPMN models are expressed by simple diagrams constructed from a limited set of graphical elements. For both business users and developers, they simplify understanding of business activities' flow and process. BPMN's four basic element categories are:

-Flow objects (events, activities, gateways)

-Connecting objects (sequence flow, message flow, association)

-Swim lanes (pool, lane)

-Artifacts (data object, group, annotation)

These four categories enable creation of simple business process diagrams (BPDs). BPDs also permit making new types of flow object or artifact, to make the diagram more understandable.

Flow objects and connecting objects

Flow objects are the main describing elements within BPMN, and consist of three core elements: events, activities, and gateways.

Event

An Event is represented with a circle and denotes something that happens (compared with an activity, which is something that is done). Icons within the circle denote the type of event (e.g., an envelope representing a message, or a clock representing time). Events are also classified as Catching (for example, if catching an incoming message starts a process) or Throwing (such as throwing a completion message when a process ends).

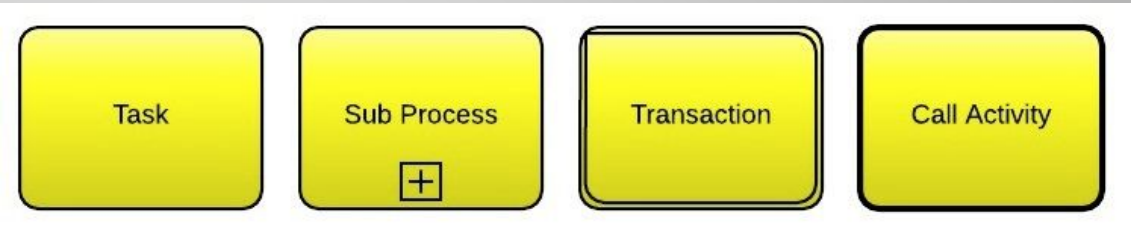
Start event
Acts as a process trigger; indicated by a single narrow border, and can only be Catch, so is shown with an open (outline) icon.

Intermediate event
Represents something that happens between the start and end events; is indicated by a double border, and can Throw or Catch (using solid or open icons as appropriate). For example, a task could flow to an event that throws a message across to another pool, where a subsequent event waits to catch the response before continuing.

End event
Represents the result of a process; indicated by a single thick or bold border, and can only Throw, so is shown with a solid icon.

Activity

An activity is represented with a rounded-corner rectangle and describes the kind of work which must be done. An activity is a generic term for work that a company performs. It can be atomic or compound.



Task

A task represents a single unit of work that is not or cannot be broken down to a further level of business process detail. It is referred to as an atomic activity. A task is the lowest level activity illustrated on a process diagram. A set of tasks may represent a high-level procedure.

Sub-process

Used to hide or reveal additional levels of business process detail. When collapsed, a sub-process is indicated by a plus sign against the bottom line of the rectangle; when expanded, the rounded rectangle expands to show all flow objects, connecting objects, and artifacts. A sub-process is referred to as a compound activity.

Has its own self-contained start and end events; sequence flows from the parent process must not cross the boundary.

Transaction

A form of sub-process in which all contained activities must be treated as a whole; i.e., they must all be completed to meet an objective, and if any one of them fails, they must all be compensated (undone). Transactions are differentiated from expanded sub-processes by being surrounded by a double border.

Call Activity

A point in the process where a global process or a global Task is reused. A call activity is differentiated from other activity types by a bolded border around the activity area.

Gateway

A gateway is represented with a diamond shape and determines forking and merging of paths, depending on the conditions expressed.

Exclusive

Used to create alternative flows in a process. Because only one of the paths can be taken, it is called exclusive.

Event Based

The condition determining the path of a process is based on an evaluated event.

Parallel

Used to create parallel paths without evaluating any conditions.

Inclusive

Used to create alternative flows where all paths are evaluated.

Exclusive Event Based

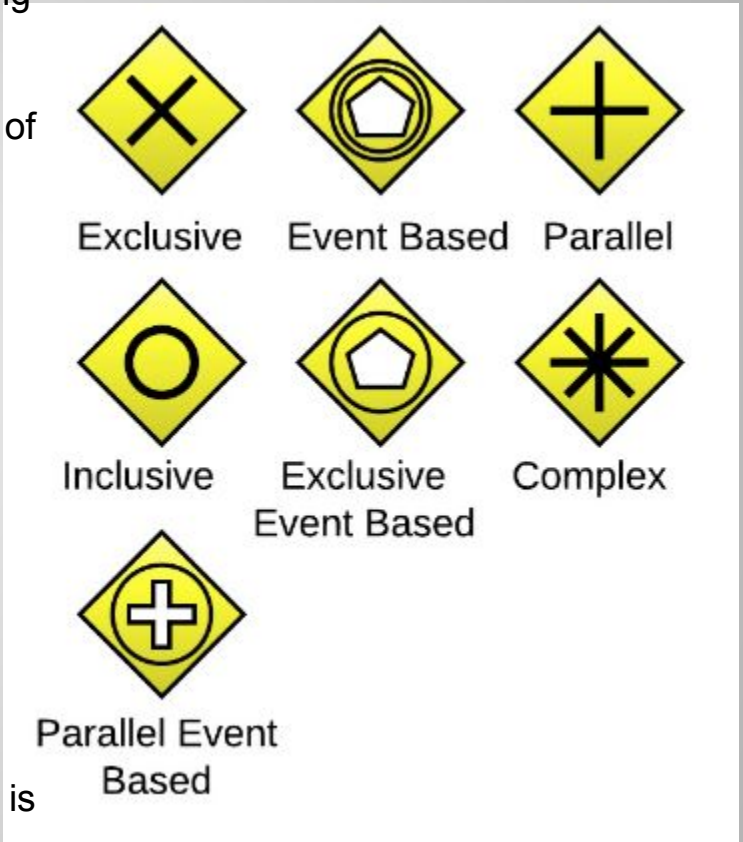
An event is being evaluated to determine which of mutually exclusive paths will be taken.

Complex

Used to model complex synchronization behavior.

Parallel Event Based

Two parallel processes are started based on an event, but there is no evaluation of the event.



Connections

Flow objects are connected to each other using Connecting objects, which are of three types: sequences, messages, and associations.

Sequence Flow

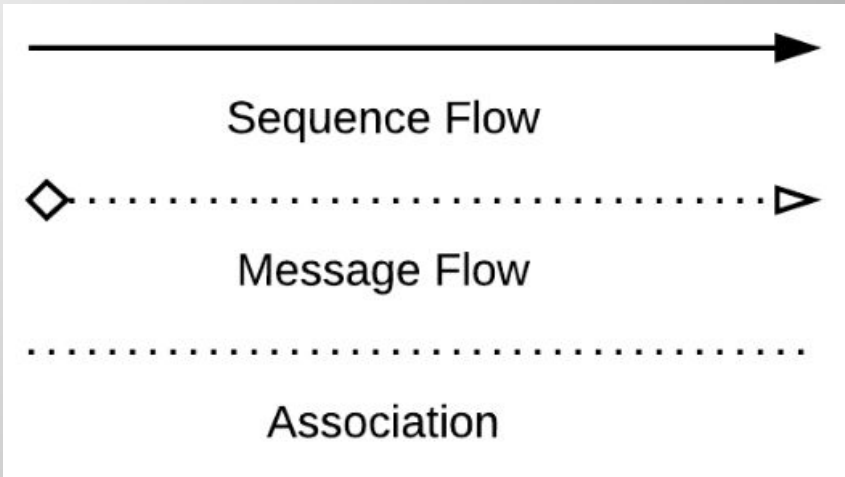
A Sequence Flow is represented with a solid line and arrowhead, and shows in which order the activities are performed. The sequence flow may also have a symbol at its start, a small diamond indicates one of a number of conditional flows from an activity, while a diagonal slash indicates the default flow from a decision or activity with conditional flows.

Message Flow

A Message Flow is represented with a dashed line, an open circle at the start, and an open arrowhead at the end. It tells us what messages flow across organizational boundaries (i.e., between pools). A message flow can never be used to connect activities or events within the same pool.

Association

An Association is represented with a dotted line. It is used to associate an Artifact or text to a Flow Object, and can indicate some directionality using an open arrowhead (toward the artifact to represent a result, from the artifact to represent an input, and both to indicate it is read and updated). No directionality is used when the Artifact or text is associated with a sequence or message flow (as that flow already shows the direction).



Swim lanes and artifacts

Swim lanes are a visual mechanism of organising and categorising activities, based on cross functional flowcharting, and in BPMN consist of two types:

Pool

Represents major participants in a process, typically separating different organisations. A pool contains one or more lanes (like a real swimming pool). A pool can be open (i.e., showing internal detail) when it is depicted as a large rectangle showing one or more lanes, or collapsed (i.e., hiding internal detail) when it is depicted as an empty rectangle stretching the width or height of the diagram.

Lane

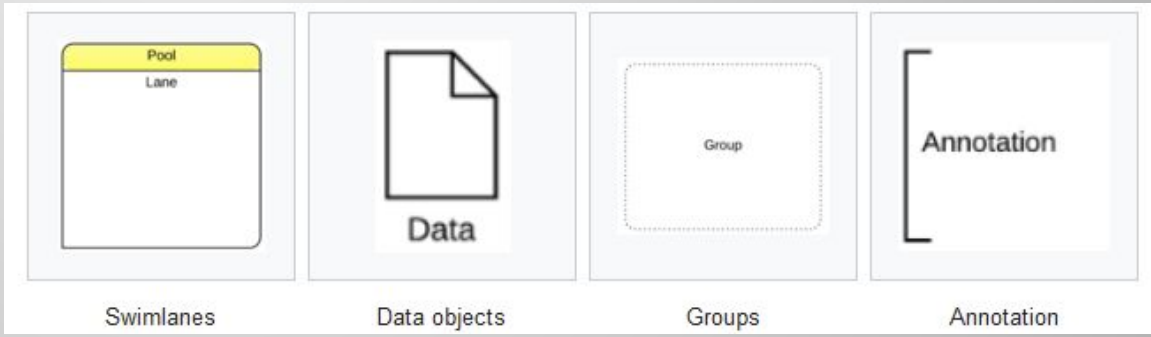
Used to organise and categorise activities within a pool according to function or role, and depicted as a rectangle stretching the width or height of the pool. A lane contains the flow objects, connecting objects and artifacts.

Artifacts allow developers to bring some more information into the model/diagram. In this way the model/diagram becomes more readable. There are three pre-defined Artefacts and they are:

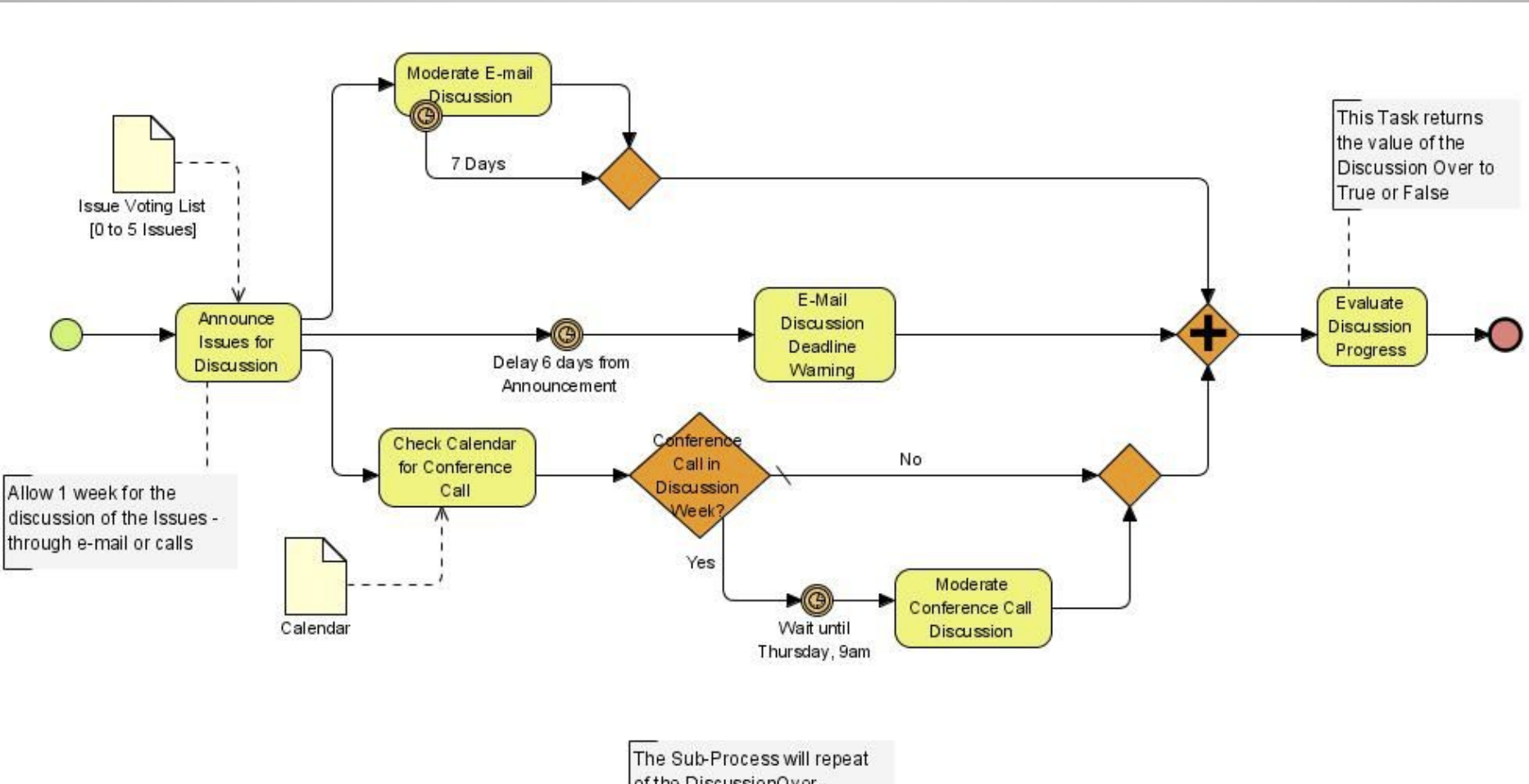
Data objects: Data objects show the reader which data is required or produced in an activity.

Group: A Group is represented with a rounded-corner rectangle and dashed lines. The group is used to group different activities but does not affect the flow in the diagram.

Annotation: An annotation is used to give the reader of the model/diagram an understandable impression.



Examples of business process diagrams



Examples of business process diagrams