The Ultimate Guide to BPMN2

The standard that bridges the needs of IT and business for Business Process Management (BPM)

2016
REVISED AND UPDATED VERSION

Bonitasoft

Contents

Why BPMN Matters

Business Process Model and Notation 2.0 (BPMN 2) is one of the best things to happen in Business Process Management (BPM) in a long time.

Finally, both the business and technical sides of the organization can share a common language – something that they can both understand and that meets their respective needs for precision and flexibility.

This shared language is empowering new ways of working together – and it results in the deployment of new and more flexible applications.

At Bonitasoft, the leading provider of open source BPM solutions, we are mindful of the power and potential of shared standards. BPMN 2.0 is a natural fit with what we do.

OBJECT MANAGEMENT GROUP

We realize that many people and organizations who could benefit from BPMN have yet to give it a try.

It may be that you've been putting it off under the mistaken assumption that you need to be an expert to use BPMN. Or it may be because the standard itself, and many of the things written about BPMN, are a bit unwieldy and hard to dissect.

In fact, BPMN is much simpler than you might think; expertise comes over time – but starting is actually pretty easy. And we believe the benefits can become quickly apparent.

In fact, the nice thing about BPMN is that it is so structurally sound that once you master the Basic BPMN level elements, your knowledge and capability will improve quickly; you'll learn what you need from the intermediate BPMN level elements for extending the model, and the technical team will pick up the advanced BPMN level to complete the execution capability.

We offer this Ultimate Guide to help you to get familiar with the basics and give BPMN a try.

We are convinced you will find it powerful, adaptable and remarkably easy. Whether you are a business professional or a developer, BPMN2 is your path to better processes, improved management, and more efficiency.

Miguel Valdes Faura,

Bonitasoft CEO and founder

What is BPMN?

The ABC's of BPMN

If you've heard of BPMN but aren't really sure what it is or what it does, you are not alone.

But, before we talk about what BPMN is, let's talk about what it is not...

It is not a "system."

You can't "buy" a BPMN – it is a standard for business process collaboration and for IT development.

It is not just for business or just for IT – it is a shared, common language.

It is not only for experts.

If you are at all familiar with flow charting, you can dive in immediately.

Definitions

BPM – **B**usiness **P**rocess **M**anagement

The discipline of managing processes as the means for improving business performance outcomes[1].

BPMN – **B**usiness **P**rocess **M**odel and **N**otation

A graphical representation for specifying business processes in a business process model[2].

BPMS – **B**usiness **P**rocess **M**anagement **S**uite

Application infrastructure to support BPM projects and programs… from process discovery, definition and design to implementation, monitoring and analysis, and through ongoing optimization[1].

1 Gartner Research
2 Object Management Group

BPMN = BPM + N

A **business process** model is a representation of an organization's processes. A model can be analyzed and improved.

Notation consists of graphic symbols to represent action, flow, or behavior of a process.

In a BPMS, BPMN notation represents coding instructions that are executable.

BPMN provides a notation that can be readily understandable by all users:

- from the business analyst who models the process conceptually,
- to the technical developers responsible for implementing the technology for the process,
- to the people who will manage and monitor the process.

A means for business & technical collaboration

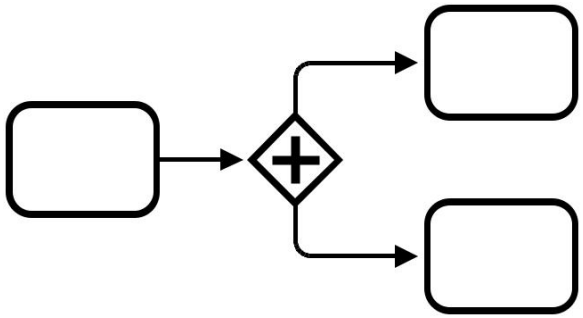
BPMN provides a way to quickly diagram business functions.

Use it to draw a process graphically

The visual model will be translated quickly and easily into software that will run the process.

With BPMN, business people can define what they want, simply but with a high degree of precision; and IT professionals can communicate with each other and with business people about the model in a clear, common framework.

BPMN works for any kind of management, operation and support process. By developing a model with BPMN, you can collaboratively improve communications with decision makers about the nature and health of a process; you can collaboratively initiate improvements – and you can collaboratively move toward automating those improvements.



Source: Business Process Model and Notation, Version 2, January 2011 by OMG

BPMN may look familiar

BPMN has been around for almost a decade and much in BPMN2 remains from the 1.0 version, especially the shapes and symbols.

One thing that has changed "behind the scenes" is the adoption of XML interchange format and the support BPMN 2.0 provides for turning a model and its notation into an executable process.

Open source and proprietary BPM vendors now have the capacity to take BPMN 2.0 input and turn it into process automation.

BPMN is not an execution language

It is designed to be "consumed" by process engines and made into executable processes.

The 4 categories of BPMN

BPMN in 4 categories

The BPMN2 spec is long, dense and relatively complex.

We can approach it by organizing BPMN elements into a few general categories.

With just a few elements from first three categories you can draw a business process diagram and begin to build and understand a process.

Let's look more closely at what they represent.

BPMN 2.0 spec in numbers

98	visual elements
508	pages
300	figures
313	tables
3	annexes
13	collaborating groups

Workflow	Organizing	Readability	Special behavior
Activities	Pools	Annotations	Messages
Start & end events	Swimlanes or lanes	Links	Signals
Sequence flow			Timers
Gateways			Errors
			Loop
			Multi-instance

BPMN fact: Graphical representation for BPMN elements is **monochrome**. We use the following colors to improve diagram readability:

Start events | Activities & intermediate events | Gateways | End events

Workflow

Workflow includes activities, gateways, events, and the sequence flow that connects them.

Each of these elements have several types, and all of these types can be connected in a sequence.

Activities

Tasks that are performed in the process – by humans, by automation, or that activate subprocesses

Events

Used to start or end a process, and to manage specific actions during a workflow; it triggers or is the result of something external of the process flow

Event

Sequence flows

Used to show how the workflow moves

Gateways

Used to separate or join process flow

Gateway

Organizing

Organizing uses pools and swimlanes. Think of these as the container for the process flow.

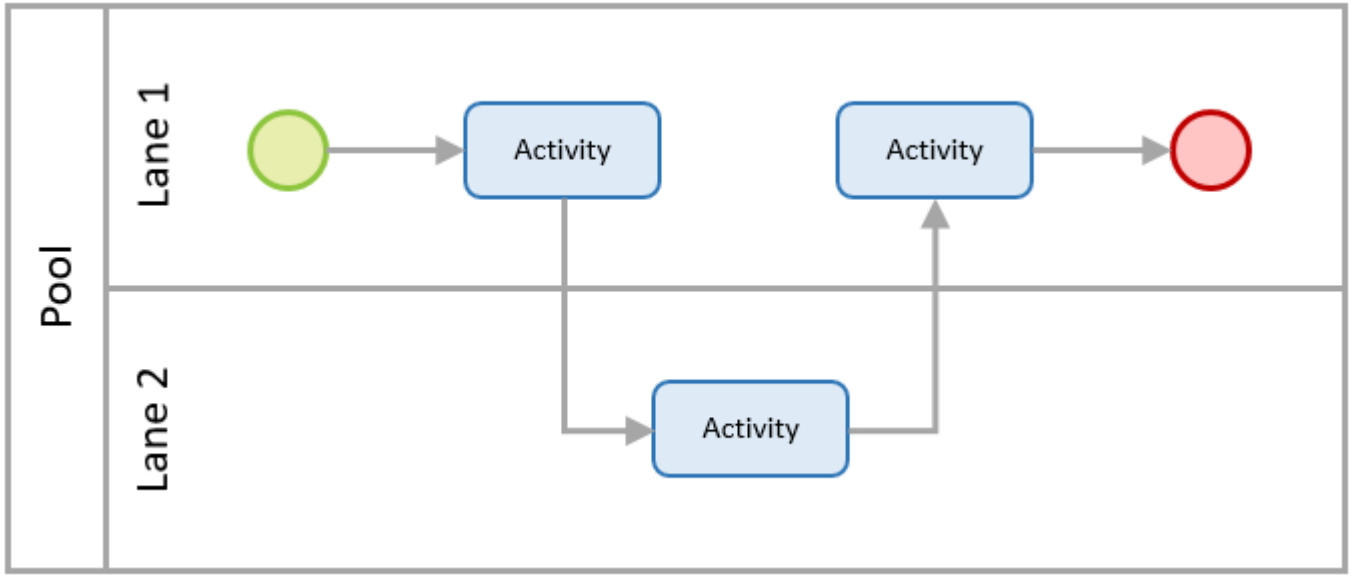
Pools

Contains a single, complete process. Workflow cannot leave a pool - we need to transfer action or data from one pool/process to another using other means.

Swimlanes

Used to help organize the process based on who does what (actors). In a lap pool, swimlanes keep the swimmers from crashing into one another.

Workflow crosses swimlane boundaries as if they did not exist – they are purely for organizational clarity.



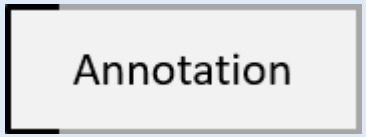
Readability

Readability includes annotations and links.

These elements help make a model readable. They have no effect at all on the actual process flow.

Text annotations

Allow you to paste notes all over a model with explanations for clarity (a great tool for beginning modelers!)



Links

Allow you to cut a process that has become too long to read easily, and simply continue the process on another line in the same pool.

Throw link

Catch link

Special behavior

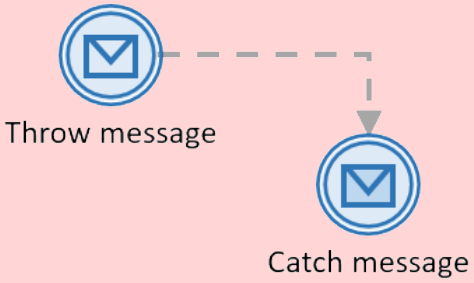
Special behavior includes a specific set of events and task markers.

These elements allow us to design executable workflow that can behave in complex ways.

Messages and message flow

Used to transfer data from one pool/process to another and to correlate related processes

Correlation is used to coordinate progress between two running process instances and match message events



Signals

Used to broadcast information to other processes

Throw signal Catch signal

Timers

Used to launch periodic activities, or to ensure that an activity happens within a specified deadline

Timer

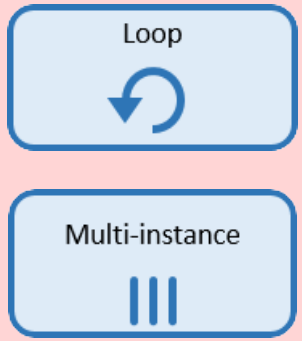
Errors

Used to define behavior when the system encounters error

Error

Loop and multi-instance

Used to repeat tasks, such as multiple launches of the same task (multi-instance) or repeating the same task (loop)



The 3 levels of BPMN complexity

BPMN at 3 levels of complexity

BPMN symbols serve a dual purpose.

They visually represent a process flow.

They translate to executable code that allows a visual process model to be executed as an application.

Recall that we can organize BPMN modeling elements into a few general categories:

- Workflow
- Organizing
- Readability
- Special behavior

Note that Basic BPMN is predominately **visual**. Intermediate and Advanced BPMN becomes **executable**.

Let's look at these BPMN elements at the three levels of complexity: **Basic**, **Intermediate** and **Advanced**.

	Basic	Intermediate	Advanced
Activities	Abstract	Human Service Call	
Events	Start End	Message Timer Error Signal	Event subprocess
Gateways	Parallel Exclusive	Inclusive	
Sequence flow	Sequence	Conditional Default	
Other	Pools Lanes		Loop Multi-instance
	Annotation Links		

Basic BPMN

Basic BPMN is useful for modeling when details have not been worked out.

Activities, events, gateways, and sequence flow all have Basic BPMN level versions.

Abstract activity

No specific execution, acts as a placeholder for documentation purposes.

Start event

Begins a process flow.

End event

Ends a process flow.

Parallel gateway

All inputs must be received (in any order) before the process can continue.

All outputs are activated – process continues in parallel.

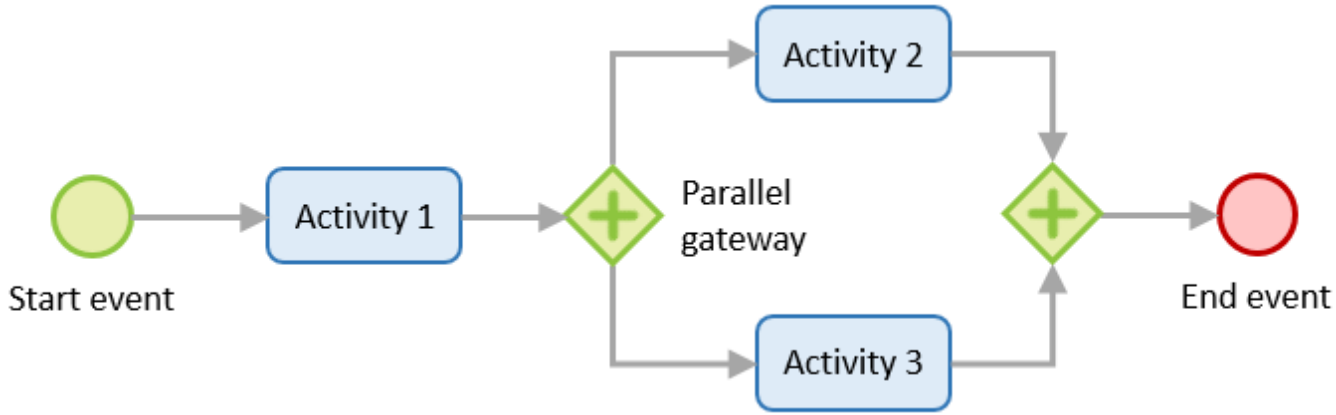
Exclusive gateway

Only one input is needed for the process to continue.

Only one output is activated – a condition is needed to determine which one.

Sequence flow

Directs process flow from activity to activity.



An example with basic BPMN

Start with the basics: *abstract activity*, *start* and *stop events*, *gateways*, and *sequence flow*.

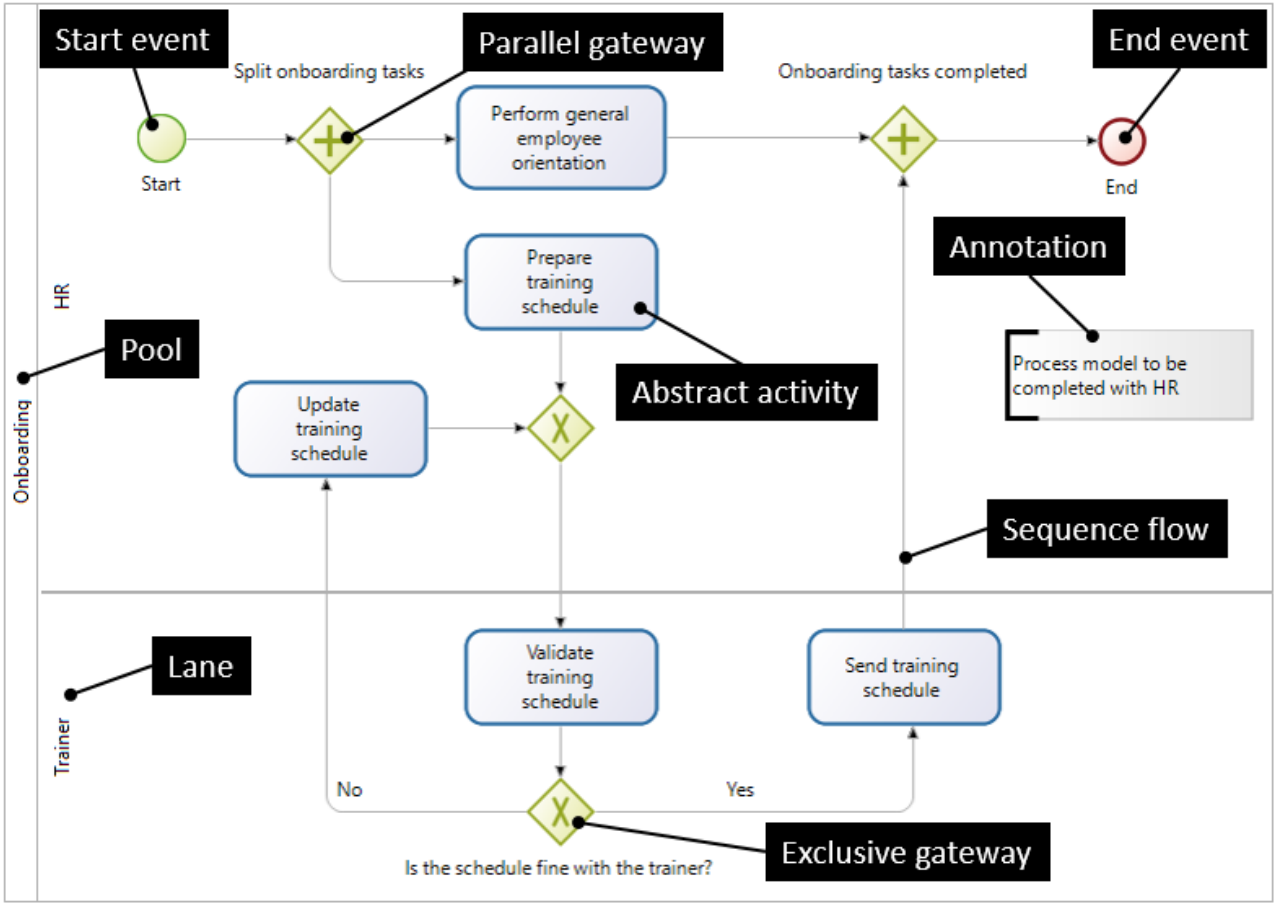
For example, a generic new employee orientation and training process modeled in basic BPMN elements looks like this.

Imagine a token being moved through the diagram – like a traditional board game.

This can help clarify how the features of the model control the movement of the token as you add complexity.

When a start event is triggered, a new "instance" of a process begins. Think through what happens to a single token traversing a single pathway at a time.

BPMN 2.0, Thomas Allweyer



New employee orientation and training process

Intermediate BPMN

To make a visual model executable, begin to apply intermediate BPMN.

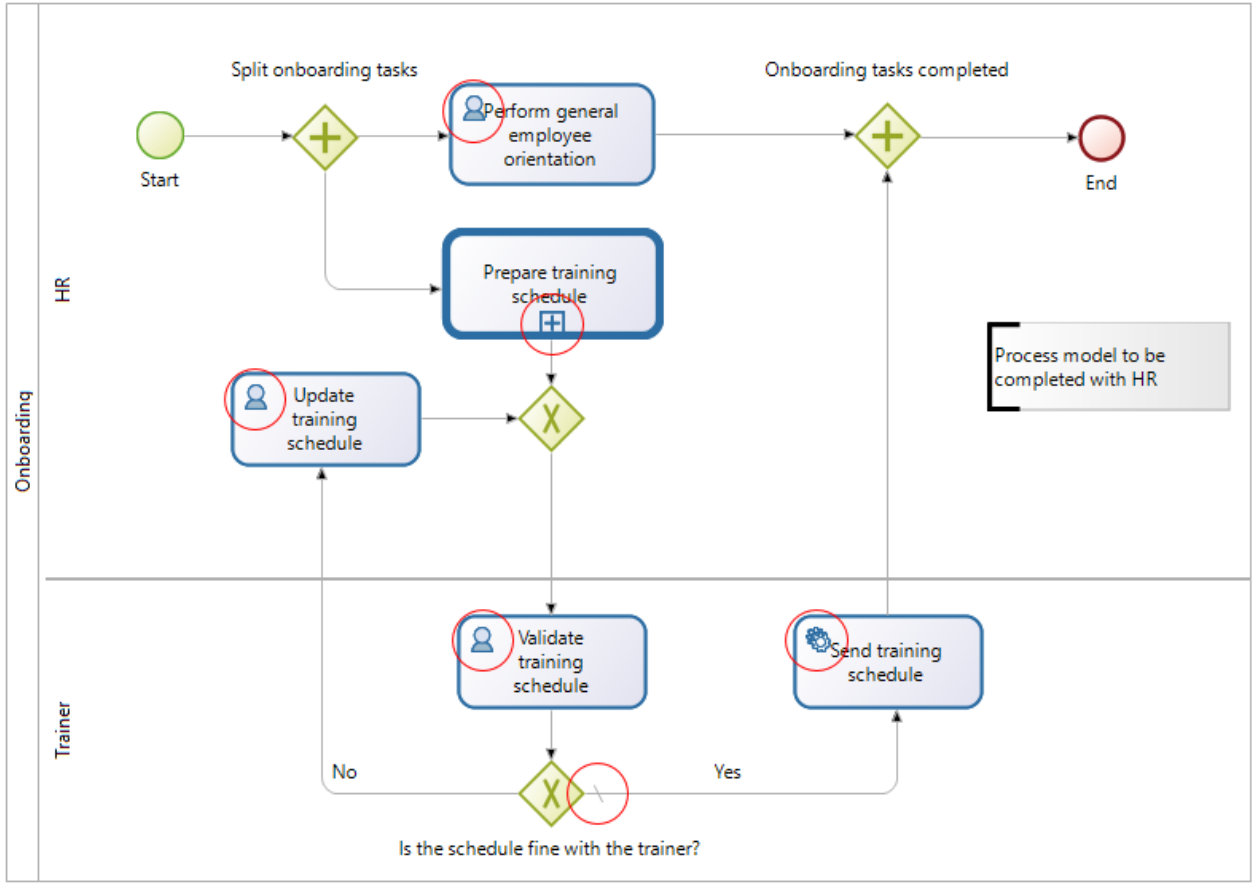
In an executable process, the flow model becomes an actual process application!

As you advance with BPMN, begin making your BPMN "executable" – to ultimately turn it into an automated process.

BPMN 2.0 is not just a notation. Implemented through a BPMN modeling tool, it provides programming instruction that a process engine uses to execute the process.

The previous example is a simple model that clearly shows visually what happens in the process.

The example on this page and the next shows how the model is extended as you begin to apply intermediate BPMN.



New employee orientation and training process

Note that activities have been defined, and default flow has been added

Intermediate BPMN: activities

Intermediate-level activities include *human*, *service*, and *call activity*.

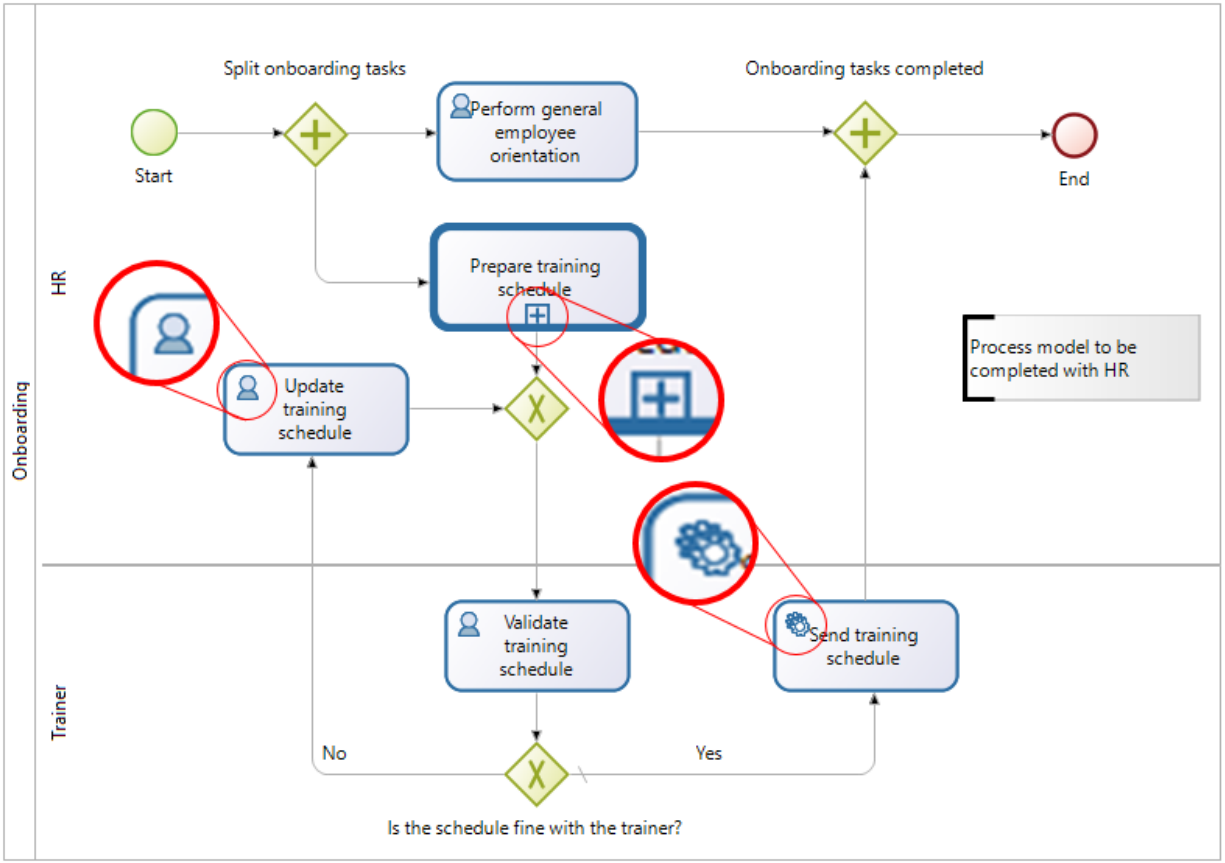
Activities need to be differentiated – is each task performed by a person, is it automated or, is it a subprocess in its own right?

- **Human activity** is a step that must be done by a person
- **Service activity** is an automated step
- **Call activity** represents a subprocess

"Prepare training schedule" is a call activity. It is linked to a subprocess (a "child" of the original parent process).

At this point in the process, the "token" is passed to the subprocess, and when it has completed its passage, it is passed back to the parent process.

This is a super-useful aspect of BPMN.



Using this notation, you can model a top-level parent process that can be quite simple. It can call a series of subprocesses that are entirely independent workflows.

This means they can be modeled independently and modified as needed without necessarily changing the parent process.

Intermediate BPMN: sequence flows

Intermediate-level sequence flow includes *conditional* and *default* flows.

Basic sequence flow is simply automatic (as soon as an activity is completed, the process moves to the next task in the sequence).

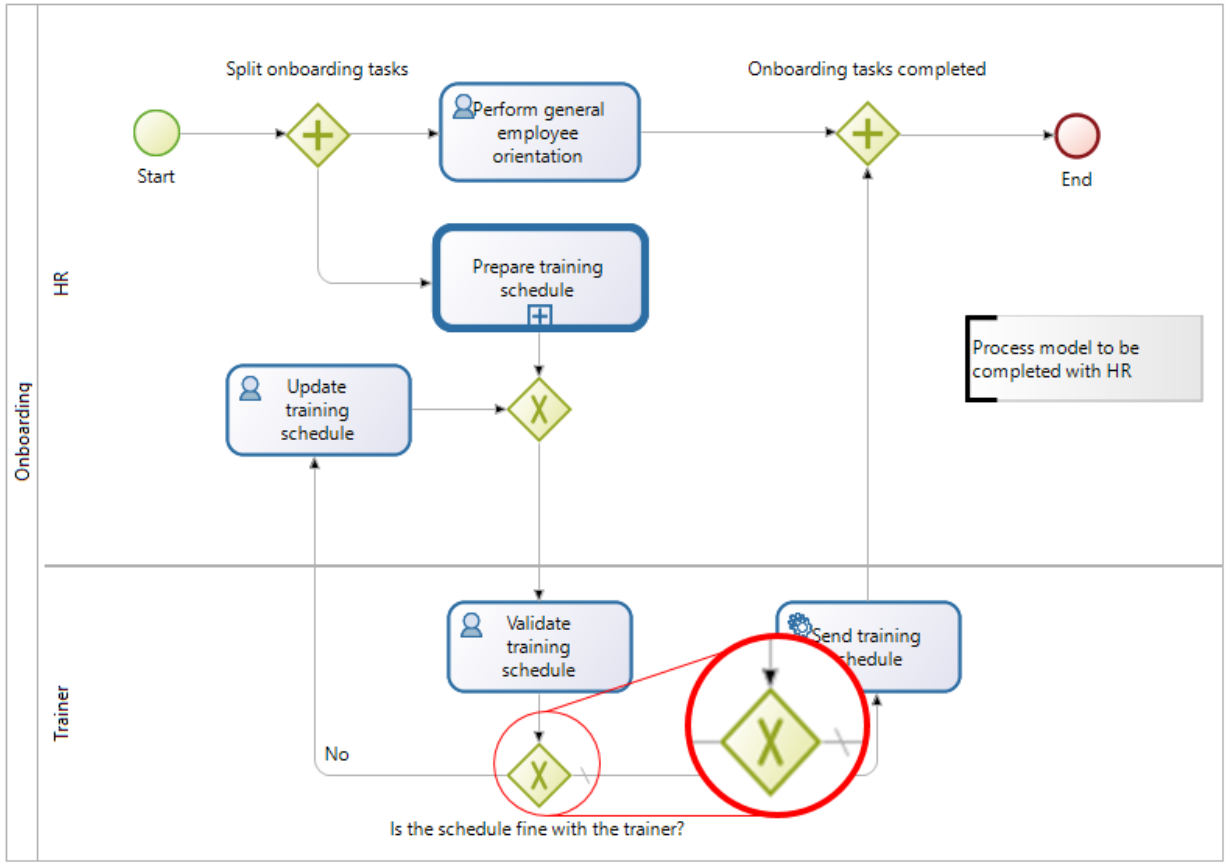
When connected to *Exclusive* or *Inclusive* gateways, sequence flows need to be defined as conditional or default, so the "flow token" knows which path to follow.

Conditional sequence flow

Some specified condition(s) must be met so the process can "choose" the next task from among two or more options.

Conditional flow is what it sounds like: an IF-THEN condition is defined. In this (Boolean) example:

- If the schedule is ok with the trainer, this condition = true.
- If the schedule is NOT ok with the trainer, this condition = false.



Default sequence flow

Default flow allows you to direct flow if, for some reason, no conditions are met. The flow token always has a direction to take.

Default flow is marked with a \

Sequence flow can't cross a pool boundary. To communicate between pools (processes), use messages or signals.

Intermediate BPMN: gateways

The intermediate-level gateway *inclusive* offers finer control of process flow.

Inclusive gateway

Outputs from inclusive gateway

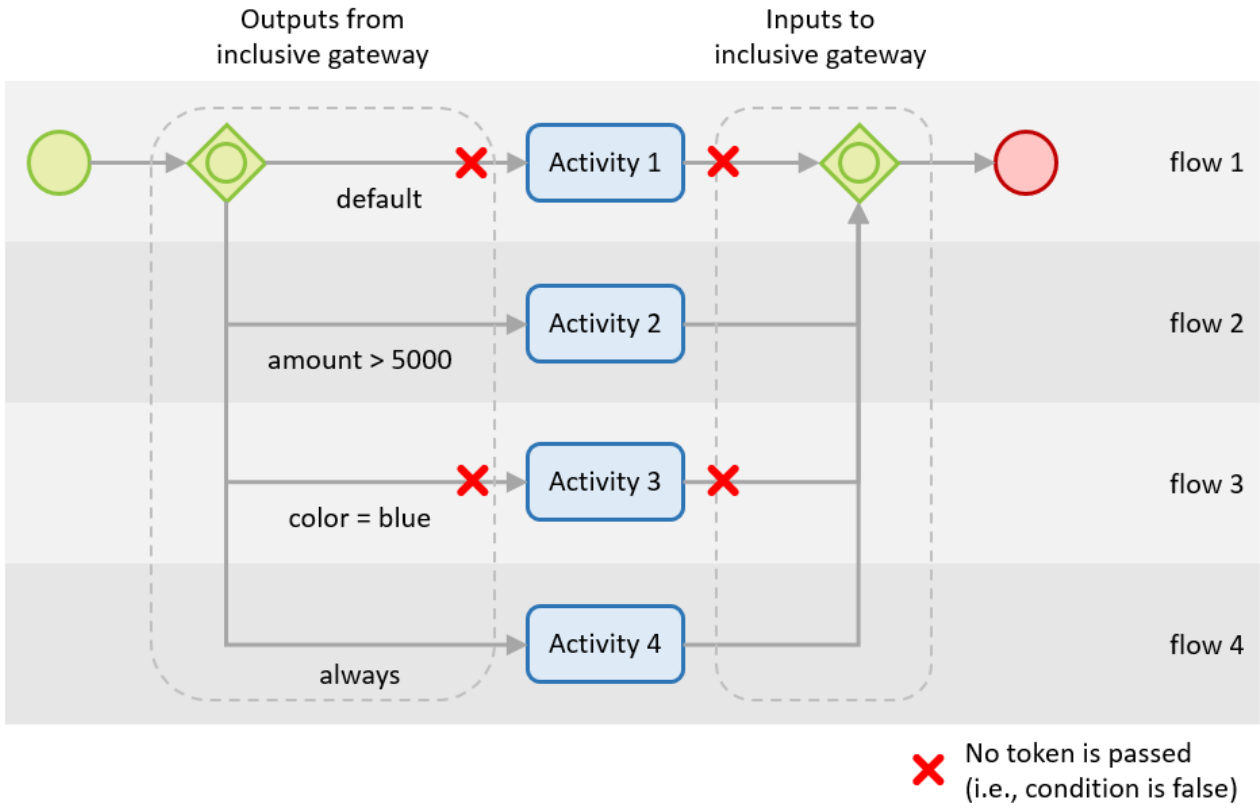
The inclusive gateway can fire multiple outputs simultaneously.

It supports conditions on the outgoing sequence flows.

Example:

Variable	Value
amount	5000
color	red

In this example, flows 2 and 4 meet the flow condition. Flows 1 and 3 do not – so no token passes.



Inputs to inclusive gateway

The inclusive gateway waits for all incoming inputs (tokens).

All valid inputs (i.e., flows 2 and 4) must be received before the process flow can continue.

Intermediate BPMN: events

Events are either *throw* or *catch* events.

Mastery of the different start, end, and in-flow "intermediate" events is key to mastery of intermediate BPMN.

BPMN events are either "throw" (think of these as senders) or "catch" (think of these as receivers).

Solid – throws or sends events

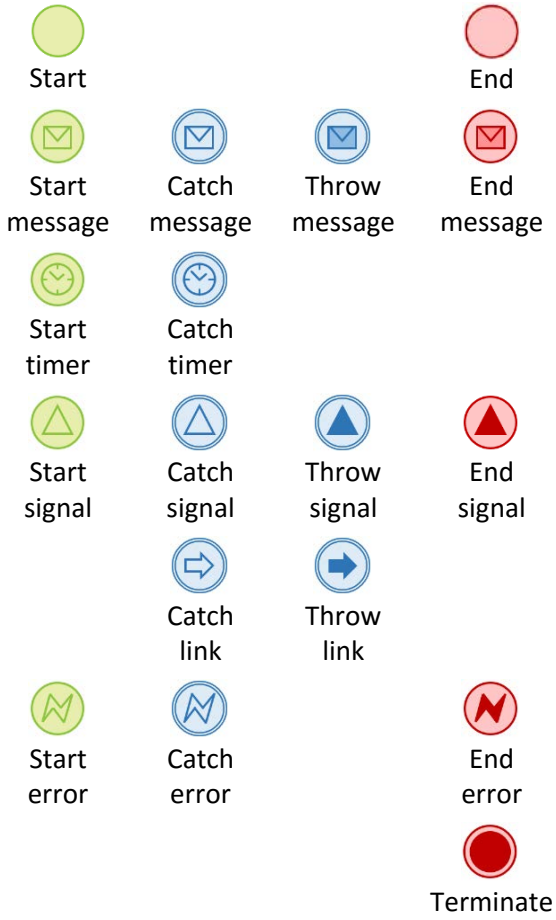
Empty – catches or receives events

The following colors are used as a convenience (non-normative):

Start event (catch), starts a process. It must have at least one outgoing sequence flow.

Intermediate event (catch or throw), takes place within the flow of a process. It must have at least an incoming and an outgoing sequence flow.

End event (throw), ends a process flow. It must have at least one incoming sequence flow.



Message, **signal** and **error** start events allow you to trigger processes without direct human interaction, as they are set to "catch" information sent from elsewhere.

"Elsewhere" can mean from a throw event somewhere in another process, and this can be an end event.

In this case, the end of one process can trigger the start of another process.

Timers too can start processes automatically, by triggering at pre-set intervals.

Intermediate BPMN: messages and signals

Messages and *signals* carry information across pool boundaries.

Messages send to single receivers, while signals broadcast widely to many receivers.

Message

You can start a process with a message. In BPMN, message is specifically defined as the means by which data can be transferred between processes.

With BPMN you can start a process with data received from a different process.

And conversely, if you want to send data to another process, use an intermediate send message (anywhere in the process flow) or an end message.

Signal

Like messages and errors, signals can be caught from elsewhere and can start a process.

A single “throw” signal is broadcast widely and can be received by multiple catch signals. This is useful when you want multiple actions to be triggered.

Intermediate BPMN: timers and errors

Timers can delay or pause a process, while *errors* send it on an exception path.

Like other intermediate events, timers and errors can start a process – or impose an action within the process flow.

Errors can also end a process.

Timer

Timers can be set to "go off" at specific intervals, or specific calendar-linked dates and times. For example, a start timer can go off every 24 hours, or on the first Tuesday of each month.

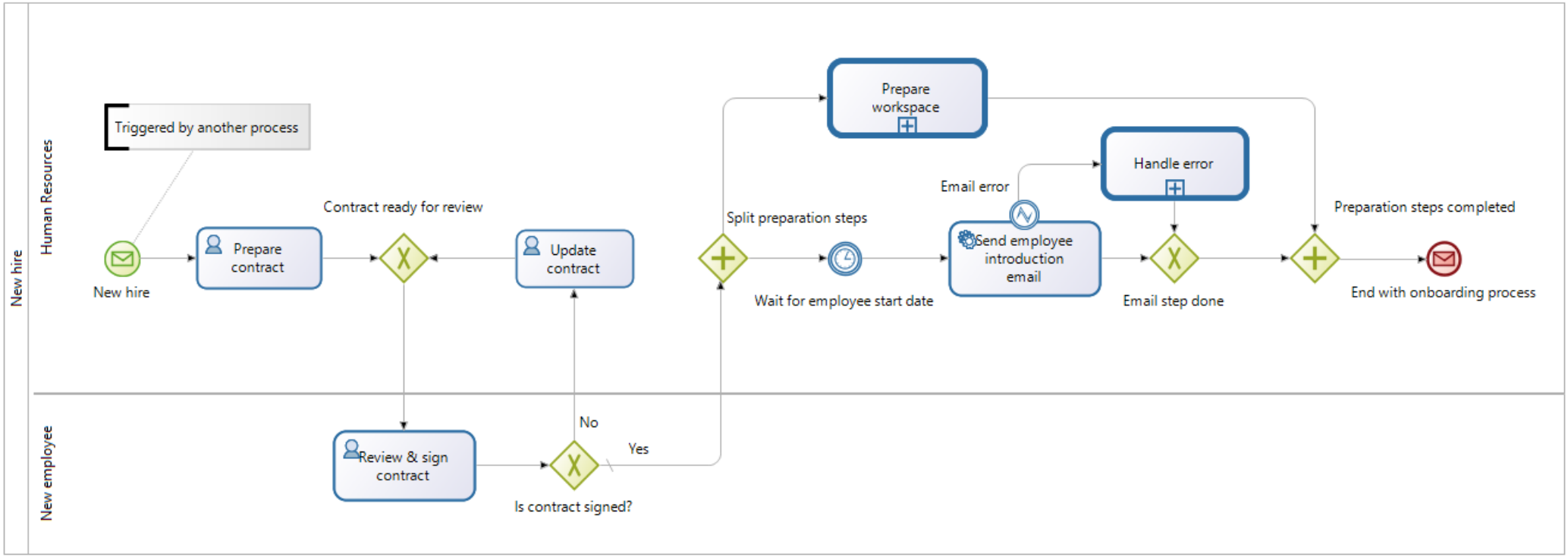
If the timer is a start event, the process starts when the timer goes off. If the timer is located in the process flow, the process waits until the timer goes off – and then it continues.

Error

Like messages, errors can be caught - and can start a process, or a special error path within a sub-process.

An example with intermediate BPMN

Messages, signals, timers, and *errors* specify workflow behavior.



Summary

With just 4 categories of basic and intermediate BPMN you can begin to build a deployable, executable process application.

BPMN is a standard that allows business and IT to share a common language, which makes development of BPM applications for business by IT easier and more efficient.

BPMN is both a set of visual modeling elements, and a set of semantics for executable code represented by those elements.

Many of the visual elements in BPMN are similar to standard flow chart elements. Modeling with and interpreting models with BPMN is relatively straightforward.

BPMN elements can be categorized

Workflow

Organizing

Readability

Special behavior

There are **Basic**, **Intermediate**, and **Advanced** elements in each of these categories.

- **Basic BPMN** is useful for modeling.
- **Intermediate BPMN** begins to make a model executable.
- **Advanced BPMN** fully defines process behavior.

If you're designing a BPM software suite, read the BPMN2 spec...

If you're designing process applications, this *Ultimate Guide* is what you really need!

Sources and further reading

BPMN Method and Style, 2nd ed., Bruce Silver, October 2011

OMG Business Process Model and Notation (BPMN) Version 2.0, January 2011

BPMN 2.0: Introduction to the Standard for Business Process Modeling, Thomas Allweyer, February 2010

Learn more about BPM and BPMN