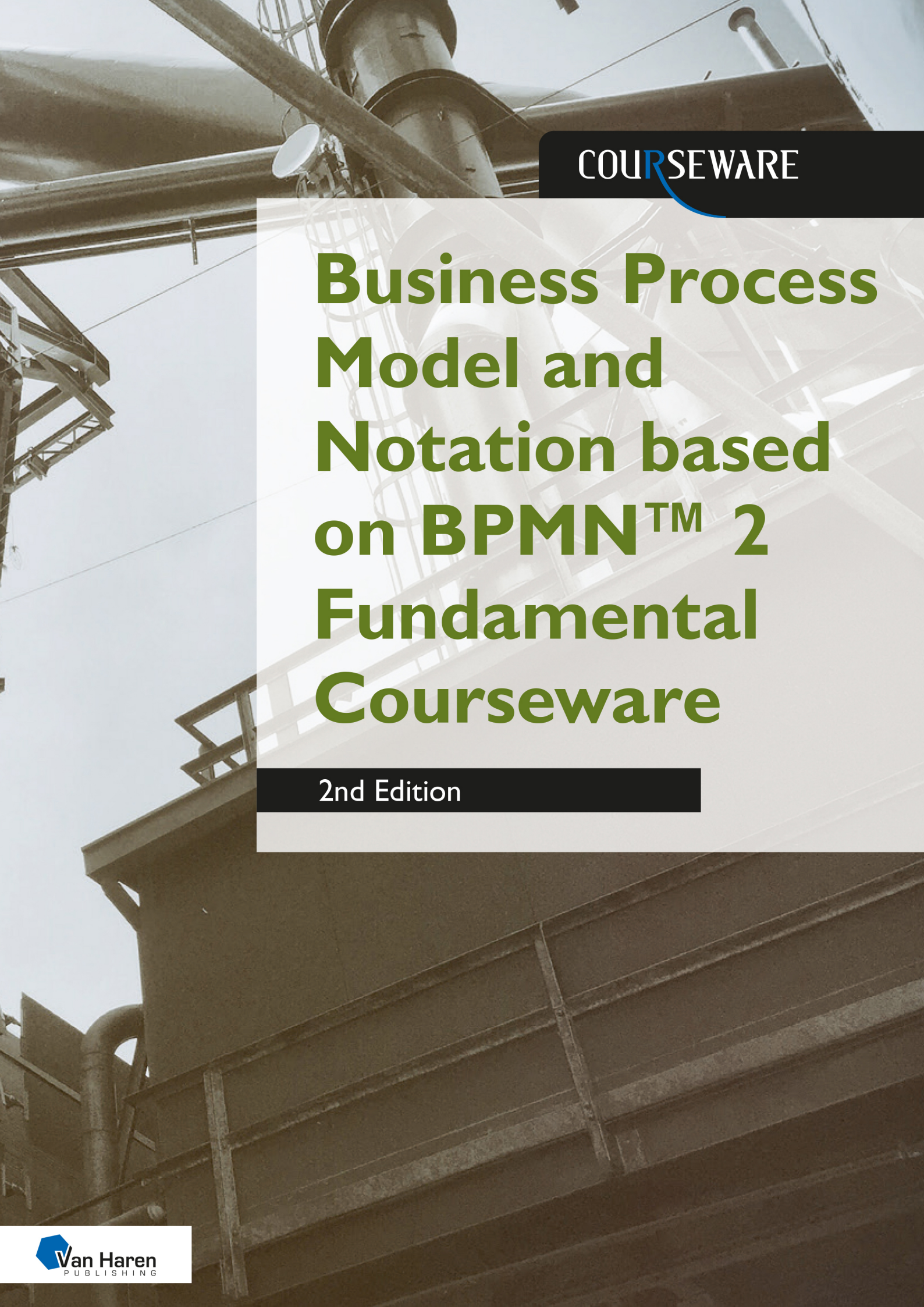

COURSEWARE

Business Process Model and Notation based on BPMN™ 2 Fundamental Courseware

2nd Edition

Van Haren PUBLISHING

Business Process Model and Notation (BPMN™ 2)
Fundamental Courseware
2nd Edition

Colophon

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Publisher’s overview of the courseware

The courseware was created by experts from the industry who served as the author(s) for this publication. The input for the material is based on existing publications and the experience and expertise of the author(s). The material has been revised by trainers who also have experience working with the material. Close attention was also paid to the key learning points to establish what needs to be mastered.

The objective of the courseware is to provide maximum support to the trainer and to the student, during his or her training. The material has a modular structure and according to the author(s) has the highest success rate should the student opt for examination.

The courseware is also accredited for this reason, wherever applicable.

To satisfy the requirements for accreditation the material must meet certain quality standards. The structure, the use of certain terms, diagrams and references are all part of this accreditation. Additionally, the material must be made available to each student to obtain full accreditation. To optimally support the trainer and the participant of the training assignments, practice exams and results are provided with the material. Students are encouraged to make notes directly with the slides. Additionally, dedicated notes pages can be used.

Direct reference to recommended literature is also regularly covered in the sheets so that students can find additional information concerning a particular topic.

Although the courseware is complete, the possibility that the trainer deviates from the structure of the sheets or chooses to not refer to all the sheets or commands does exist. The student always has the option to cover these topics and go through them in their own time. It is recommended to follow the structure of the courseware and publications for maximum exam preparation.

The courseware and the recommended literature are the perfect combination to learn and understand the theory.

-- Van Haren Publishing

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Van Haren Publishing (VHP) specializes in titles on best practices, methods, frameworks and standards within four domains:

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- Architecture (Enterprise and IT)
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- Project Management

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Topics are (per domain):

IT Management	IT Service Management	FitSM, ISM®, ISO/IEC20000, IT4IT®, ITIL®, VerISM®, SAF, TRIM, XLA®
	Data Management	Data literacy, Data visualization, DMBOK
	IT Asset Management	HAM, ITAM, SAM
	IT Security Management	BIO, ISO/IEC27001, NIS2
	Test Management	CTAP
	Application Management	ASL
	Other	eCF, IT-CMF, Scrum
Project Management	Project Management	Half Double, ICB, ISO/IEC21500, P3.express, PM^2, PMBOK Guide, Praxis, PRINCE2
	Agile	Agile, Agile PM
	Other	PMO
Business Management	Operations Management	Lean, Lean Six Sigma, OBM, OMC, RASCI
	Contract Management	CATS CM, CATS RVM, IACCM World
	Business Information Management	BiSL, DID
	Artificial Intelligence	AI, Generative AI
	Outsourcing	OPBOK
Enterprise Architecture	Enterprise Architecture	BIAN, TOGAF
	Modeling	ArchiMate, BPMN
	Software Architecture	ISAQB
	Other	Open Agile Architecture

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Sources

The content of this course is based on the latest official BPMN 2.0.2 standard from OMG, as published on their website https://www.omg.org/spec/BPMN and various sources, specifically from the following books:

1. (Silver, BPMN Method and Style 2009) Silver, Bruce. *BPMN Method and Style*. Cody-Cassidy Press, 2009
2. (Weilkiens and Grass, OCEB2 Certification Guide 2016) Weilkiens, Tim; Christian Weiss; Andrea Grass. *OCEB 2 Certification Guide*. Morgan Kaufmann, 2016.
3. (Allweyer 2010) Allweyer, Thomas. *BPMN 2.0. Introduction to the Standard for Business Process Modeling*. Books on Demand, 2010.

A complete bibliography can be found at the end of this book.

The language and spelling used for the course material (slides, handbook) is International (UK) English. Our sources of reference for citations, grammar, syntax, and mechanics are from The Chicago Manual of Style, The Oxford English Dictionary, and the Microsoft Manual of Style for Technical Publications.

Tools

Diagrams shown in the slides have been created with:

- *Vizi Modeler* from vizibpm: https://vizi-bpm.com/vizi-modeler/
- *Enterprise Architect* from Sparx Systems: www.sparxsystems.com
- *Trisotech Workflow Modeler*: www.trisotech.com

About this book

This courseware is identical for the different delivery modes of training: classroom, hybrid, online or self-paced using recorded video. Please expect minor differences in the actual slides or their sequence during the training because of the differences in delivery or considerations of your instructor.

The courseware contains the following:

1. The slides used during the training, including discussions, lab exercises, and test questions
2. Additional comments and explanations with the slides
3. Footnotes where applicable to refer to more information
4. Room to make your own notes after each module
5. Additional reference material in the appendices
6. Test questions and exercises in the appendices, with answers

Important notes:

This is a note of importance.

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Self-Reflection of understanding Diagram

'*What you do not measure, you cannot control*.'' – Tom Peters

Fill in this diagram to self-evaluate your understanding of the material. This is an evaluation of how well you know the material and how well you understand it. In order to pass the exam successfully you should be aiming to reach the higher end of Level 3. If you really want to become a pro, then you should be aiming for Level 4. Your overall level of understanding will naturally follow the learning curve. So, it's important to keep track of where you are at each point of the training and address any areas of difficulty.

Based on where you are within the Self-Reflection of Understanding diagram you can evaluate the progress of your own training.

Level of Understanding	*Before Training (Pre-knowledge)*	*Training Part 1 (1st Half)*	*Training Part 2 (2nd Half)*	*After studying / reading the book*	*After exercises and the Practice exam*
Level 4 *I can explain the content and apply it .*					
Level 3 *I get it!* *I am right where I am supposed to be.*					Ready for the exam!
Level 2 *I almost have it but could use more practice.*					
Level 1 *I am learning but don't quite get it yet.*					

(Self-Reflection of Understanding Diagram)

Write down the problem areas that you are still having difficulty with so that you can consolidate them yourself, or with your trainer. After you have had a look at these, then you should evaluate to see if you now have a better understanding of where you actually are on the learning curve.

Troubleshooting

Problem areas:	*Topic:*
Part 1	
Part 2	
You have gone through the book and studied.	
You have answered the questions and done the practice exam.	

Timetable

Day 1: Blocks 1 & 2	
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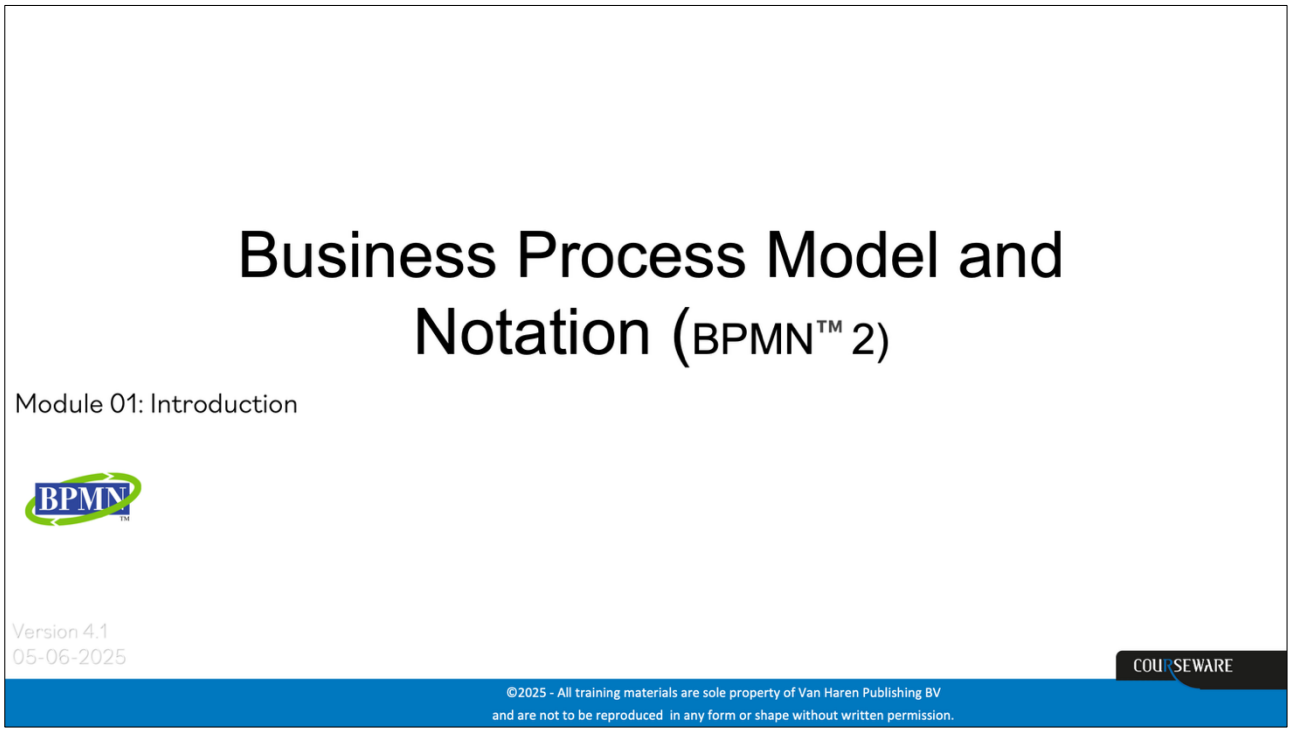
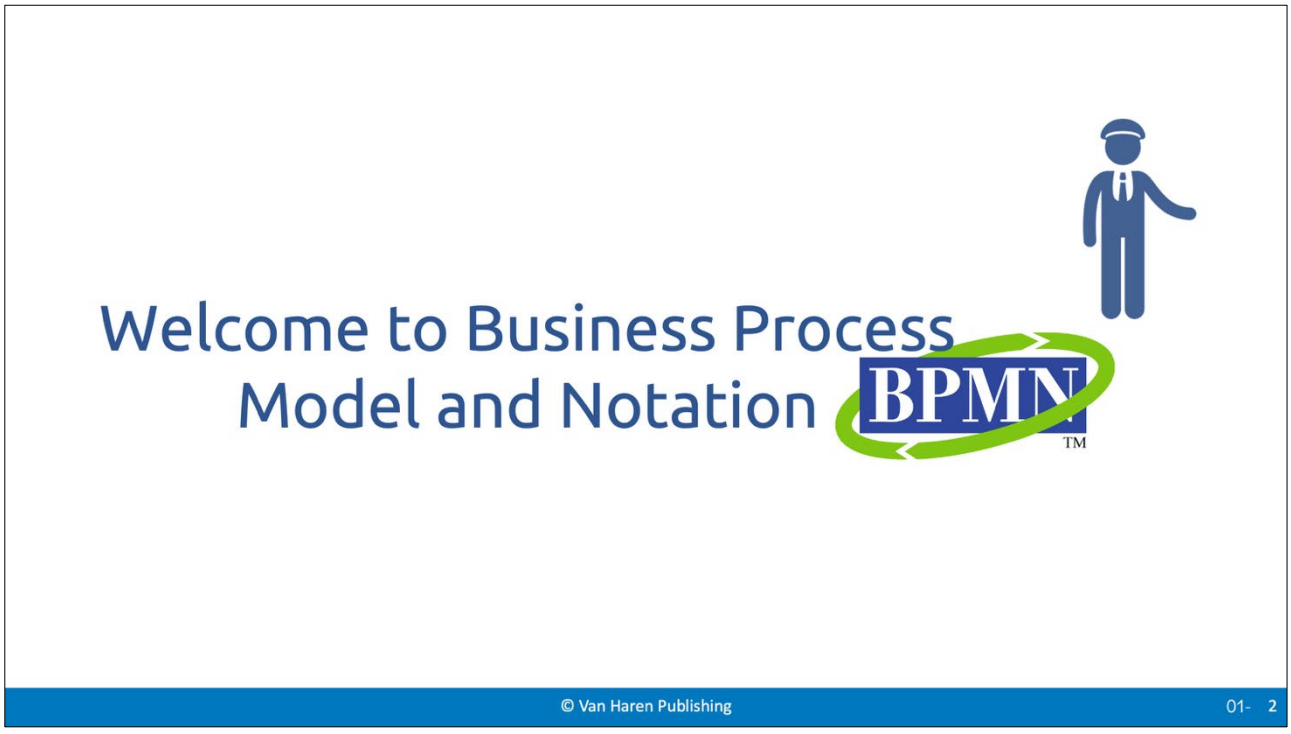
Module 1: Introduction

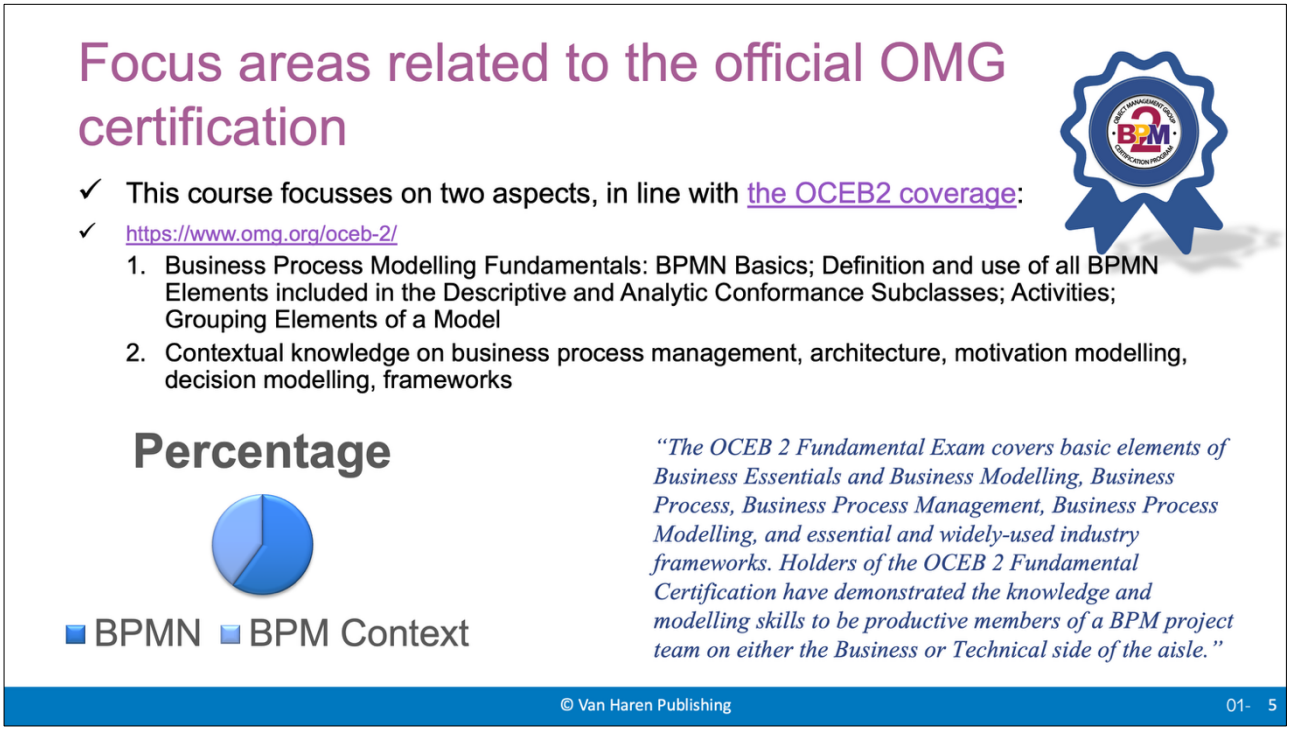
This module introduces the course, the trainer and the participants, and sets expectations.



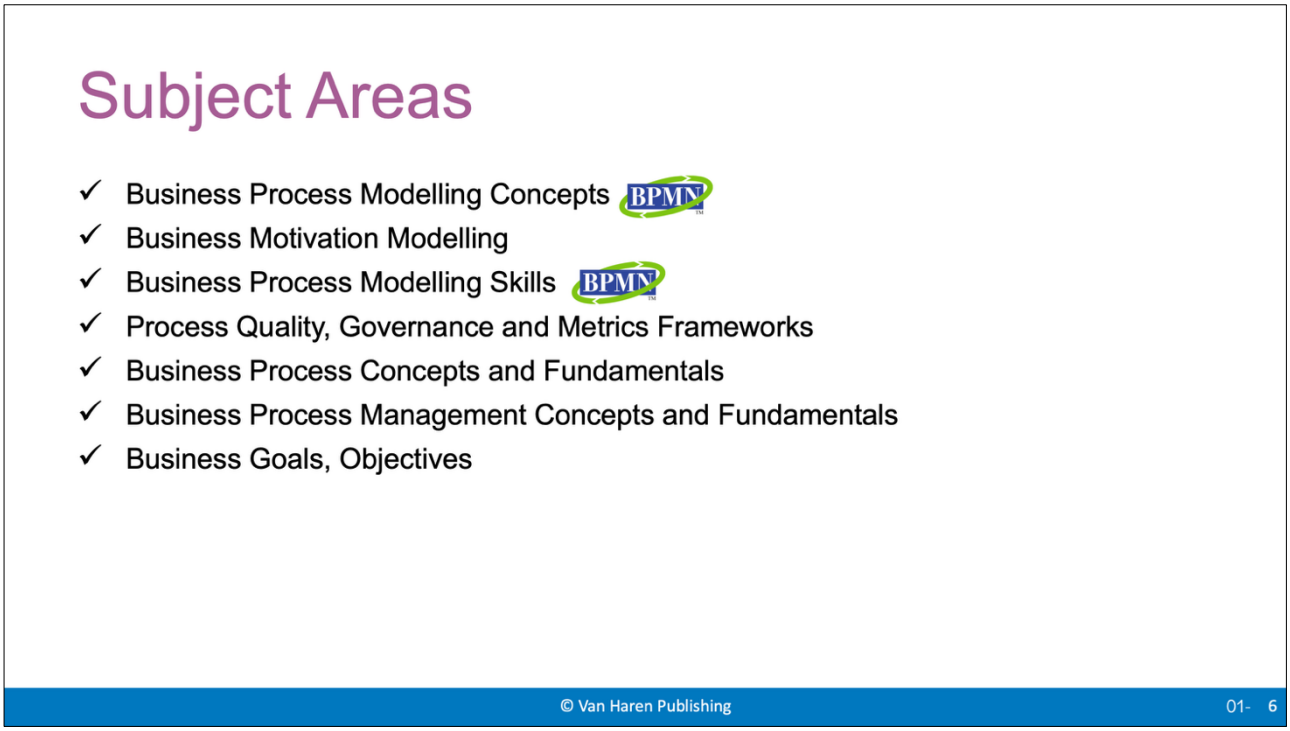


Introduction

Focus areas related to the official OMG certification

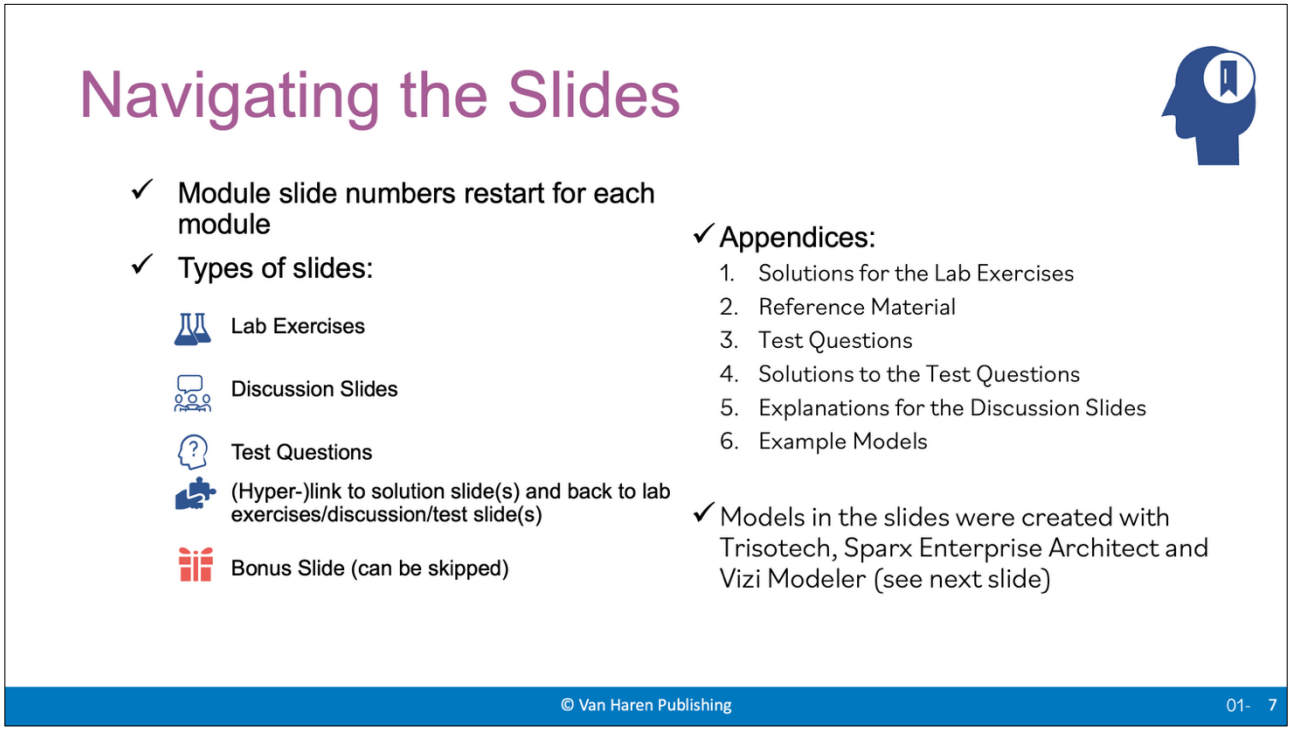


Subject Areas



The subject areas show that the training focusses not solely on using the BPMN language to create process models but also requires you to learn several basic Business Process Management concepts. This is invaluable background knowledge for effective process modelling and is required knowledge for Business Analysts and Business Architects.

Navigating the slides



The slides are numbered with the module number first, and then the slide number. So, a slide that is numbered 10-8 is the eighth slide of module 10.

BPMN Tooling

BPMN modelling can be done using brown-paper or whiteboard. However, to store, reuse and share your models, a more robust environment is obviously better. There are many tools supporting the BPMN 2.0 standard. We name a few here. The best tools offer support for both

the BPMN standard notation, as well as validation of the models you create, but also enable you to link the BPMN models with other models created in UML and ArchiMate. Using a single enterprise architecture repository where all models are stored, is best of all. Ideally, in such a repository not only BPMN diagrams are created and maintained, but also (depending on the extent of the tool support) other diagrams in other languages such as ArchiMate® and UML™.

If you have a BPMN modelling tool that also supports not only basic validation ("is the process correct according to the standard?") but also additional validation such as compliance with the Method & Style rules, you may consider yourself to be blessed.

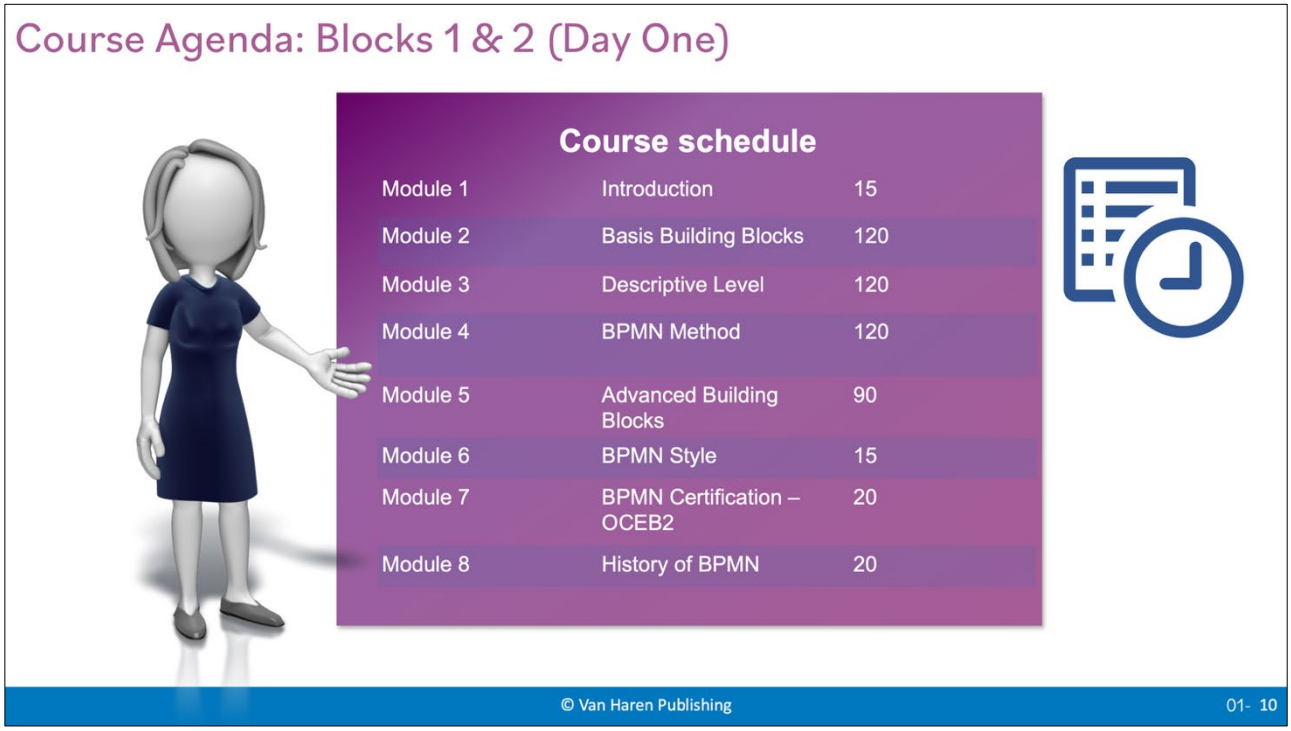
Lab Exercises: Tooling

Your trainer has informed you of the selected tool for your training.

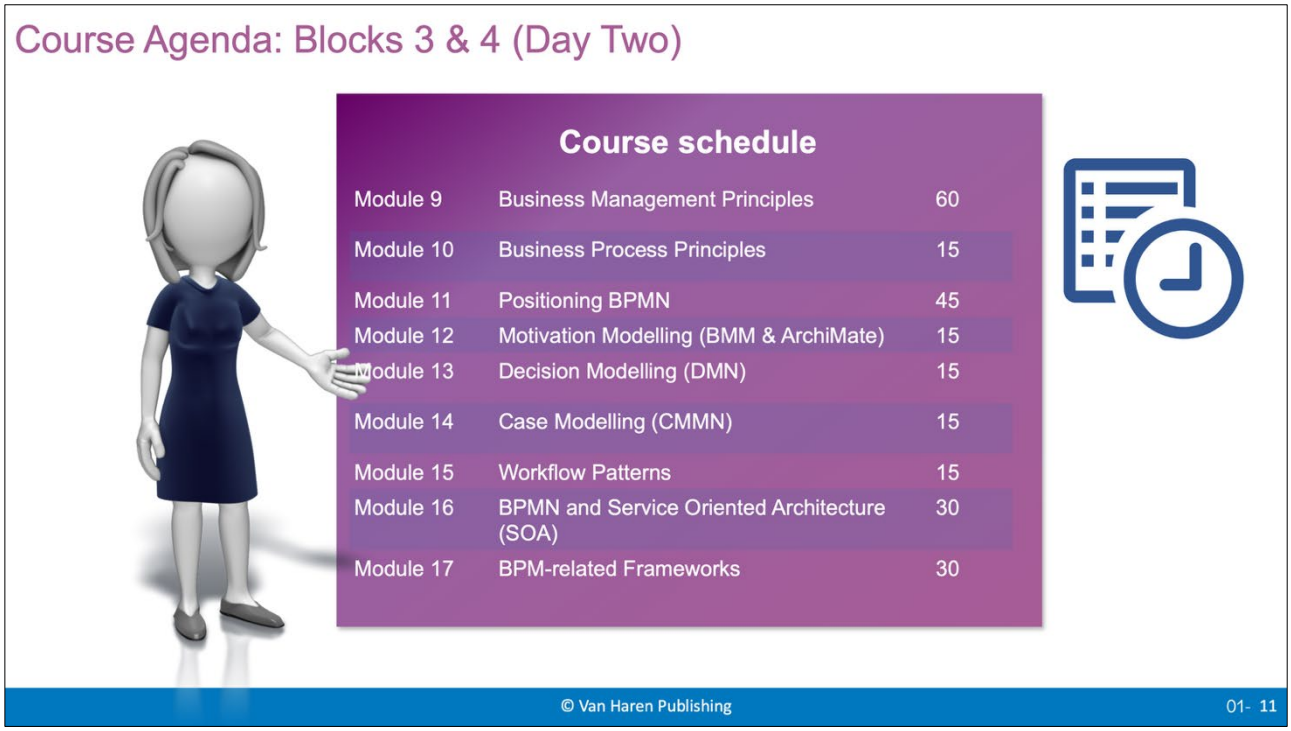
Course Agenda

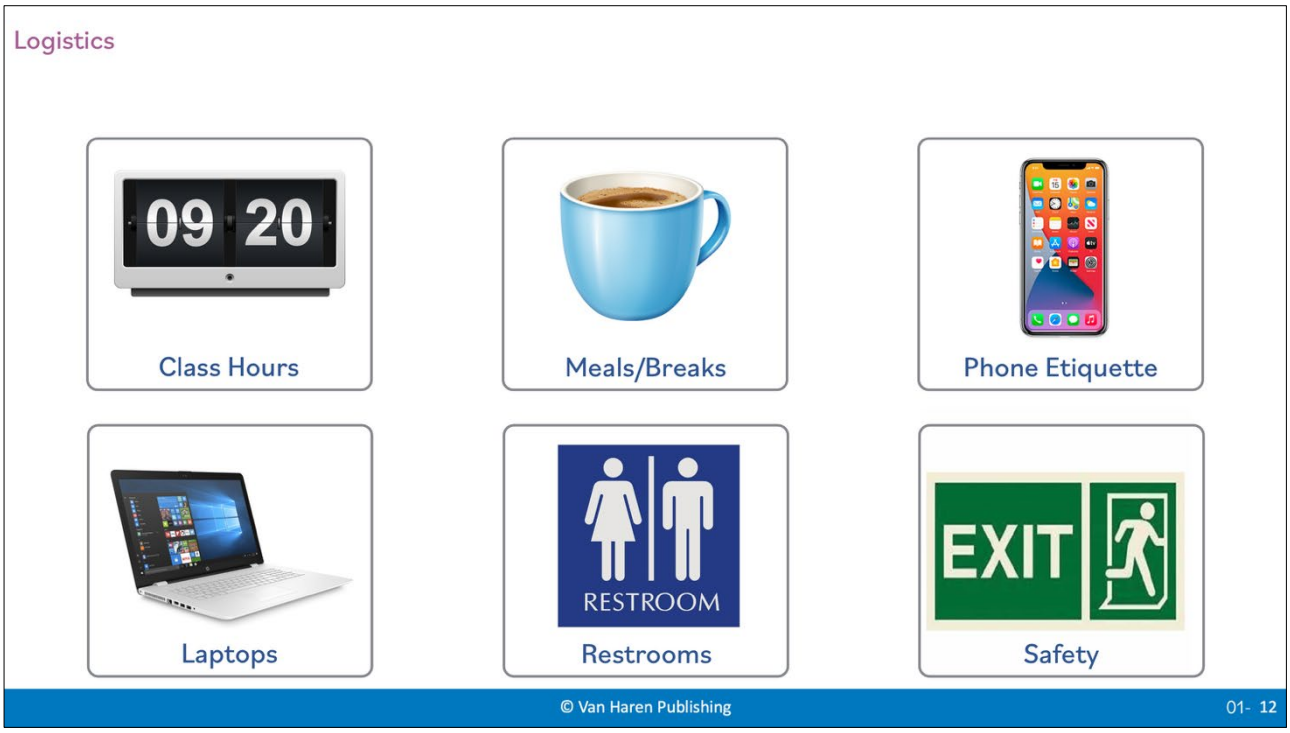
Below you can find the standard agenda. The modules can be worked through slightly differently for the different delivery versions (on-line, hybrid, on-demand). The two-day live training deals with blocks 1 and 2 on day one and blocks 3 and 4 on day two.

Course Agenda: Blocks 1 & 2

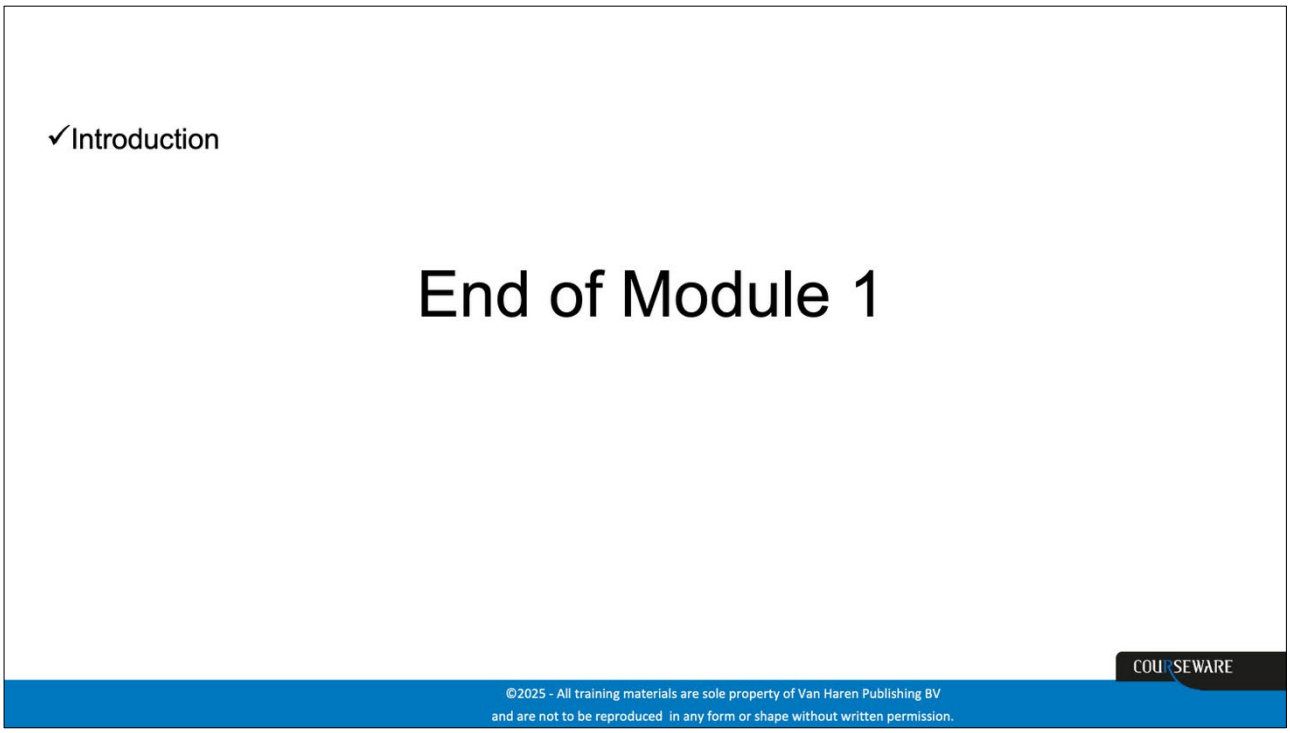


Course Agenda: Blocks 3 & 4





Slightly different for classroom delivery, hybrid, or online obviously.



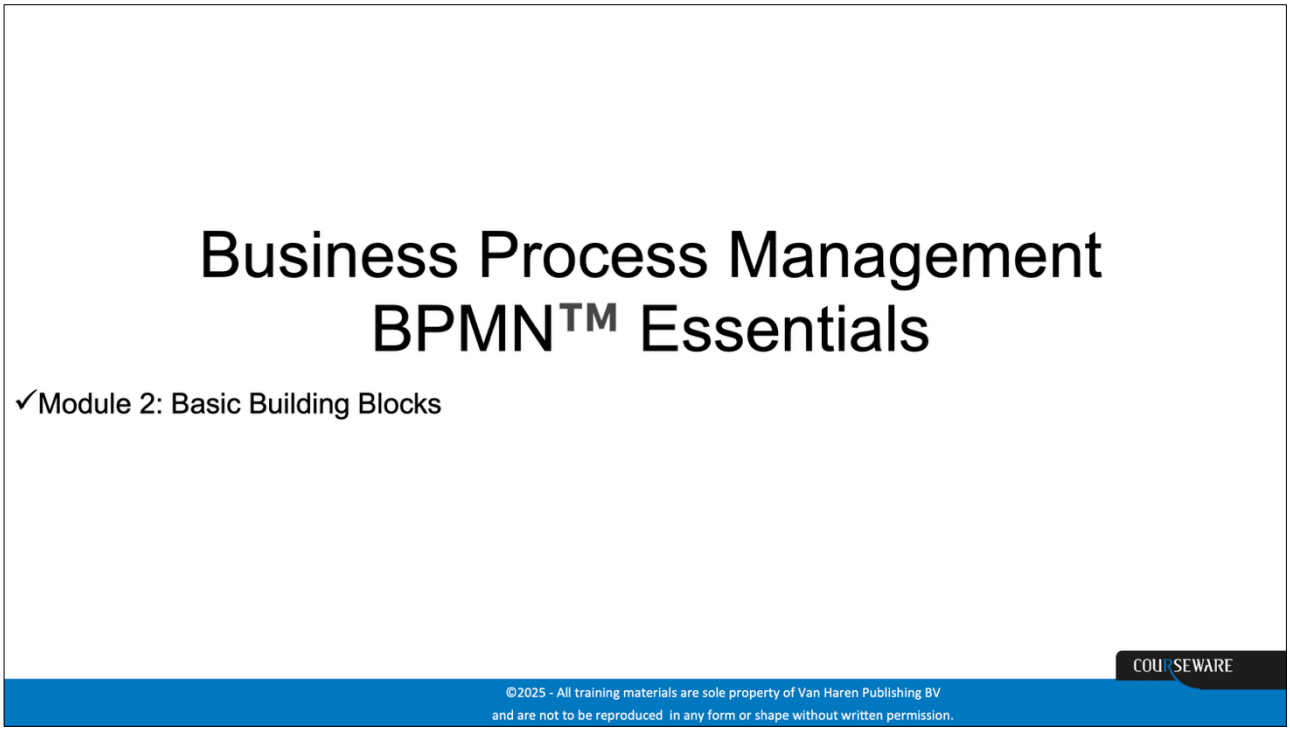
Notes

Module 2: Basic Building Blocks

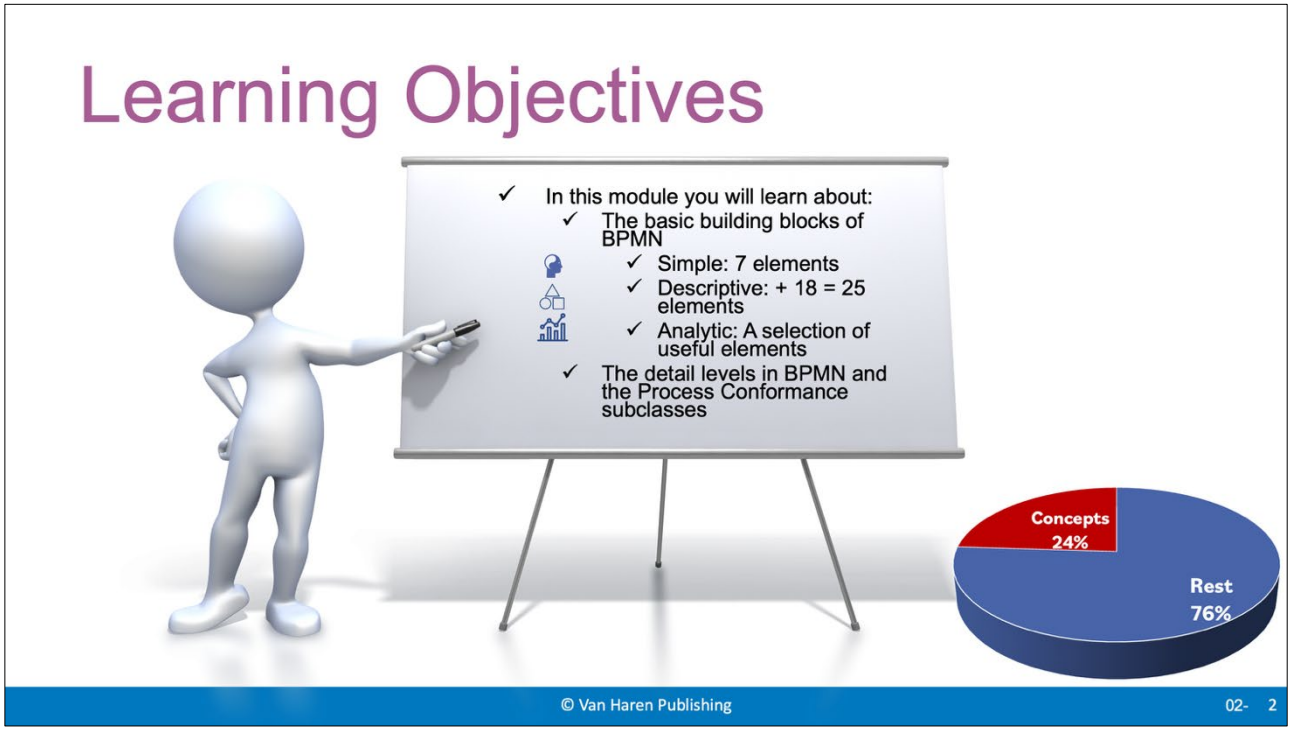
Starting with simple building blocks and simple diagrams, you will learn and exercise the basic skills needed to create process models using the BPMN language.

Even with this very basic set of building blocks you are already able to create serious process models.

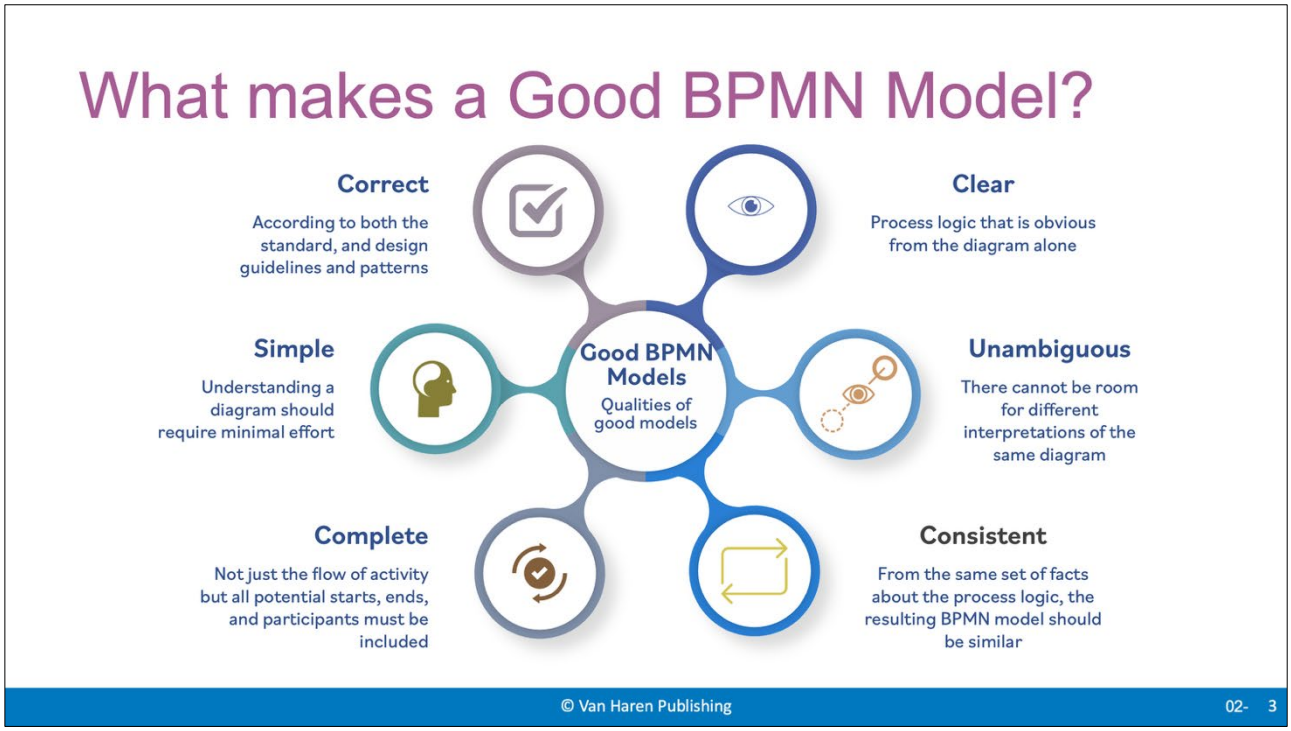
An important skill to learn is to create process diagrams using the simplest subset of elements. Use the more advanced elements when you really need them, not to impress your users with your mastery of the esoteric elements.



Learning Objectives



What makes a Good BPMN Model?

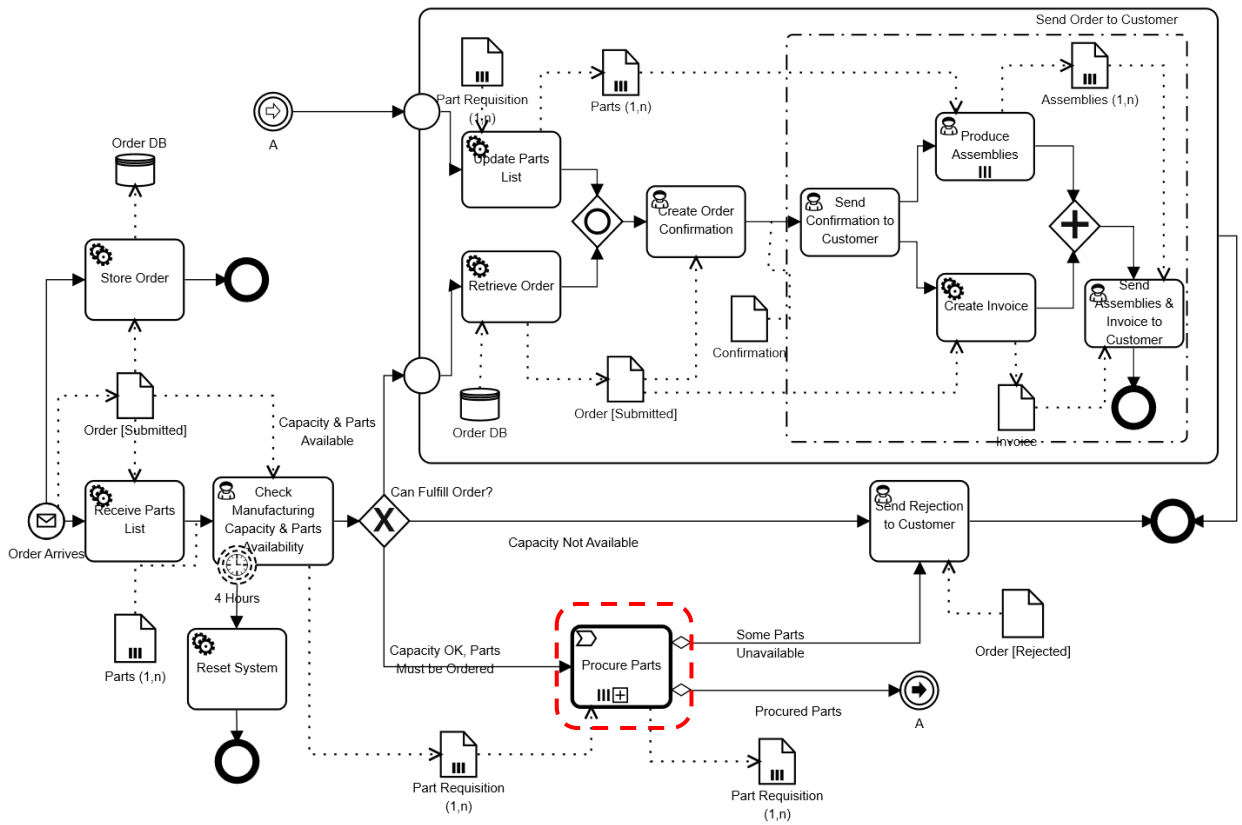


This set of principles will be mentioned again and again; it cannot be emphasised enough. Basically, when creating a model, you should ask yourself these questions:

- *Is the model correct?*
  An incorrect model creates all manner of issues: not understandable by others or yourself after some time, unusable for automated processes, etc.

- *Is the model clear?*
  Clarity is an art: avoid clutter and unnecessary information and elements. Focus on what the process wants to express and use other models or documents to document those aspects not directly related to the process itself.
- *Is the model simple?*
  Simplicity is also an art. “apologies for this long mail, but I lacked the time to make it shorter”. A simple model should be comprehensible at first glance.
- *Is the model unambiguous?*
  Ambiguity, like correctness, makes models harder to understand over time.
- *Is the model complete?*
  Leaving out details is fine, but on the process level you are showing, all possible paths should be visible.
- *Is the model consistent?*

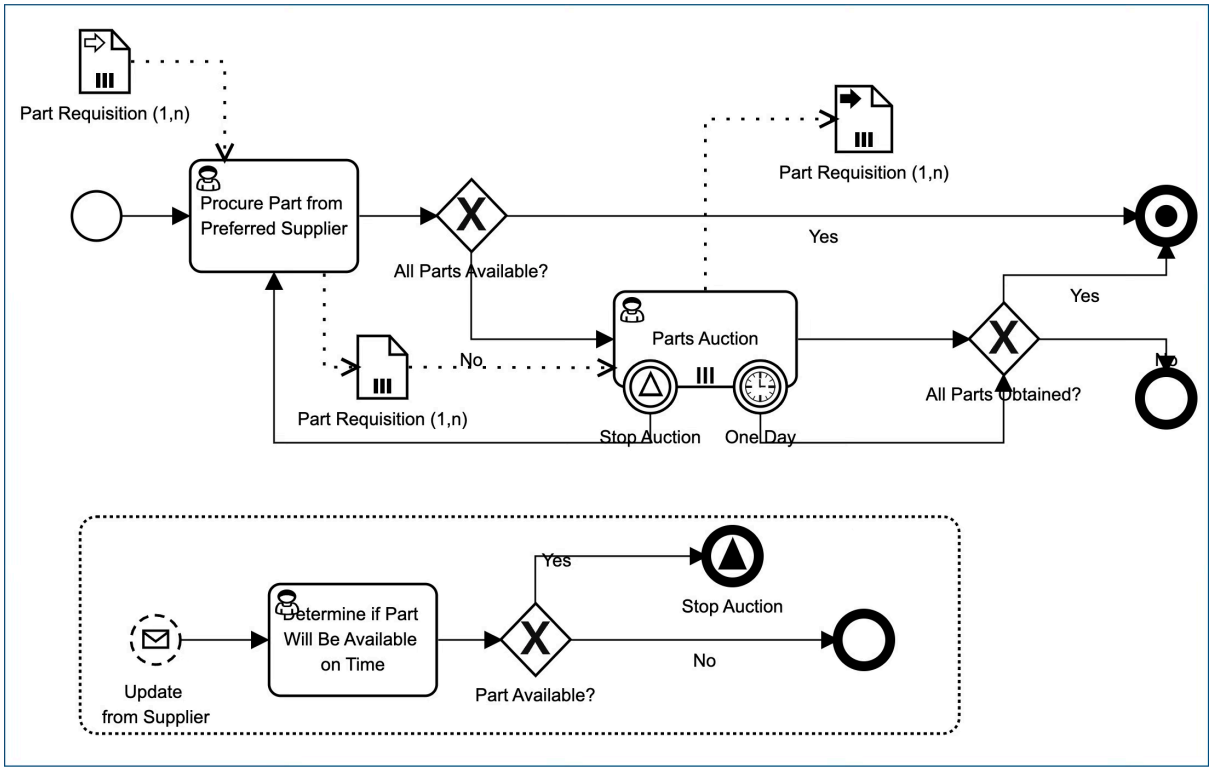
Top-level example model: Order Fulfilment



This diagram is derived from an example model in the spec ((OMG 2014) Business Process Model and Notation (BPMN) Version 2.0.2: Figure 7.8), which curiously enough is not explained further in any way in the spec itself.

The **Procure Parts** sub-process is expanded in the next slide below:

Level 1 sub-process model: Procure Parts

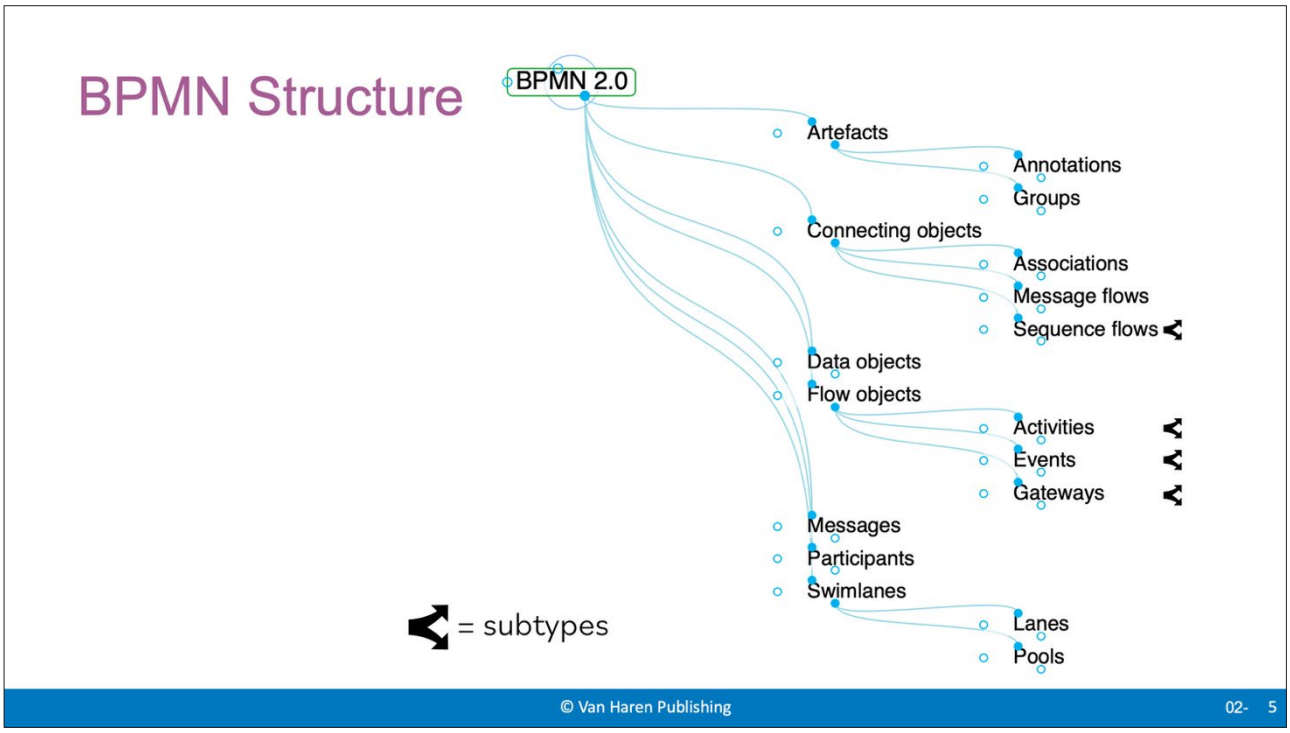


The above diagrams look quite impressive; however, we will learn during the training that to stuff all this information into one view or diagram might not be the best approach.

Diagrams or views that are simple to understand in one glance are a design guideline, which will be discussed when we are going to talk about hierarchical decomposition of process models and BPMN style.

BPMN Structure

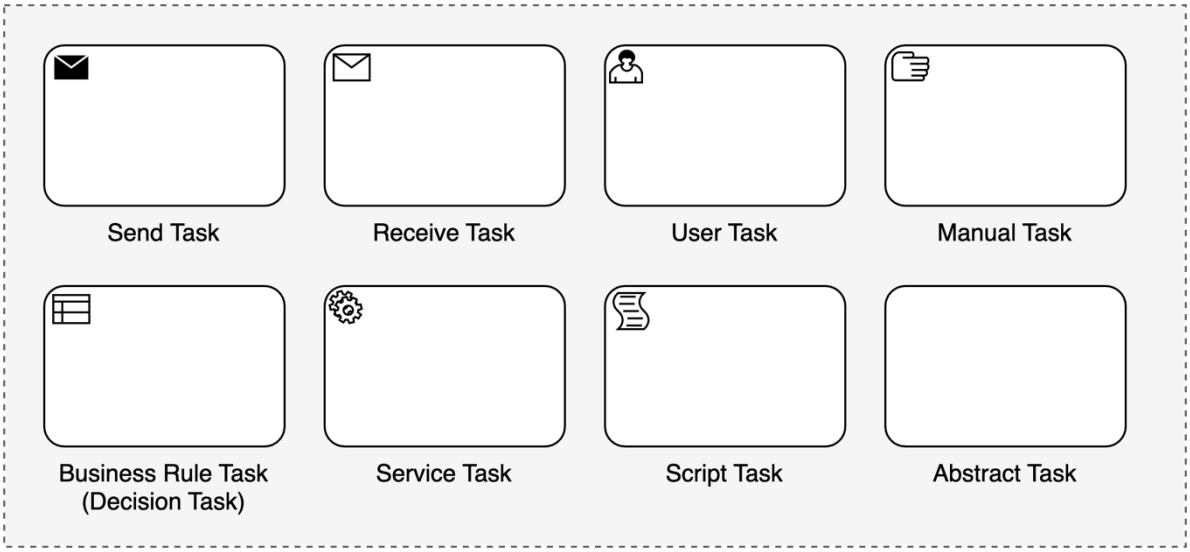
Below you can see the top-level classification of all BPMN elements.



The subtypes indicator shows elements of which subtypes exist.

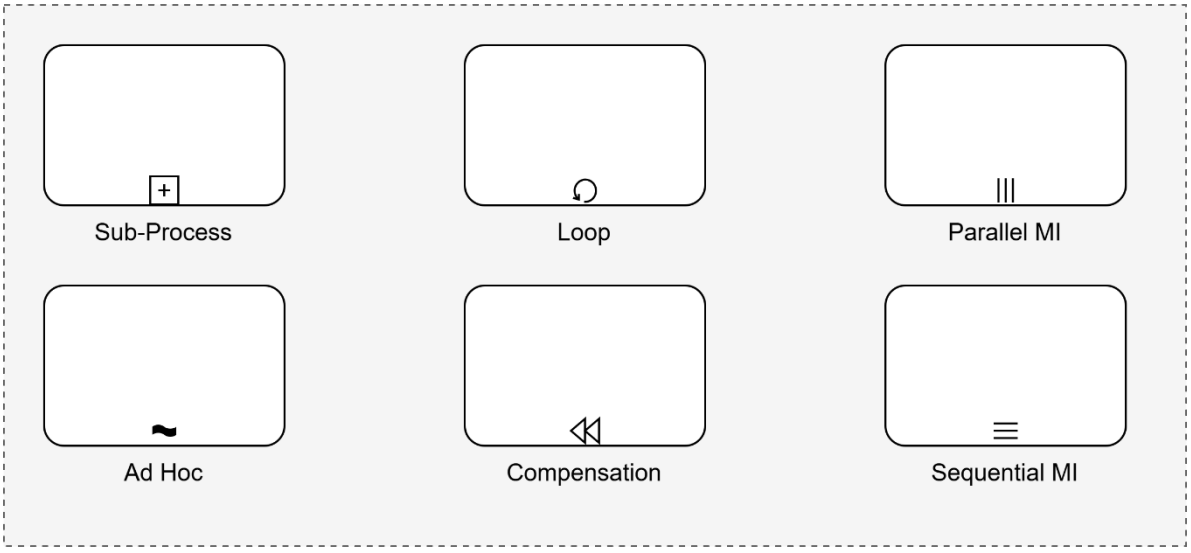
Within the following set of elements there are more specialisations:

- **Activities**
- **Task**: Represents a unit of work that needs to be performed as part of the process. Tasks can be atomic (indivisible) or expanded into sub-processes.



  - **Send task**: Represents a task that sends a message or signal to another process or participant.
  - **Receive task**: Represents a task that waits for a message or signal to be received before proceeding.
  - **User task**: Represents a task that requires human interaction. It is typically performed by a knowledge worker or end-user.

        - **Manual task**: Represents a task that is performed manually by a human, but it is less specific than a User task.
        - **Decision task** (currently still named **Business Rule task**): Represents a task that is based on business rules or decision logic. It is often used for decision-making within the process.
        - **Service task**: Represents an automated task that is performed by a software service or system. It may involve communication with external systems.
        - **Script task**: Represents a task that is performed based on a predefined script or script language. It is typically automated.
        - **Abstract task**: An activity which is not further specified.
    - **Sub-process**: Represents a sub-process within the main process. Sub-processes allow for the decomposition of complex processes into smaller, more manageable components.
    - **Transaction**: Represents a transactional sub-process, which is a specialized form of a sub-process. It makes sure that all enclosed activities are completed successfully or rolled back in case of an error.
    - **Call activity**: Represents a call to a global process or a reusable sub-process defined outside of the current process. It is used for modularizing processes and reusing them in different contexts.
- **Activity Markers**
  Activity markers are BPMN symbols or icons added to BPMN activity shapes to convey additional information about the nature or behaviour of the activity.



    - **Loop marker**: Indicates that the associated activity or sub-process should be repeated in a loop until a certain condition is met. The loop condition should be specified (using a Text Annotation).
    - **Parallel marker**: Indicates that the tasks within a sub-process can be executed in parallel. MI = Multi Instance.

- **Ad hoc marker**: Indicates that the tasks within the sub-process can be performed in any order or repeated as needed. Only used for relatively simple ad hoc processes. For more complex ad-hoc (non-sequential) processes it is advised to use CMMN™ (Case Management Model and Notation), which is introduced in Module 14: Case Management (CMMN).
- **Compensation marker**: Indicates that the activity is a compensation activity, and it is associated with handling compensation for a previous activity in case of an error.
- **Sequential marker**: Indicates that the tasks within a sub-process should be executed sequentially. MI = Multi Instance.

- **Events**

	START			INTERMEDIATE				END
	Standard	Event Sub-Process Interrupting	Event Sub-Process Non-Interrupting	Catching	Boundary Interrupting	Boundary Non-Interrupting	Throwing	Standard
None: Untyped events, indicate start point, state changes or final states.								
Message: Receiving and sending messages.								
Timer: Cyclic timer events, points in time, time spans or timeouts.								
Escalation: Escalating to a higher level of responsibility.								
Conditional: Reacting to changed business conditions or integrating business rules.								
Link: Off-page connectors. Two corresponding link events equal a sequence flow.								
Error: Catching or throwing named errors.								
Cancel: Reacting to cancelled transactions or triggering cancellation.								
Compensation: Handling or triggering compensation.								
Signal: Signalling across different processes. A signal thrown can be caught multiple times.								
Multiple: Catching one out of a set of parallel events.								
Parallel Multiple: Catching all out of a set of parallel events.								
Terminate: Triggering the immediate termination of a process.								

- **Start Events**

  Start events mark the beginning of a process. They represent the points at which a process is initiated. There are several types of start events, including:

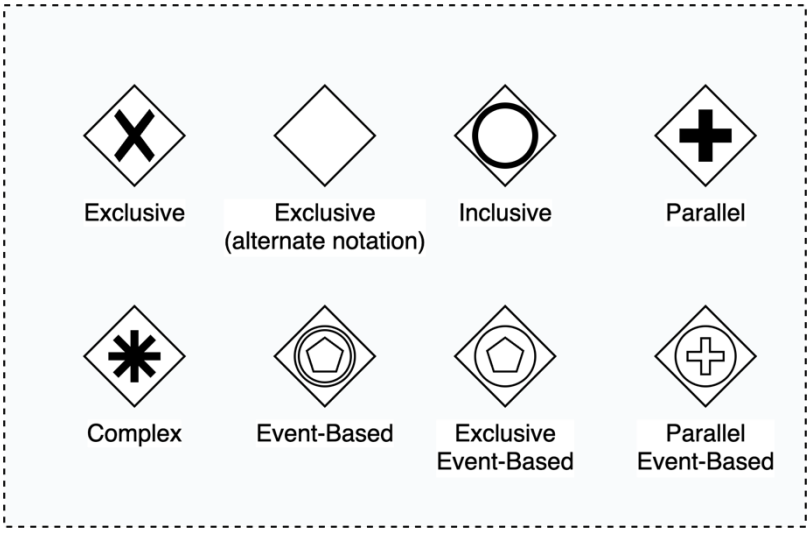
  - **None start event**: The process starts immediately without an (explicit or known) external trigger.

- **Message start event**: The process is triggered by the receipt of a message.
- **Timer start event**: The process is initiated based on a predefined time or timer.
- **Conditional start event**: The process starts based on a specified condition. The condition is a Boolean expression.
- **Signal start event**: The process begins in response to the receipt of a signal, broadcasted from a Signal throwing event. The throwing signal is generated from the Pool in which it is specified, and can be caught in the same or any other process (Pool).
- **Multiple start event**: Multiple events can trigger the start of the process, and any one of them can initiate the process. The label of the event should specify all event types.
- **Error event**: only allowed as an interrupting Event Sub-process start event.

- **Intermediate Events**
  Intermediate events occur between the start and end of a process (in the process flow). They represent points where something happens during the execution of the process.
  - **Message intermediate event**: Represents the receipt (intermediate receive) or sending (intermediate send) of a message during the process.
  - **Timer intermediate event**: Represents an intermediate point in the process based on a timer or specific time.
  - **Conditional intermediate event**: Represents an intermediate point based on a specified condition. The condition is a Boolean expression.
  - **Signal intermediate event**: Represents the occurrence of a signal during the process.
  - **Link intermediate event**: Represents the use of a link to connect different parts of the process. Labels are used to match link events. This event type has no semantic effect on the process logic and is only used for visual layout purposes.
  - **Compensation intermediate event**: Represents the initiation of compensation activities in case of an error or exception.
  - **Error intermediate event**: Represents an error condition during the process. This event type can only be used as a boundary event, not in a regular flow.
- **End Events**
  End events mark the conclusion or completion of a process. They represent the points at which the process finishes its execution. There are several types of end events, including:
  - **None end event**: The process concludes without any specific result.
  - **Message end event**: The process concludes by sending a message.

- **Error end event**: The process concludes with an error condition. This is the only throwing error event type (you cannot have throwing error start or intermediate events).
- **Terminate end event**: The process is terminated abruptly, which implies the immediate destruction of all tokens on the process level and all child levels (not on parent levels!).
- **Signal end event**: The process concludes in response to a signal.
- **Multiple end event**: Multiple end events can be used to indicate various possible outcomes or results.

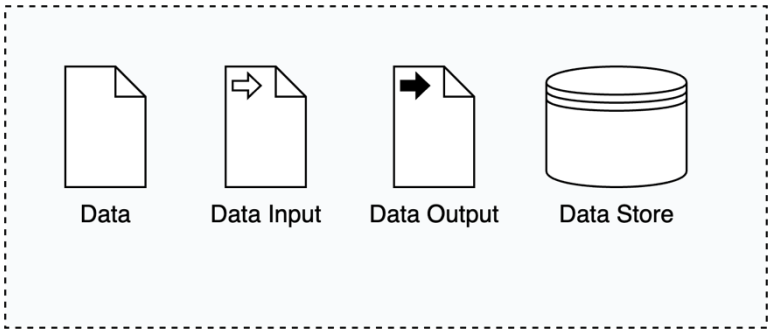
- **Gateways**



  - **Exclusive gateway**: Represents a decision point where only one of the outgoing paths can be taken. The decision is based on evaluating conditions or state provided by the process, associated with each outgoing sequence flow.
  - **Inclusive gateway**: Represents a decision point where multiple paths can be taken based on evaluating conditions or state provided by the process, associated with each outgoing sequence flow. All paths with conditions that evaluate to `true` are taken.
  - **Parallel gateway**: Represents a point where multiple paths can be taken simultaneously without evaluating conditions. It is used for parallel execution of activities, and this implies the splitting or joining of multiple tokens.
  - **Complex gateway**: Represents a more complex decision point where conditions and rules may involve a combination of logical operators. It allows for more sophisticated decision-making logic.
  - **Event-based gateway**: Represents a decision point based on events. It is used when the process flow depends on the occurrence of specific events on the outgoing gates, such as receiving a message or a timer event.
  - **Exclusive event-based gateway**: Like the event-based gateway, but enforces exclusive decision-making based on events. Only one path can be taken, depending on the first event to occur.

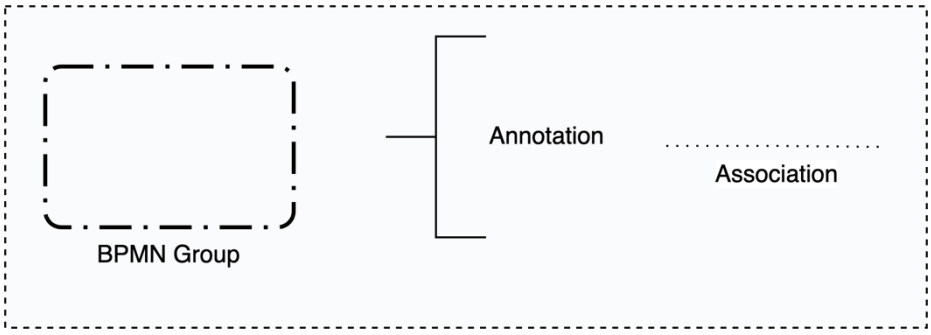
- **Parallel event-based gateway**: The occurrence of all subsequent events starts a new process instance.

- **Data Symbols**
  Data BPMN symbols represent the flow and handling of data within a business process. They help in visualizing how data is created, used, stored, and transferred throughout the process.



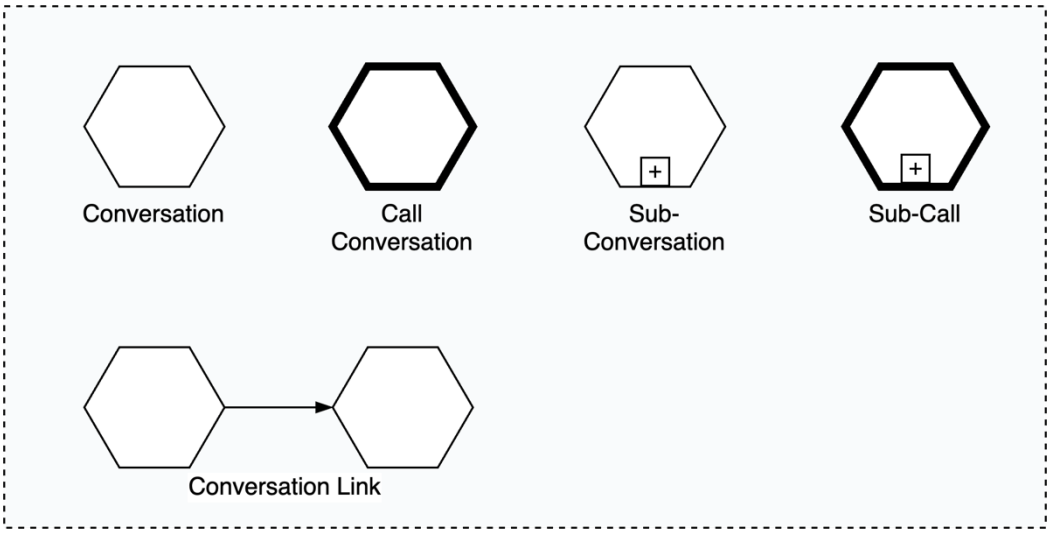
  - **Data object**: Represents data or information used or produced within a process. It helps illustrate the flow of data between activities. Data Objects do not persist outside the process instance and should not be confused with data in a database. It is only used for process flow logic.
  - **Data input/output**: Represents the input or output of data from an activity. It indicates the flow of data into or out of a task or sub-process.
  - **Data store**: Represents a place where data is stored during the execution of a process. It can be a physical repository or a database. The Data Store is persistent across process instances and should not be confused with data in a database. It is only used for synchronising process between different pools.

- **Group, Annotation, & Association**



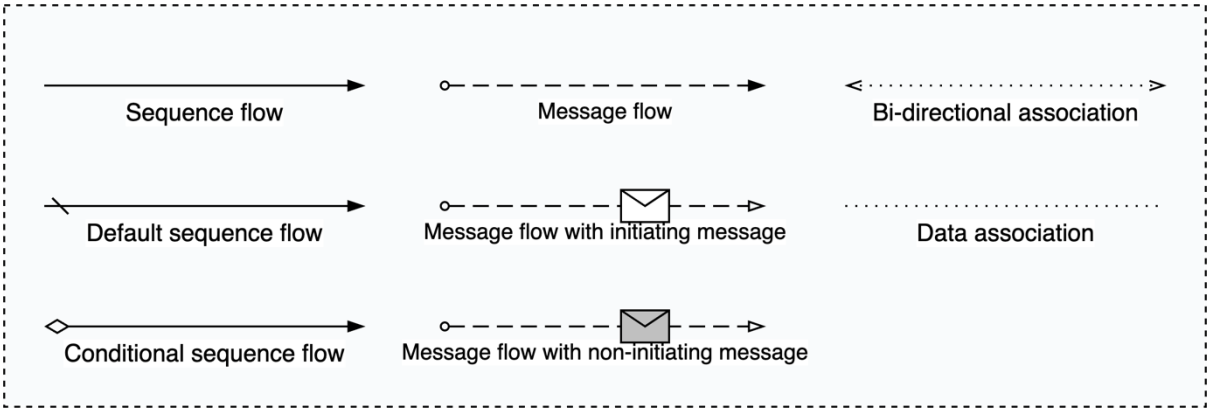
  - **Group**: Collects related elements in a diagram. It is often used to visually organize and highlight specific sections of the process. A Group has no process semantics.
  - **Annotation**: Provides additional information or comments to enhance the understanding of the process. Annotations are often used to add explanatory notes or documentation. An Annotation has no process semantics.
  - **Association**: Connects artifacts, data objects, or text annotations to flow objects, indicating a relationship or dependency. Associations help in clarifying connections between elements. An Association has no process semantics.

- **Conversations**
  Conversations are used to model interactions and communications between participants in a business process. Conversations provide a high-level view of how different participants, typically represented as Pools in BPMN diagrams, exchange messages and collaborate to achieve a common goal.

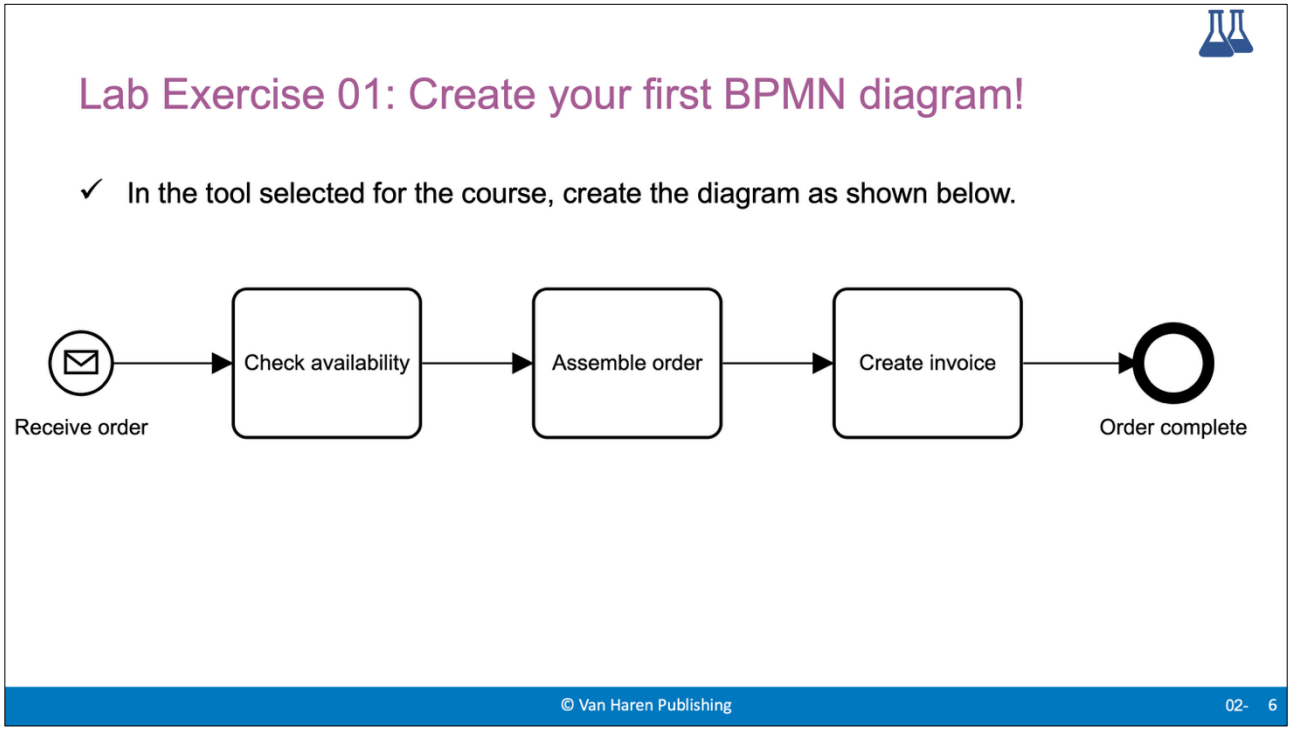


  - **Conversation**: Represents a conversation or communication between different participants in a business process. It provides an overall context for the interactions.
  - **Sub-conversation**: Represents a more detailed or nested conversation within a larger conversation. It is used to provide a more granular view of interactions within a specific part of the overall process.
  - **Call conversation**: Represents a call or sub-process that is initiated from within a conversation to represent a more detailed interaction or sub-process.
  - **Conversation link**: Represents a connection or link between different parts of a conversation or between different participants. It indicates that there is a relationship or interaction between them.

- **Connecting Objects**

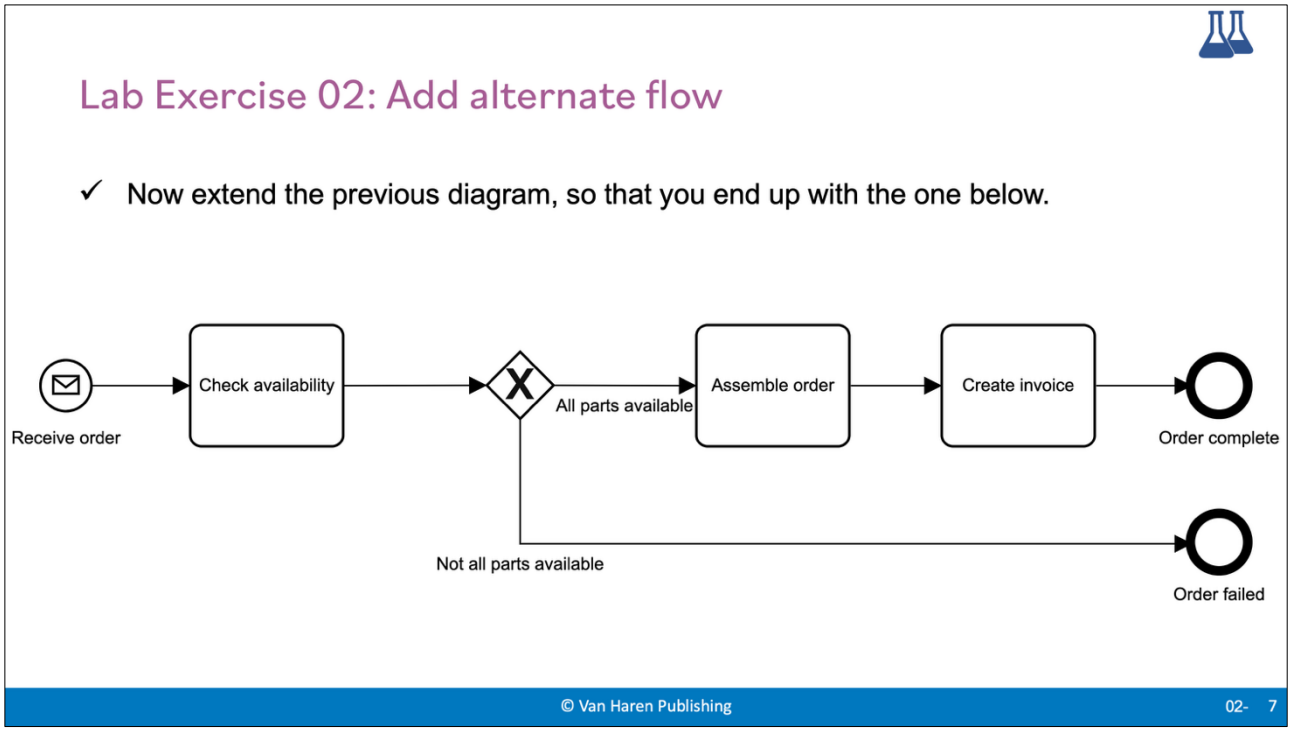


Lab Exercise 01: Create your first BPMN diagram!

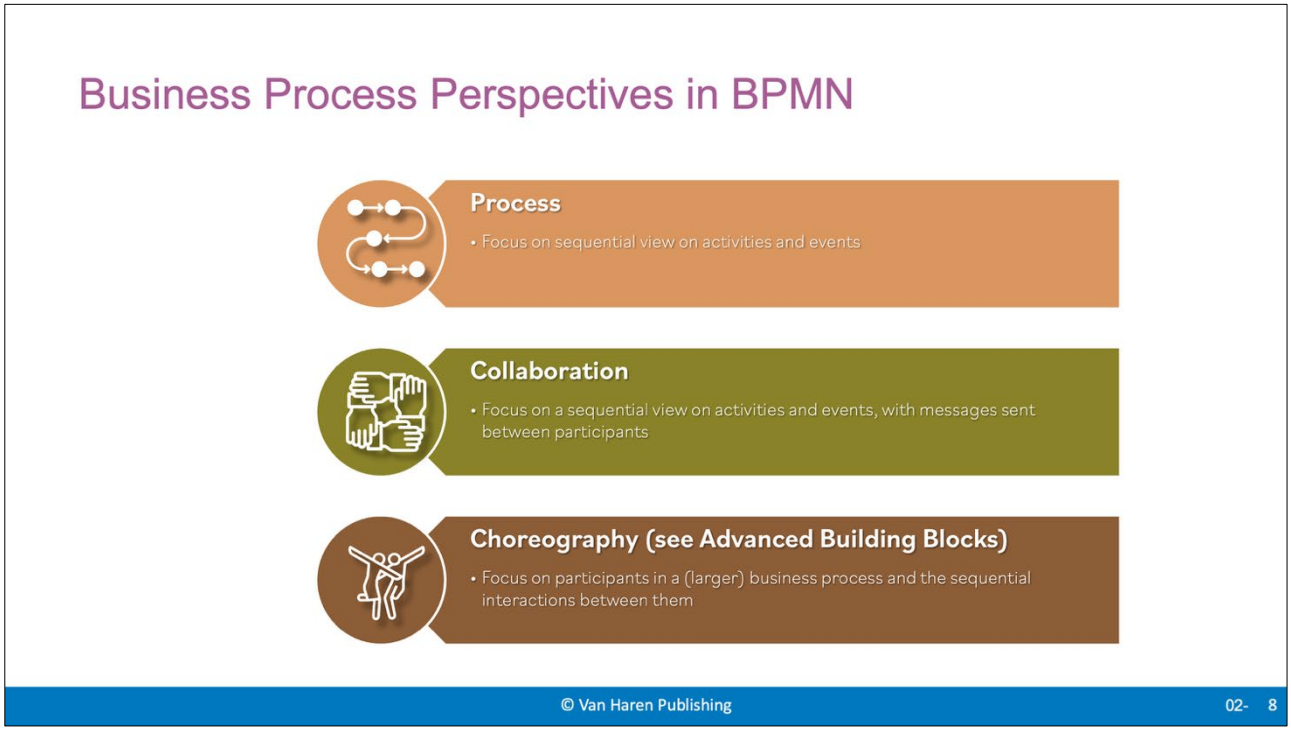


Using the tool selected for the training you need to familiarise yourself with the tool and how to create diagrams efficiently. Just try to copy the diagram shown, playing with the various options of the tool. Do not think too much on the semantics of the model.

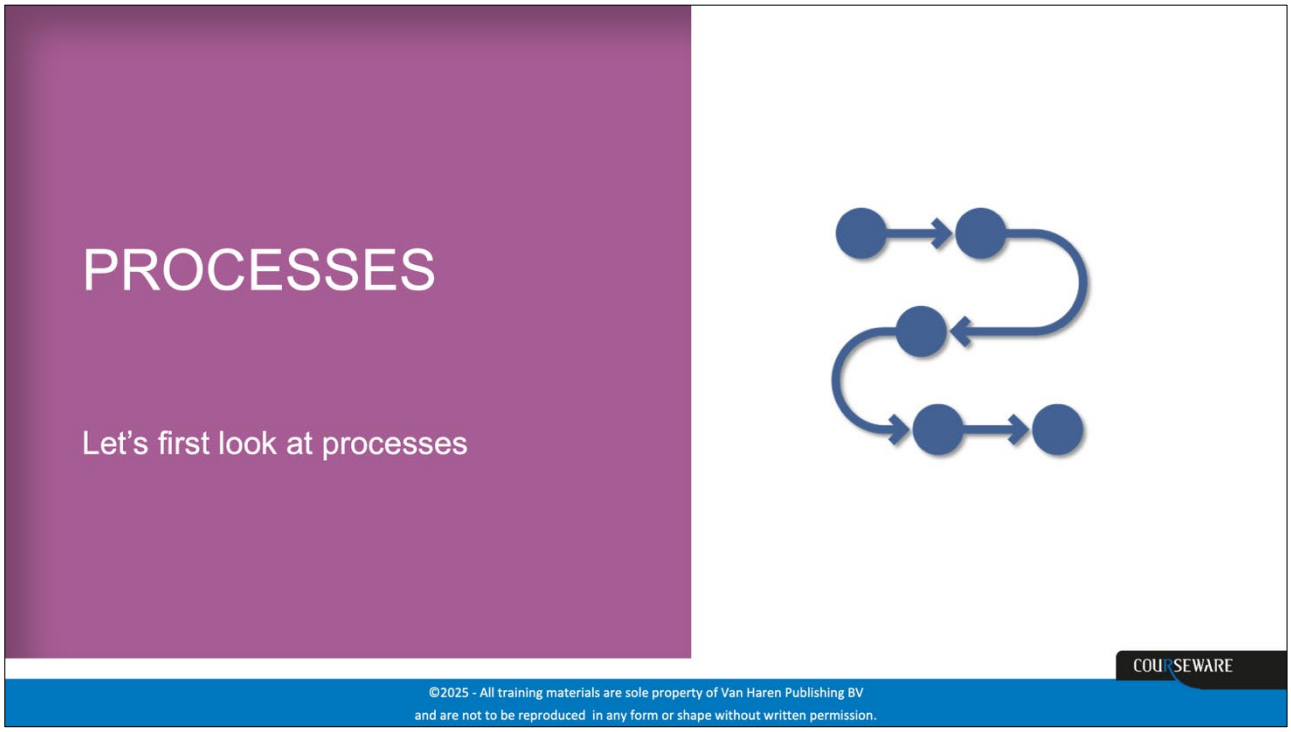
Lab Exercise 02: Add alternate flow



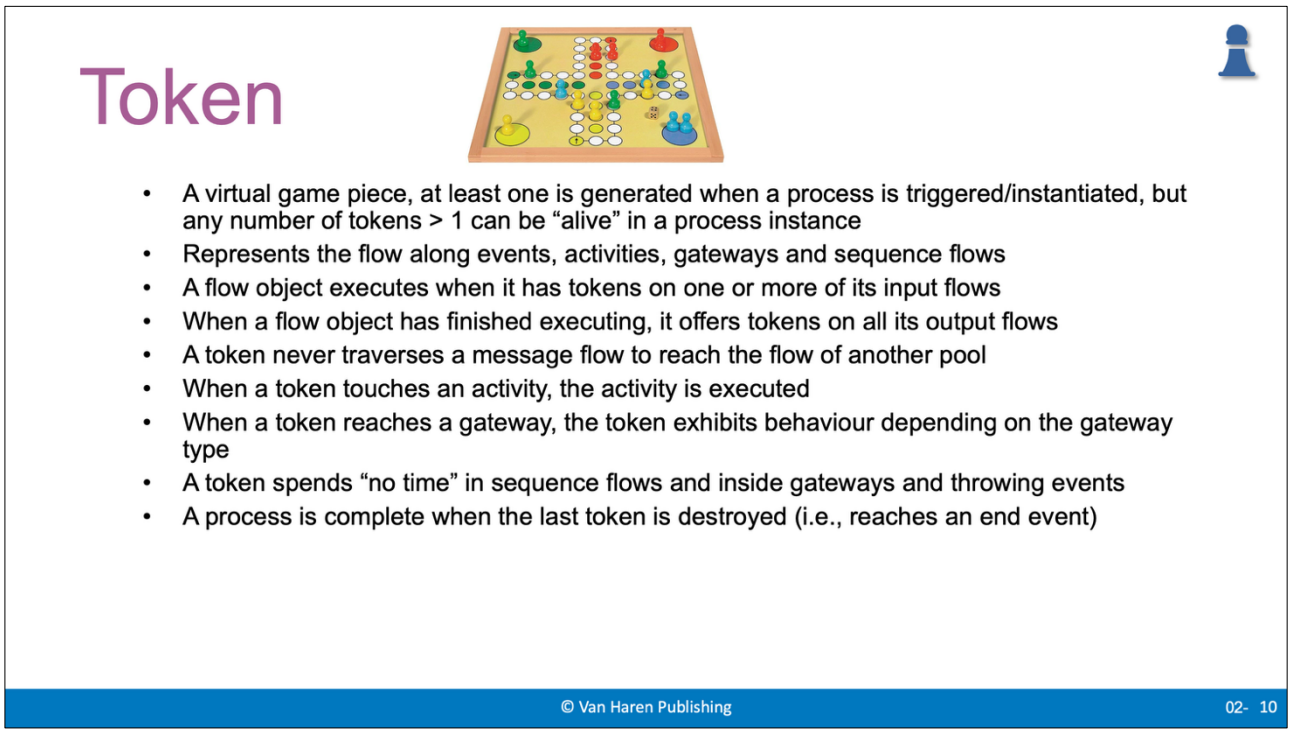
Business Process Perspectives in BPMN



Processes



Tokens



A token is not really part of the BPMN spec but is often used to illustrate in an intuitive way how processes execute. It is a theoretical non-graphical element that (unfortunately) in BPMN has no semantics such as state.

BPMN: the basics