Process Modeling: BPMN L1

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Lecture Overview

1. Why modeling?
2. Process development roles
3. Modeling notations
4. Resources
5. Object classes
    - Activities, events, gateways, connecting objects and artifacts
6. Process types

Why Process Modeling?

- Elegant way to express structure of a process.
- Understandable for all participants of the development cycle.
- Transformable from analytical model to implementation.
- Covers nested structure and supports various interactions:
  - sub-processes and inter-process/system communication
- Pictures are fun!

(non-scientific) **Experiment**

🧪 Is diagram more elegant and expressive than free text?

1. Two teams of volunteers (three students in each team).
2. Team1 gets text description and they have 4 mins to read.
3. Team1 starts discussion and Team2 goes away with the process in BPMN 2.0
4. Team2 starts discussion.
5. Audience compares the quality of discussion.

History of Modeling Notations

BPEL

- 2003 - 2007
- technical modeling, very detailed
- service orchestration, executable
- human task extended by BPEL4People (2007)

BPMN 1.0 – 1.1

- 2004 - 2009
- analytical modeling, not tight with semantics, not executable
- XPDL semantics

BPMN 2.0

- 2011 - 2014
- analytical modeling (Level 1,2)
- defined semantic – executable (Level 3)

BPMN 2.0 Levels

Level 1 - Structural

Basic structure of a process
Business experts ~ analysts/developers

Level 2 - Analytical

More details of process behaviour (interactions, events, timing)
Process analysts ~ Process developers

Level 3 - Executable

Specifies all used services and activity tasks
(Process developers ~ Process engine

Model Quality Aspects

- Validity against BPMN specification
  - Wrong connections of the flow, missing start/end events, wrongly used gateways
- Model understandability
  - Reasonable naming of activities and reasonable amount of connections/gateways/activities
- Expressiveness
  - How it reflects the situation in real world, granularity of activities
- Compliance to the modeling best practices
  - Modeling style (seminars & third modeling lecture)

Roles in Development Cycle

Business Analyst

- Designs BPMN diagrams (Level 1)
- Sums business strategy
- Describes goals & objectives, KPIs
- Describes processes

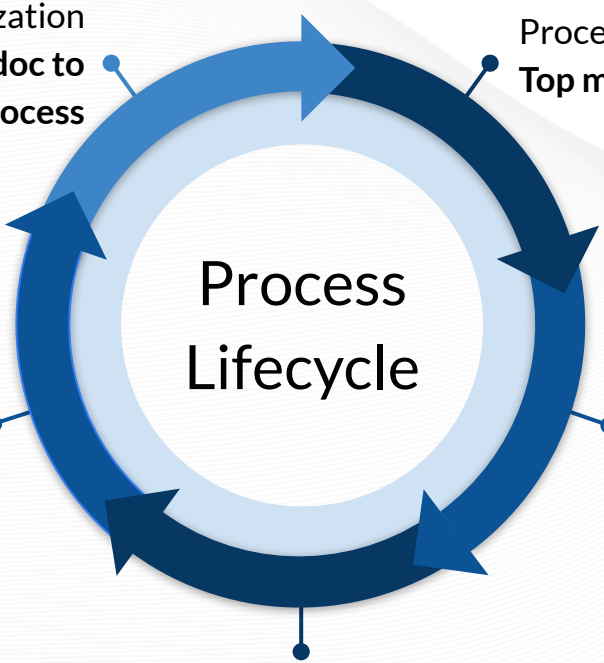
Process specialist

- Designs BPMN diagrams (Level 1,2,3)
- Designs monitoring models

Process developer

- Implements services and deploy processes (Level 3)

Roles in Development Cycle



Process optimization
Business analyst creates doc to improve process

Process design
Top management provides doc

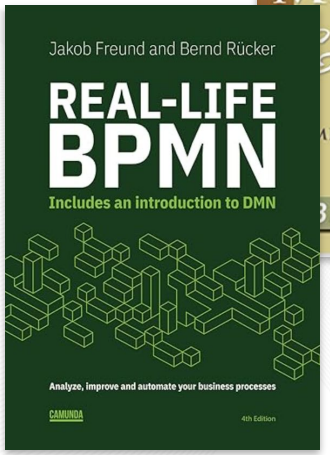
Process monitoring
Line manager monitors the process

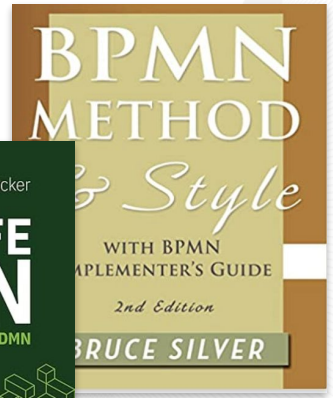
Process modeling
Business analyst creates L1

Process execution
Process specialist with process developer handles L2 and L3

Resources

- BPMN method and style by B. Silver
- Real-Life BPMN by J. Freund and B. Rücker
- Signavio Modeler – Academic Licence
  - http://academic.signavio.com
- BPMN Official OMG Website
  - http://www.bpmn.org
- Business Process Modeling and Analysis
  - https://open.hpi.de/courses/bpm2019
- BPMN 2.0 Poster
  - http://www.bpmb.de/images/BPMN2_0_Poster_EN.pdf

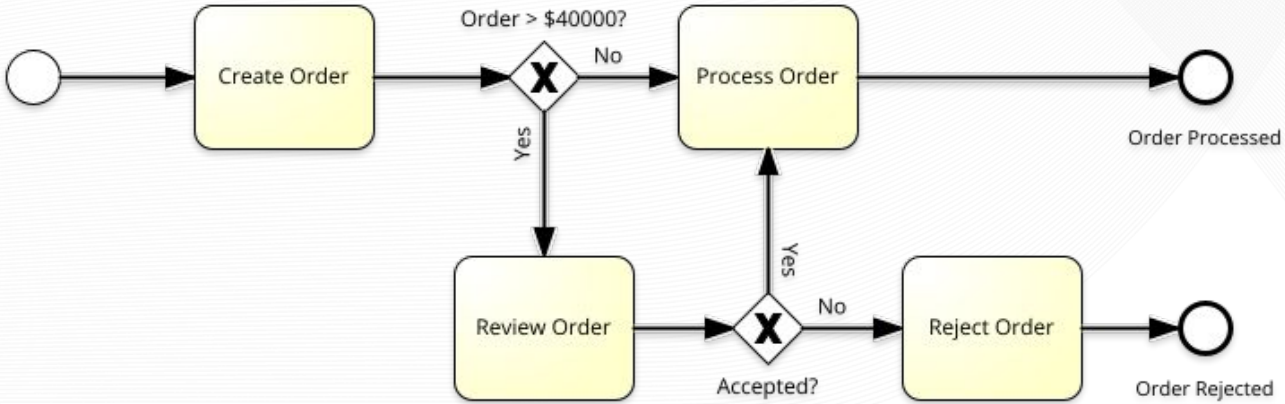





Coffee break time…

Process Example

1. Customer **creates an Order**
2. **Order is reviewed** by Sales
   2.1. If price of the Order is **lower** than $40 000, it is processed
   2.2. If price is **over** $40 000 it have to be confirmed by Financial department
      2.2.1. Order can be rejected by the Financial department
3. Otherwise the **order is processed**



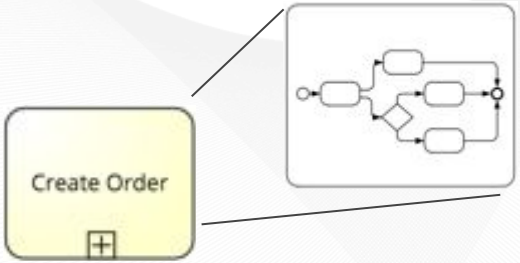
BPMN 2.0 Object Classes

- Flow objects
  - activities, events, gateways
- Connecting objects
  - sequence flow, message flow, associations
- Artifacts
  - annotations, groups
- Swimlanes
  - pools, lanes
- Data
  - data inputs/outputs, data stores

Activities

Represent certain activities in the process. It can be a task or an activity.

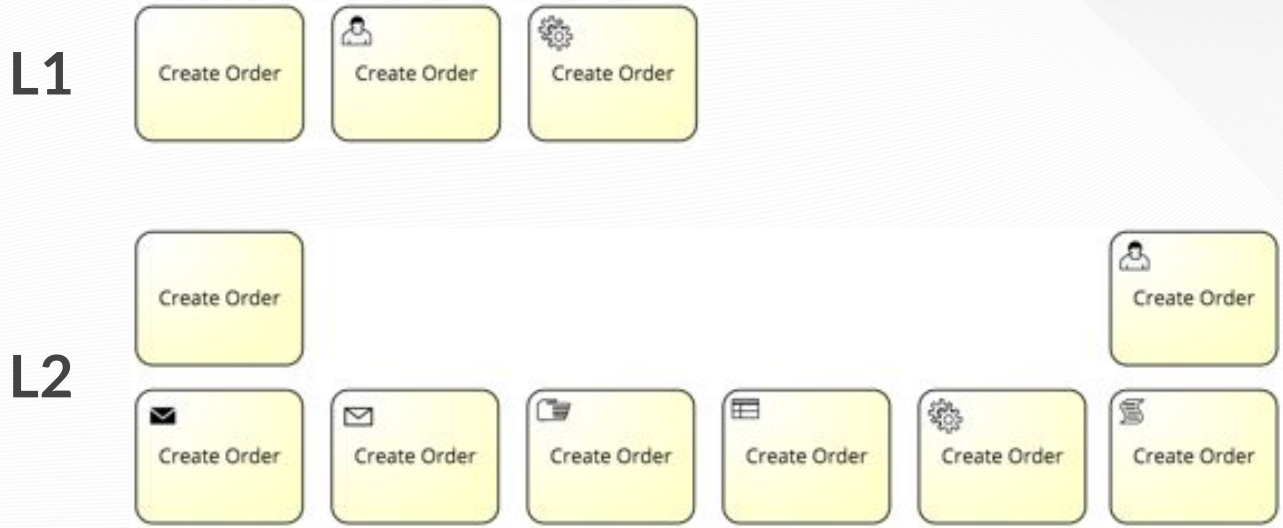
Task
Atomic activity



Subprocess
Complex activity
(contains other tasks, events…)

Types of Tasks

- Types provide additional info about the task.
- Useful when modeling requirements and for implementation.



Events

- Represent event that occur in a process.
- Have impact on process flow.
- We have these L1 events:

Start events:


None


Message


Time

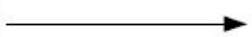
End events:


None

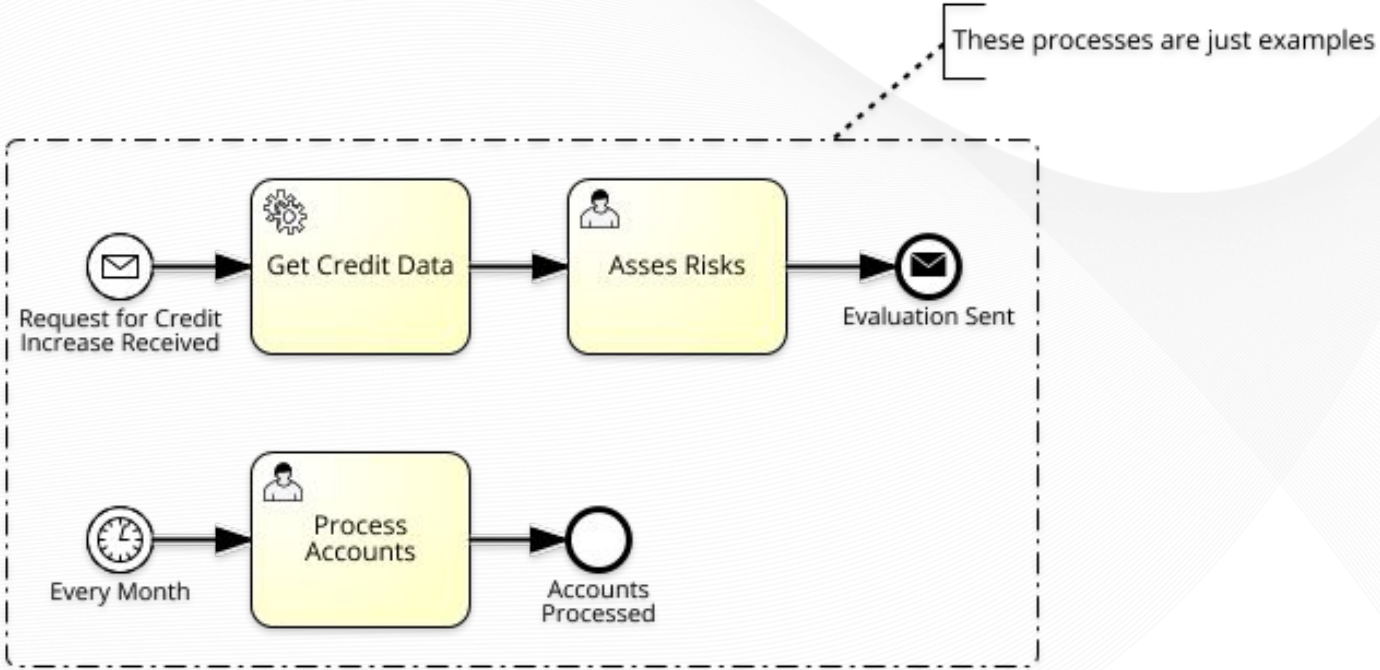

Message


Terminate

Connecting Objects

- Process sequence flow 
  - Defines order of activities
- Message flow 
  - Does not influence the process flow!
  - Message flow should be between two processes
- Association 
  - Does not influence the process flow!
  - Connects objects with artifacts (labels, data objects..)

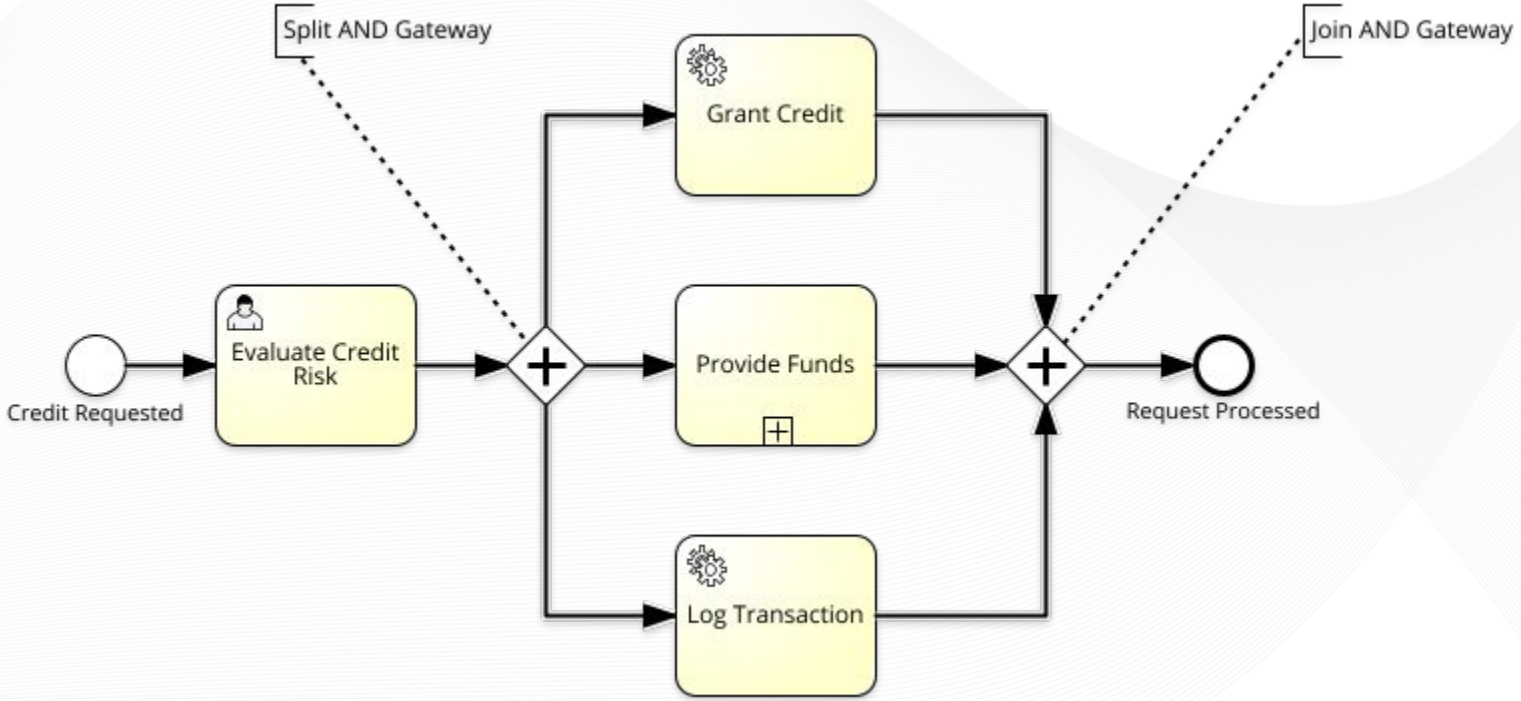
Basic Examples



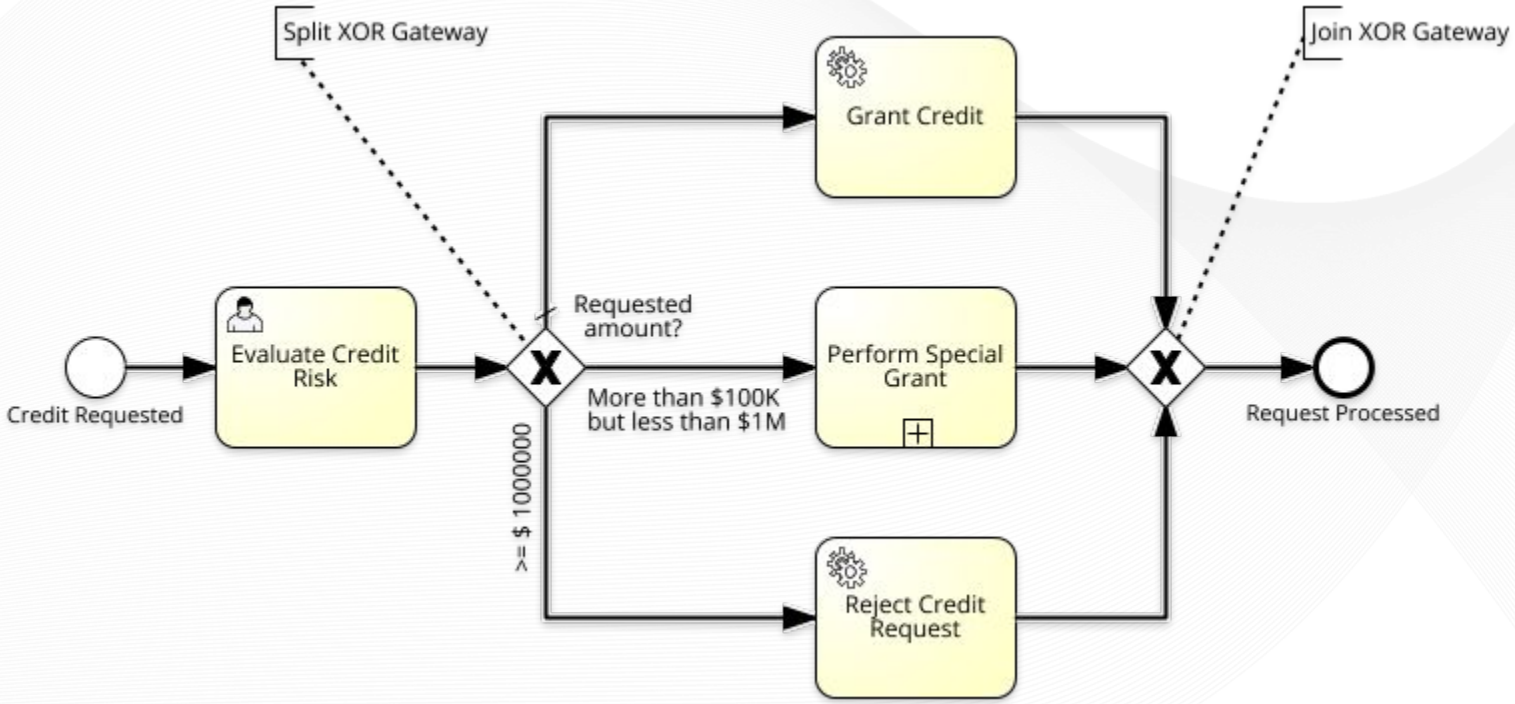
Gateways

- Represents a control point in the sequence flow
- Used for flow branching or join of branches
- We have these types:
  -  **Exclusive data-based (XOR)**
  -  **Parallel**
  -  **Default branch**
  -  Exclusive event-based (L2)
  -  Inclusive (L2)
  -  Complex (L2)

Gateways Examples I: AND

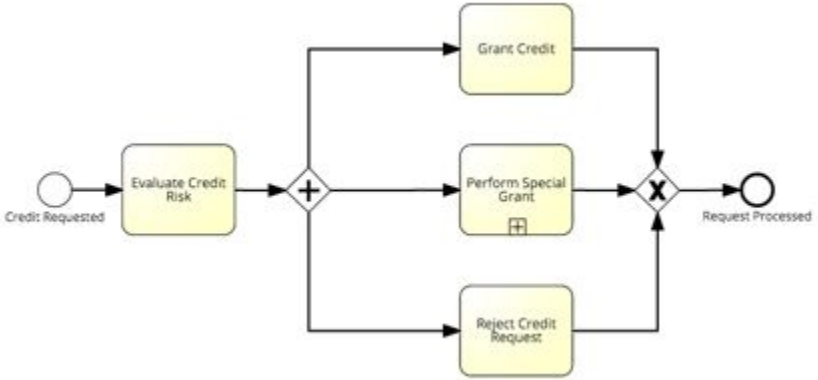


Gateways Examples II: XOR



Gateways Examples III: OK or NOK?

A



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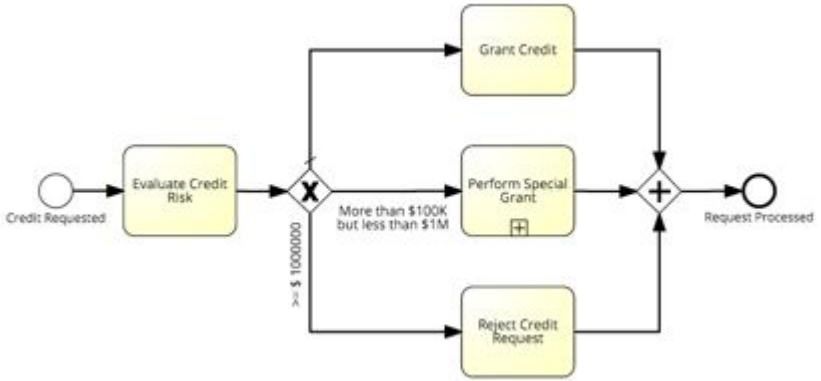

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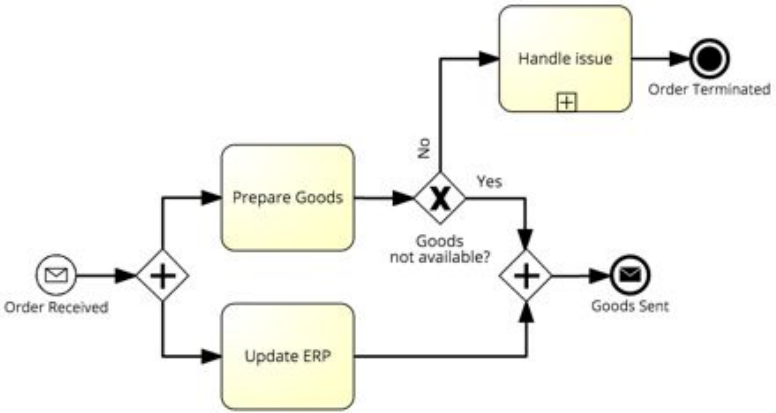

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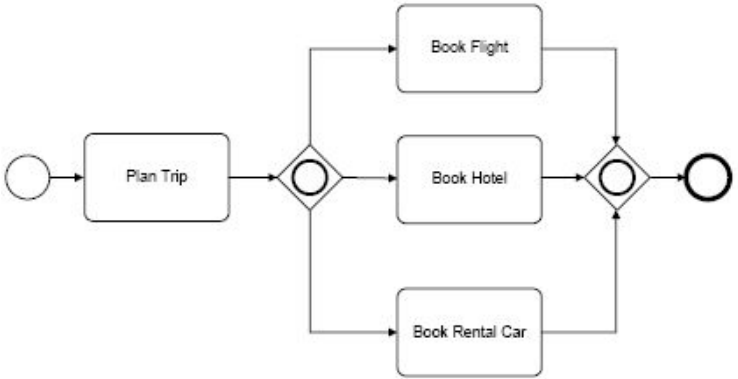
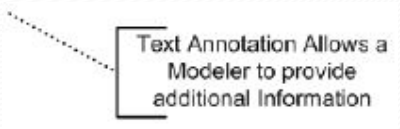
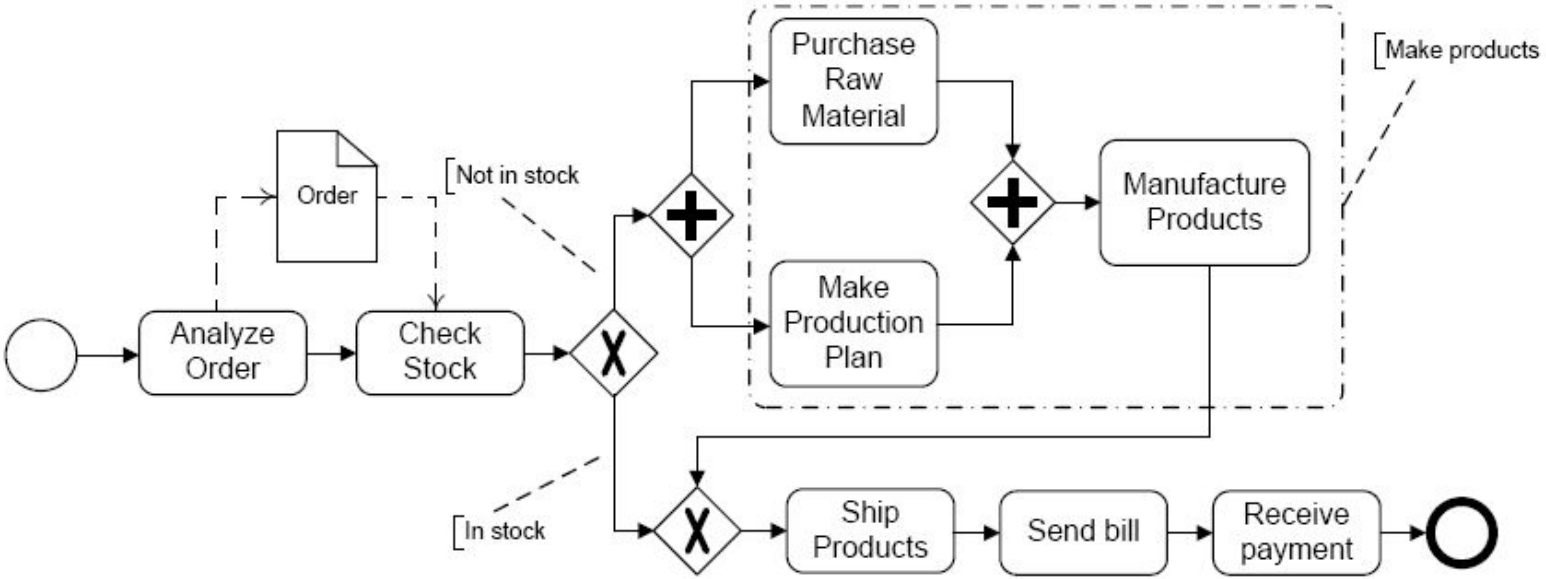


Artifacts

- Additional information
- Do not affect flow
- Data objects
  - Data used in activities
  - Inputs and outputs of activities
- Annotations
  - Label, additional informatio
- Groups
  - Grouping of objects (analytical/documentation reasons)



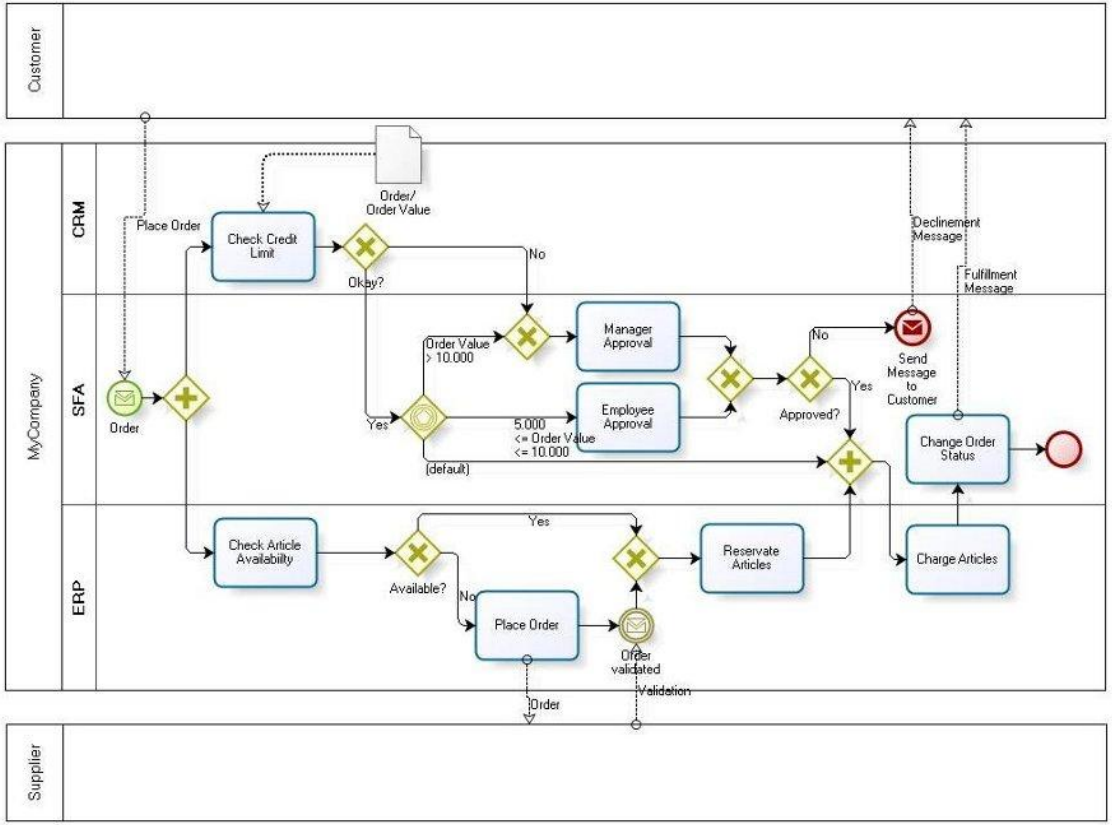
Artifacts Example



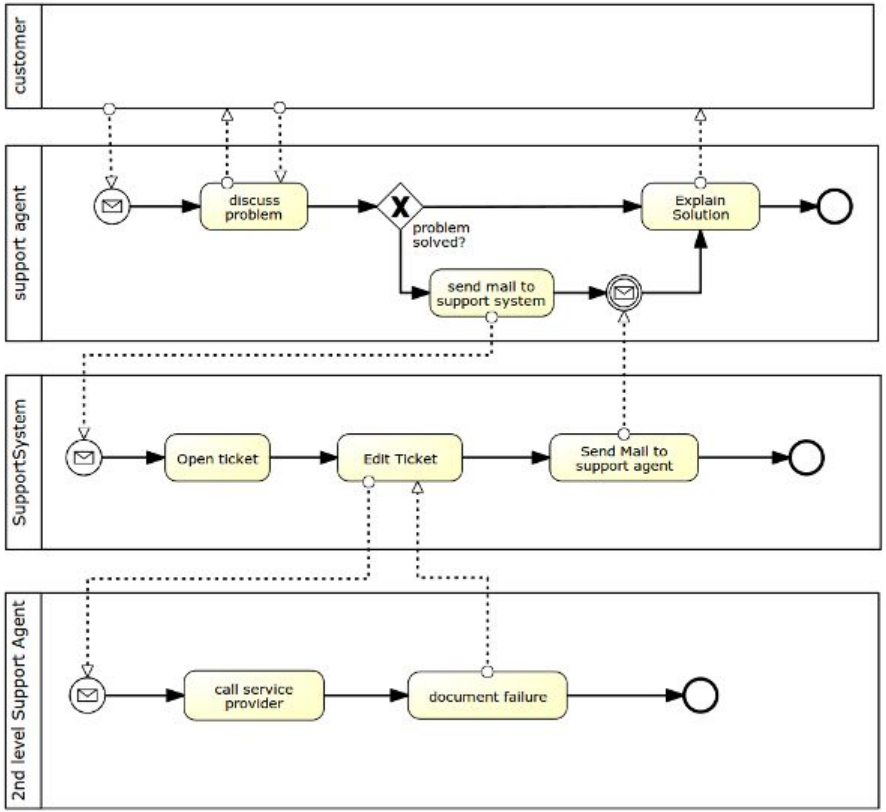
Pools & Lanes

- Pools Represent a participant in a process
  - Show message flows between participants
- Lanes divide pool
  - Express roles, departments or actors in a process

Pools & Lanes Examples I

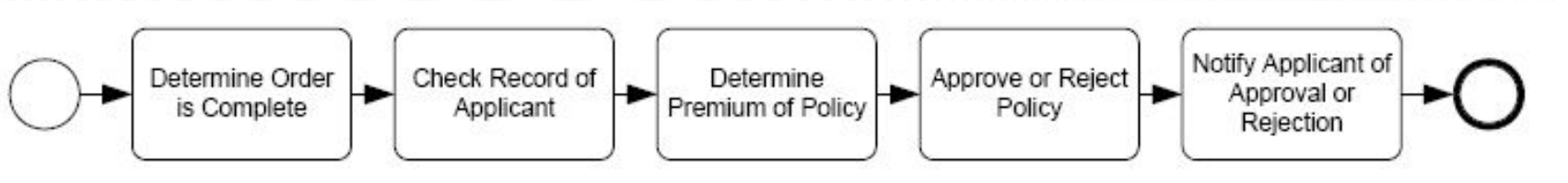


Pools & Lanes Examples II



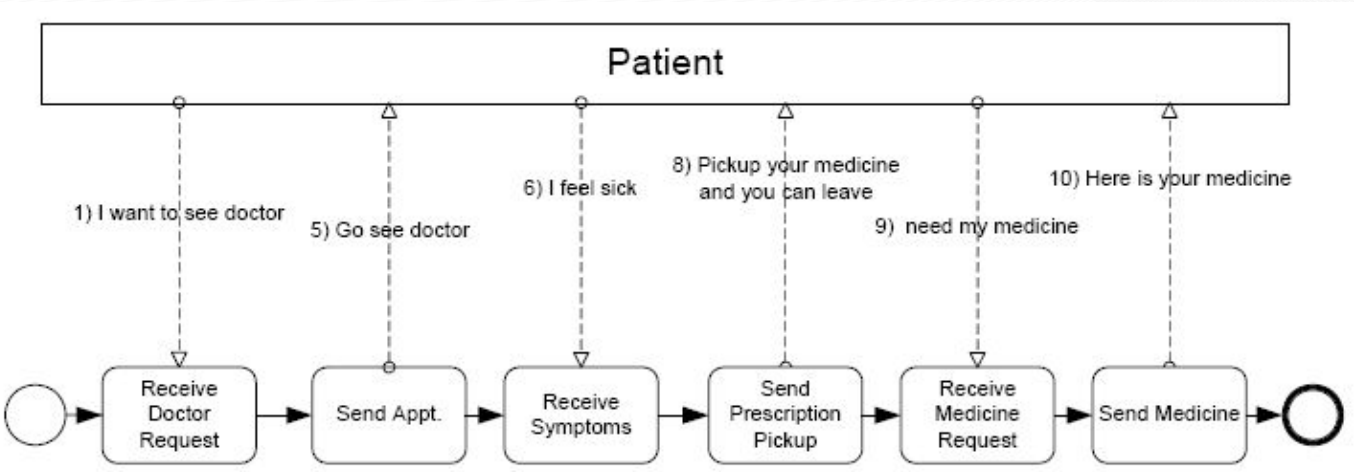
Private (Internal) Process

- From the point of view of one organization
- Activities are not visible to the outside world
- One pool (the pool can be omitted)
- Also known as orchestration of services



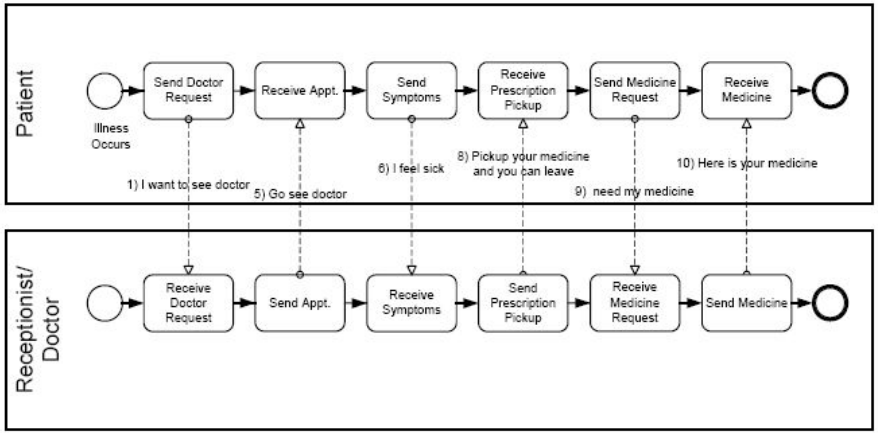
Abstract (Public) Process

- Interaction between a private process and another process/participant
- Only activities that send/receive messages
- Communication is visible to outside world



Collaboration (Global) Process

- Collaboration between business entities
- Activities represent message exchange
- Public process are shown, corresponding private processes have much more activities and detail

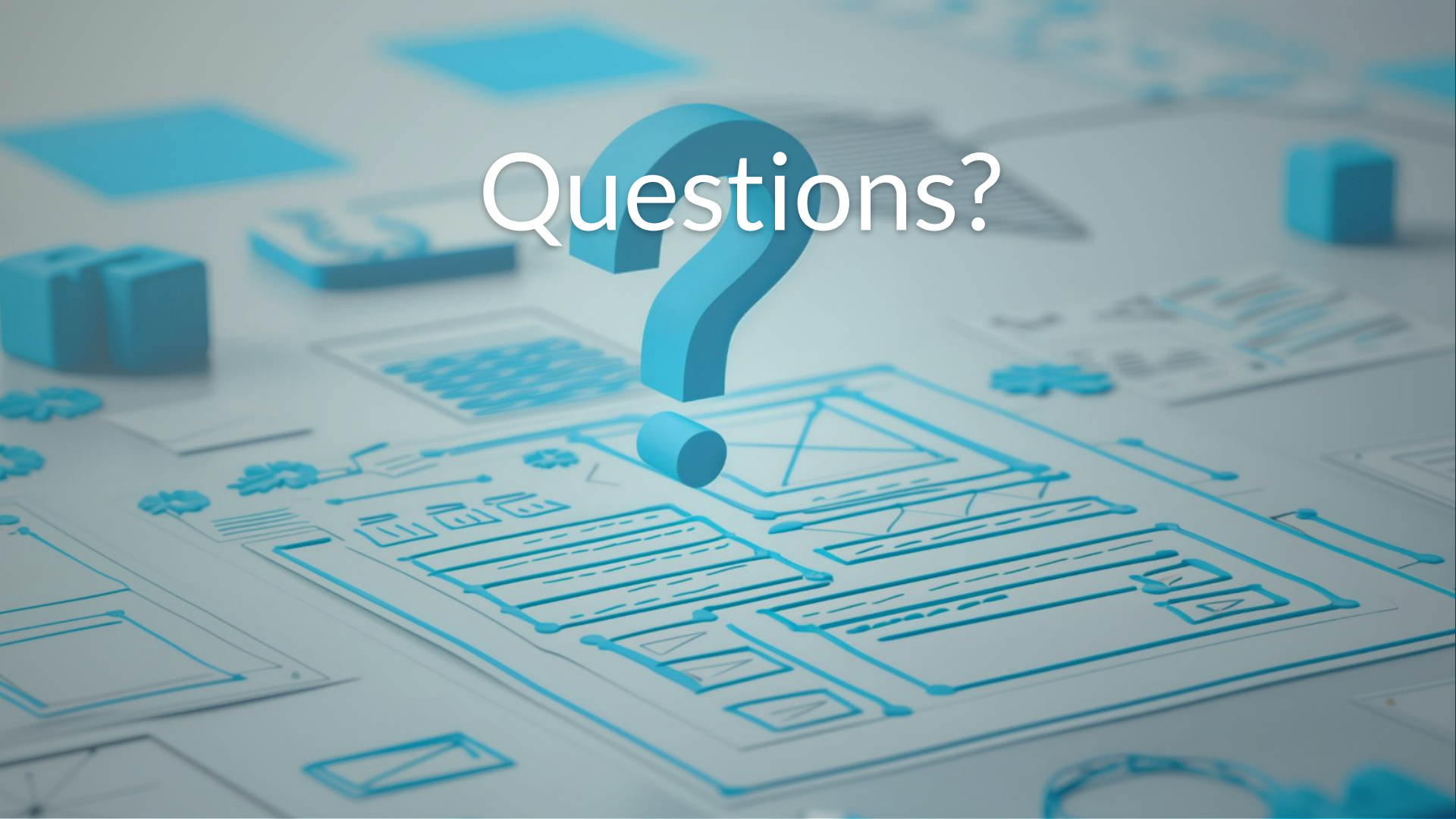


Level 1 Palette

- Pool and Lane
- Task User, Service, Abstract/None
- Subprocess Collapsed, Expanded
- Start Event None, Message, Timer
- End Event None, Message, Terminate
- Gateway Parallel, Exclusive
- Sequence Flow
- Message Flow
- Data Object Data store, Message
- Text Annotation

Homework Assignment

- Model a process (more info in seminar slides).
- Deadline is Monday 18th at 4 PM.
- Next week seminar:
  - You will receive corrected homework and also get L2 assignment.
- Homework submission:
  - Submit PNG or PDF exported from Signavio to IS MUNI folder "Homework 2" named `<surename>_bpmn.png`, before deadline
  - Diagram has to be readable in a printable on A4 paper size (it can be multiple pages if needed).


Questions?


Thank You!