



Model-driven Software Development (MDSE) for the Cloud

Business process modelling – How to define your business processes



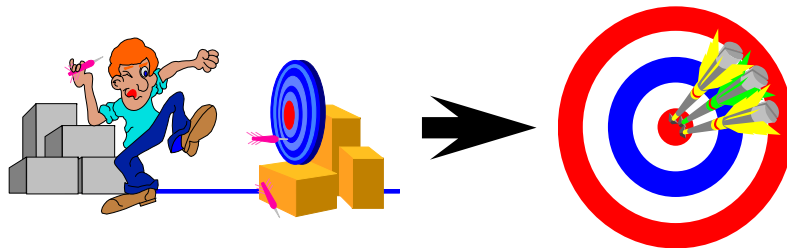
Outline

- Roadmap
- Recommended workflow
- Tasks and corresponding Work products
 - Business Process Model and Notation (BPMN)
 - Examples
 - Guidelines
- References















Practice: Business process modelling

- Purpose

- To understand your business processes and its requirements



- Contents

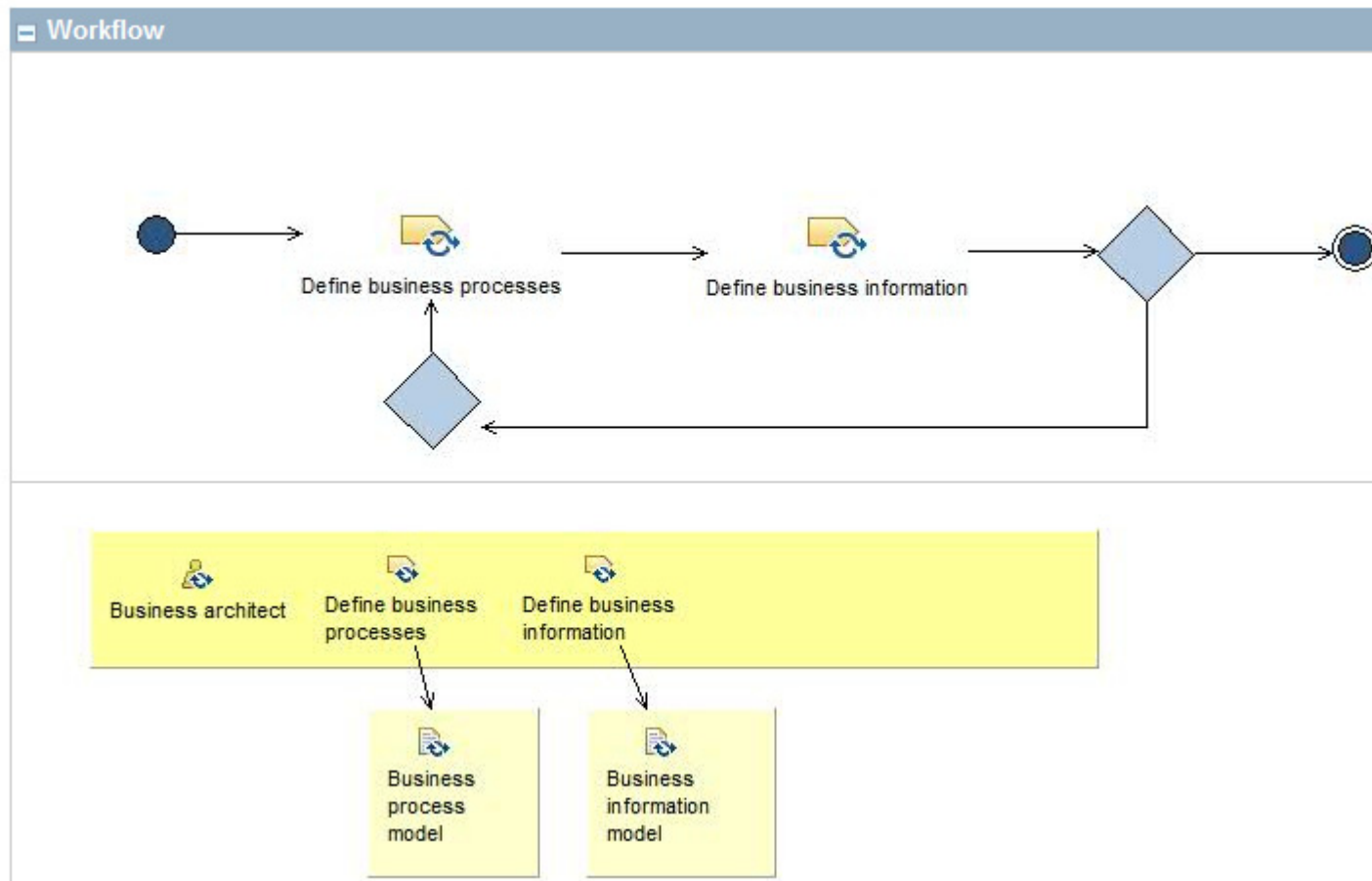
-  How to adopt the business process modelling practice
- Key Concepts
 -  Choreography
 -  Collaboration
 -  Conversation
 -  Process
 -  Service
-  Business information model
-  Business process model
-  Define business information
-  Define business processes
-  Business process and information modelling
-  Business architect
-  BPMN process checklist
-  Business Process Model and Notation (BPMN)



Roadmap: How to adopt the Business process modelling practice

- This practice provides guidelines for how to use BPMN to define and model business processes. The practice prescribes building a set of model artefacts following the iterative and incremental process paradigm.
- The main model to construct is the
 - [Business process model](#) which defines the business processes of the domain which are relevant to the service-oriented architecture. In addition to the process model a related
 - [Business information model](#) which defines the business information that are exchanged in the business processes is also prescribed.

Recommended workflow: Business process and information modelling





Task: Define business process

- Purpose
 - To identify and define the business processes the software services are to support.
- Steps
 - 1. Create a process diagram.
 - 2. Define pools and link them to the organization units defined in the organization view.
 - 3. Define lanes for the organisation units and roles participating in the business process and link them to the elements defined in the organization view.
 - 4. Define the sequence of tasks and link them via flows.
 - 5. Derive initial process model from business goals.
 - 6. Detailing of business processes.
- Output
 - Business process model
- Roles
 - Business architect



Work product: Business process model

- Business processes may be at a number of levels of detail, from a high level description of the business processes down to task flows which is a set of detailed specifications for the business services that the service-oriented architecture will provide.
- A business process is a sequence of actions carried out by different actors working together. This model formalizes the business process and defines:
 - the business processes of the domain which are relevant to the Product, and which will enable the goals to be met, and:
 - the roles of the resources that perform those processes.
- This model may be at a number of levels of detail, from a high level description of the business processes down to the WARM, which is a set of detailed specifications for the business services that each IT element in the Product will provide.
- It includes a full definition of the roles in the business, focusing on those fulfilled by the system or component to be developed.

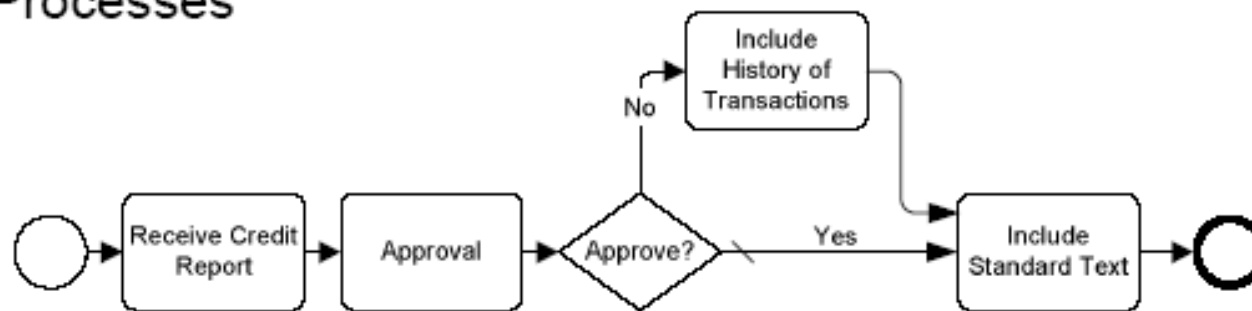
Guideline: BPMN notation

- See the following slides.



What is BPMN ?

- BPMN is flow-chart based notation for defining Business Processes



- BPMN is an agreement between multiple modeling tools vendors, who had their own notations, to use a single notation for the benefit of end-user understand and training
- BPMN provides a mechanism to generate an executable Business Process (BPEL) from the business level notation
 - ▶ A Business Process developed by a business analyst can be directly applied to a BPM engine instead of going through *human* interpretations and translations into other languages

Core Set of Diagram Elements

Events



Sequence Flow



Activities



Message Flow



Gateways



Association



■ The core set of modeling elements enable the easy development simple Business Process Diagrams that will look familiar to most Business Analysts (a flowchart diagram)

BPMN Diagram elements

Activities



Events



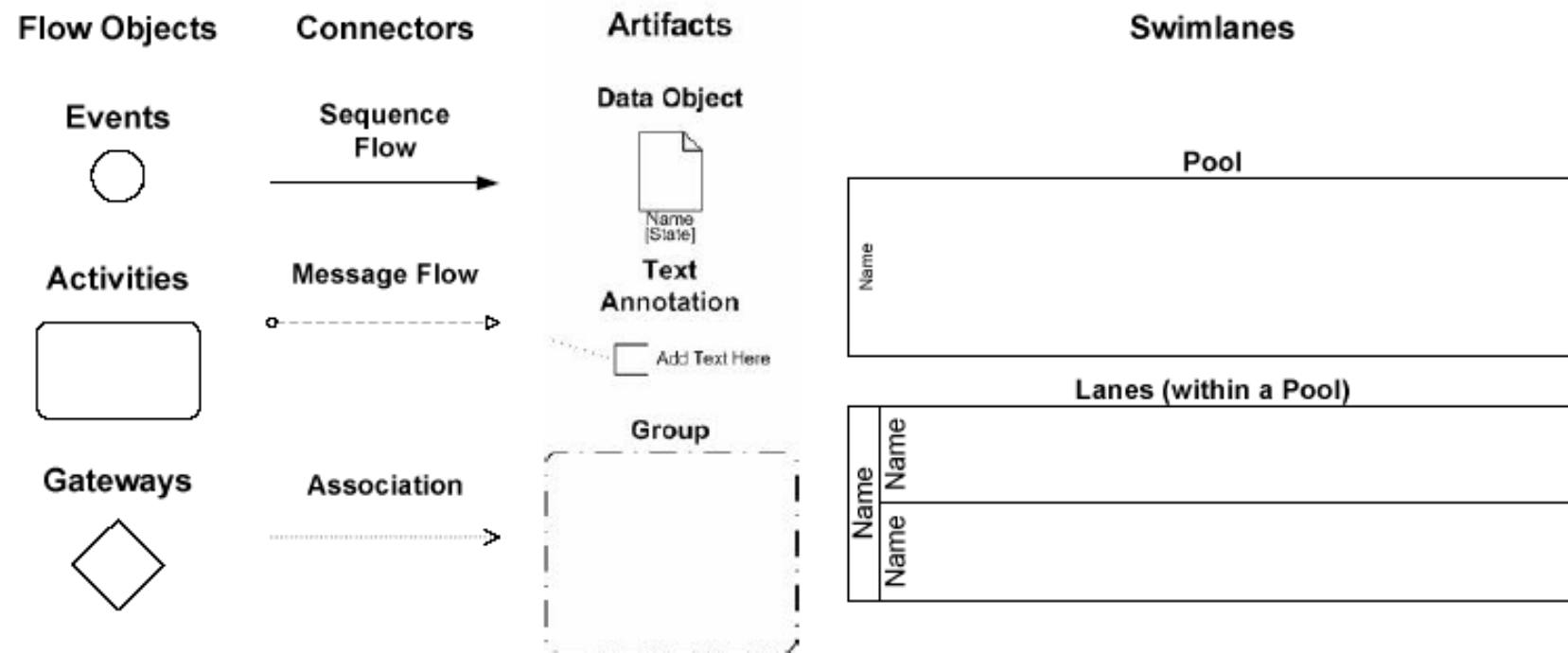
Gateways



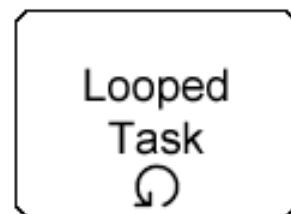
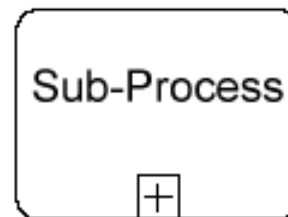
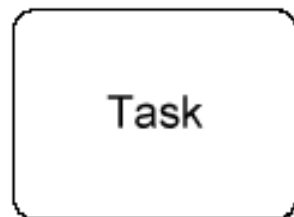
Connectors



Diagram elementer (2)



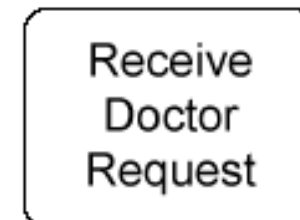
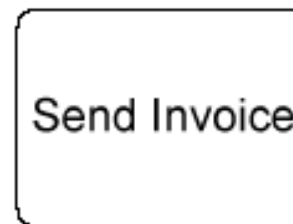
Activities



- An activity is work that is performed within a business process. An activity can be atomic or non-atomic (compound). The types of activities that are a part of a Process Model are: **Sub-Process**, and **Task**
- Activities are rounded rectangles
- They can be performed once or can have internally defined loops

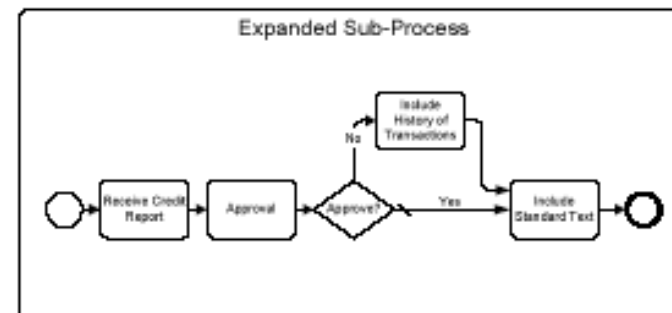
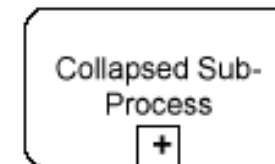
Task

- A Task is an atomic activity that is included within a Process. A Task is used when the work in the Process is not broken down to a finer level of Process Model detail
- There are specialized types of Tasks for sending and receiving, or user-based Tasks, etc.
- Markers or icons can be added to Tasks to help identify the type of Task
 - ▶ Markers must not change the footprint of the Task or conflict with any other standard BPMN element



Sub-processes

- Sub-Processes enable hierarchical Process development
- A Sub-Process is a compound activity that is included within a Process. It is compound in that it can be broken down into a finer level of detail (a Process) through a set of sub-activities
- For a collapsed version of a Sub-Process, The details of the Sub-Process are not visible in the Diagram. A “plus” sign in the lower-center of the shape indicates that the activity is a Sub-Process and has a lower-level of detail.
- For an expanded version of a Sub-Process, the details (a Process) are visible within its boundary.
- There are two types of Sub-Processes: Embedded and Independent (Re-usable)



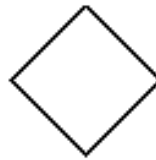
Events



- An **Event** is something that “happens” during the course of a business process. These Events affect the flow of the Process and usually have a trigger or a result. They can start, interrupt, or end the flow
- Events are circles
 - ▶ The type of boundary determines the type of Event

Gateways

Exclusive
Data-Based



Event-Based



Inclusive



Complex

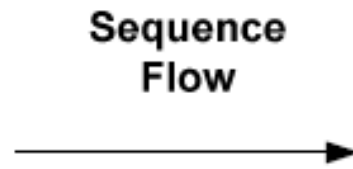


Parallel



- **Gateways** are modeling elements that are used to control how Sequence Flows interact as they converge and diverge within a Process
- All types of Gateways are diamonds
 - ▶ Different internal markers indicate different types of behavior
 - ▶ All Gateways both split and merge the flow
- *If the flow does not need to be controlled, then a Gateway is not needed. Thus, a diamond represents a place where control is needed*

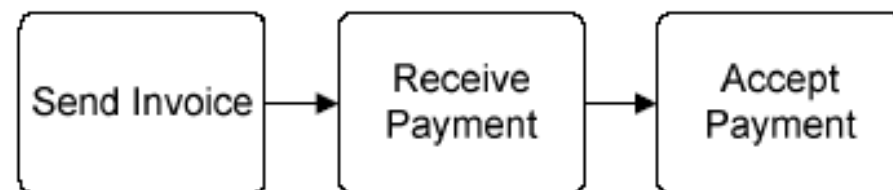
Conectors



- 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 two entities that are prepared to send and receive them
- An **Association** is used to associate data, information and artifacts with flow objects

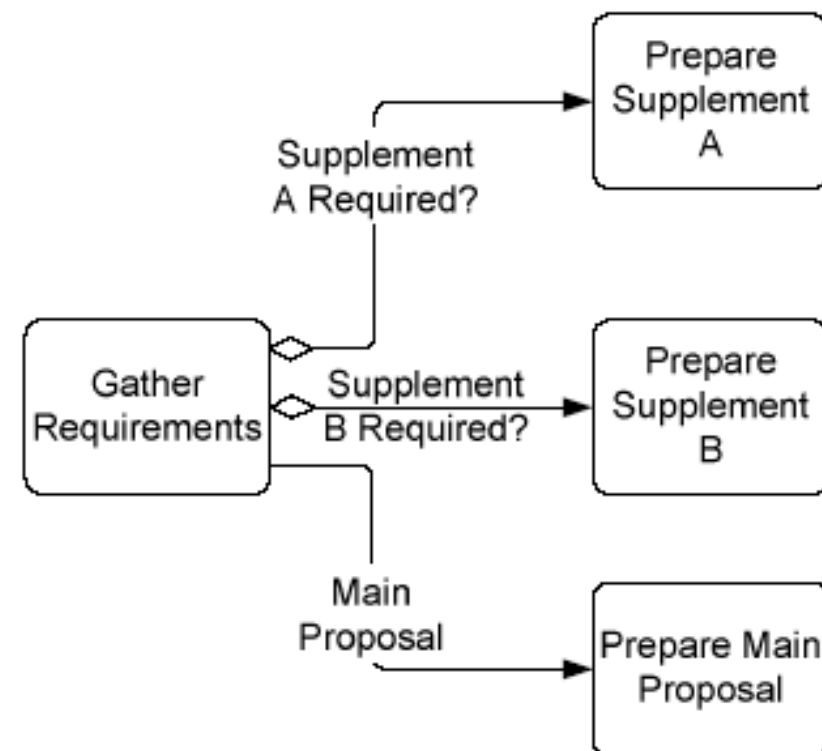
Sekvens flyt

- A Sequence Flow is used to show the order that activities will be performed in a Process
- The source and target must be one of the following objects: Events, Activities, and Gateways
- A Sequence Flow cannot cross a Sub-Process boundary or a Pool boundary



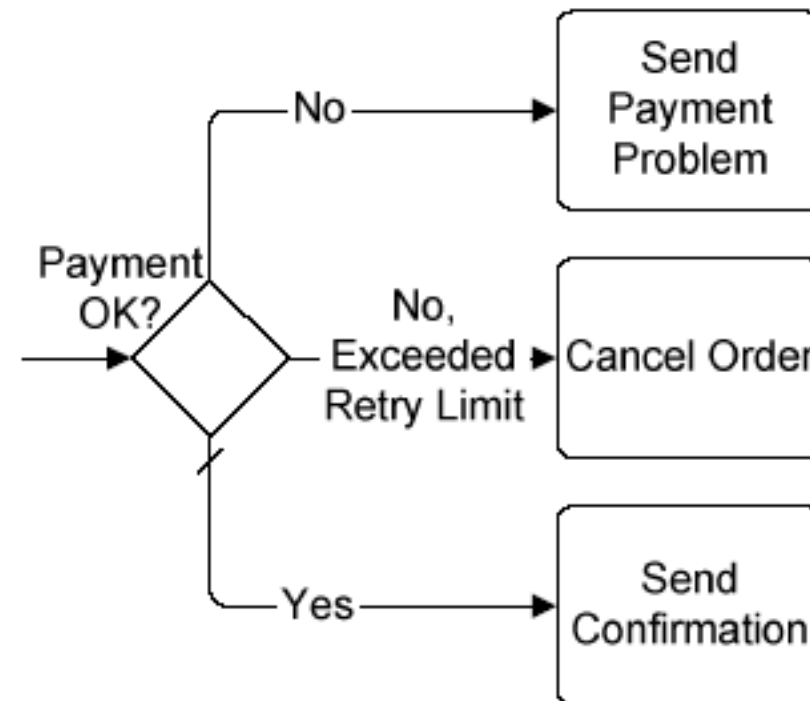
Conditions in sequence floww

- A Sequence Flow MAY have a defined condition if it exits an activity
 - ▶ Such an activity must have at least two Sequence Flows
- The condition has to be True to allow the flow to continue down the Sequence Flow
 - ▶ A mini-diamond shows that the Sequence Flow has a condition
- At least one of the outgoing Sequence Flow must be chosen during Process performance



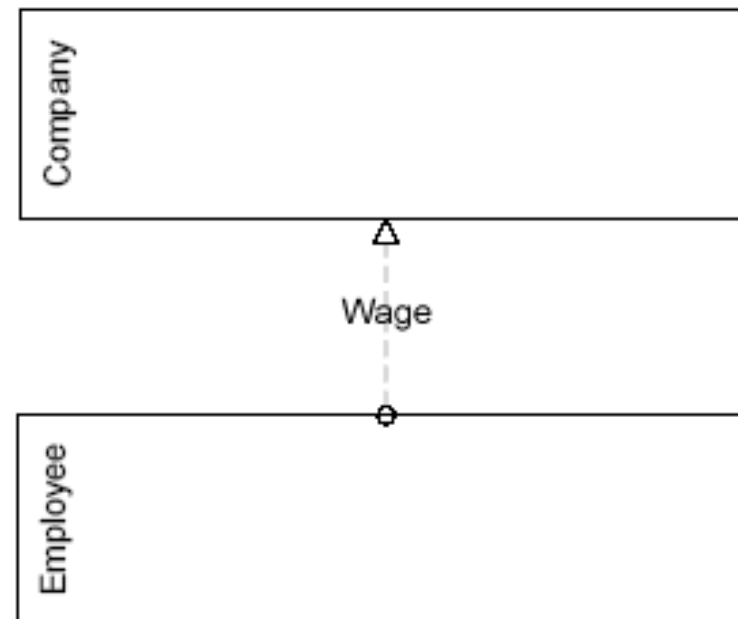
Default sequence flow

- A Sequence Flow that exits an Exclusive or Inclusive Gateway may be defined as being the default path
 - ▶ A hatch mark at the line beginning shows the default Sequence Flow
- The default path is chosen only if all the other conditions of the Gateway are False



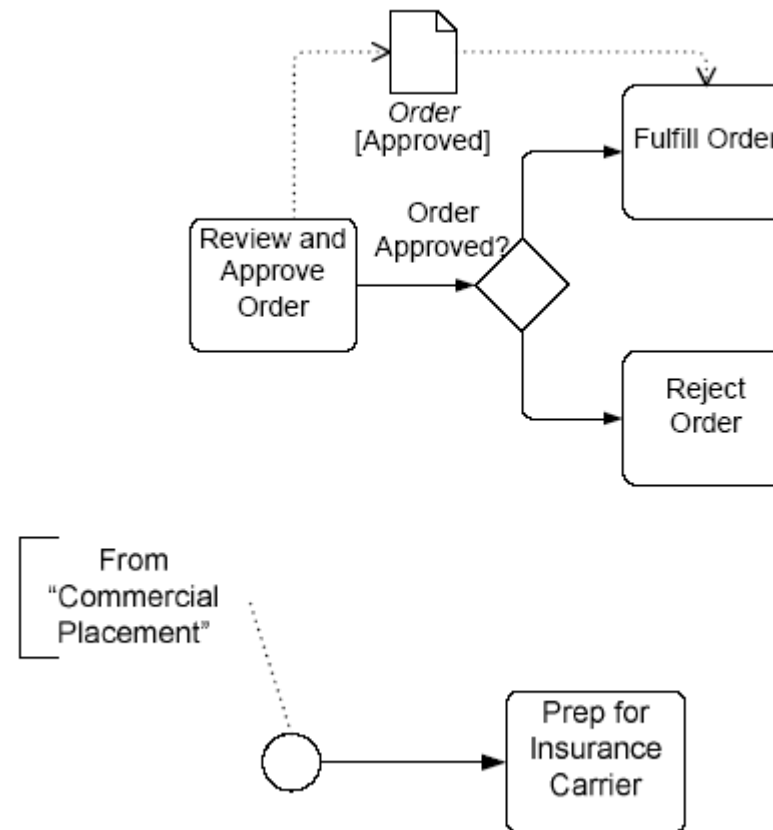
Message flow

- A Message Flow is used to show the flow of messages between two Participants of Process
 - ▶ In BPMN, separate Pools are used to represent the Participants
- A Message Flow can connect to the boundary of the Pool or to an object within the Pool
- Message Flow are not allowed between objects within a single Pool



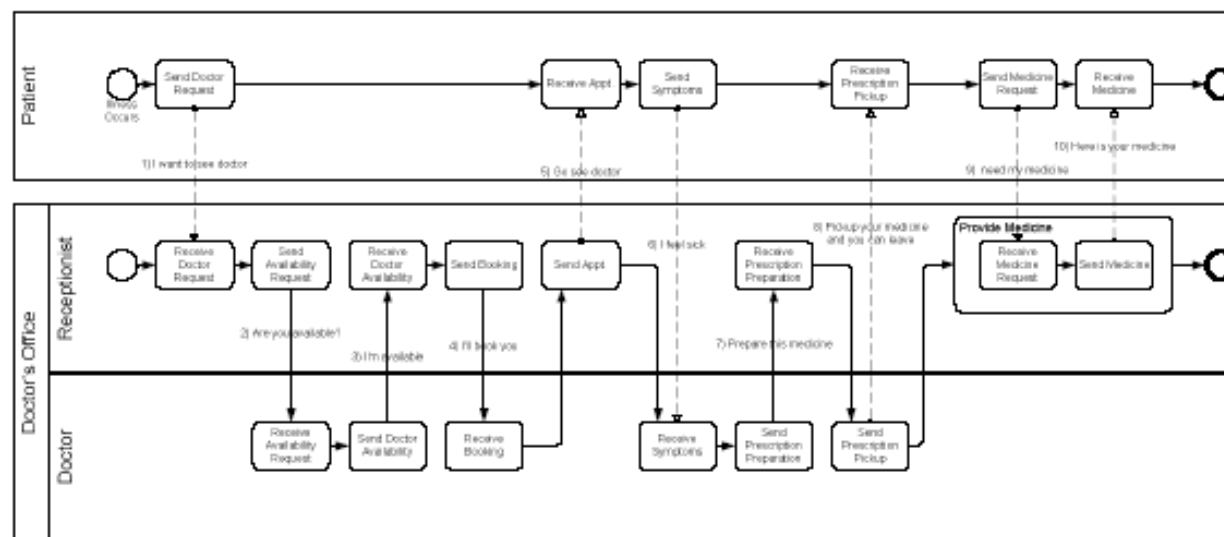
Associations

- An Association is used to associate objects to one another (such as Artifacts and Activities)
- Associations are used to show how data is input to and output from Activities
- Text Annotations can be Associated with objects



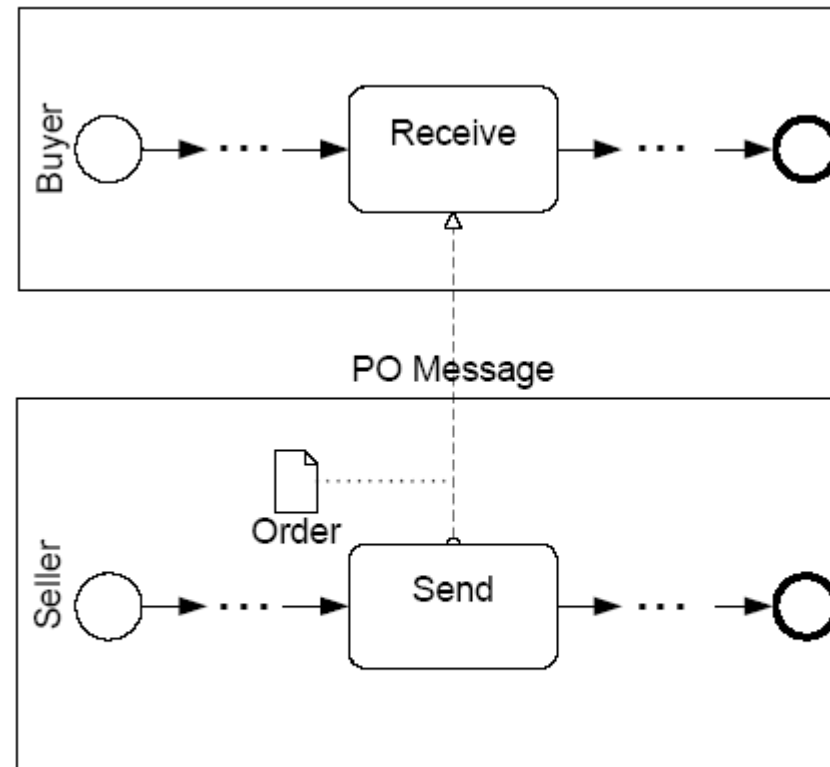
Swim lanes

- BPMN uses the concept known as “swimlanes” to help partition and/organize activities
- There are two main types of swimlanes: Pool and Lane
 - ▶ Pools represent Participants in an interactive (B2B) Business Process Diagram
 - ▶ Lanes represent sub-partitions for the objects within a Pool



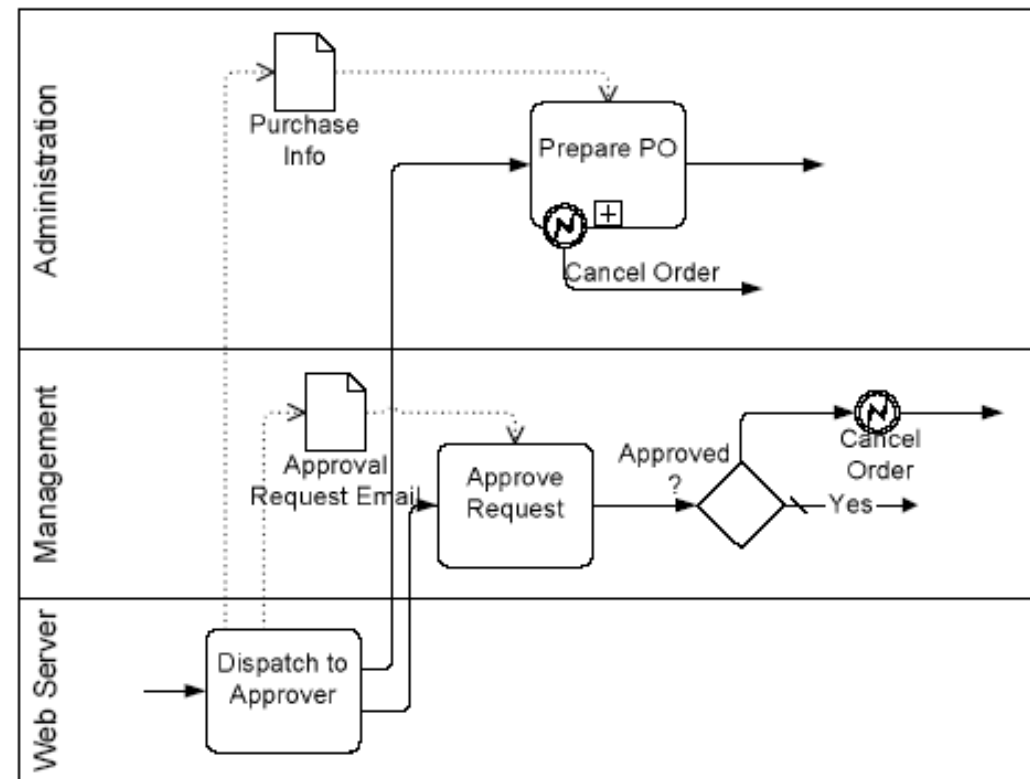
Pool

- Pools represent Participants in an interactive (B2B) Business Process Diagram
 - ▶ A Participant may be a business role (e.g., “buyer” or “seller”) or may be a business entity (e.g., “IBM” or “OMG”)
- A Pool may be a “black box” or may contain a Process
- Interaction between Pools is handled through Message Flow
- Sequence Flow cannot cross the boundary of a Pool (i.e., a Process is fully contained within a Pool)



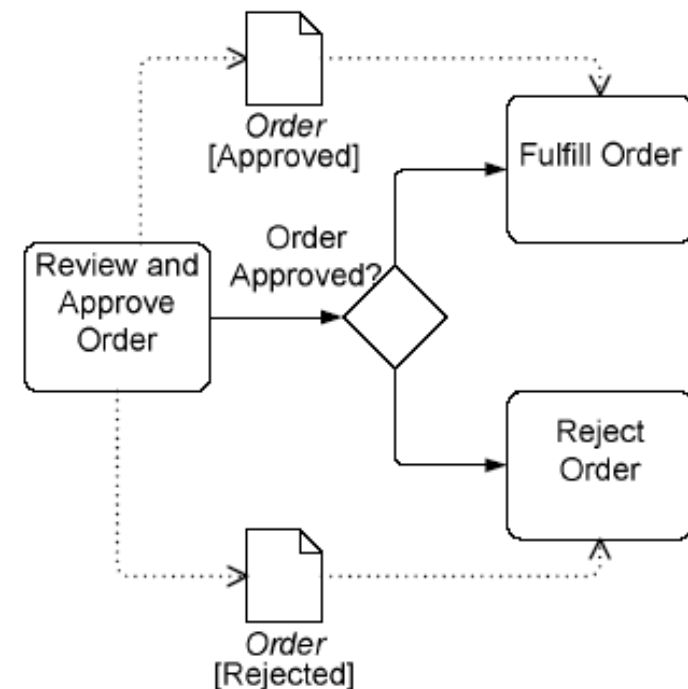
Lanes

- Lanes represent sub-partitions for the objects within a Pool
- They often represent organization roles (e.g., Manager, Associate), but can represent any desired Process characteristic
- Sequence Flow can cross Lane boundaries



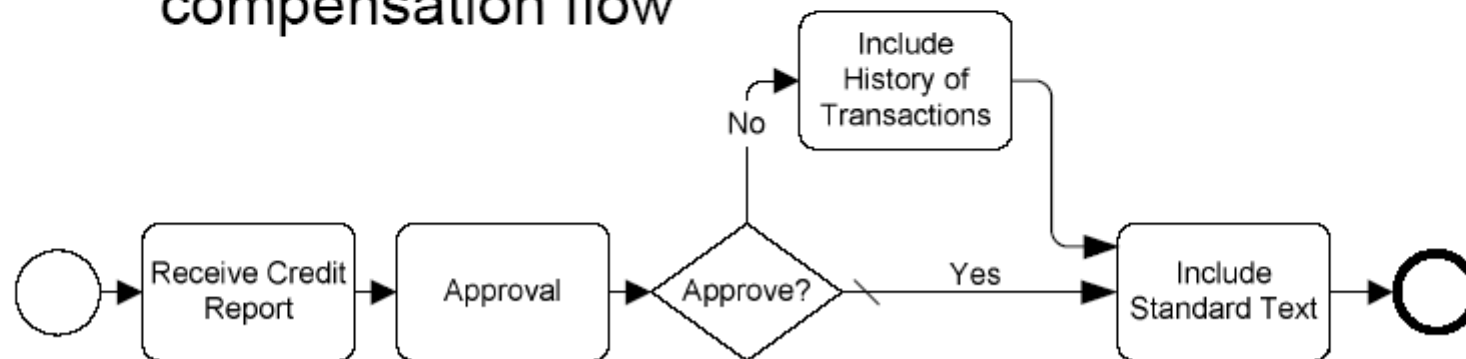
Data objects

- Data Objects are Artifacts that are used to show how data and documents are used within a Process
- Data Objects can be used to define inputs and outputs of activities
- Data Objects can be given a “state” that shows how a document may be changed or updated within the Process

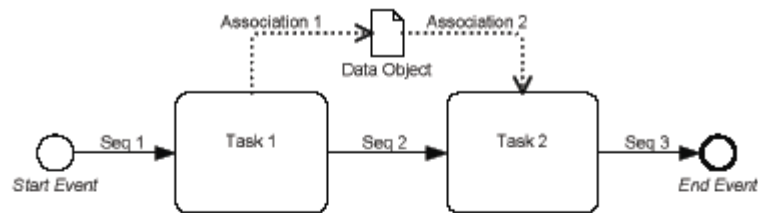


Normal flow

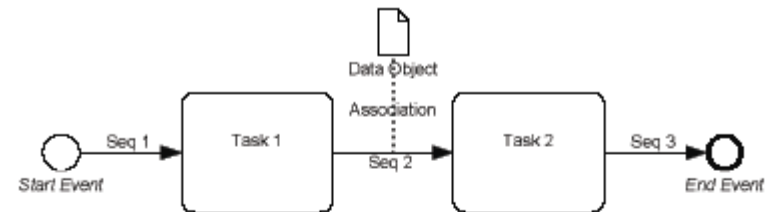
- Normal Sequence Flow refers to the flow that originates from a Start Event and continues through activities via alternative and parallel paths until it ends at an End Event
 - ▶ Normal Flow does not include exception flow or compensation flow



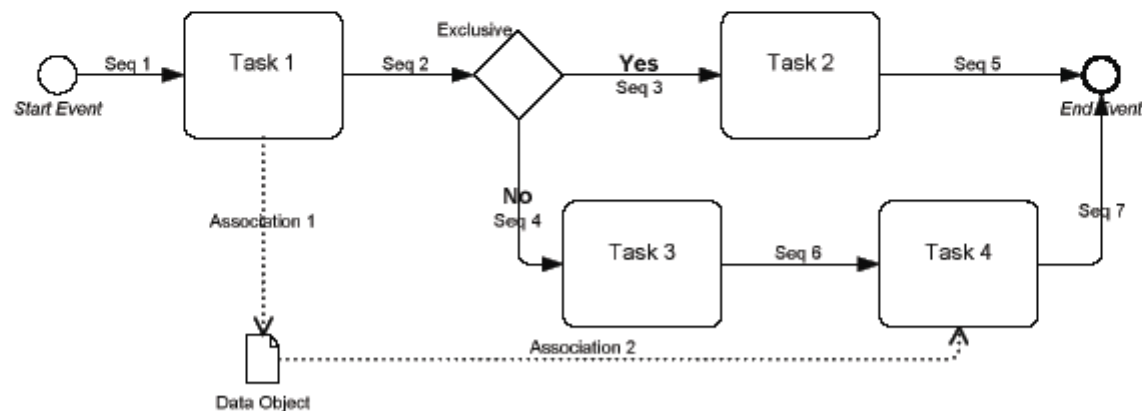
Data flow



Sequence Flow and Data Flow are decoupled



They can be bound together



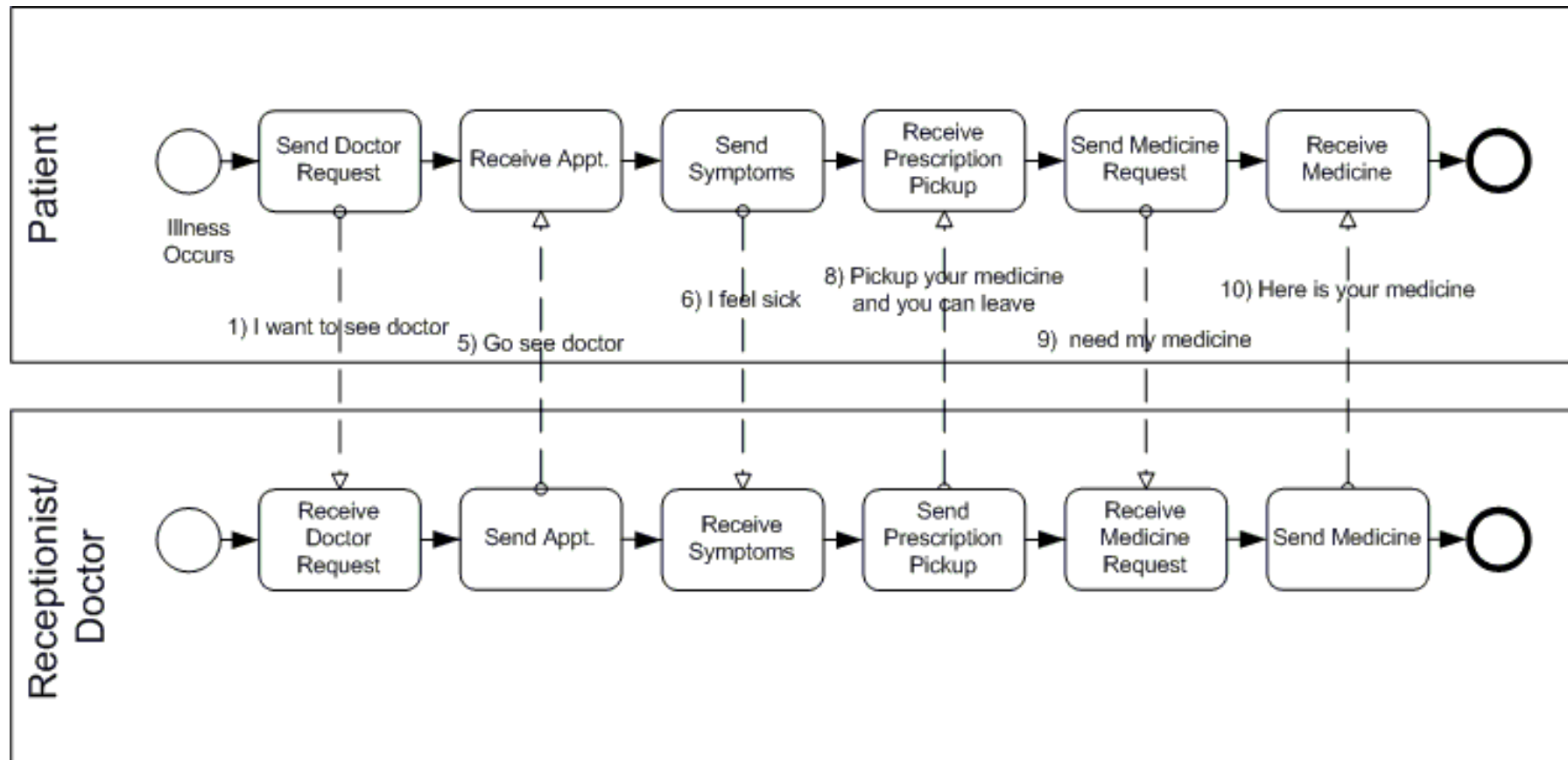
Use case for decoupling



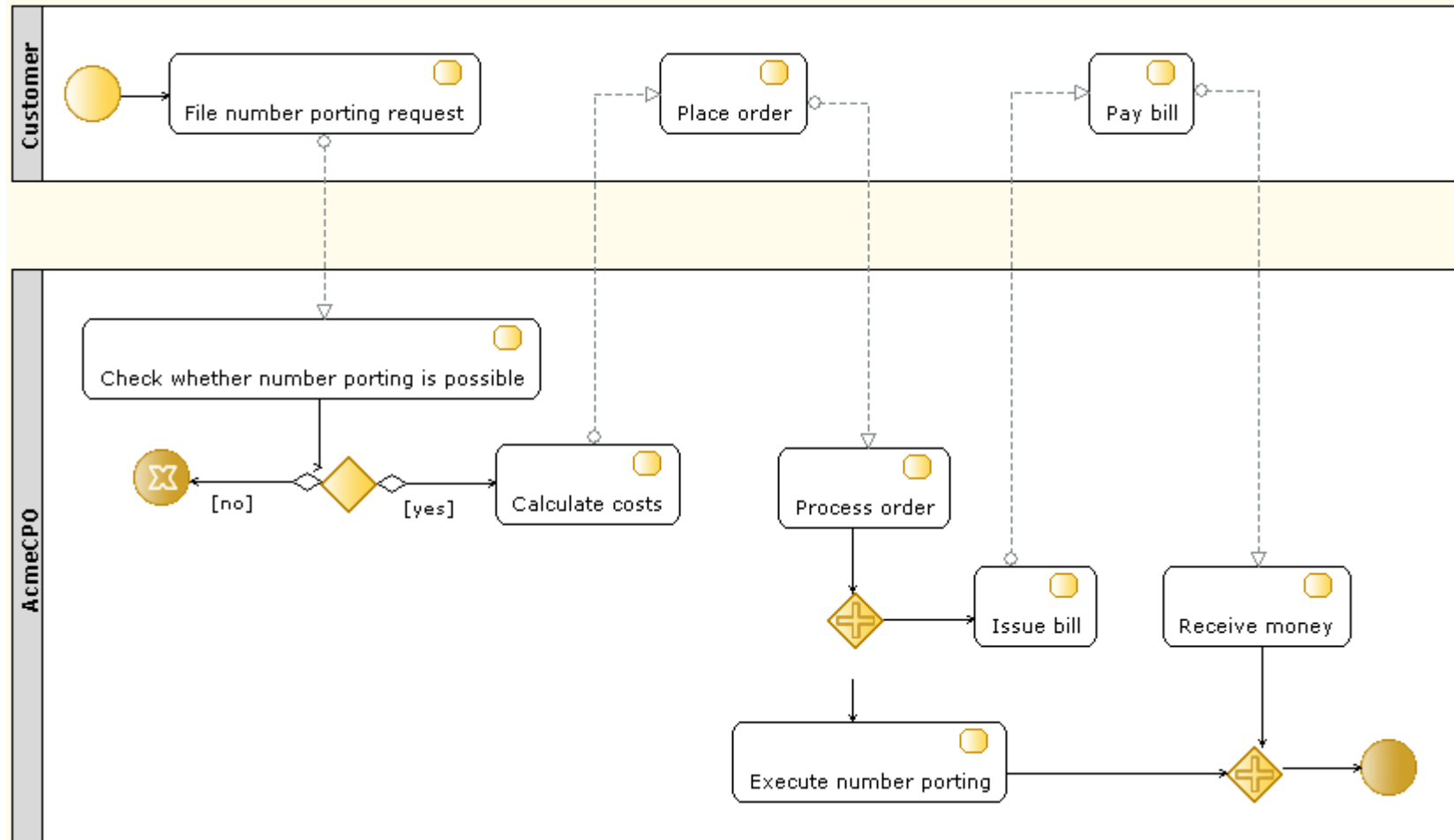
Eksempel - legekontor

- A text description of the choreography was presented as so:
- 1) Patient send a "I want to see doctor" message to the Receptionist
- 2) Receptionist send a "Are you available ?" message to a a list of Doctors
- 3) One doctor send a "I'm available" message to the Receptionist.
- 4) Receptionist send a "I'll book you" message to the Doctor.
- 5) Receptionist send a "Go see doctor" message to the Patient
- 6) Patient send a "I feel sick" message to Doctor
- 7) Doctor send a "Prepare this medicine" message to Receptionist
- 8) Doctor send a "Pickup your medicine and you can leave" message to Patient
- 9) Patient send a "I need my medicine" message to Receptionist
- 10) Receptionist send a "Here is your medicine" message to Patient

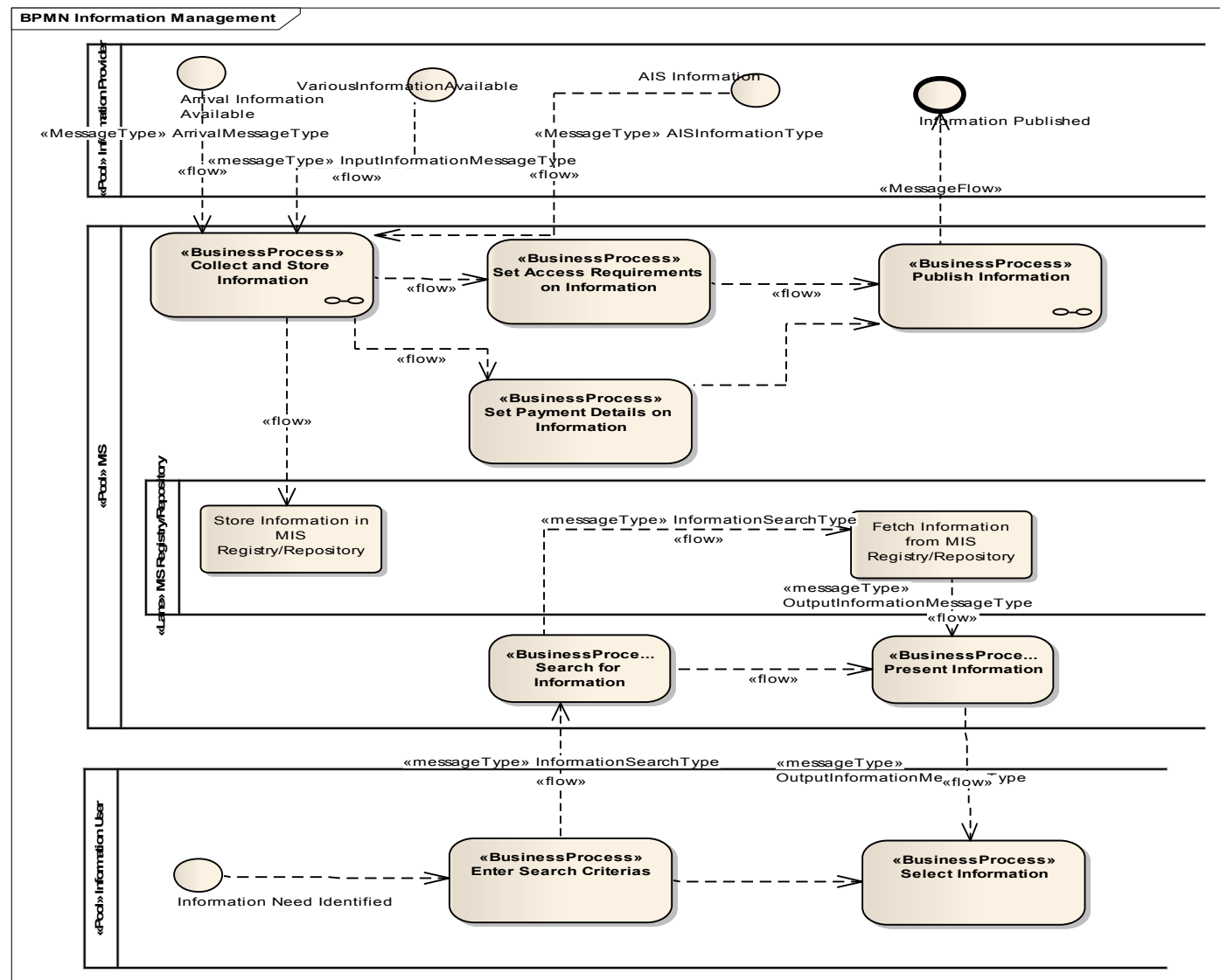
Example: BPMN: Patient and doctor



Example: Number porting between operators



Example: MIS: Information management





Task: Define business information

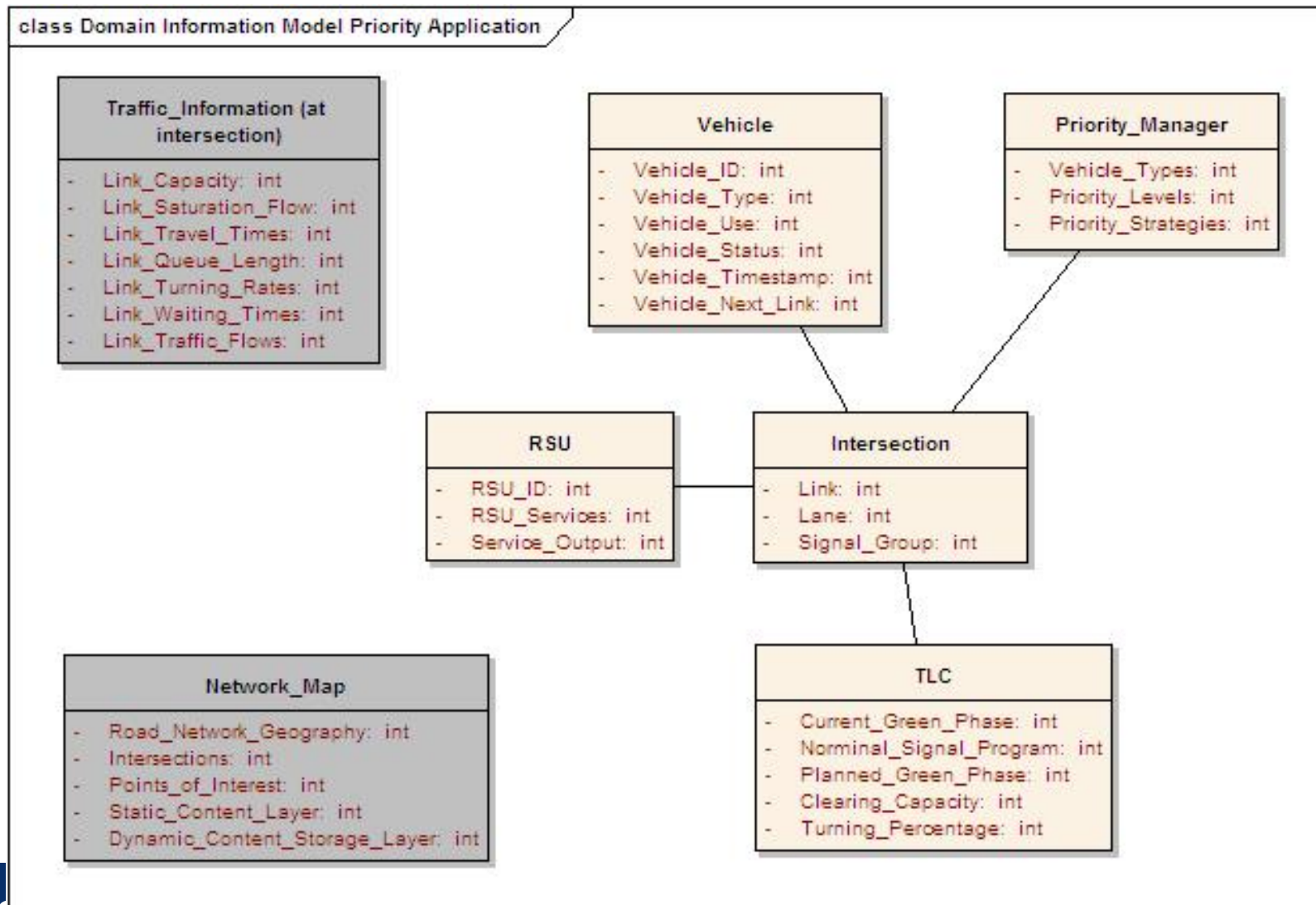
- Purpose
 - To identify and define the business information that flows between tasks and pools in the business processes.
- Steps
 - 1. Create an information diagram.
 - 2. Create classes representing the dataobjects in the business process and link them using type by associations.
 - 3. Refine the classes.
- Outputs
 - Business information model
- Roles
 - Business architect



Work product: Business information model

- The Business information model identifies and defines the main things (and concepts) of the domain that are relevant to the system under consideration.
 - Things that do things in the business (including the system itself)
 - Things that have things done to or with them
 - Details the relationships between these concepts.
- The Business information model takes the form of a UML class model.
 - In cases where it is useful it may be accompanied by state machine models for any of the resources modelled.

Example: TIM: Priority application





References



References