Workflow Modelling and Process Management

BPMN2.0

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based on slides of
Marlon Dumas

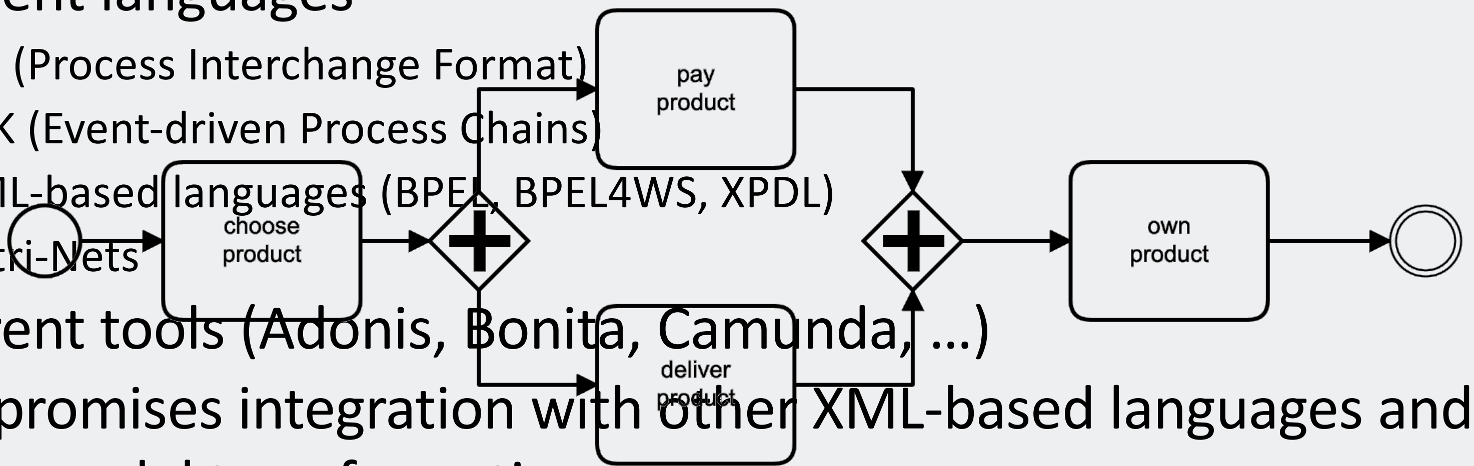
TU WIEN Informatics

Different Motivations of Process Modelling

- knowledge sharing (staff and other stakeholder of organization)
- choreography between organization (how to exchange information between different organizations)
- simulation of resources (check for capacity and time restrictions)
- cost analysis
- management of the process with software (special extensions)

Process Modelling

- different application domains
  - manufacturing
  - office workflows
  - inter-organizational processes
  - software processes
  - cloud and edge processes
- different methods
  - graph-oriented methods (declarative)
  - block-oriented methods (imperative)
- different languages
  - PIF (Process Interchange Format)
  - EPK (Event-driven Process Chains)
  - XML-based languages (BPEL, BPEL4WS, XPDL)
  - Petri-Nets



- different tools (Adonis, Bonita, Camunda, …)
- XML promises integration with other XML-based languages and easier model transformation

BPMN 2.0

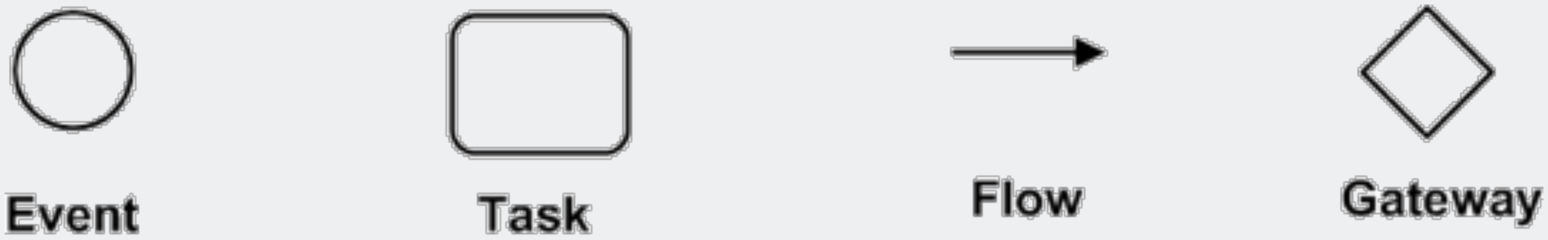
- standardization by Business Process Management Initiative (BPMI) and OMG
  - V 1 2006
  - V 1.2 2009
  - V 2.0 2011
    - graphical method
    - execution semantics,
    - Storage (serialization) as XML exchange format,
    - extensibility
- primary goals:
  - language for business analysts
  - translation into BPEL proposed (language for choreography of Web services) and XPDL (standard of WfMC)
  - import into process management system

Supporting Tools

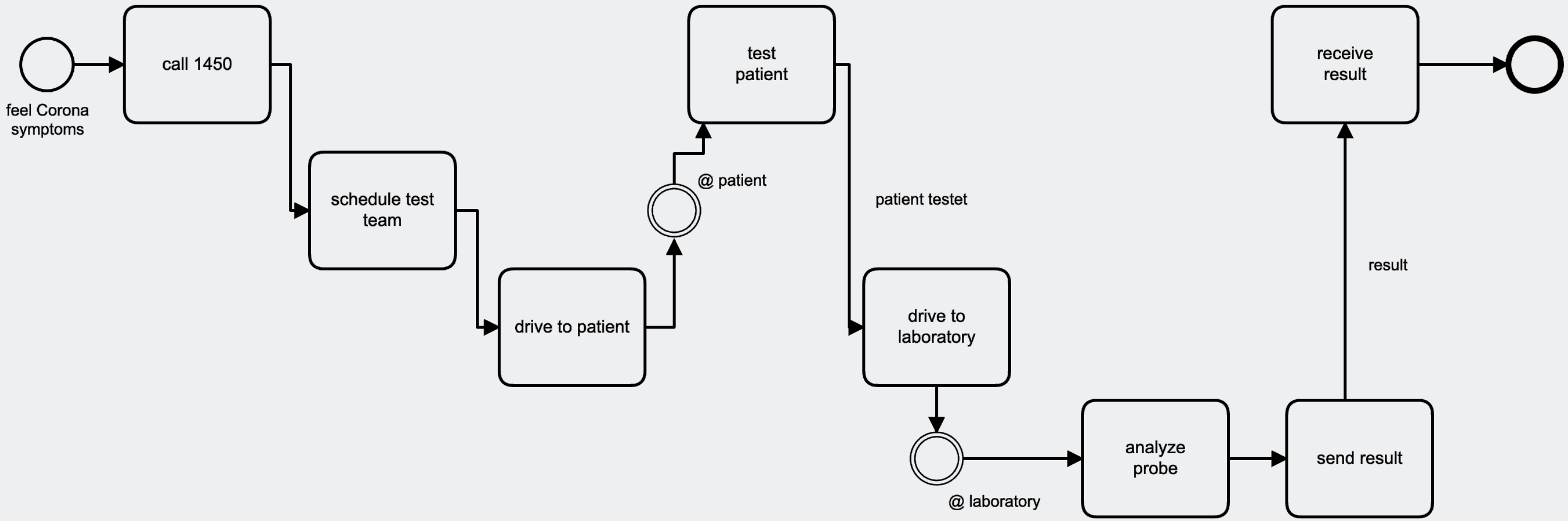
- Activiti Modeler
- Adonis
- Bizagi Process Modeller
- Eclipse BPMN2 Modeller
- Signavio
- Camunda
- TIBCO Business Studio (free download, quite large)
- IBM Websphere Business Modeler
- ARIS
- Oracle BPA
- Business Process Visual Architect (Visual Paradigm)
- Progress Savvion Business Modeller
- …

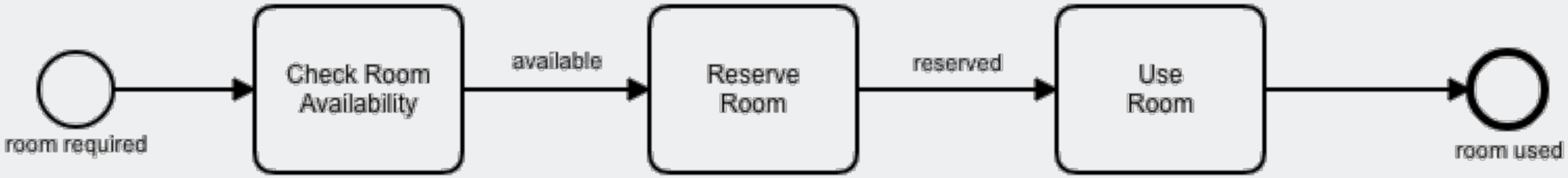
BPMN from 10 000 miles…

- A BPMN process model is a graph consisting of four types of elements (among others):

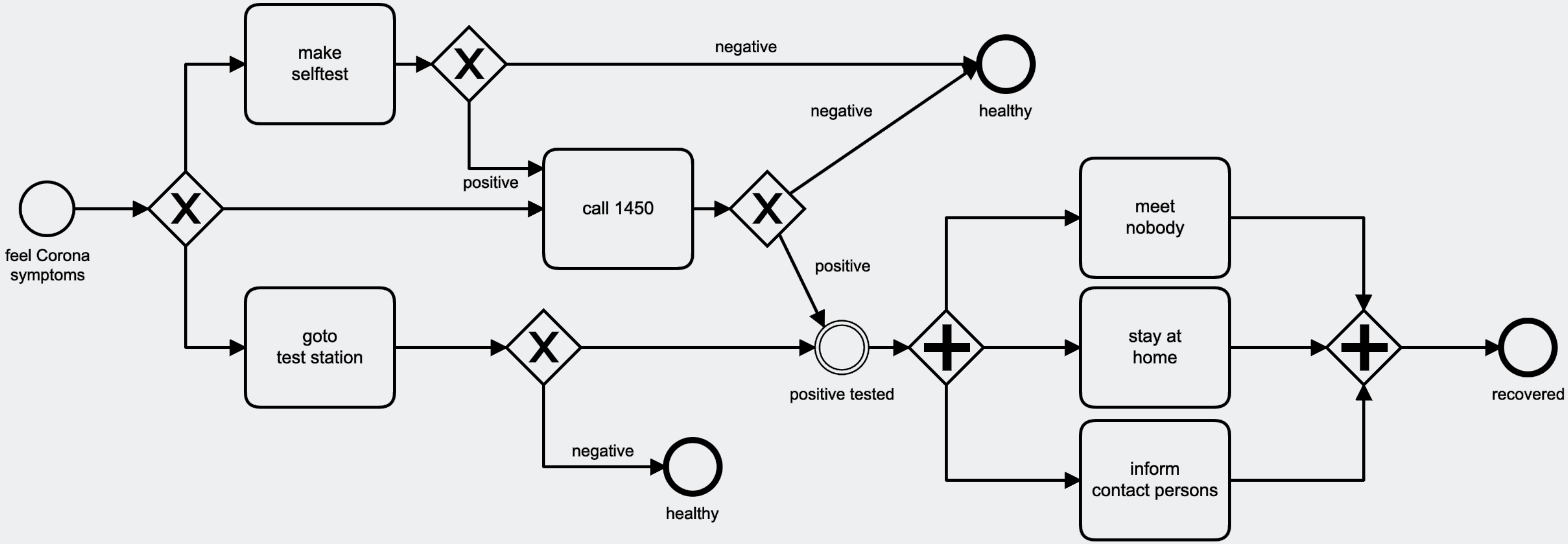


Simple room process





Process with Gateways



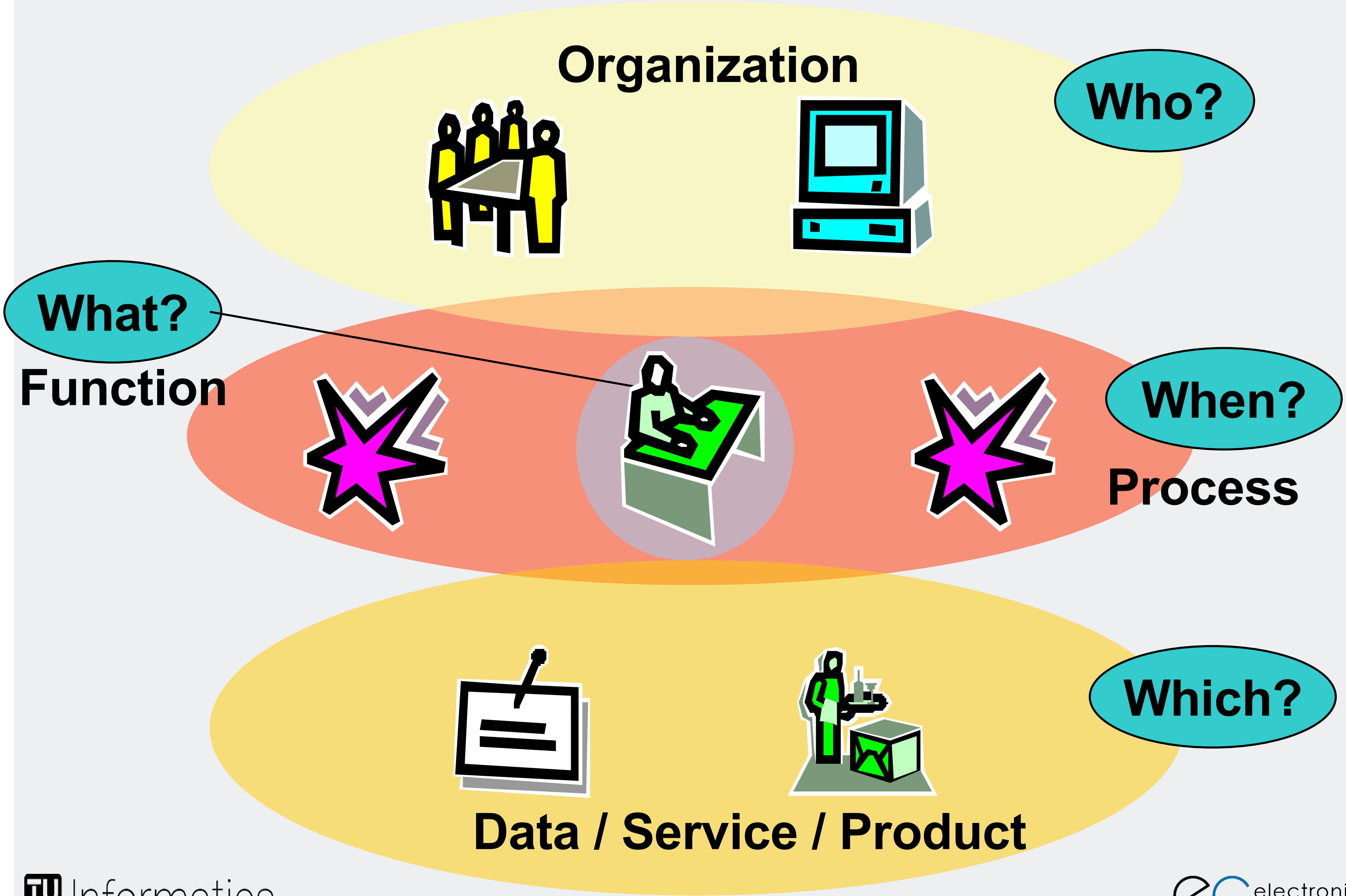
- exclusive gateways (xor) to have decisions what to do next
- parallel fork and join (several activities to be performed simultaneously)

Gateways

- exclusive decision / merge
  - indicates locations within a business process where the sequence flow can take two or more alternative paths
  - **only one** of the paths can be taken
  - depicted by a diamond shape that *may* contain a marker that is shaped like an “X”

- parallel fork / join
  - provide a mechanism to synchronize parallel flow and to create parallel flow
  - depicted by a diamond shape that *must* contain a marker that is shaped like a plus sign

Process Modelling Viewpoints



Organisational Elements in Process Models

Two basic abstractions:

- **Resource**: human actor or equipment (e.g. printer) that is required to perform an activity
- **Resource class**: Set of resources with shared characteristics, e.g. clerk, manager, insurance officer, test team

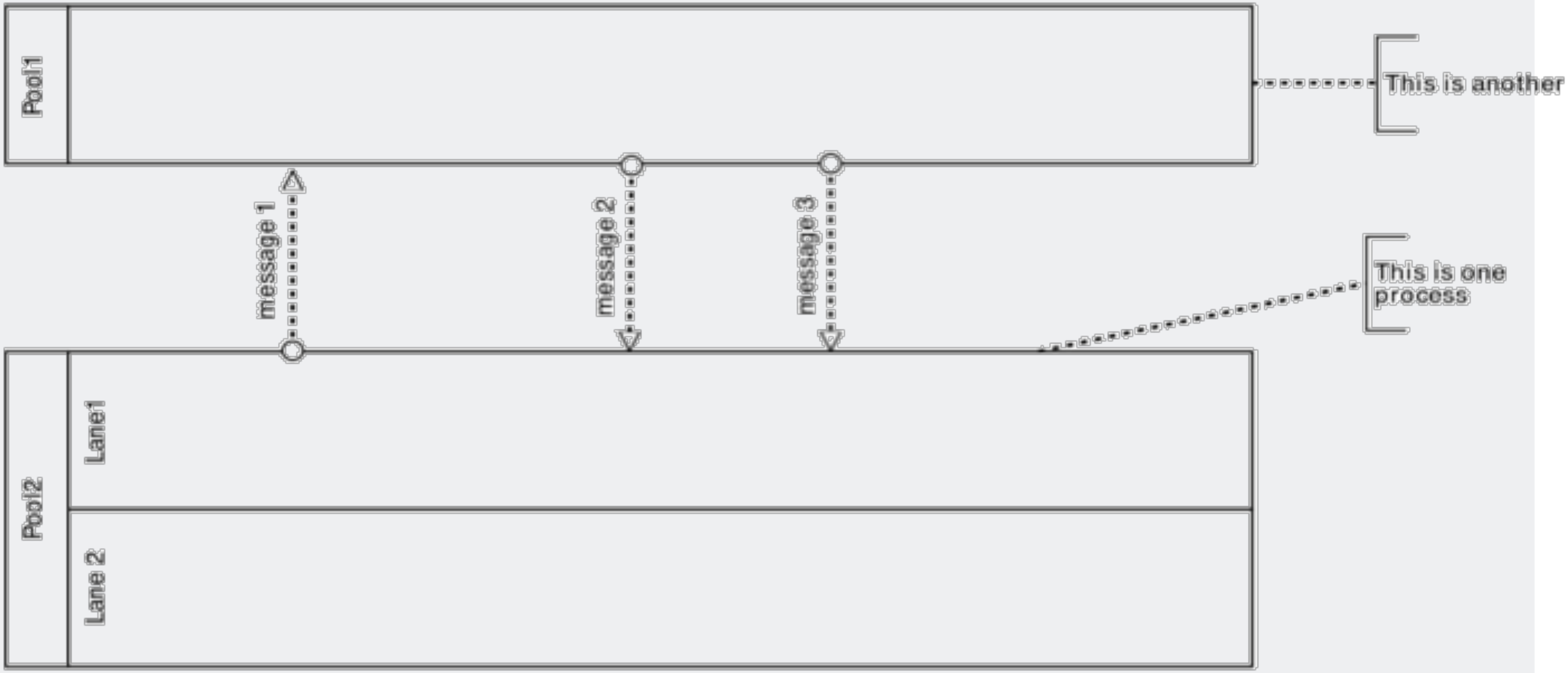
A *resource class* may be a:

- **Role** (skill, competence, qualification)
  classification based on what a resource can do or is responsible for (test teams may come from different organizations)
- **Group** (department, team, office, organizational unit)
  classification based on the organization's structure (staff of call center)

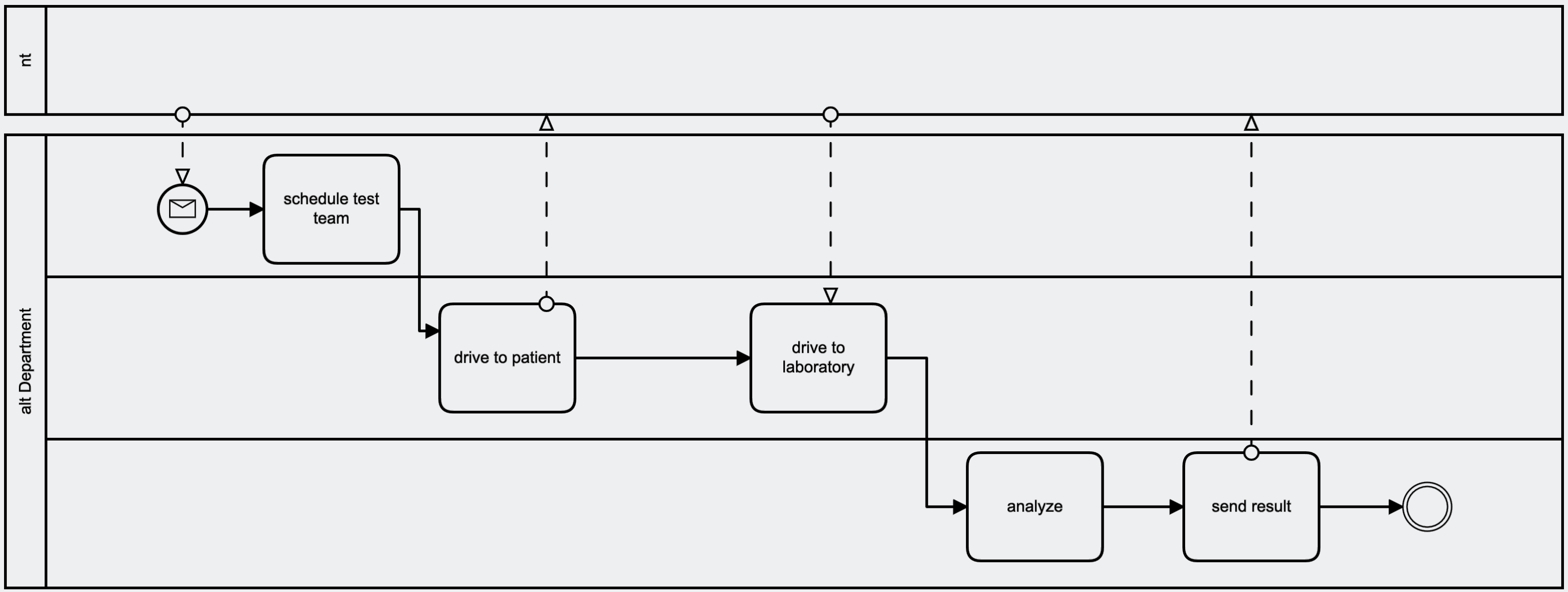
Resource Modelling in BPMN

- In BPMN, resource classes are captured using:
  - pools
    (independent organizational entities), e.g.
    - customer, supplier, university,
    - public health administration of Vienna
  - lanes – resource classes in the same organizational space and sharing common systems
    - call center, faculty, sales department, marketing unit, …
    - student, professor, officer, manager, engineer, …
    - information system (e.g. TISS, TUWEL, …)
    - machines, vehicles
    - or certain person or team

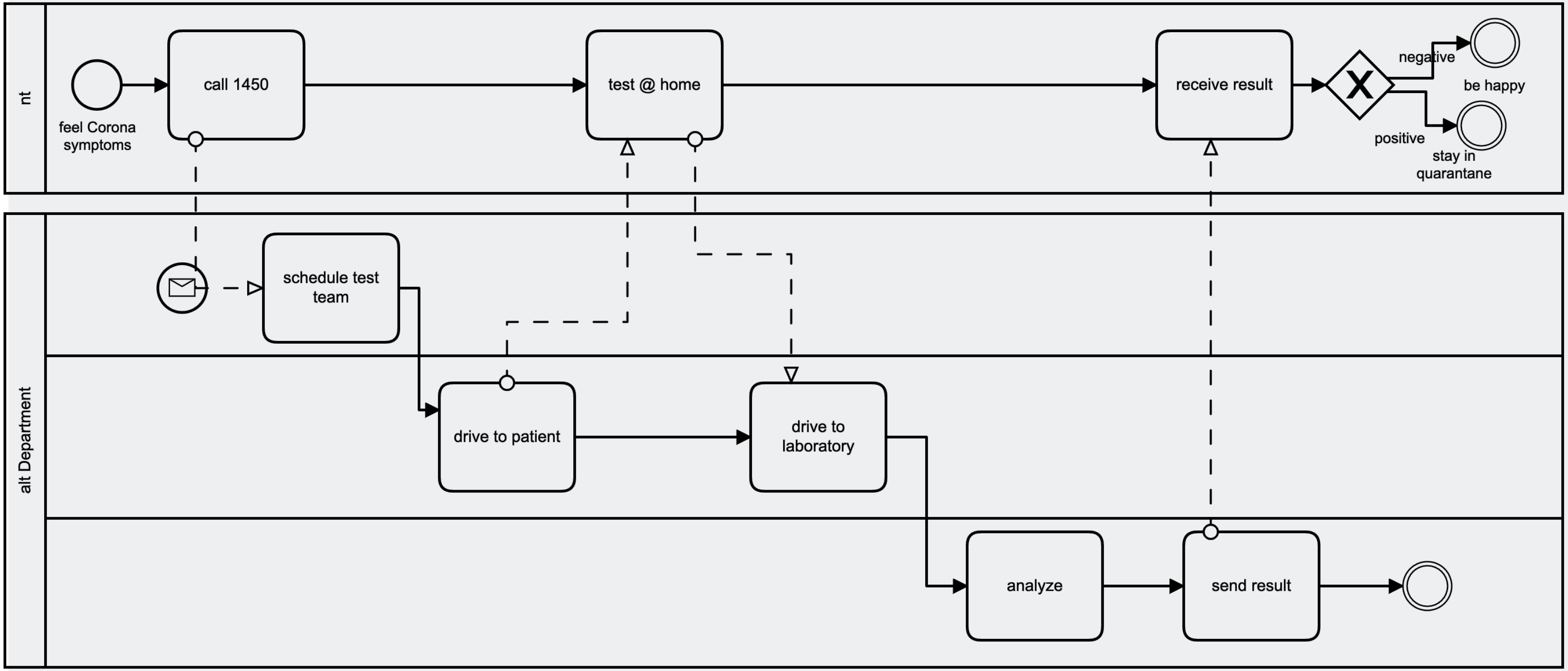
Lanes and Pools – Notation



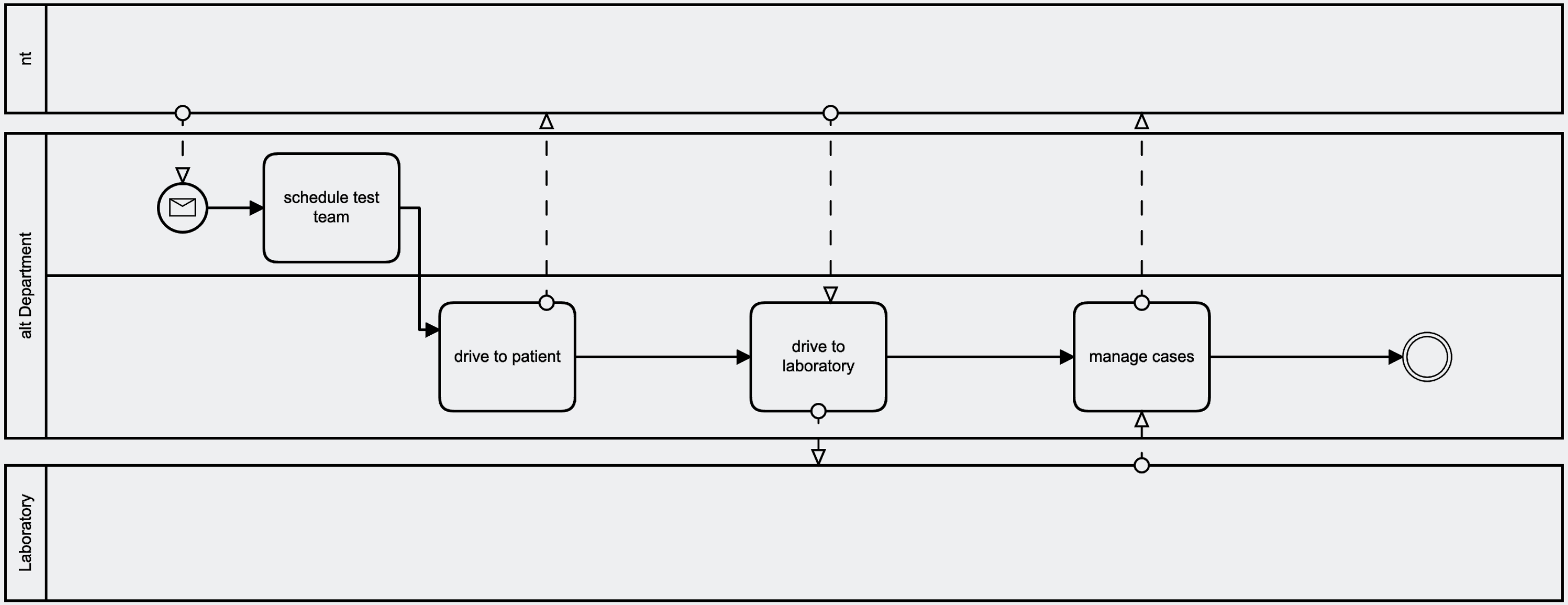
Patient as Pool



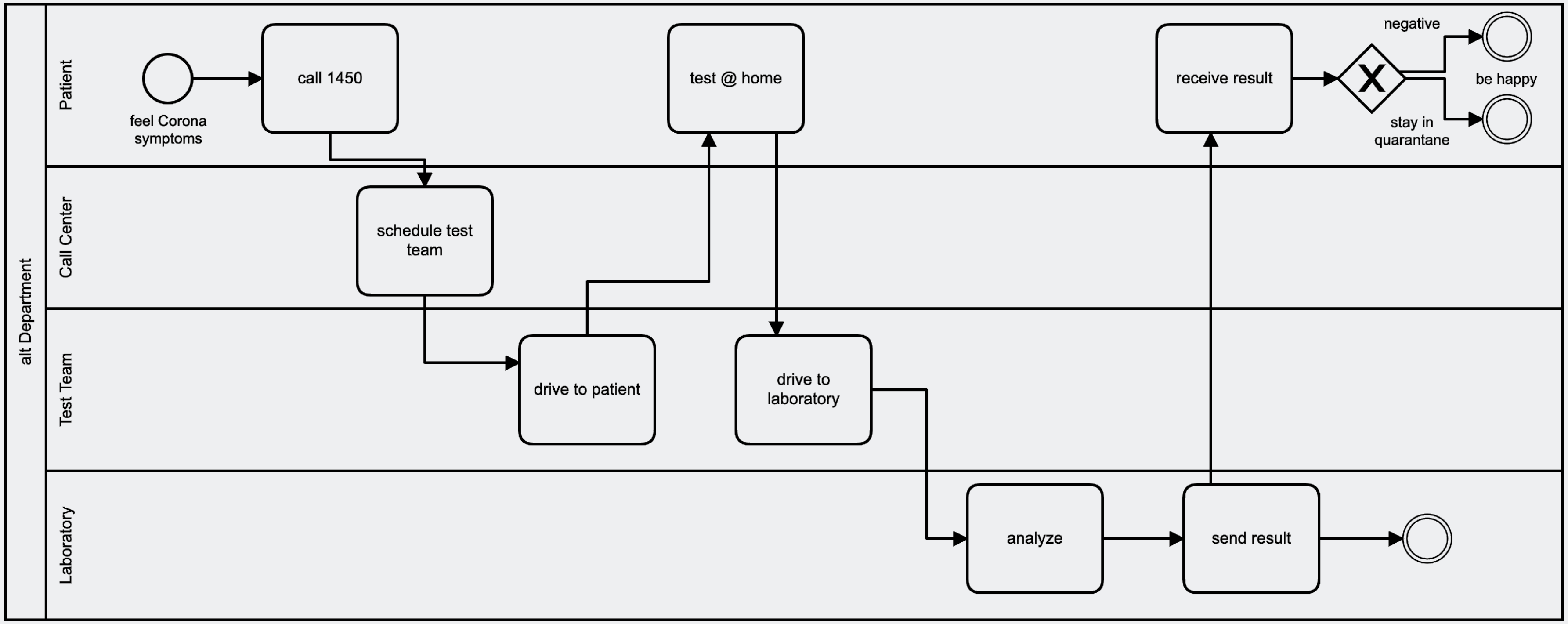
Two Processes – Two WfMS



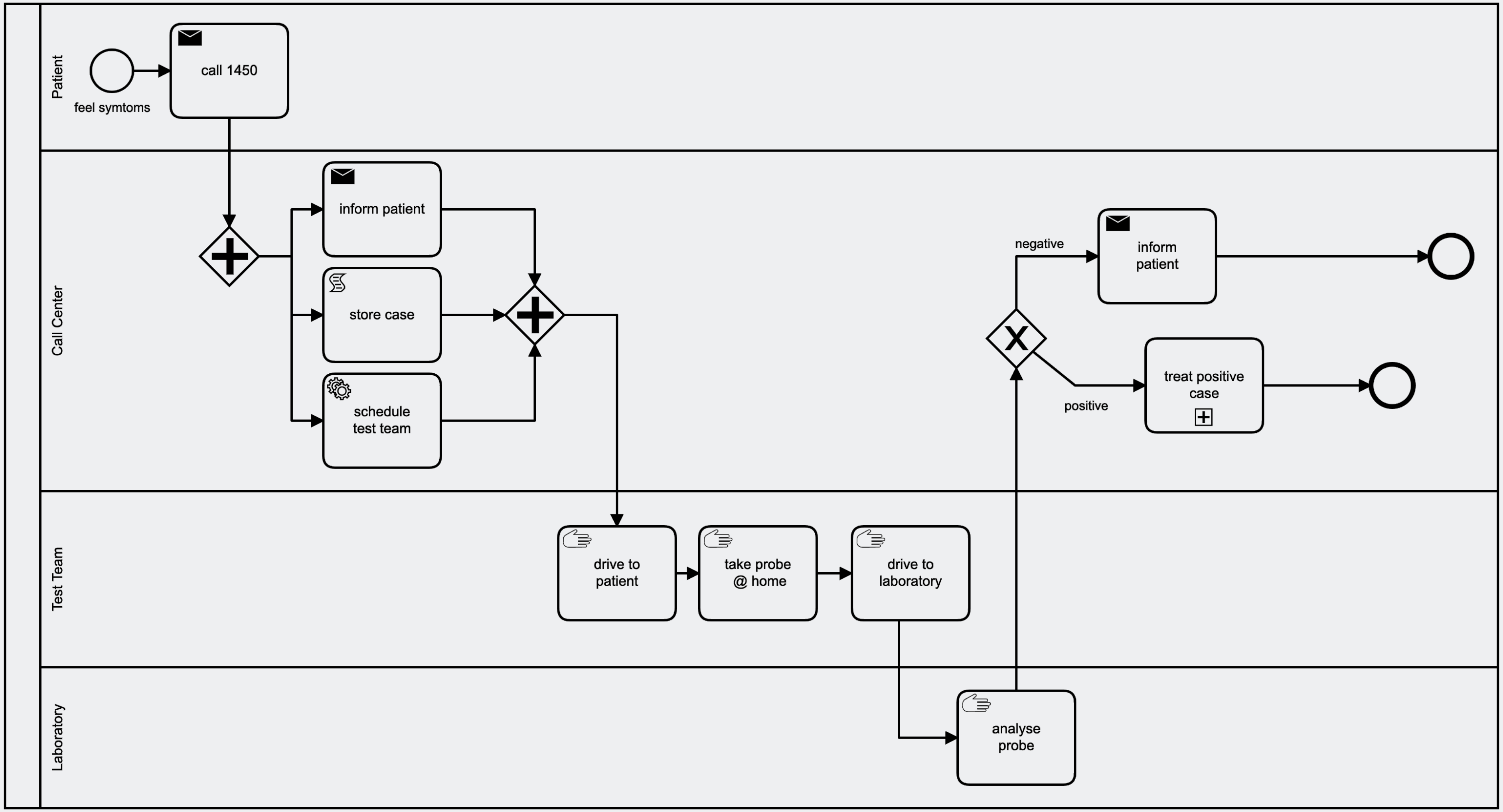
Three Pools – Control of one Process



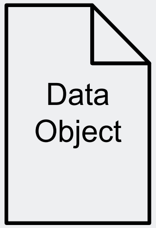
One Process – One Pool



Process with Task Markers

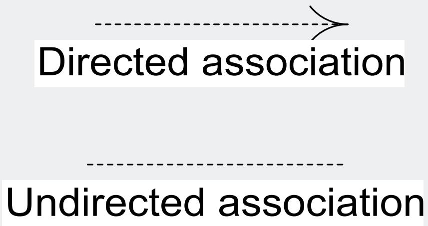


BPMN Information *Artifacts*



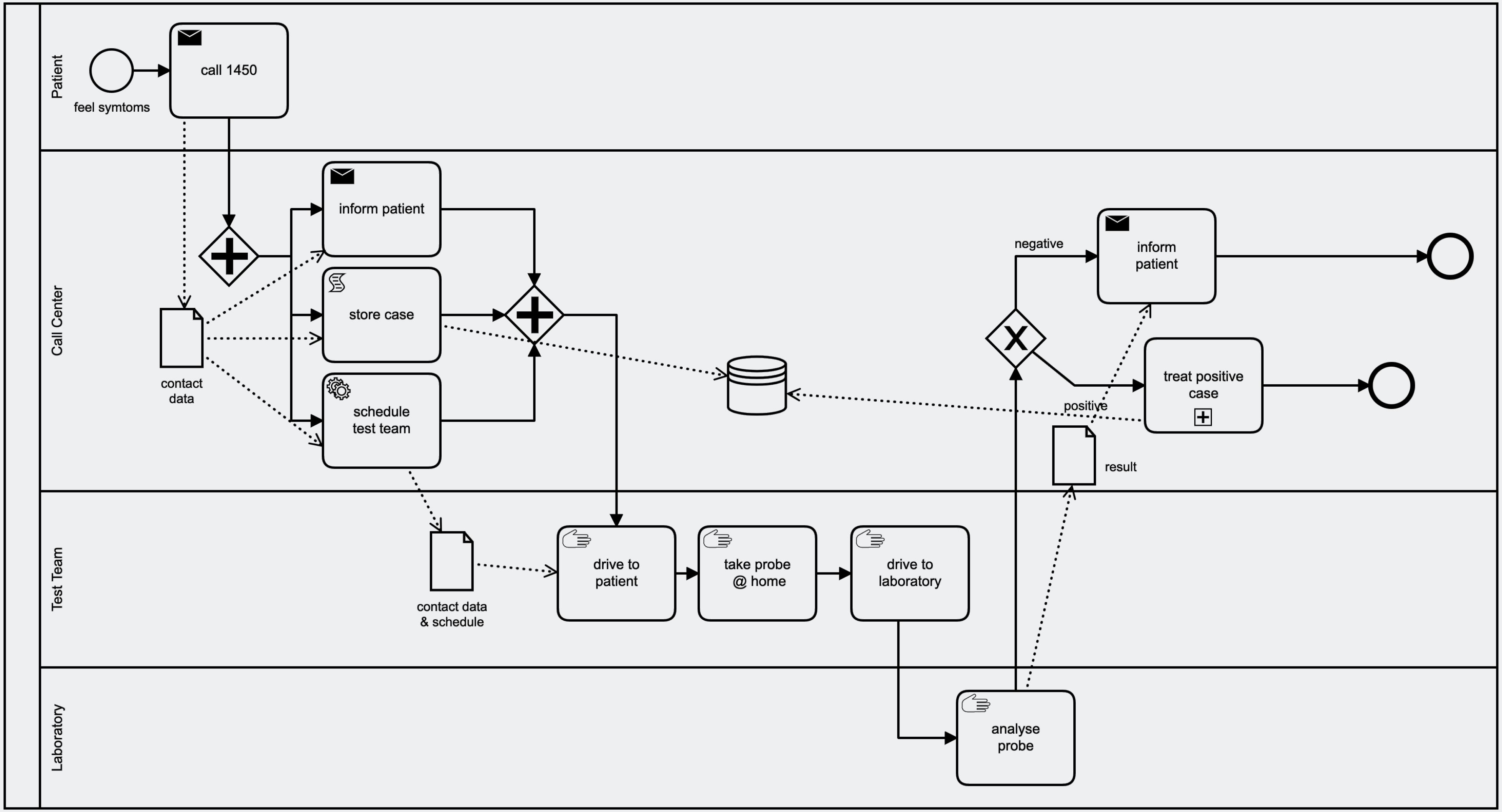
- *data objects* are a mechanism to show how data is required or produced by activities
  - are depicted by a rectangle that has its upper-right corner folded over.
  - represent input and output of a process activity.

- data stores are containers of data objects that need to be persisted beyond the duration of a process instance

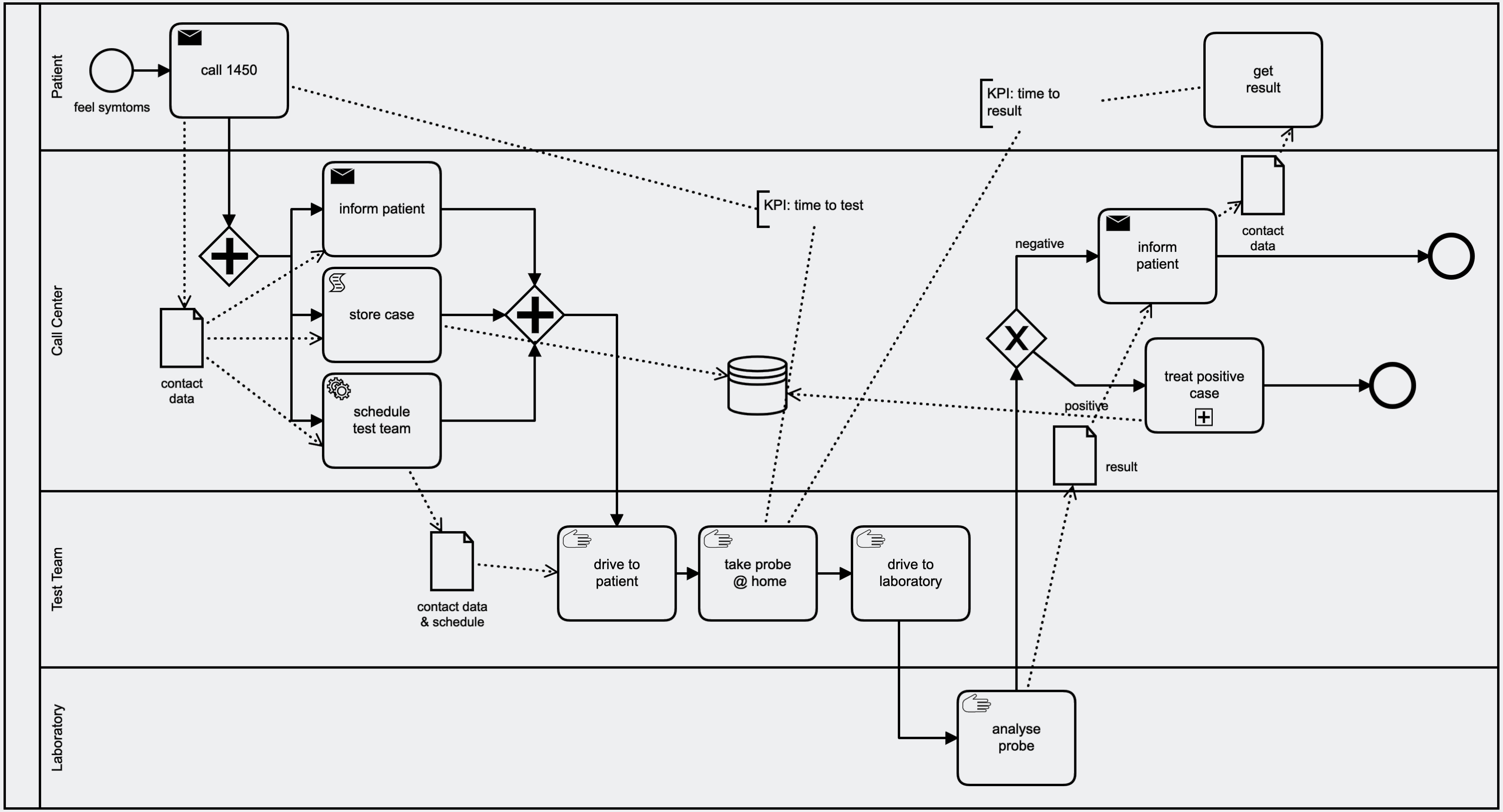


- associations are used to link artifacts such as data objects and data stores with flow objects (e.g. activities).

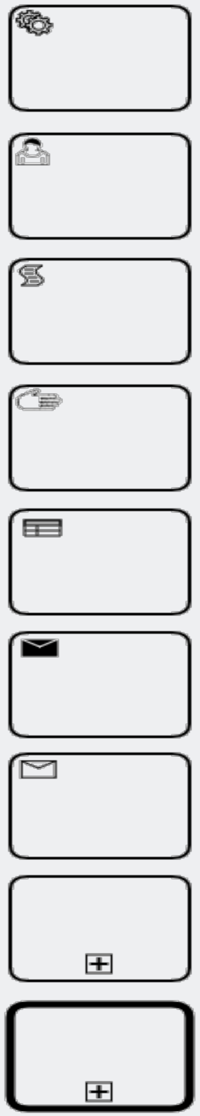
Process with Data Elements



Process with KPIs as Annotation

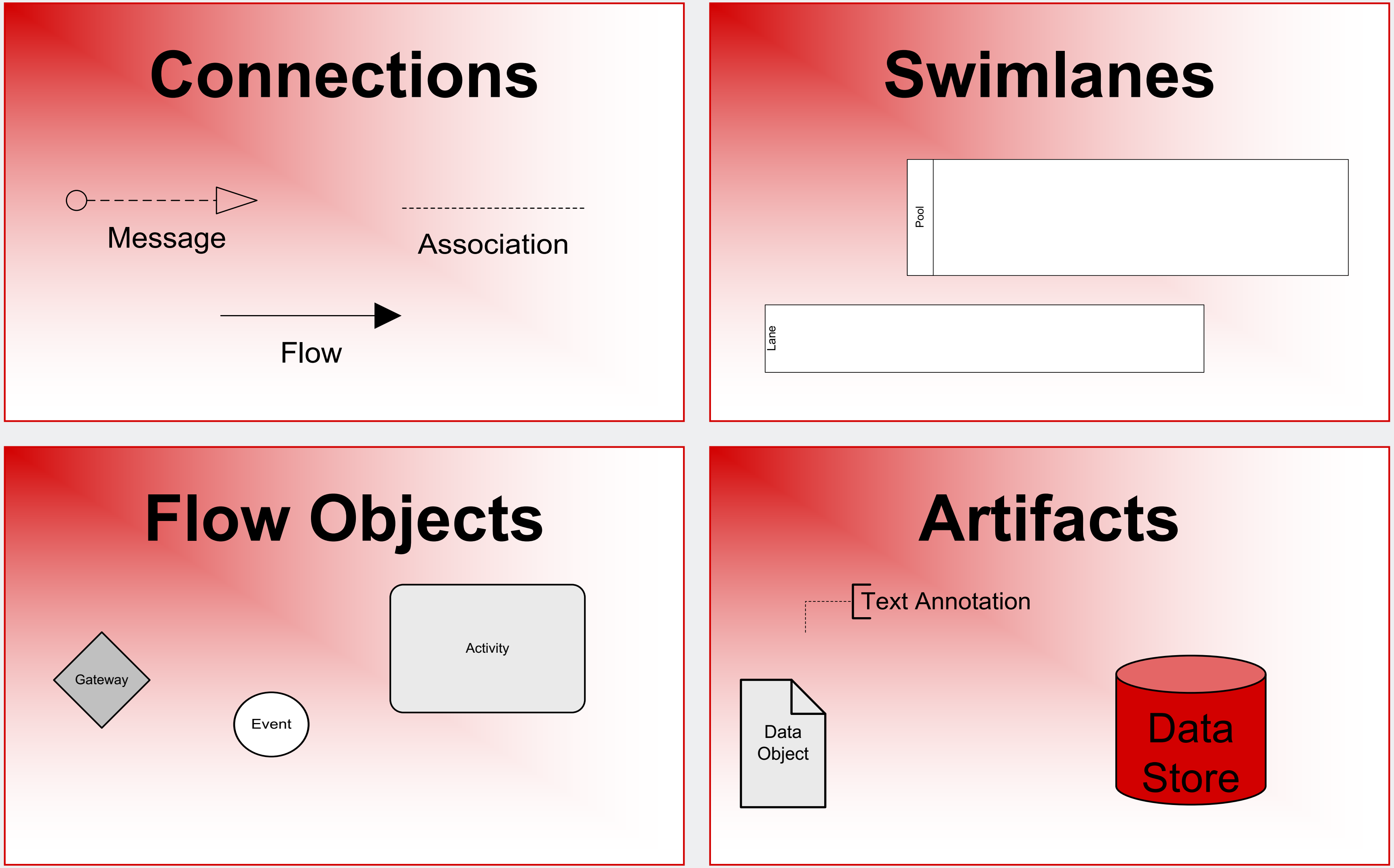


Task marker

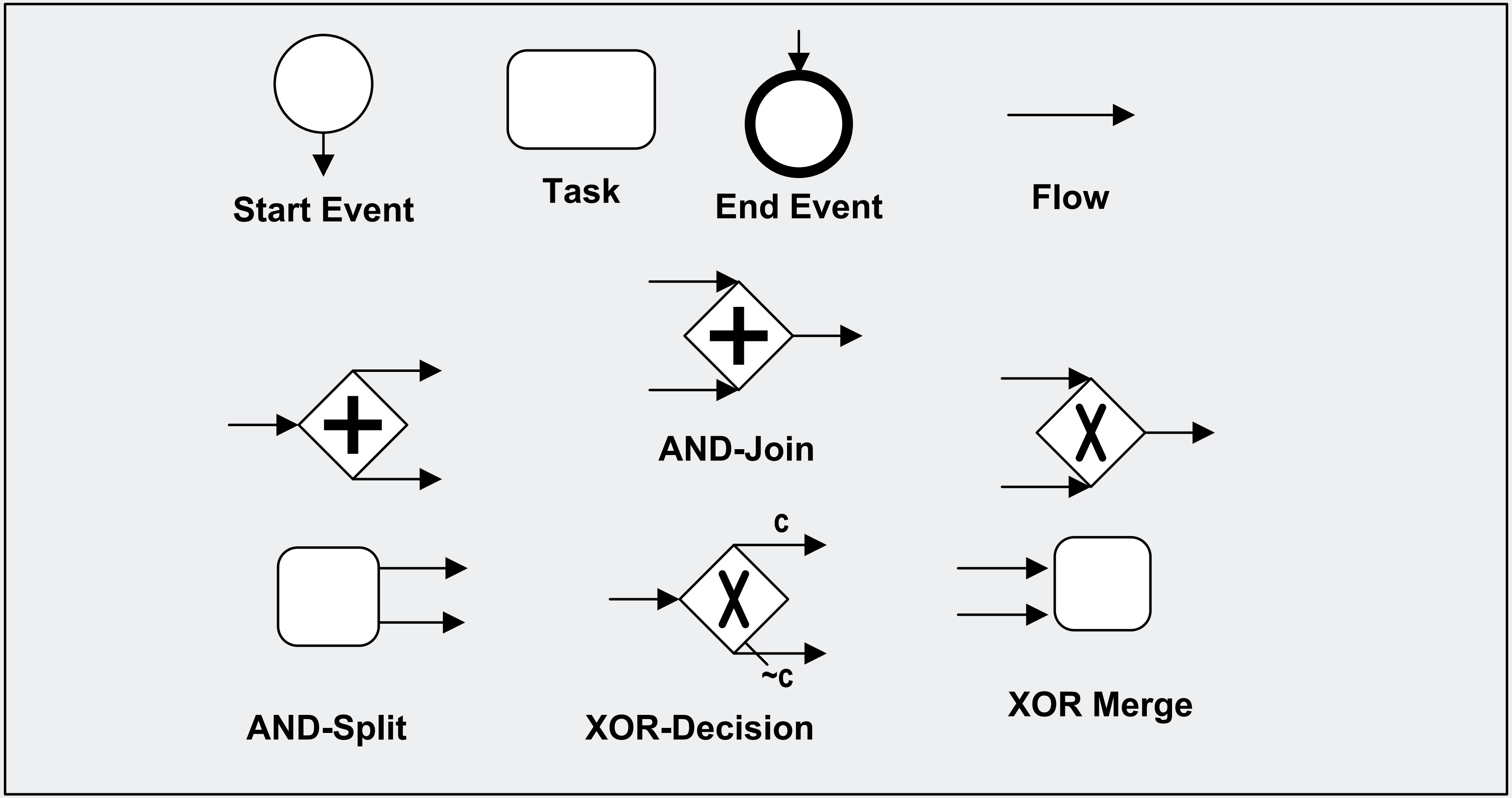


- Service task (a program or information system)
- User task (a user is notified to edit some information)
- Script task (simple program inside BPMS)
- Manual task (handling external objects)
- Business rules task (using rule language and engine, DMN)
- send task (send information to other pool)
- Receive task (receive information from other pool)
- Call task (external reusable sub-process)
- Sub-process (internal, collapsed)

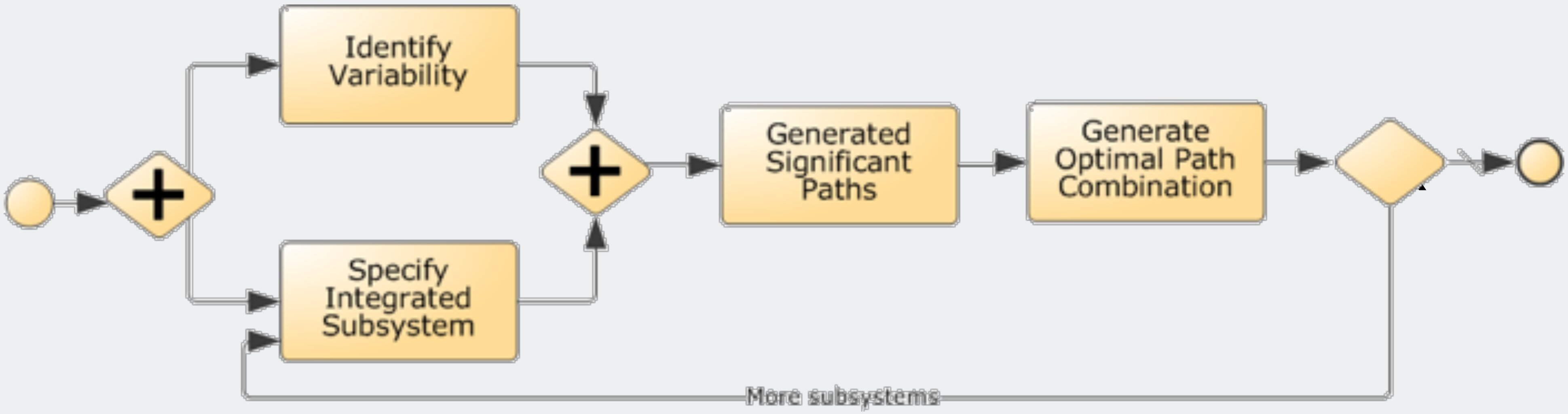
BPMN Main Elements - Recap



BPMN Flow Elements – Recap



What's wrong with this model?



BPMN Gateways

Exclusive (XOR)

- Exclusive decision
  take one branch
- Exclusive merge
  Proceed when one branch has completed

Parallel (AND)

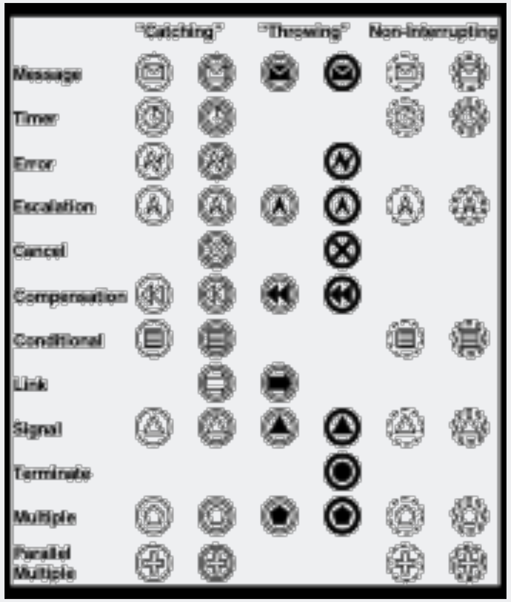
- Parallel split
  take all branches
- Parallel join
  proceed when all incoming branches have completed

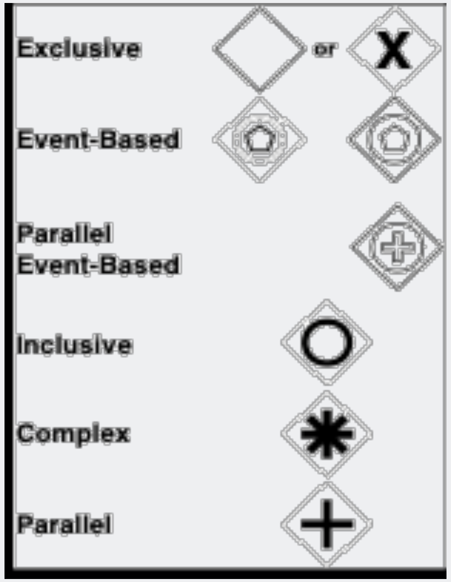
Inclusive (OR)

- Inclusive decision
  take one or several branches depending on conditions
- Inclusive merge
  proceed when all active incoming branches have completed

What is missing?

- different types of events
- different types of gateways
- grouping





Guidelines for the Project

- do not use sub-processes!
- model your business and your customer as two pools
  (perhaps your business has a supplier which is modelled again by a pool)
- the workflow management system controls your business (pool) and the communication with the other pools
- your business should have different lanes representing different resources (humans and information systems)
- usually do not model two consecutive tasks (without other elements between) in one lane
- differentiate tasks into service, user, manual, send or receive tasks

- specify data required for each activity
- specify data produced by each activity
- tasks are described by verbs