# Software Service Engineering

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TECHNISCHE UNIVERSITÄT CHEMNITZ

Part V
# SERVICES / BUSINESS PROCESS

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Services / Business Process

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# Chapter 1
# MODELLING TECHNIQUES

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# Business Process Deployed

**Business Process:**



Participant · Participant · Process Unit

Client · Call / Message Transfer · Server

<<component>> Application

<<**Endpoint**>> Business Process
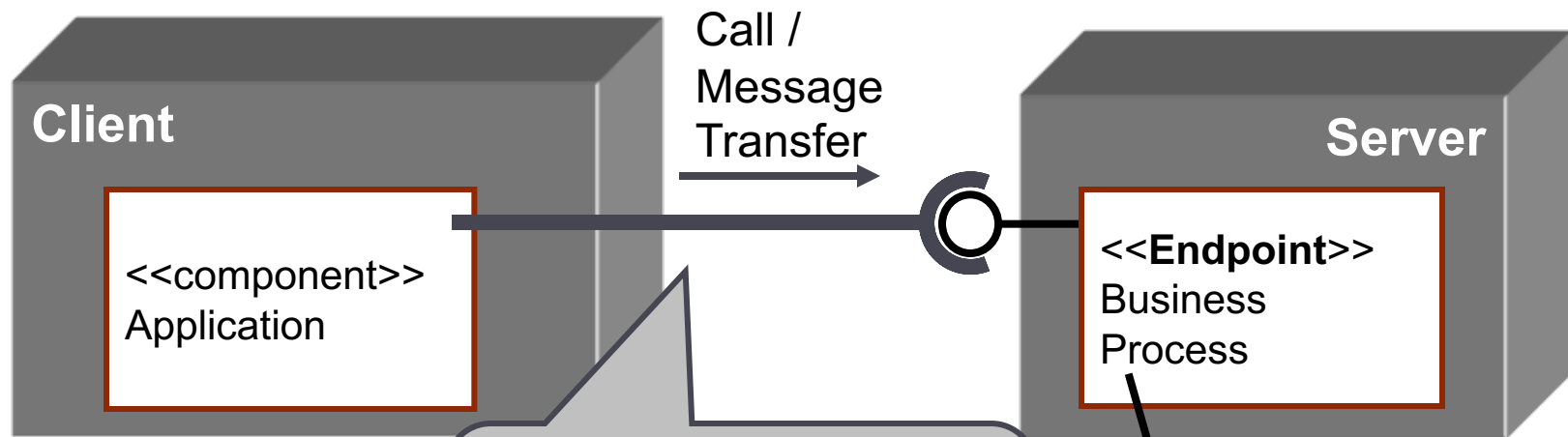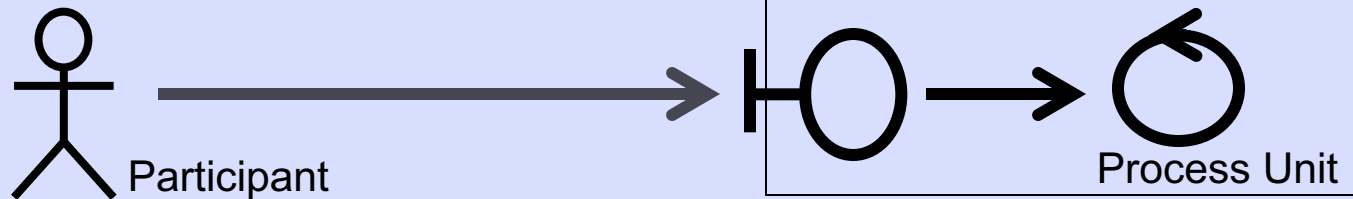
Communication & Contract Negotiation

(Might be distributed)

Endpoint: Logical Entity to access functionality on the Server

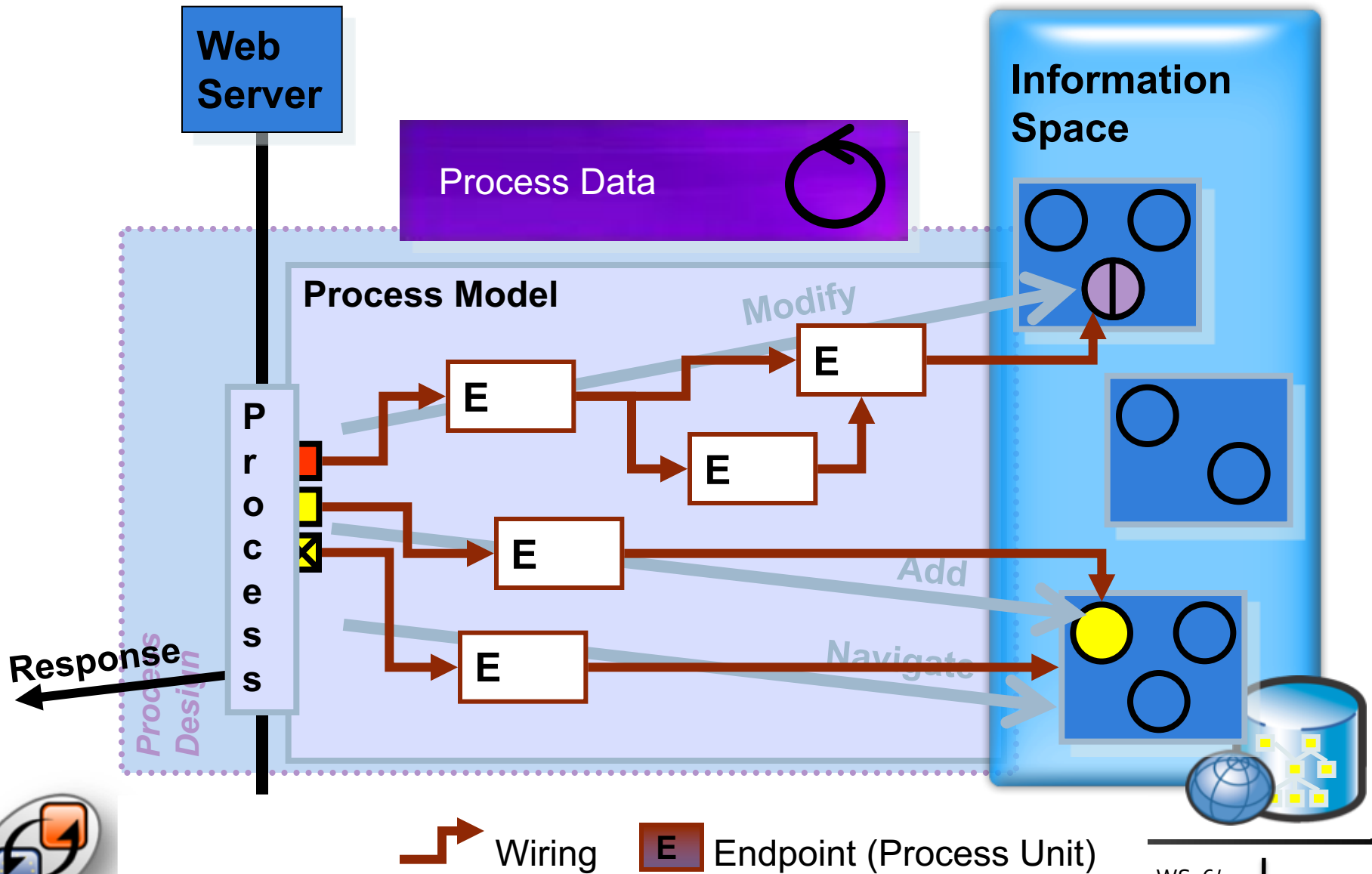**From EVS lecture for preparation**

# Process and the Web

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# Process Model and the Web

**Web Server**

<<component>> Application

<<**Endpoint**>> Business Process

**Information Space**

Process Data

**P r o c e s s**

*Process Design*

Modify

Add

Navigate

**Response**

Business Process

# Process Model in Detail



Web Server

Information Space

Process Data

Process Model

Modify

E

E

E

Add

E

Navigate

E

P r o c e s s

Response

Process Design

⟶ Wiring    E Endpoint (Process Unit)

Services / Business Process ► Chapter 1: Modelling Techniques

# Tasks to be addressed

- **Modelling Techniques (Basics)**
  - BPMN – The core of BPMN (especially the graphic Notation - BPD)
    - http://www.bpmn.org/
    - http://www.omg.org/spec/BPMN/1.2/PDF/
    - Not BPMN 2.0
  - WAM
    - Cf. Lecture PVS/SVS

Chapter 2

# BUSINESS PROCESS MODEL AND NOTATION (BPMN)

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# What is a Business Process?

- …a structured, measured set of activities designed to produce a specific output for a particular customer or market… A process is thus a specific ordering of work activities across time and space, with a beginning and an end, and clearly defined inputs and outputs

  *Thomas Davenport (1993). Process Innovation: Reengineering work through information technology*

# BPMN: Goals and differentiators

- Provides an understandable notation for all business users

- Bridges the gap between business process design and implementation

- Visualizes XML languages designed for execution of business processes (particularly BPEL) with a business-oriented notation

Business Process Model and Notation 1.2

http://www.omg.org/spec/BPMN/1.2/

# Private Business Processes

- Workflows internal to a specific organization
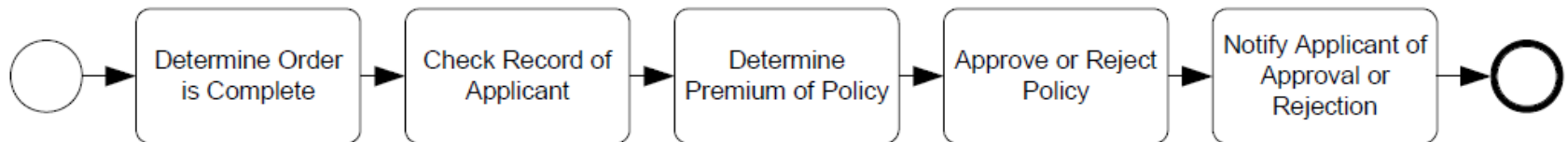


Image: Business Process Model and Notation (BPMN) 1.2. Specification. http://www.omg.org/spec/BPMN/1.2/ (Last Access 09.01.2011)

# Abstract (Public) Processes

- „Internal" activities of the process are not shown

- Focus on interactions between several participants
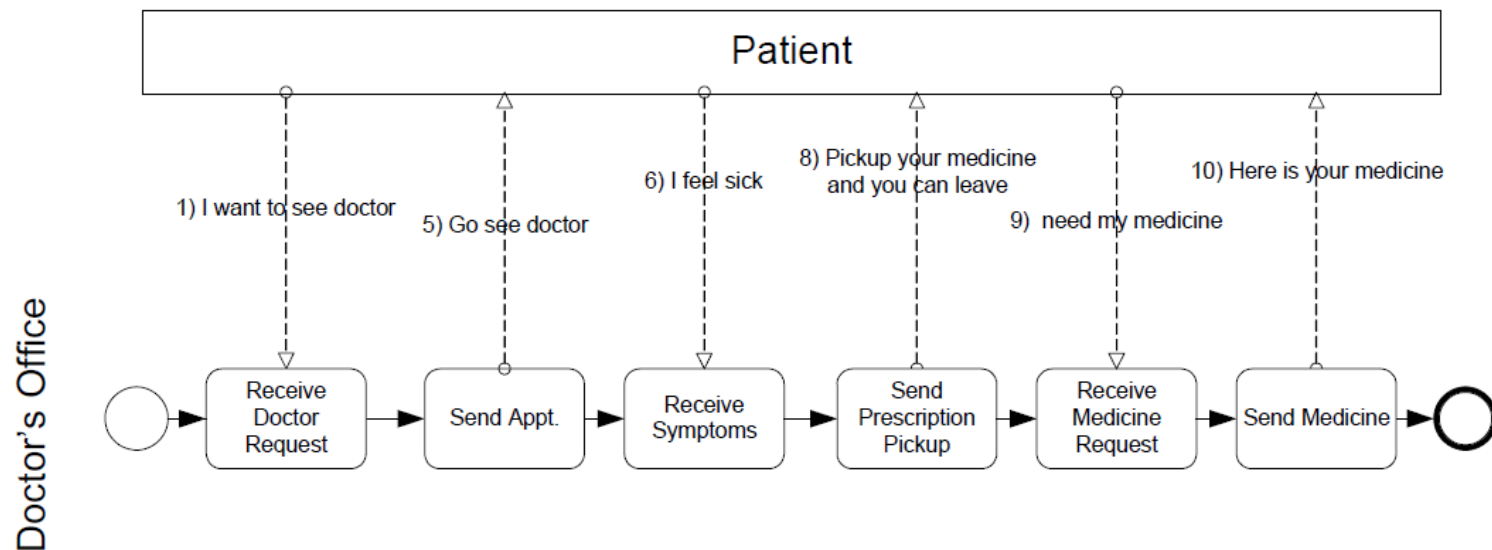


Image: Business Process Model and Notation (BPMN) 1.2. Specification. http://www.omg.org/spec/BPMN/1.2/ (Last Access 26.01.2011)

# Collaboration Processes

- Interaction between one or more business entities
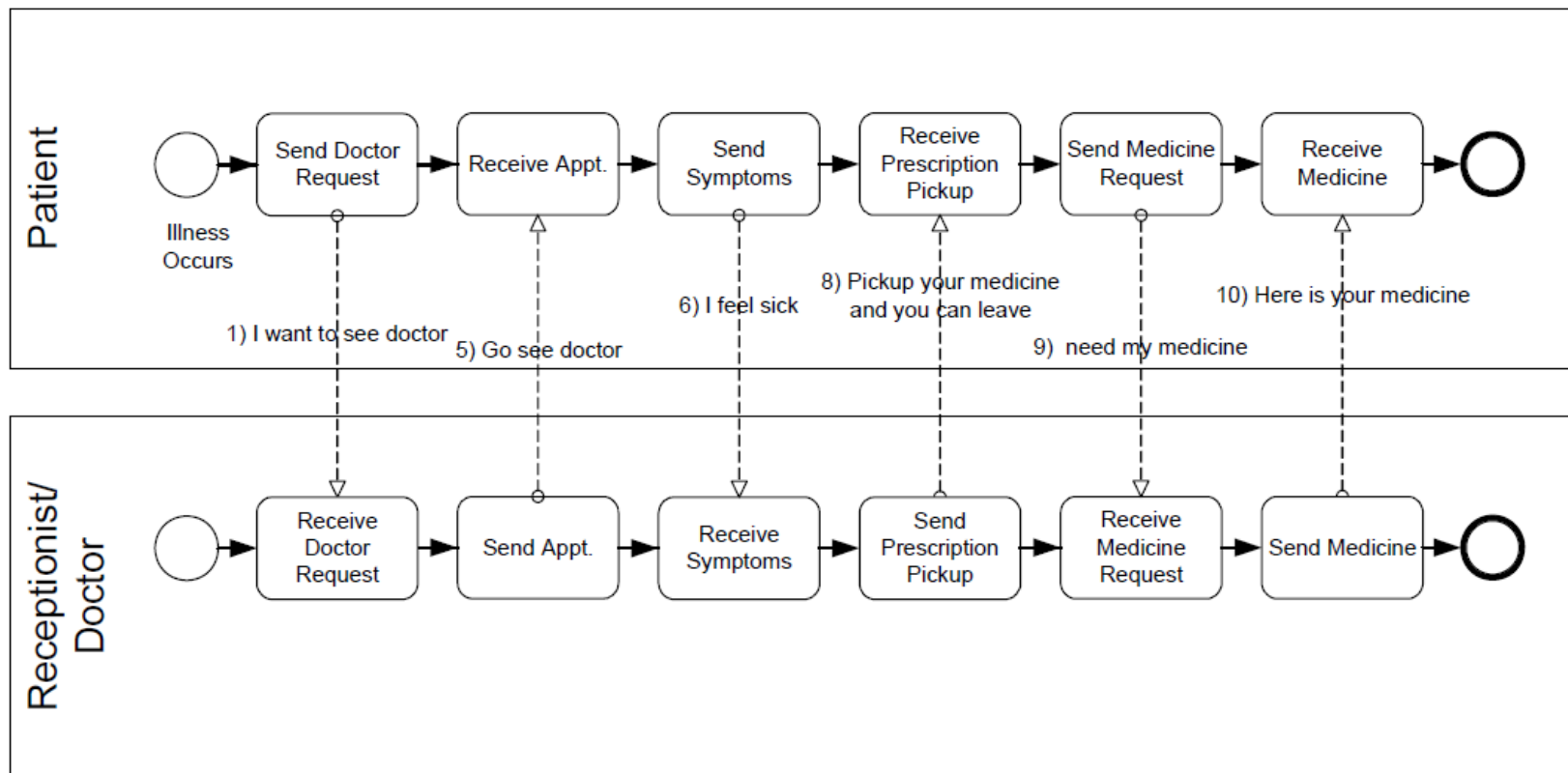


Image: Business Process Model and Notation (BPMN) 1.2. Specification. http://www.omg.org/spec/BPMN/1.2/ (Last Access 26.01.2011)

# Business Process Diagram - Overview

- Flow Objects
  - Events
  - Activities
  - Gateways
- Connecting Objects
  - Sequence Flow
  - Message Flow
  - Association
- Swimmlanes
  - Pools
  - Lanes
- Artifacts
  - Data Object
  - Group
  - Annotation
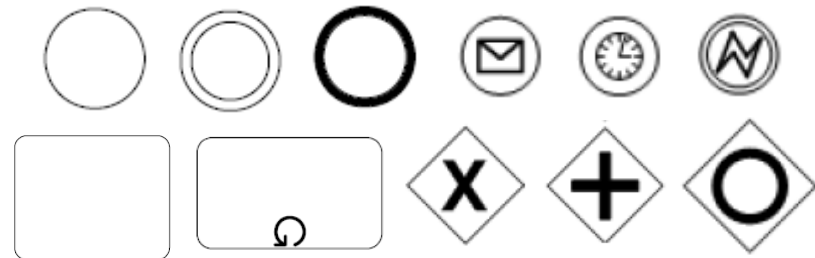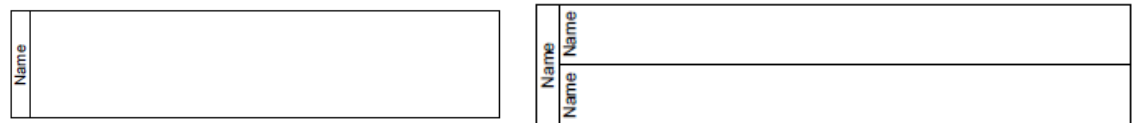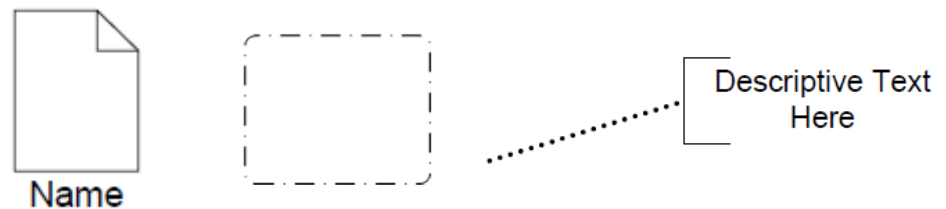


Images: Business Process Model and Notation (BPMN) 1.2. Specification. http://www.omg.org/spec/BPMN/1.2/ (Last Access 26.01.2011)

# Flow Objects: Events

- „Triggers" define the cause of the event (Message, Signal,Timer,Exception)

- Start Events can only „catch" a trigger

- End Events can only „throw" results

- Intermediate Events can do both

| | "Catching" | | "Throwing" | |
|---|---|---|---|---|
| Message | ✉ | ✉ | ✉ | ✉ |
| Timer | 🕐 | 🕐 | | |
| Error | | N | | N |
| Cancel | | ✕ | | ✕ |
| Compensation | | ◀◀ | ◀◀ | ◀◀ |
| Conditional | ▤ | ▤ | | |
| Link | | ➡ | ➡ | |
| Signal | △ | △ | ▲ | ▲ |
| Terminate | | | | ● |
| Multiple | ⬠ | ⬠ | ⬠ | ⬠ |

# Flow Objects: Gateways

- An **Exclusive Gateway (XOR-split)** restricts the flow such that only one of a set of alternatives may be chosen during runtime

- An **Inclusive Gateway (OR-split)** represents a branching point where Alternatives are based on conditional expressions contained within outgoing Sequence Flow. All Sequence Flow with a True evaluation will be traversed by a Token

- A **Parallel Gateway (AND-split)** divides a path into two or more parallel paths, which enables activities to be performed concurrently

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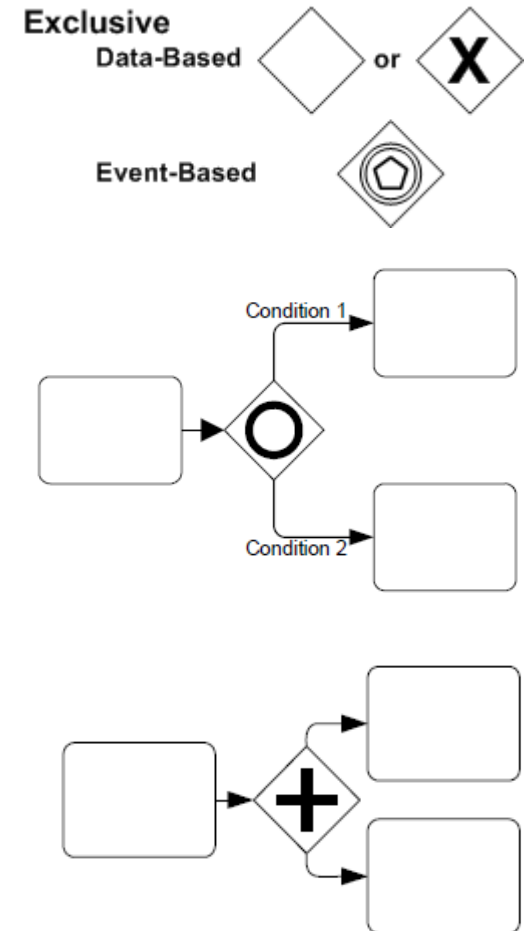
# Swimlanes
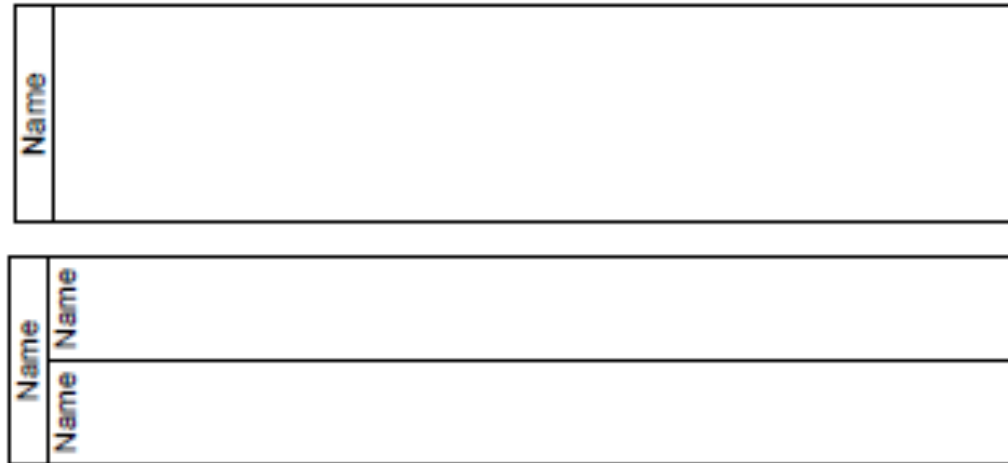


- A **Pool** represents a Participant in a Process

- A **Lane** is a sub-partition within a Pool. Lanes are used to organize and categorize activities within a Pool . The meaning of the Lanes is up to the modeler

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# Token Passing

- Control object traversing the sequence flow
- Positions of tokens define process state
- Start event generates a token, which is consumed by end event
- Gateways may divide or merge tokens
- Intermediate events may delay the token

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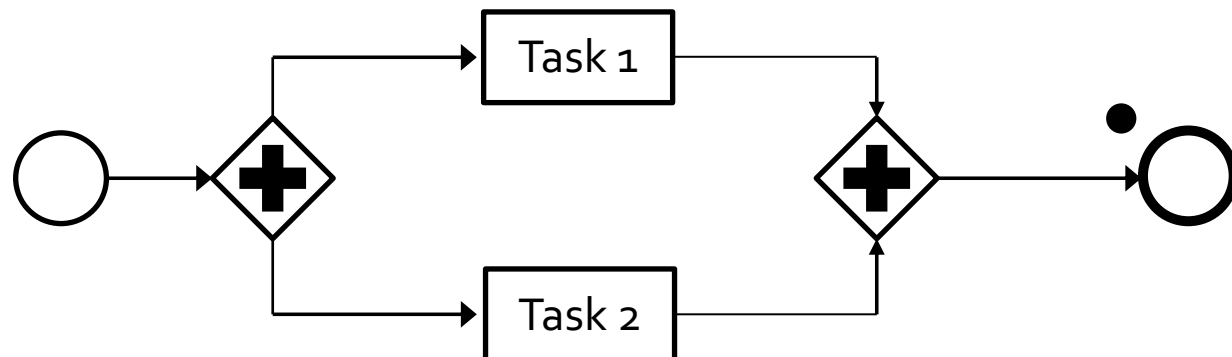
# A simple BPMN workflow… simple?
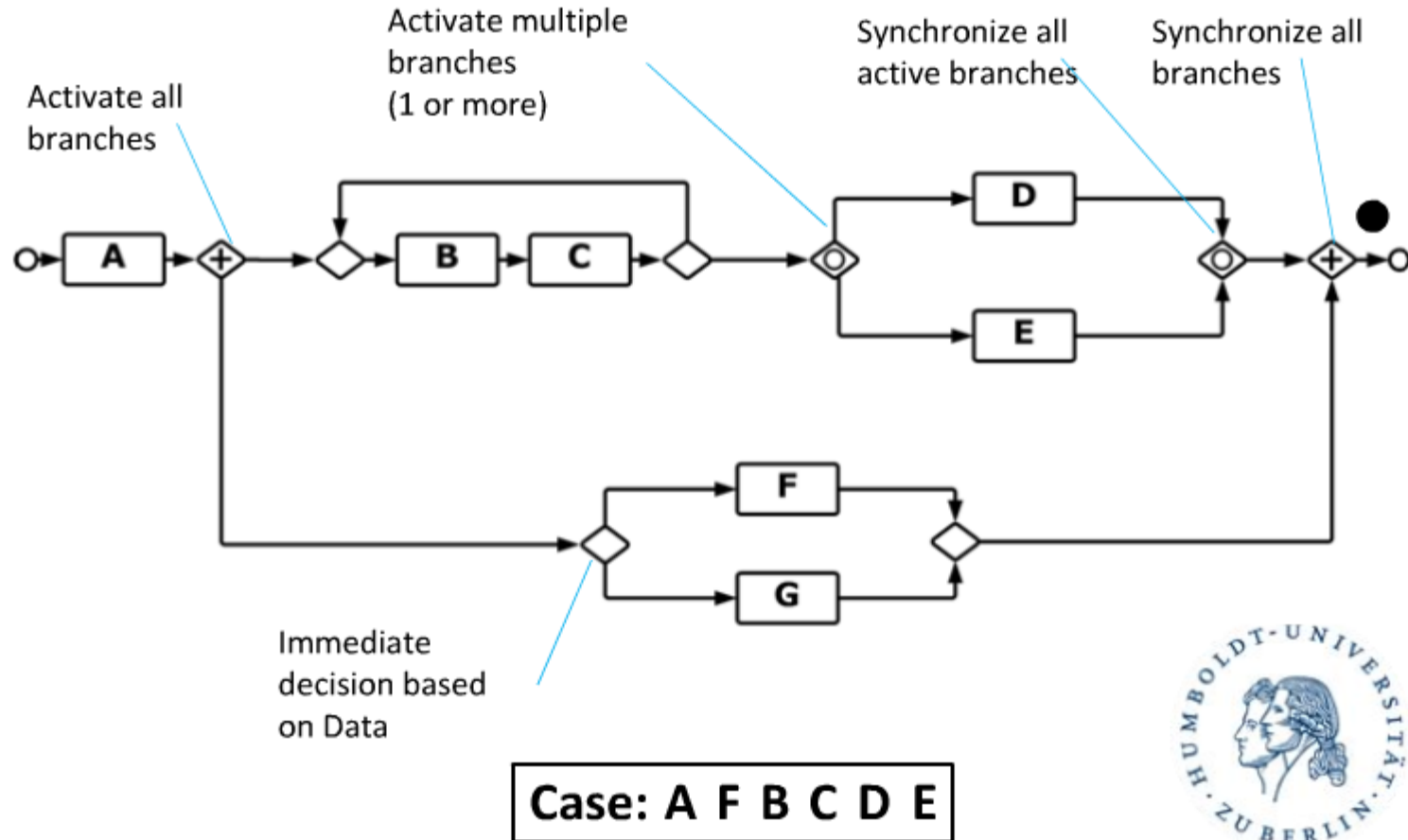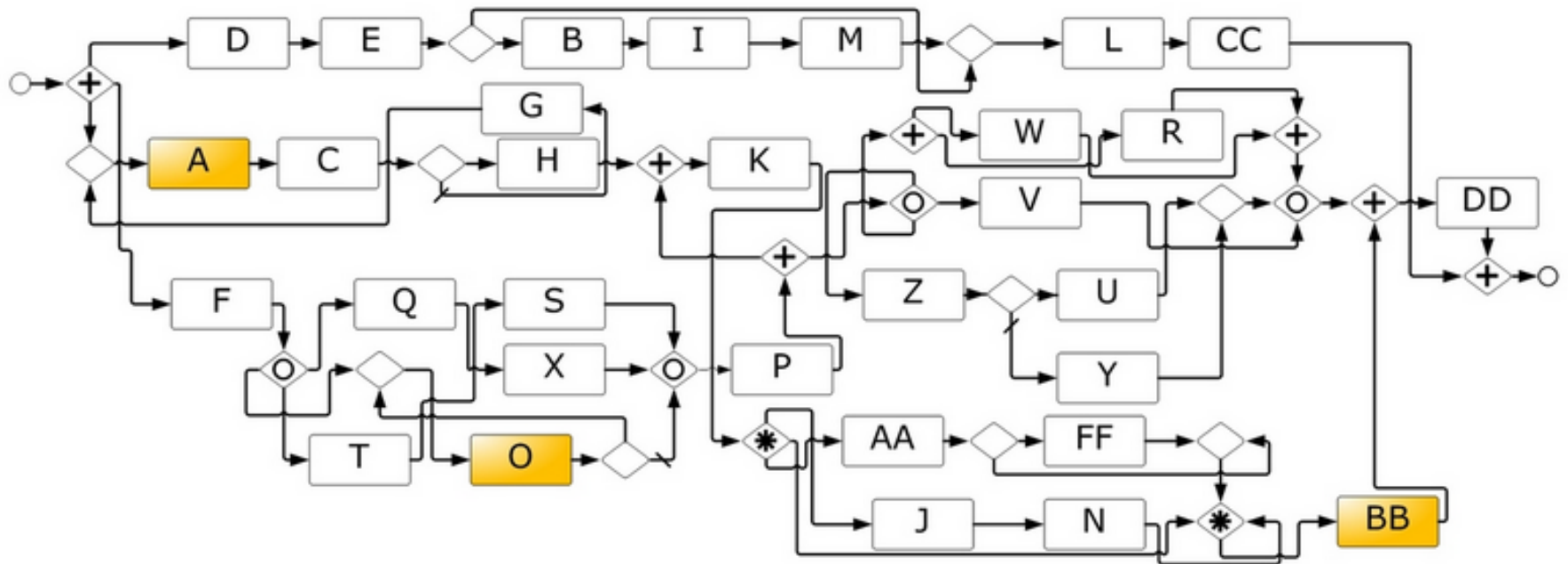


Token Passing Semantics
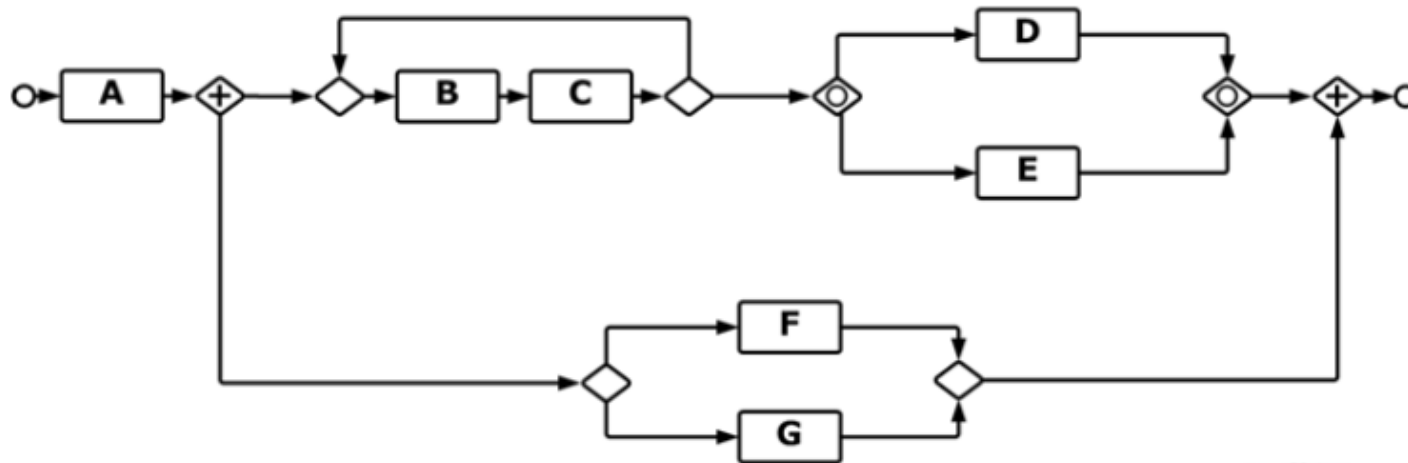
BPMN Self-Test by HU Berlin (no longer exists)

# A simple BPMN workflow... simple?



## Token Passing Semantics

Activate all branches

Activate multiple branches (1 or more)

Synchronize all active branches

Synchronize all branches

Immediate decision based on Data

Case: A F B C D E

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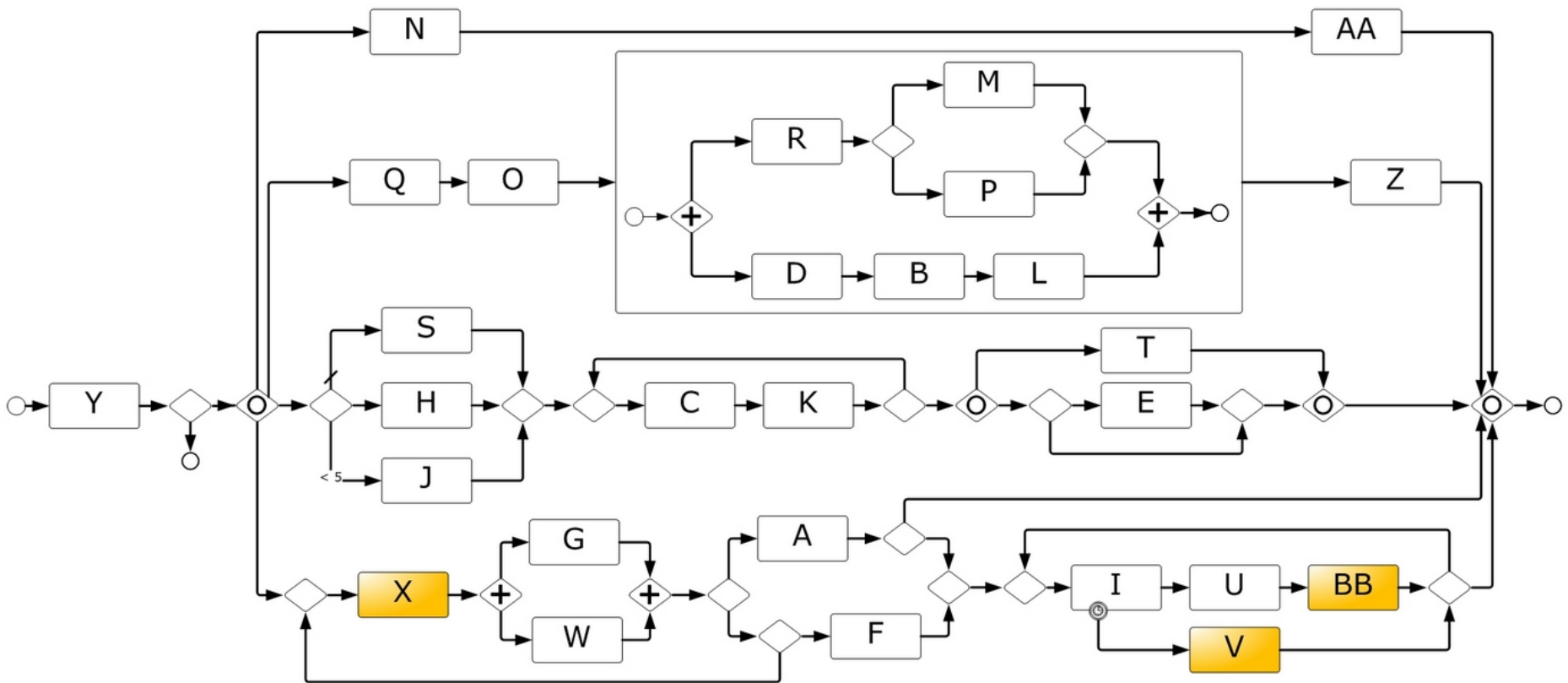
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# Could you answer this one?



If A is executed for a case, then O and BB must also be executed for this case.
○ True ○ False ● Don't know

# Could you answer this one?



If X is executed for a case, then both BB and V can be executed for the same case.
**Wahr oder Falsch?**

# BPMN Editor: ARIS Express

- Free download at