Introduction to Business Process Management

Outline

1. Defining Business Processes
2. On Modeling
3. Business Process Models
4. Interacting Business Processes
5. Models and Instances
6. Levels of Process Models
7. Business Process Lifecycle

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Business Processes are Everywhere

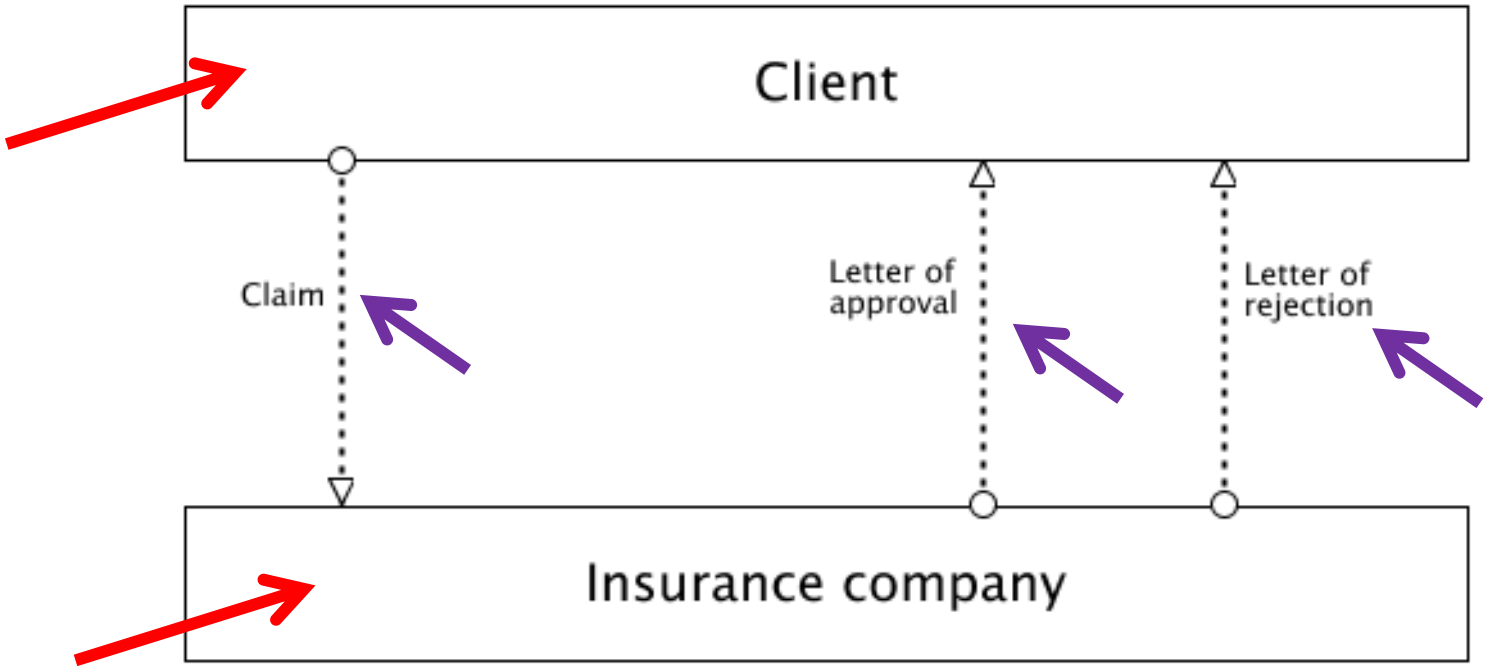
- We are all involved in business processes.

- As clients, we trigger business processes.
  - Submitting an insurance claim
  - Applying for a permit to build a house
  - Applying for a credit to finance property

- As professionals, we participate in business processes.
  - Check whether the theft of a bike is covered by the insurance contract of the applicant.
  - Check if the local requirements for building the house are met.
  - Assess the risk of granting the credit.

Visualisation is helpful

- We try to be visual and represent participants and the flow of messages



Role of Business Processes

- Companies and public administrations provide services and products to their clients by enacting business processes
- Business processes are at the core of organizations and an important success factor
- People are the key to business processes

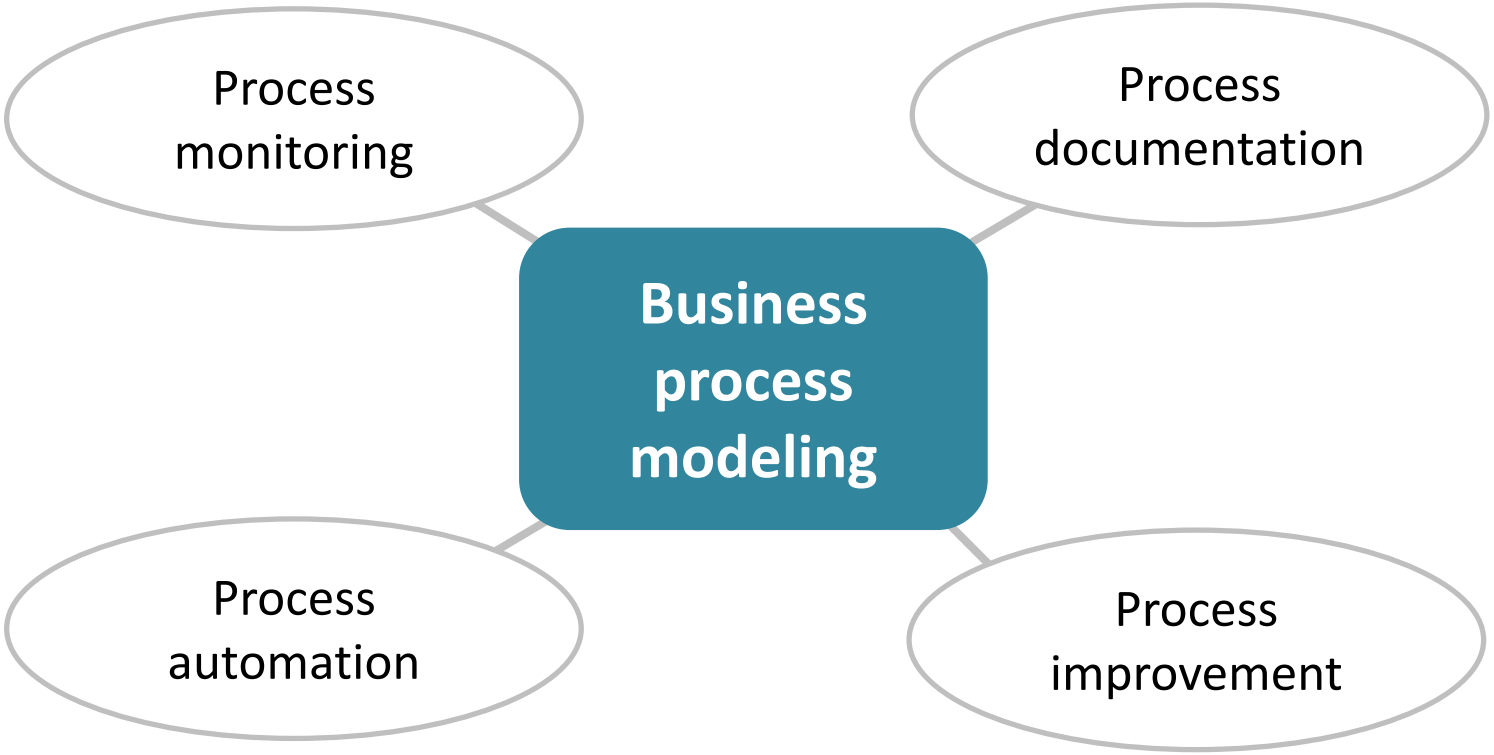
Roles involved in Process Management

- Process participants
  - Domain experts in, e.g., insurance, public administration, finance
- Process owners
  - Domain experts, management position, business background
- Business Process Management consultants
  - Process experts, with business background or IT background
- Software architects and developers
  - IT experts, often computer scientists

- These people use a different technical terminology, they speak “different languages”

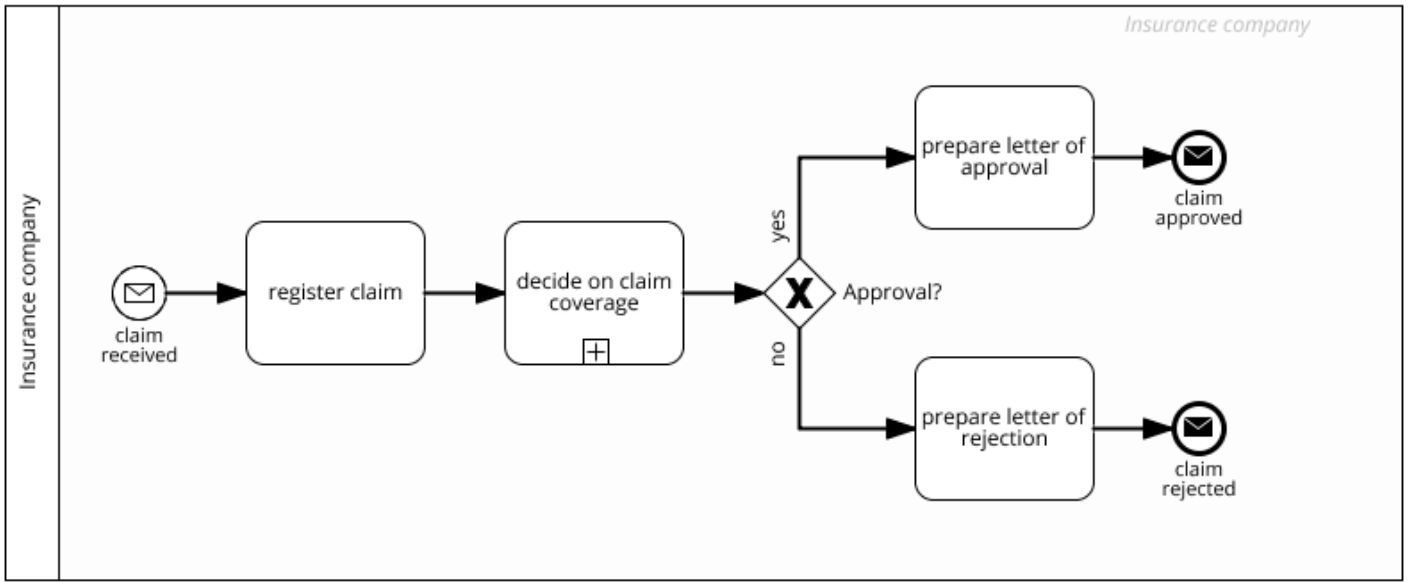
Need for a Common Understanding

- **Common understanding requires a common language**



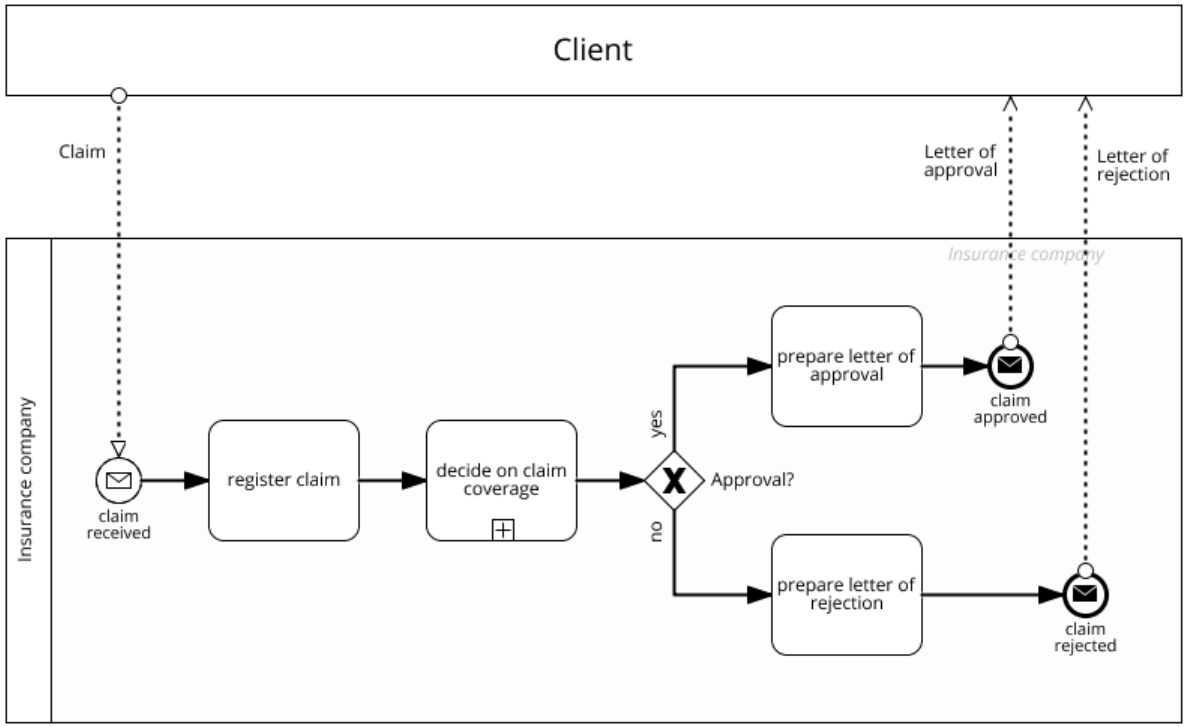
Business Process: Definition

- A business process consists of a set of activities that are performed in coordination in an organizational and technical environment. These activities jointly realize a business goal.



Interacting Business Process

- Each business process is enacted by a single organization.
- But it may – and usually does – **interact** with business processes performed by other organizations.



Business Process Management (BPM)

- BPM includes concepts, methods, and techniques to support
  - the design
  - administration
  - configuration
  - enactment, and
  - analysis of business processes.

Business process lifecycle

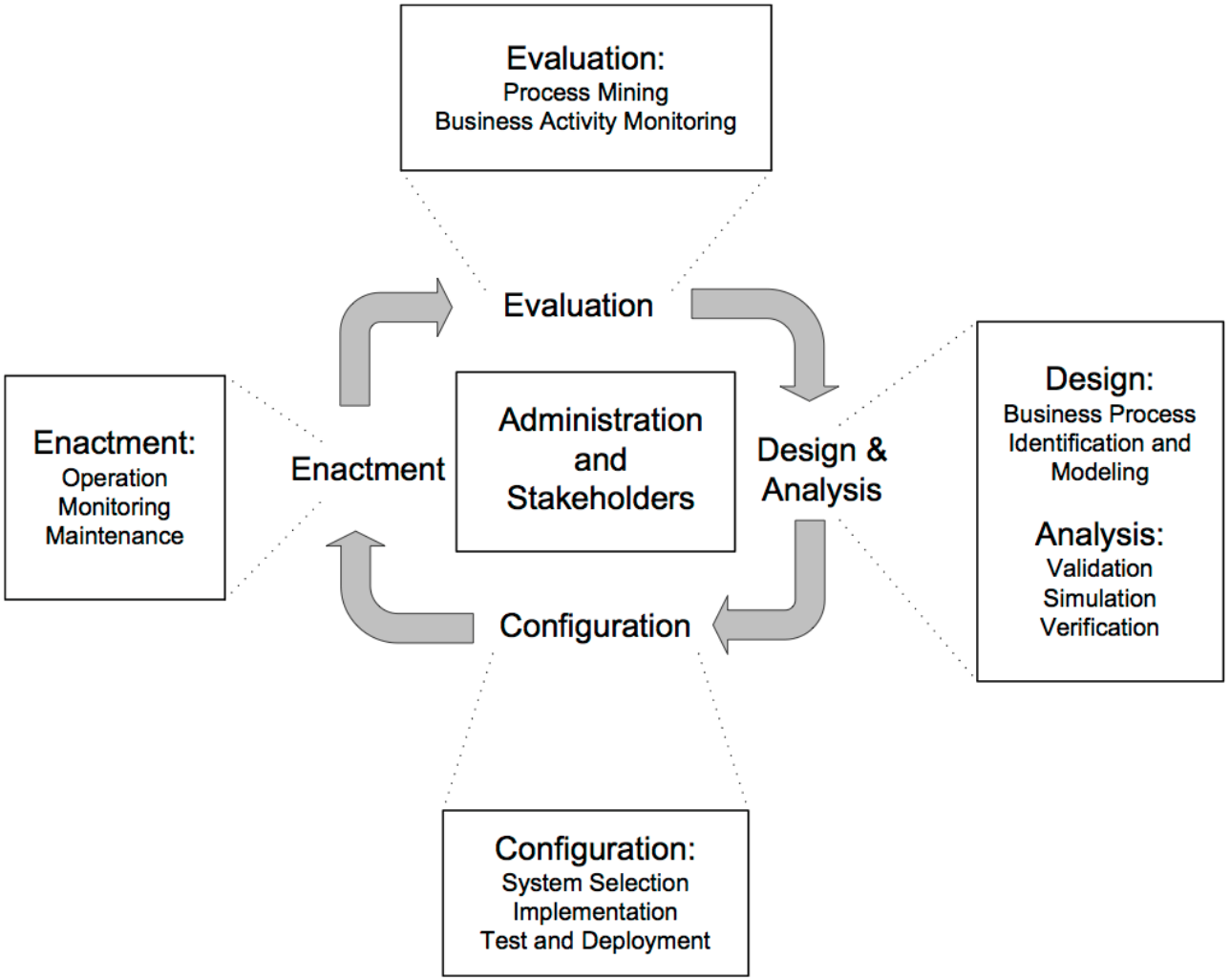


Fig. 1.5. Business process lifecycle

What Business Processes Describe

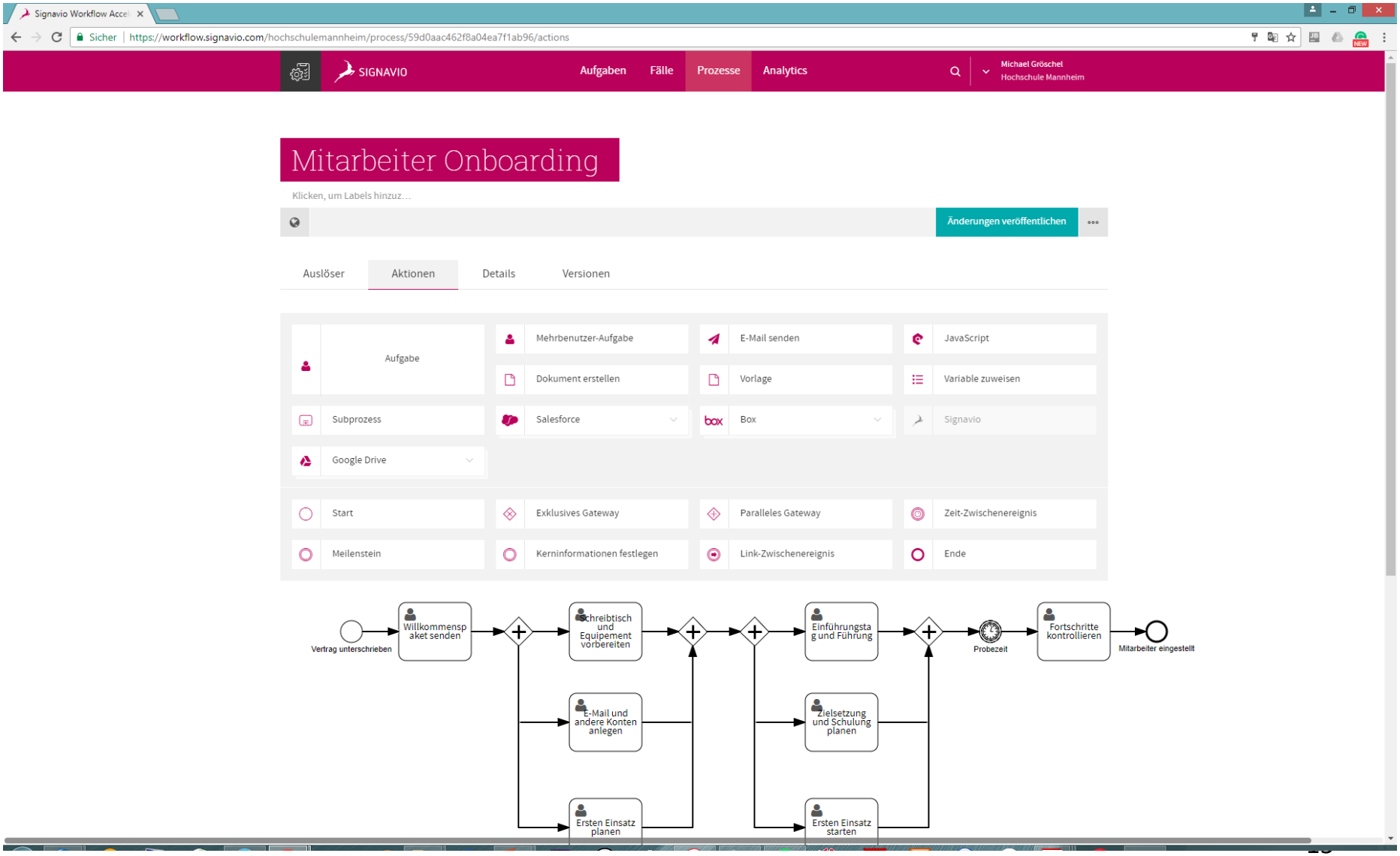
- **Business processes describe the execution ordering of activities and the interaction with partners → process logic**

- **They *do not* describe the implementation of activities (task logic) and interactions, nor the way the coordination is achieved.**

BPM System

- A business process management system (**BPMS**) is a generic software system that is driven by explicit process representations to coordinate the enactment of business processes.
- Coordination can be achieved in a flexible way by a BPMS.

Example: Signavio Workflow Accelarator



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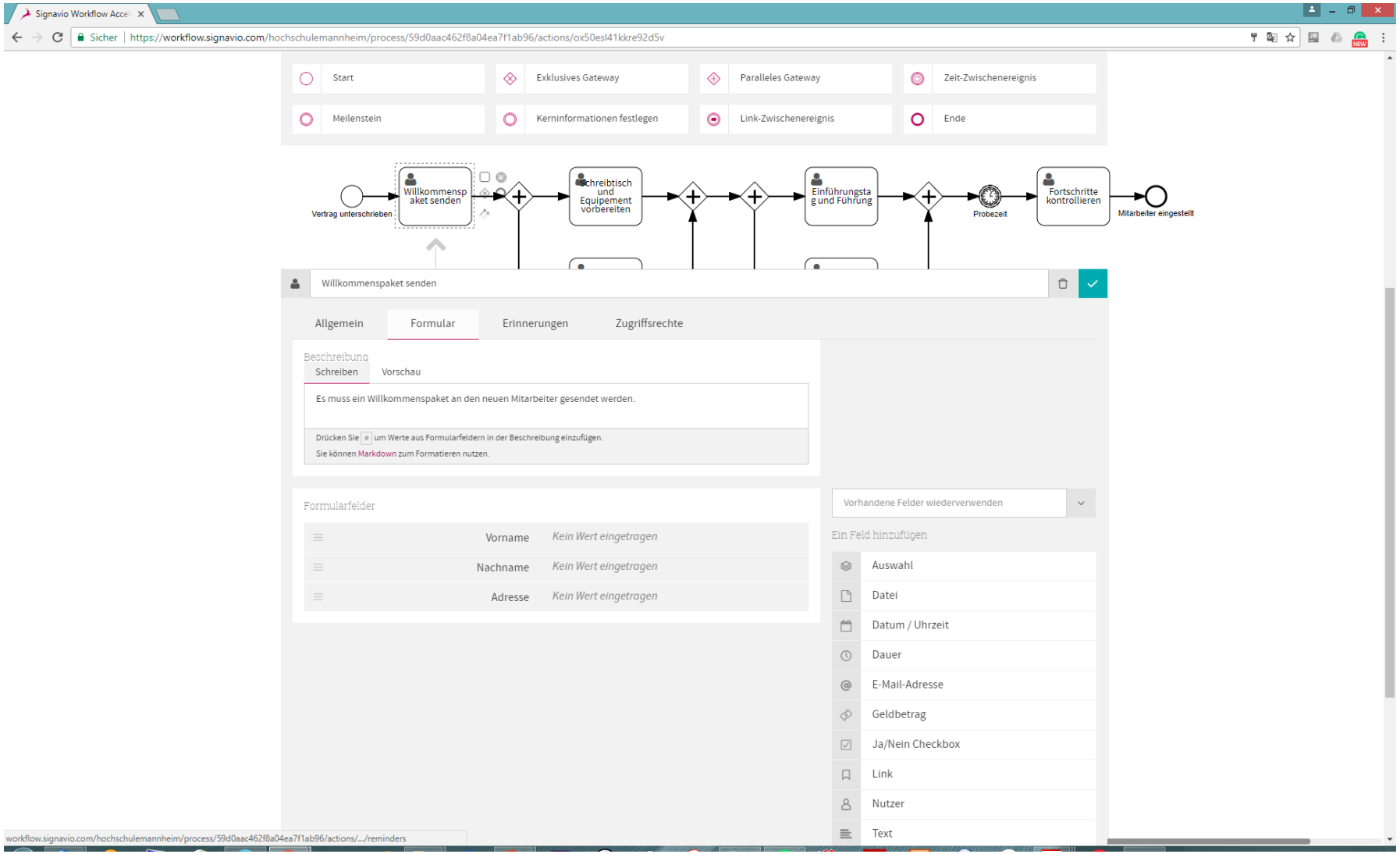
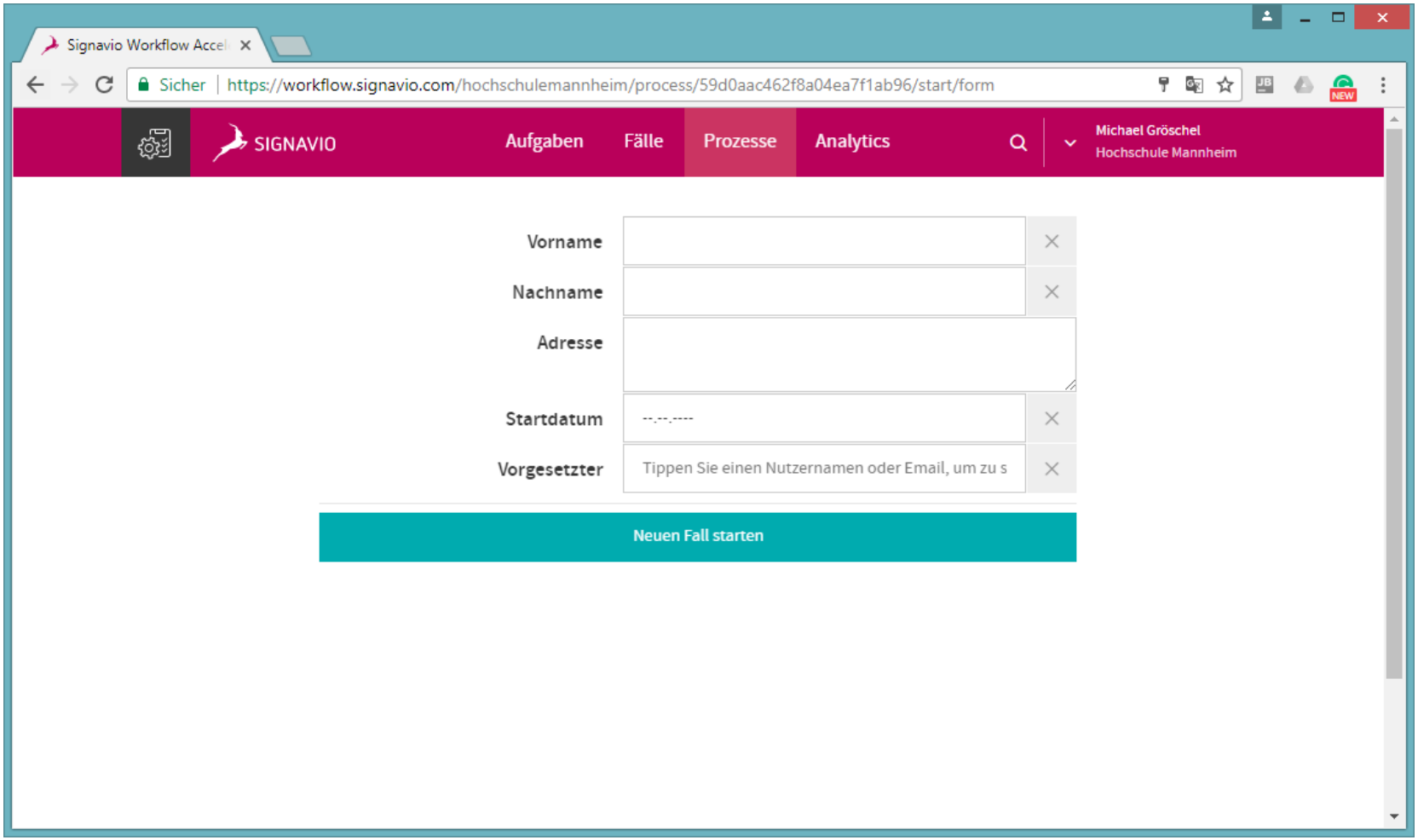


Process Orchestration

- BPMS acts as a central agent that controls the execution of process activities.
- Ensures coordination of activities as defined by the process model
- Similar to a conductor centrally controlling the musicians in an orchestra

Example: Signavio Workflow Accelarator



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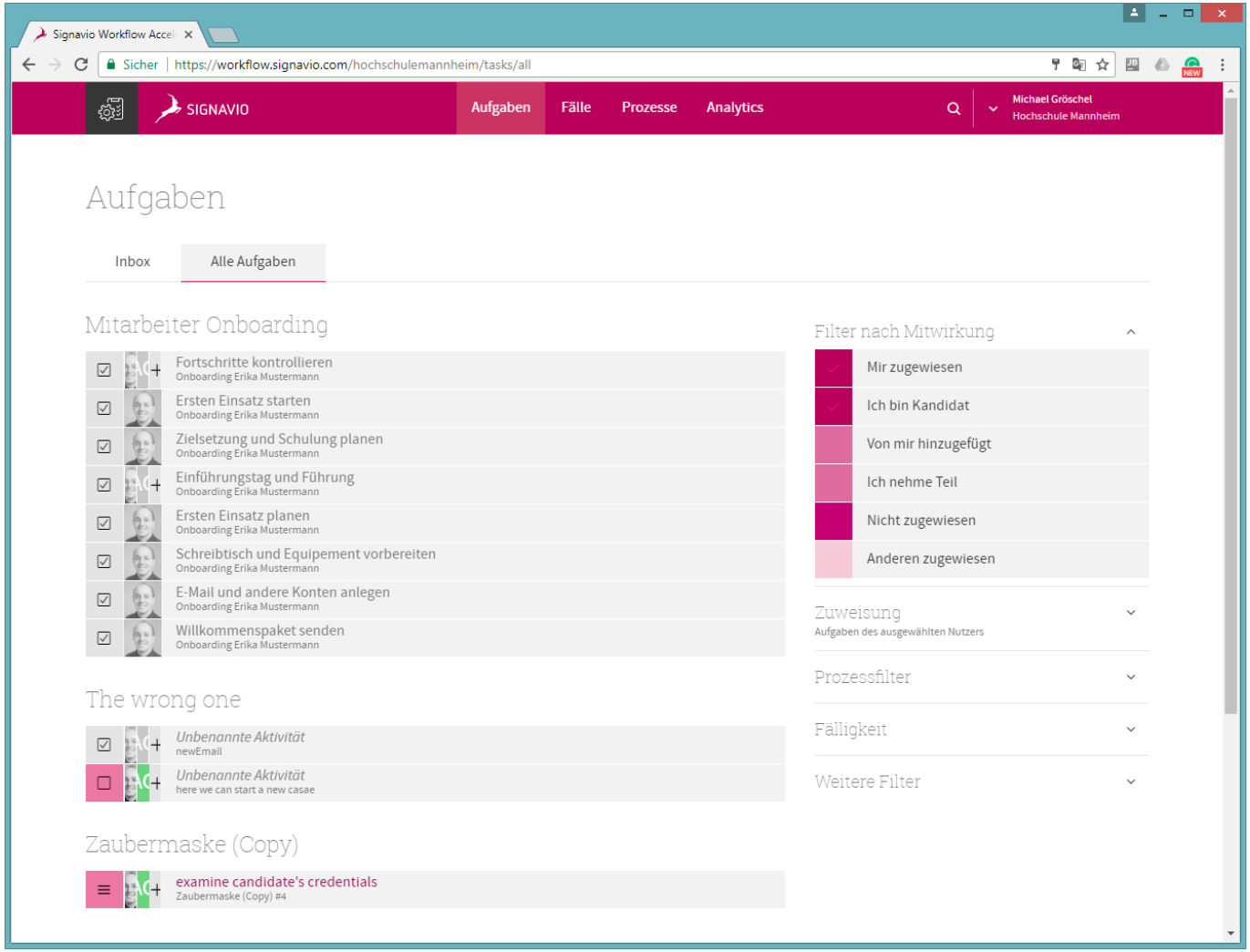

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Modeling Basics

- Modeling is a human way of coping with complexity
  - A model is an abstract representation of an original
  - and has a modeling goal

Models - Discussion

- Let‘s discuss about models you already used in your study (of information systems oder computer science)?

- How are the models presented?
- What are these models for?
- What are the advantages of these models?

Modelle: Partnerdiskussion

5 min

- **Beschreiben und diskutieren Sie 2-3 Situationen, in denen Sie in der Informatik bereits Modelle eingesetzt haben.**

- **Anregungen**
  - **Wie werden die Modelle dargestellt?**
  - **Wozu gibt es diese Modelle?**
  - **Welche Vorteile und Nachteile sind mit diesen Modellen verbunden?**

Modelle

- Welche Modelle kennen Sie bereits in der Informatik/Wirtschaftsinformatik?

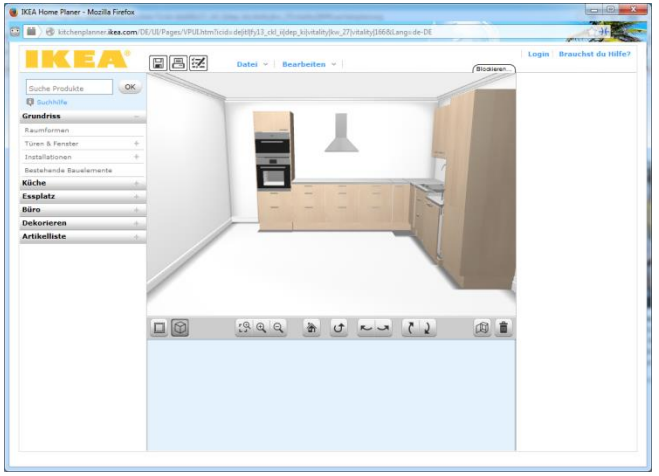
- Wozu gibt es diese Modelle?
- Welche Vorteile verspricht man sich von diesen Modellen?

Properties of Models (Stachowiak 1973)

- **Mapping feature**
  - Models are associated with originals, which might or might not exist, and originals are mapped to models during the creative act of modeling („**Abbildungsmerkmal**“)
- **Abstraction feature**
  - Models are abstract representations of originals; models disregard properties that are not considered relevant for the modeling goal by the modelers („**Verkürzungsmerkmal**“)
- **Pragmatic feature**
  - Models can replace originals for the modeling goal („**pragmatisches Merkmal**“)

Mapping feature

- **Descriptive Models**
  - Descriptive models describe an existing original
  - As-is-Models
- **Prescriptive Models**
  - Prescriptive models prescribe how to build an original
  - To-be-Models
- Is a model descriptive or prescriptive?



Modeling in Computer Science

- Models play a key role in the design of systems, especially IT systems.

- Examples
  - UML
  - Data Model (ERM)
  - Architecture Models
  - Process Models

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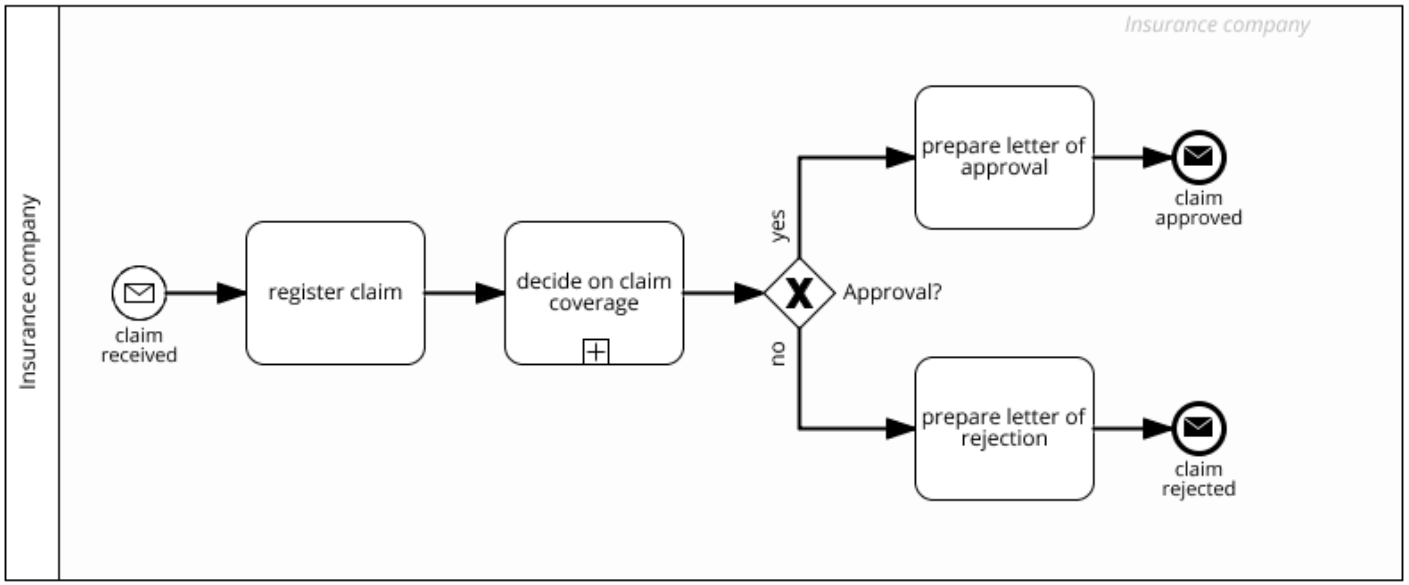
Business Process Models

- A business process model is an **abstract representation** of a business process, serving a modeling goal.

- Do you remember Stachowiaks "Properties of Models"?

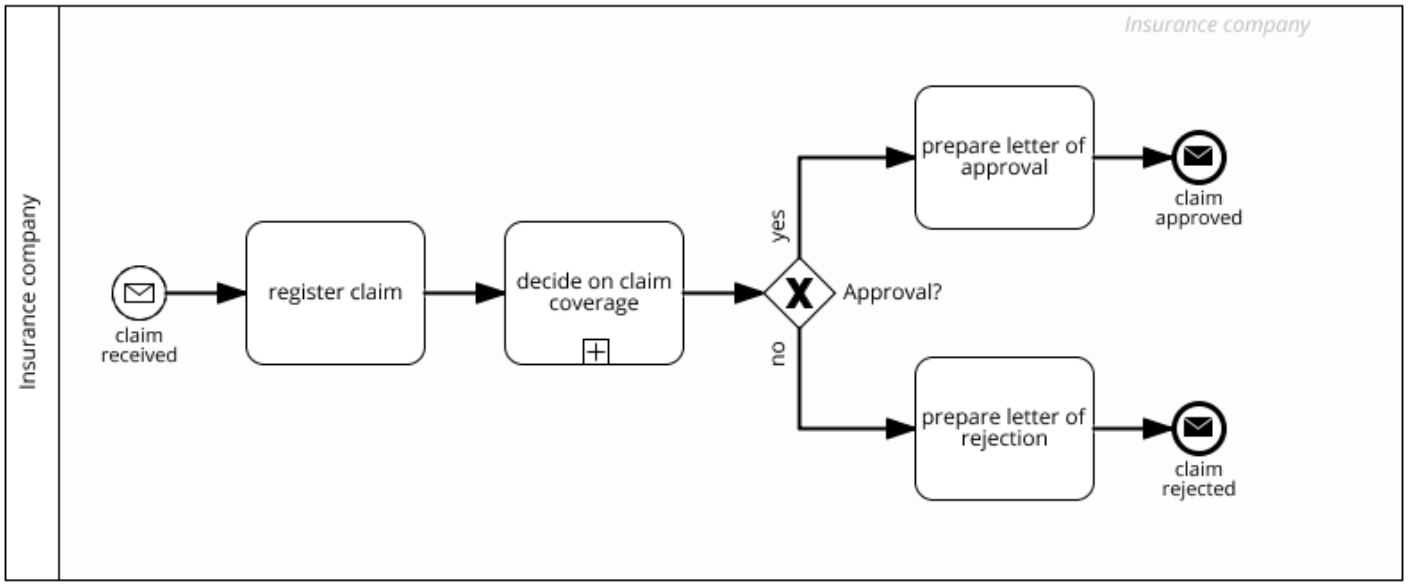
Business Process Models: Mapping feature

- In process modeling, we map relevant aspects of business processes to process models
- For instance, events, activities, ordering, and decisions



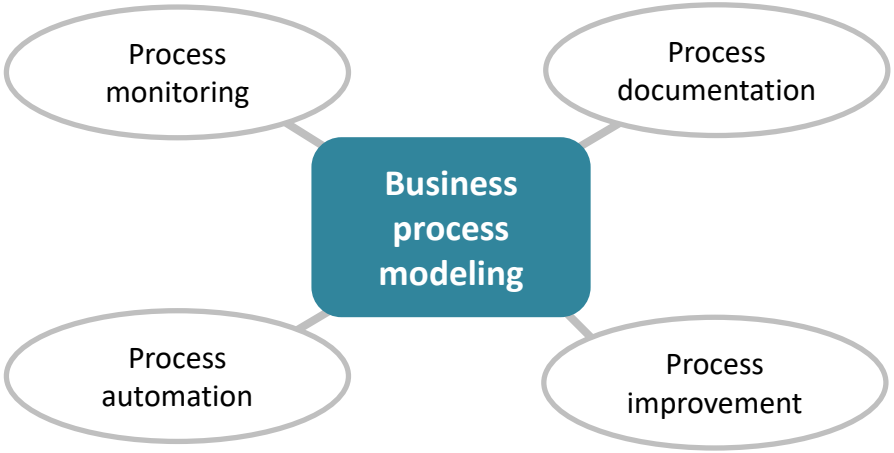
Business Process Models: Abstraction feature

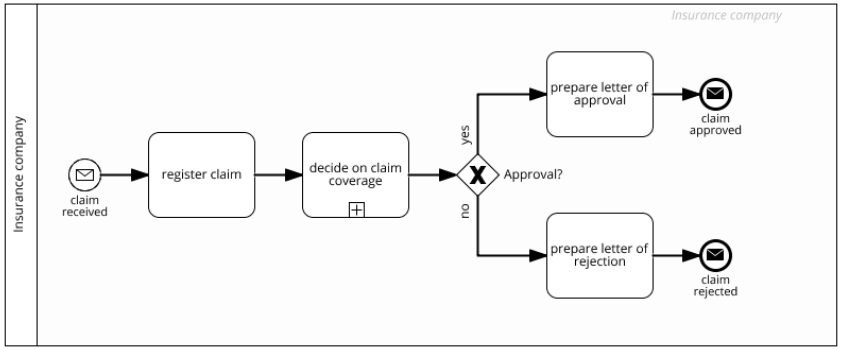
- Each business process model abstracts from aspects that are not relevant for the modeling goal
- Each process model should only have elements that are relevant for the particular modeling goal



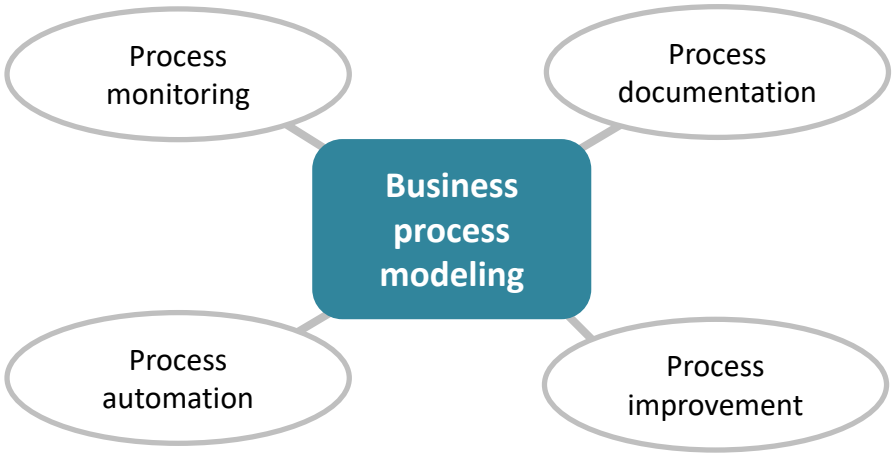
Business Process Models: Pragmatic feature

- Each business process model can replace the business process for the modeling goal





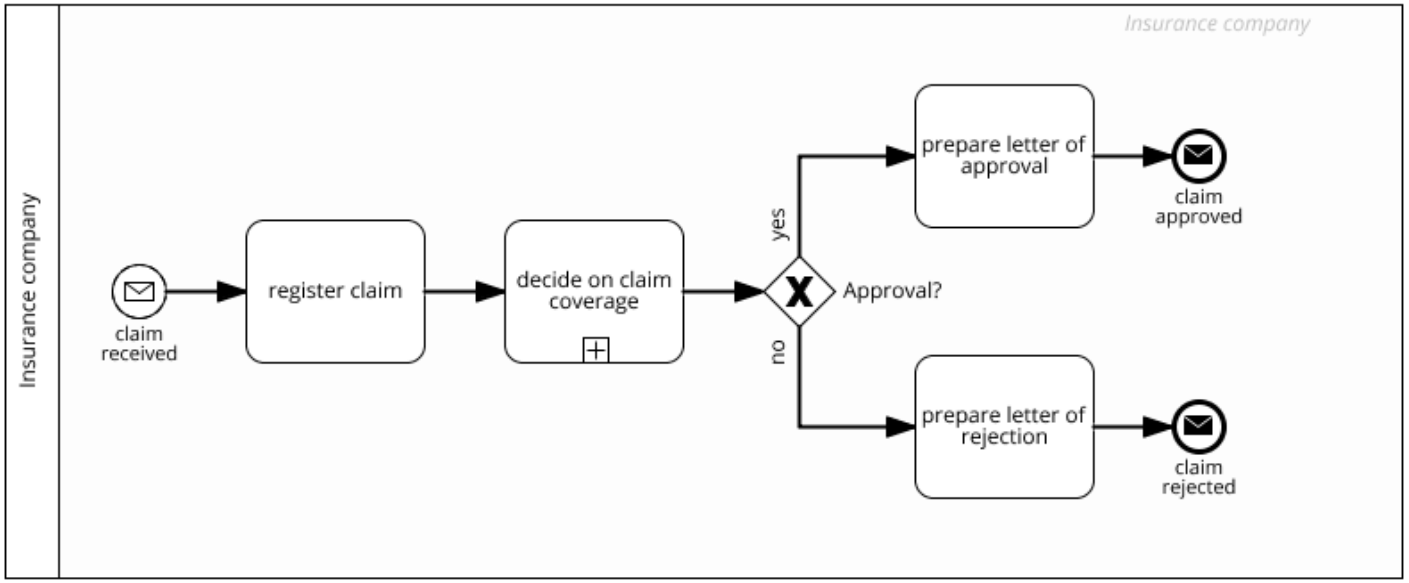
Business Process Models: Descriptive or Prescriptive?



- **Process models can have a descriptive character *or* a prescriptive character.**

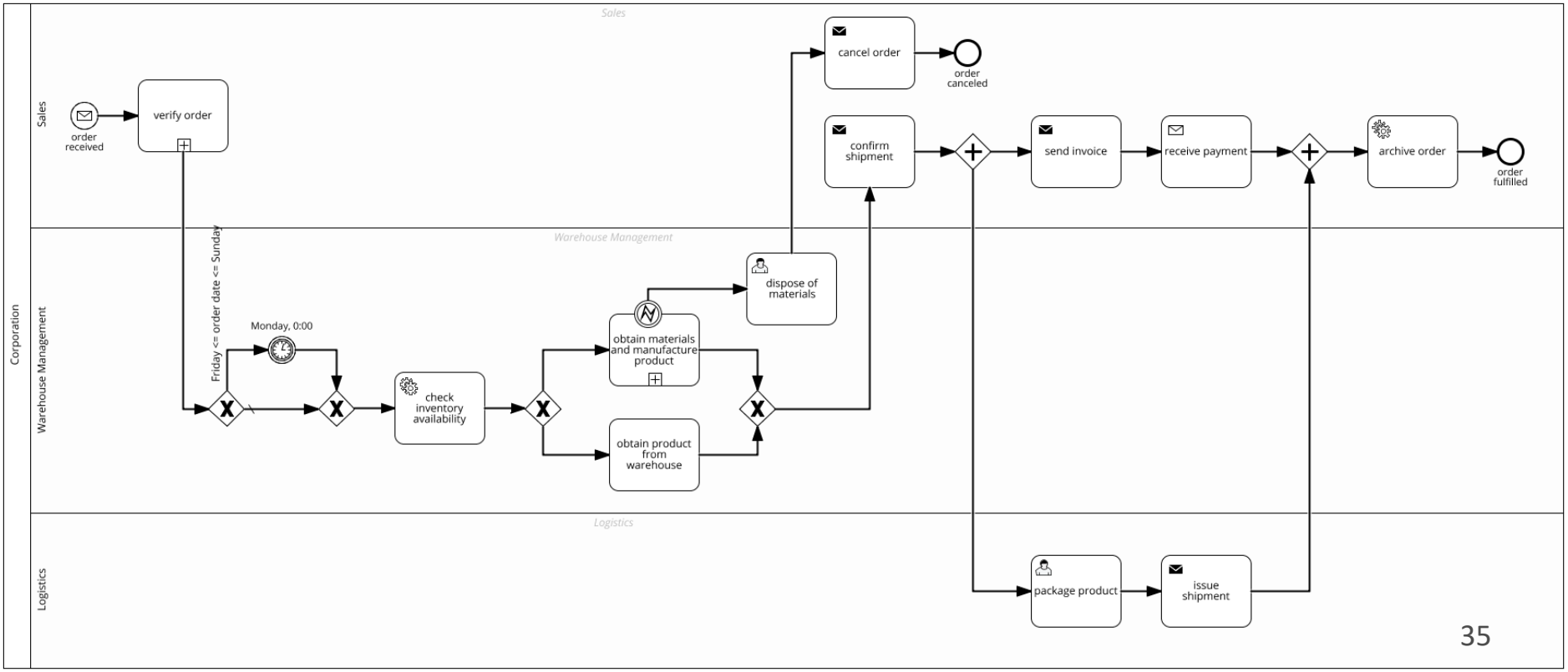
Process Models answer Questions

- The goal of business process models is answering questions:
  - Which activities constitute the business process?
  - Which decisions can be taken?
  - Which event starts the process?
  - What is the ordering of events, decisions, activities?
  - Which are the possible outcomes of the process?



Process Models answer Questions

- Who is responsible for conducting which activities?
- Where are the handovers of work in the process?
- Who takes which decisions in the process?
- Which errors can occur, and how do we react to them?

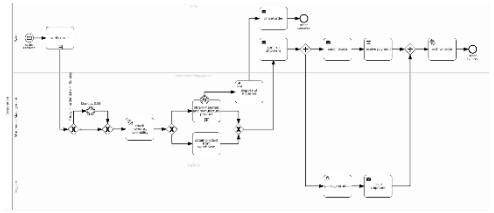


Process Models: Simple or Complex?

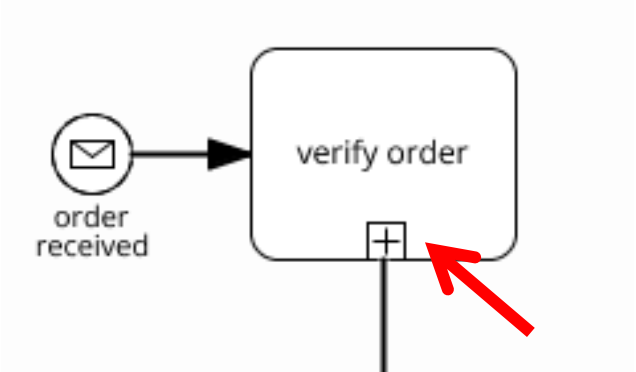
- A process model should be designed so that it can answer exactly the questions it is meant to answer
  - Simple and well readable process models might suffice
  - But some process models need to answer complex questions, for instance, regarding detailed working procedures

Process Models: Simple or Complex?

- **Process models should always be understandable, so there is a limit to process model complexity**



- **BPMN provides means to handle complexity, for instance decomposition → sub-processes**



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Interacting Business Processes

- Business processes can interact with other business processes
- Example: Order fulfillment by a reseller
  - To focus on the interaction, almost only send and

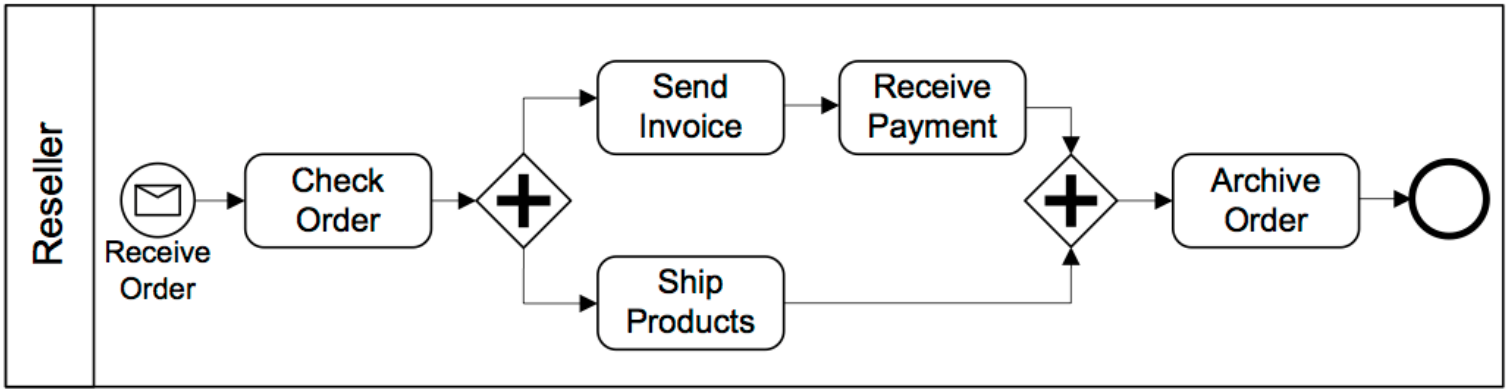


Fig. 1.1. Simple ordering process of reseller

Interacting Business Processes

- The buyer also runs a corresponding business process
  - For placing the order, receiving the products, etc.
  - The buyer process interacts with the reseller process

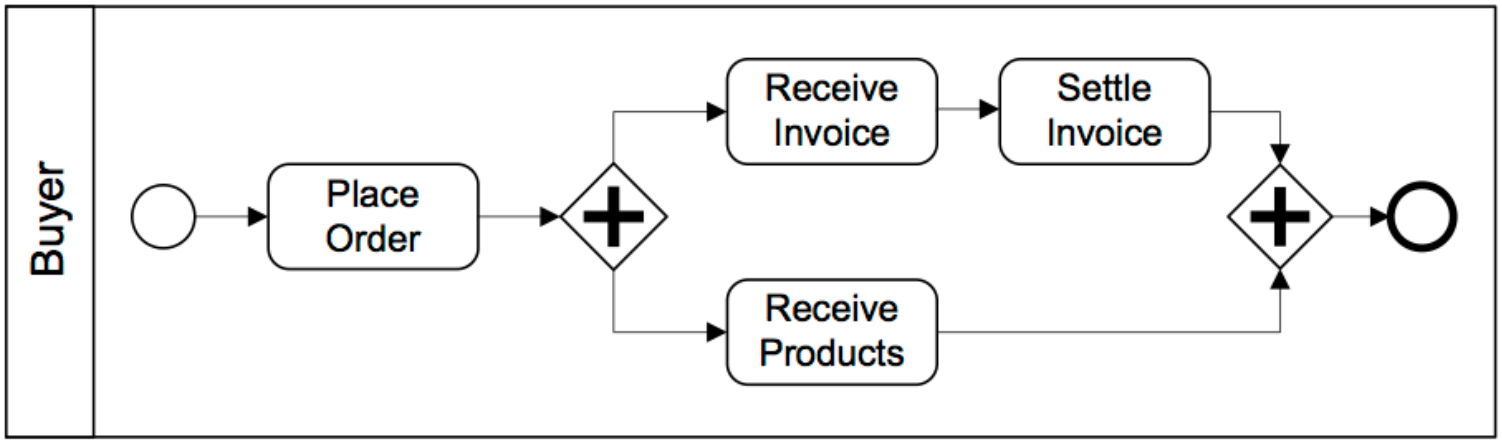


Fig. 1.2. Ordering process of a buyer

Interacting Business Processes

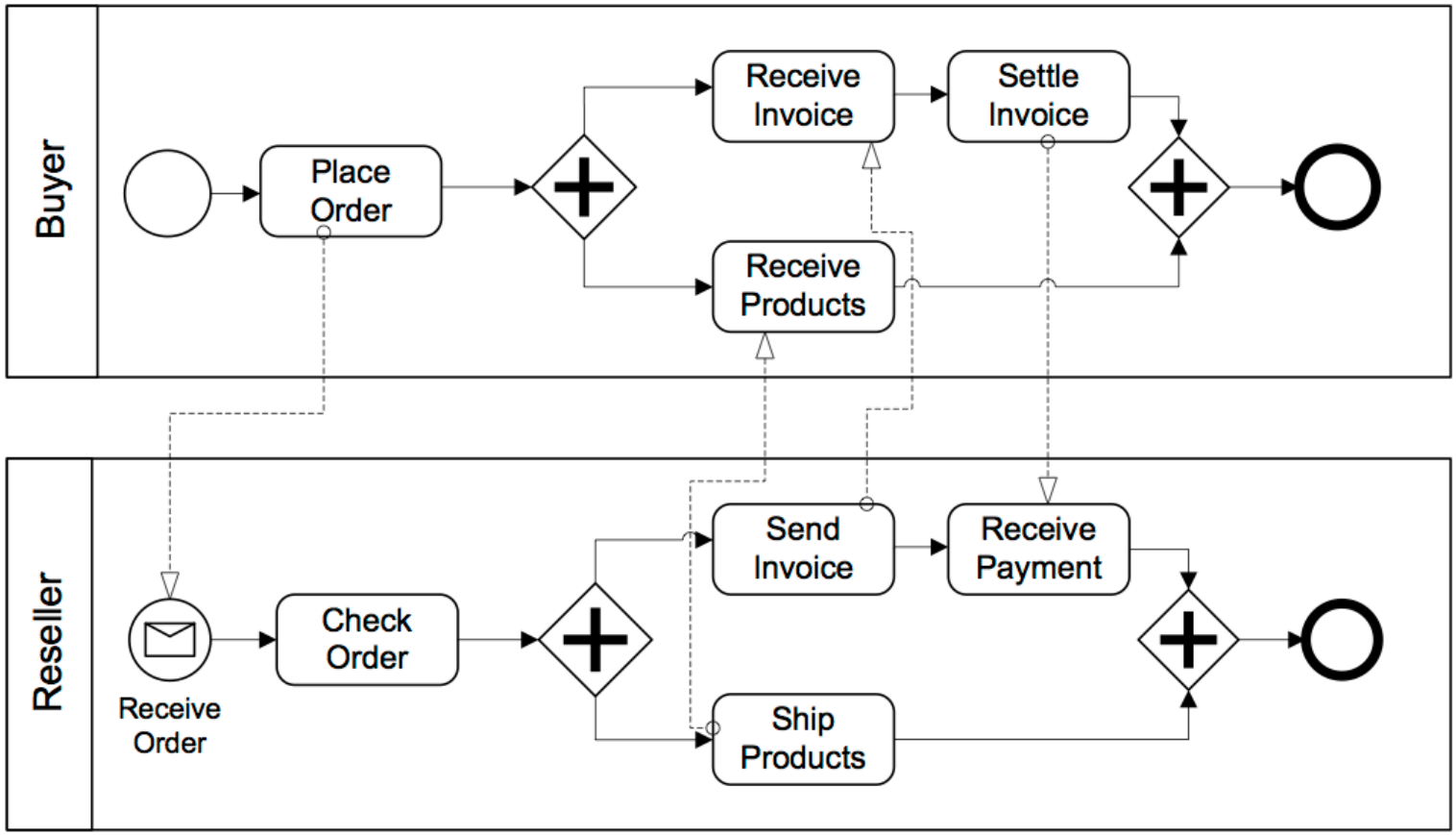


Fig. 1.3. Interacting business processes form process choreography

Interacting Business Processes

- **Interaction between business processes**
  - **Performed by sending and receiving messages (BPMN: "message flow")**
  - **No common data store assumed**
  - **These assumptions match reality quite well**

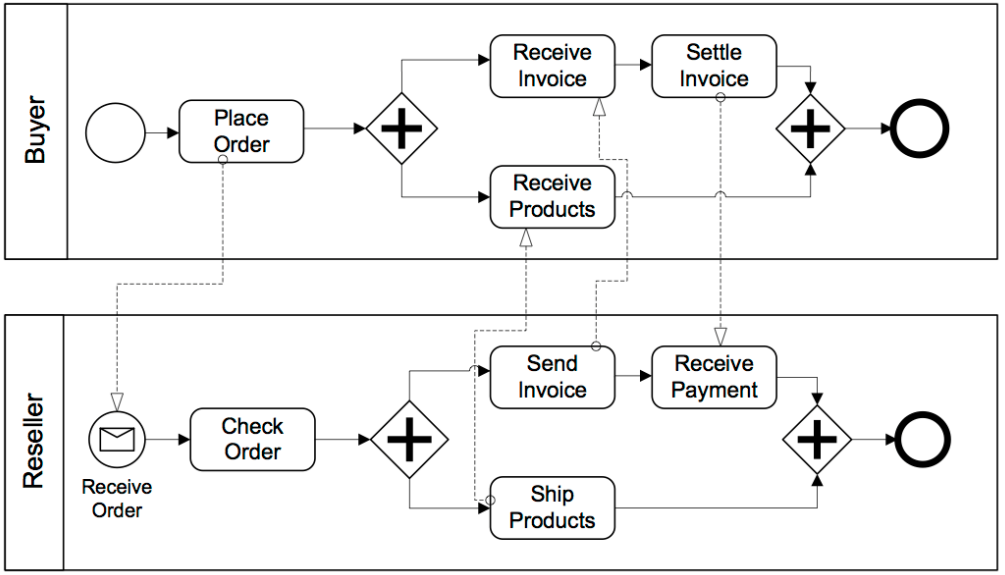
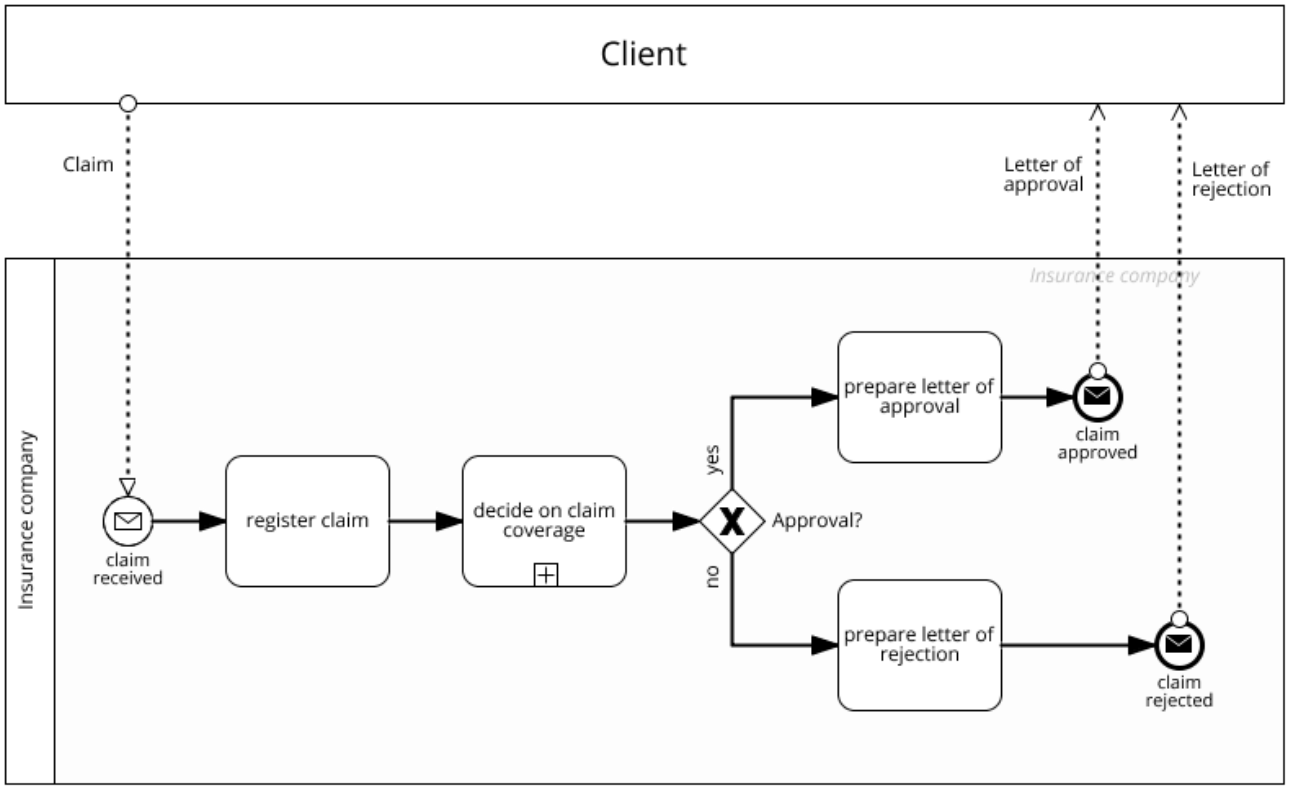


Fig. 1.3. Interacting business processes form process choreography

Interacting Business Processes

- **These assumptions also fit with the insurance claim example.**



Interacting Business Processes

- Interacting business processes are specified by process choreographies
  - can be defined by connecting send and receive activities of different business processes

- Process choreography
  - The term choreography indicates the absence of a central agent that controls the activities in the business processes involved. The interaction is only achieved by sending and receiving messages.
  - This situation is similar to dancers who need to agree on a common choreography before the performance commences. During the performance, however, each dancer behaves autonomously but in line with his or her part in the choreography.

New Reseller: Reseller-A

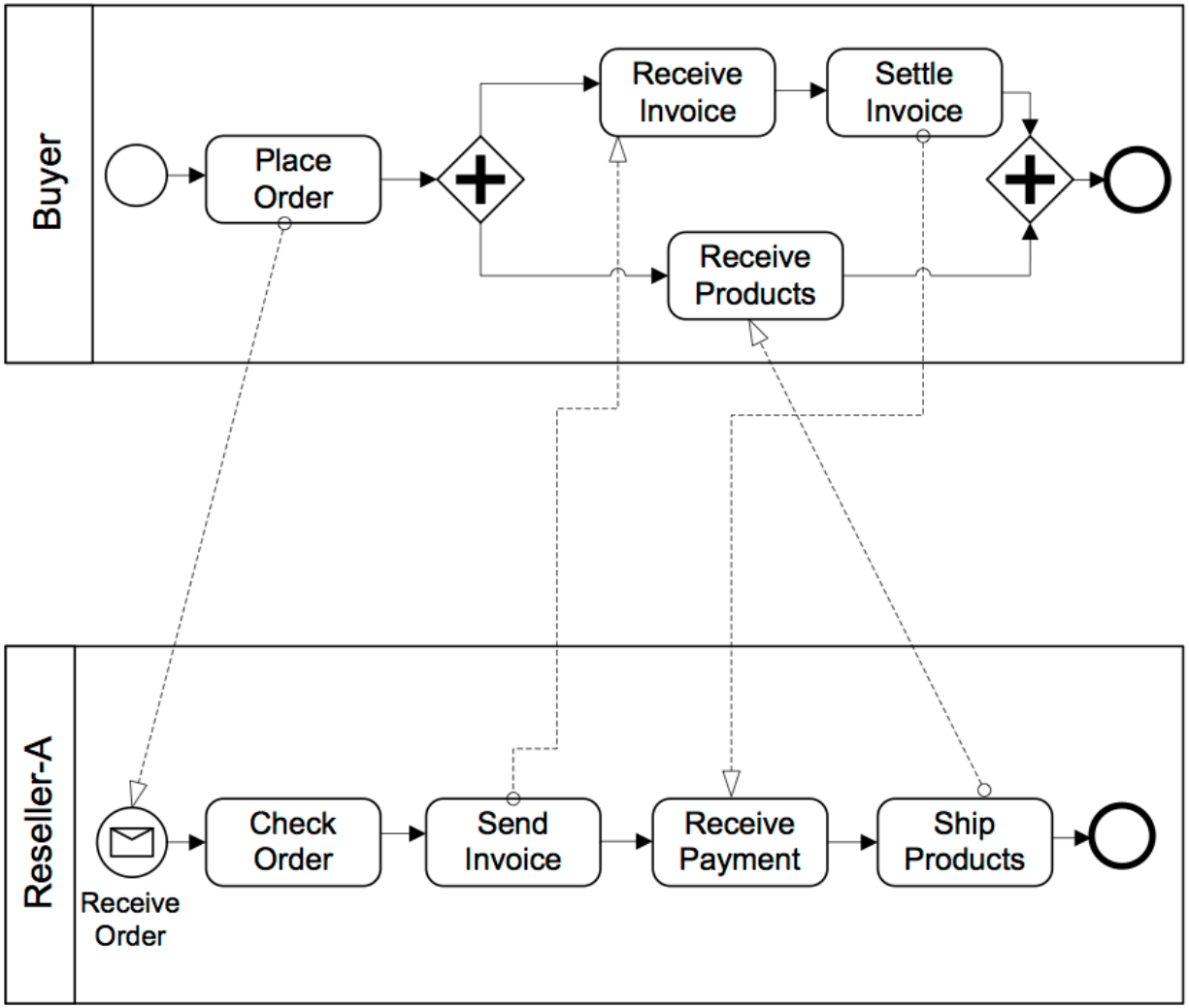


Fig. 1.4. Variant of reseller process with interacting business process

Interaction with Reseller-A

- Observation
  - Reseller-A sends the products only after receiving the payment
  - Still, the interaction between the business processes is correct

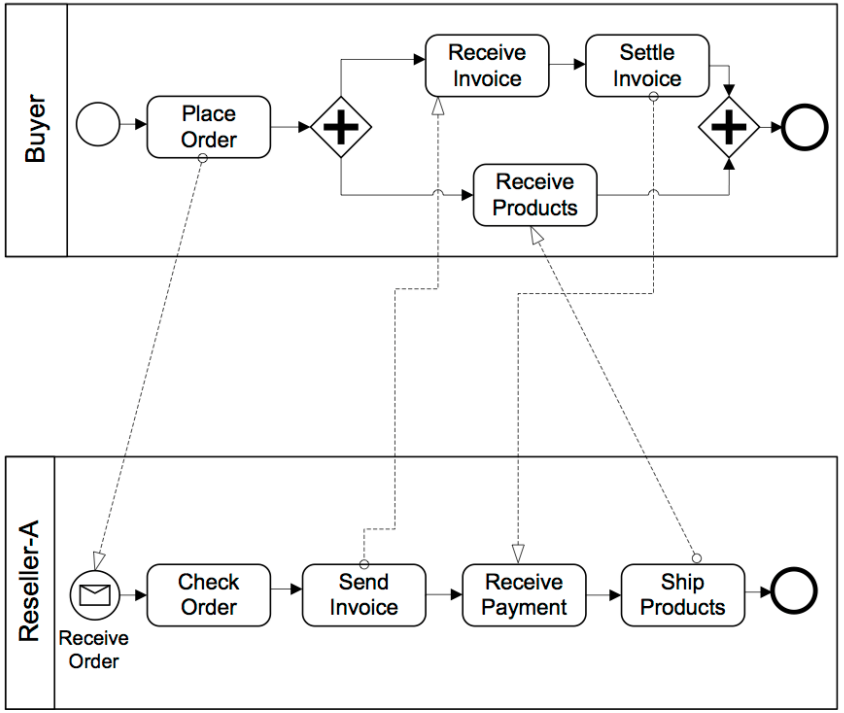
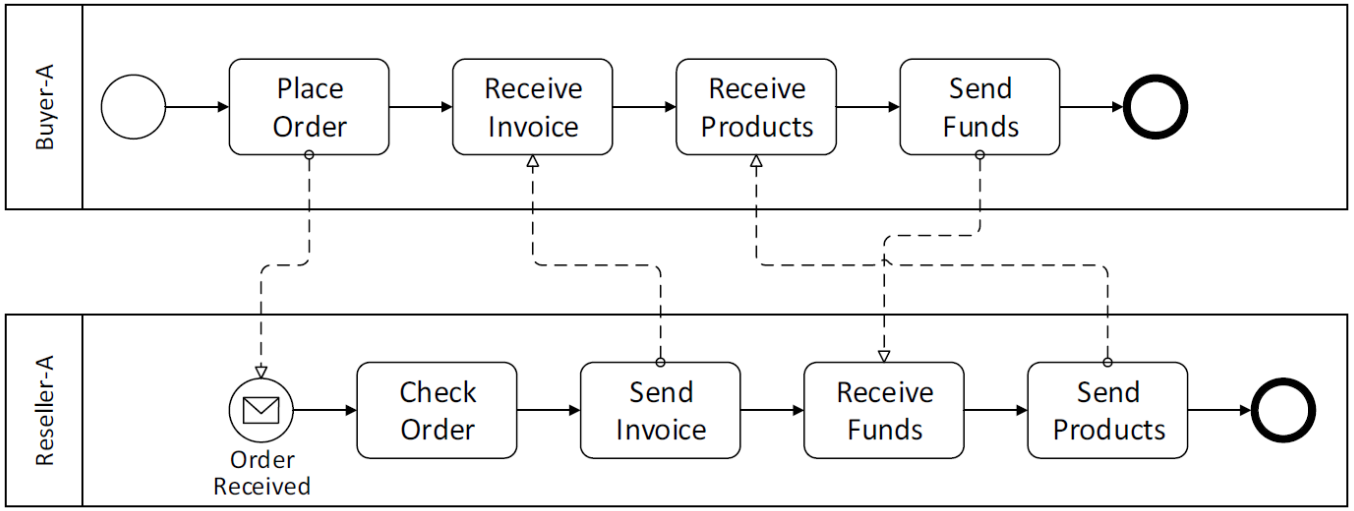


Fig. 1.4. Variant of reseller process with interacting business process

Interaction with new Buyer



- Assume there is a new Buyer-A
  - Buyer-A sends the funds only after receiving the products
  - As a result, the interaction between the business processes is incorrect

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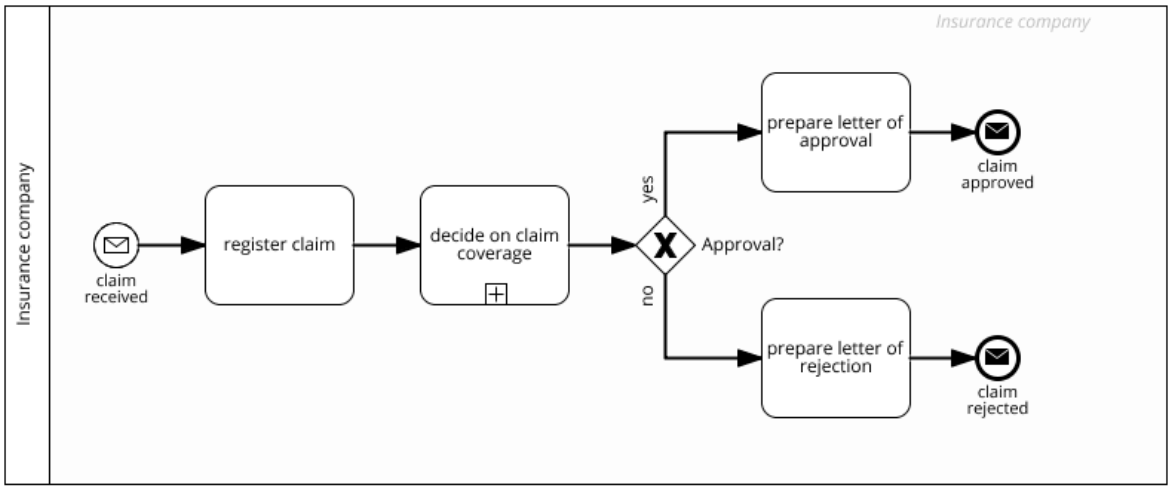
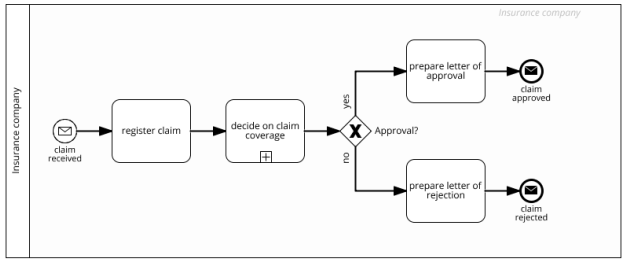
Models and Instances

- Each business process model acts as a blue print for a set of business process instances
  - The abstraction feature includes classification
  - The whole class of process instances is represented by the process model



Models and Instances

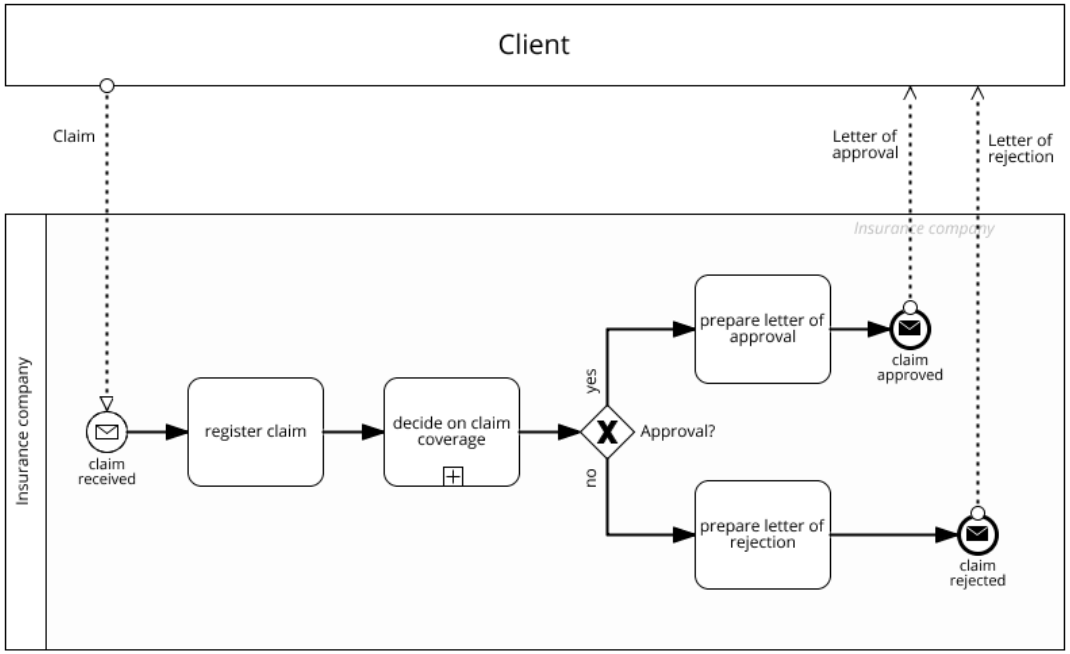
- A business process instance represents a concrete case in the operational business of a company.
  - Each process model has any number of instances
  - Process Model 1 : n Process Instances



Client-ID	Client-Name	Case-ID	Date	Subject	Value
142	Weber	7671	Sept 18, 2013	Road bike	€ 1590
143	Petersen	7479	Sept 19, 2013	MTB	€ 1490
144	Lose	7963	Sept 19, 2013	MTB	€ 1890
…	…	…	…	…	…

Process Instances

- As clients, we trigger business process instances
- Notice: There is no visual representation of process instances



Process Instances: Token Metaphor

- Process instances may be seen as **tokens**, which go a distinguished path through the process model

- Demo

Terminology is important

- We need to be careful when using the term „process“
  - Do we mean a process model or a process instance?
  - Examples
    - “Do you have a process for procuring material?”
    - “Did the hiring process already start?”

- Strictly speaking: There is not such thing as a process, it is either a process model or a process instance!

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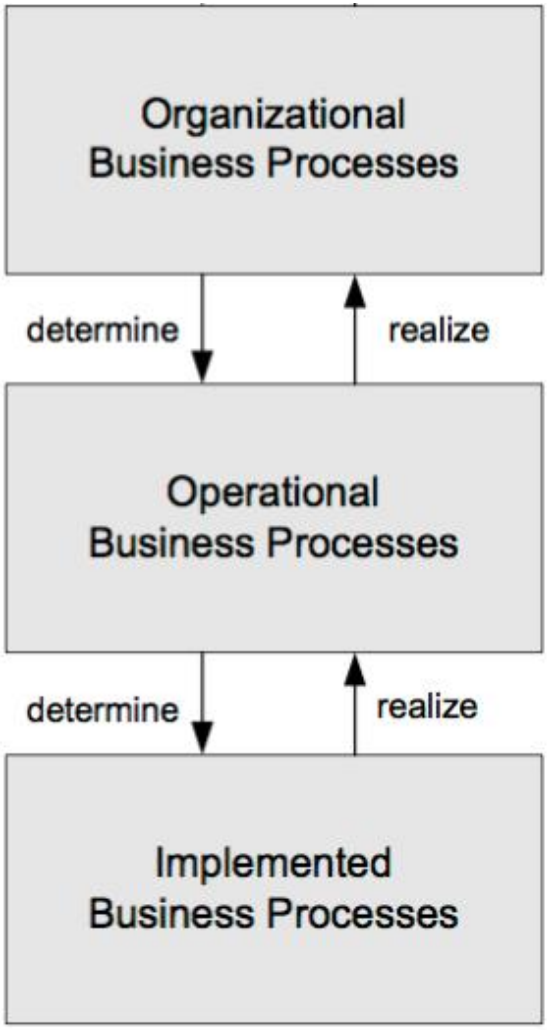
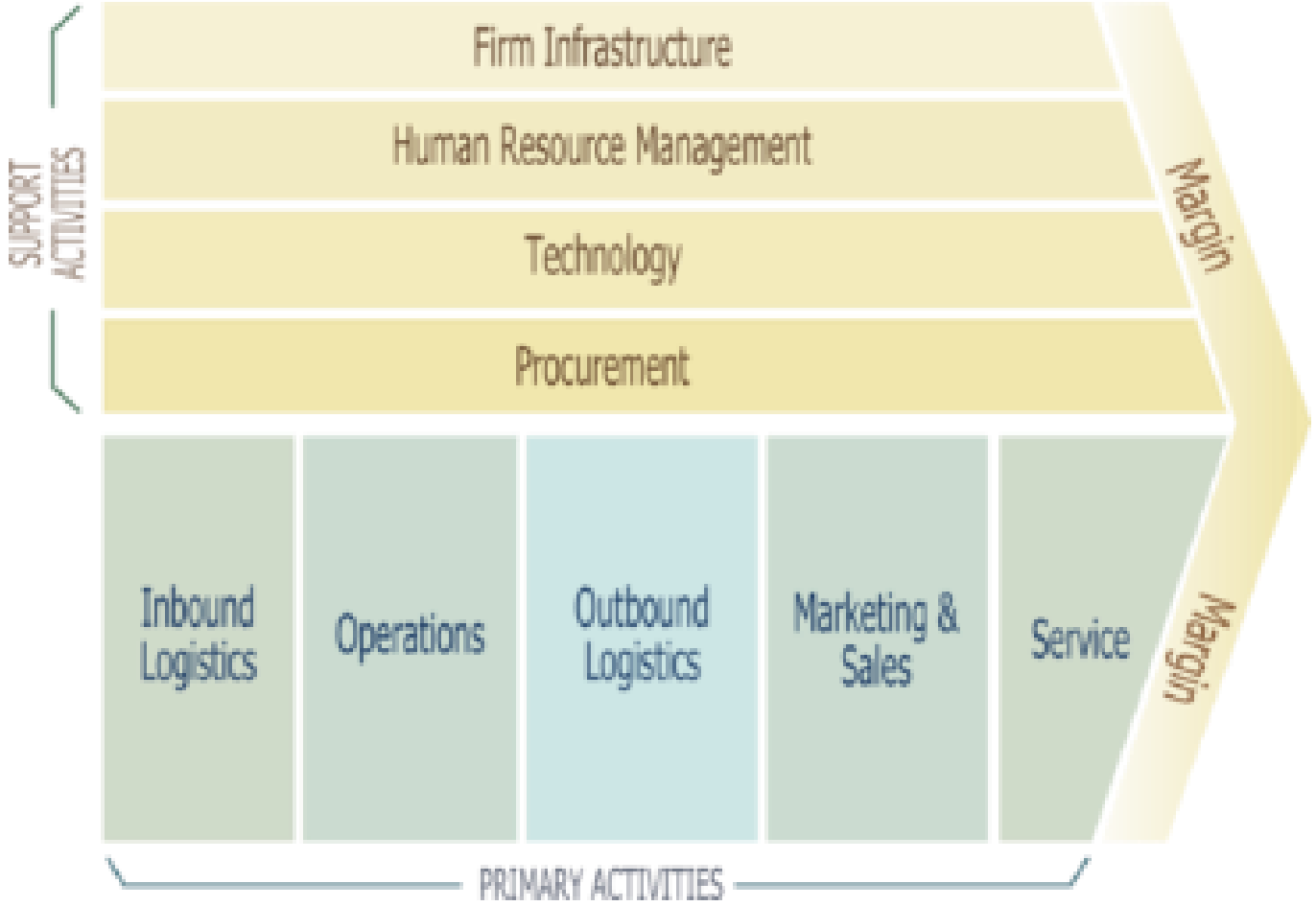
Levels of Business Processes

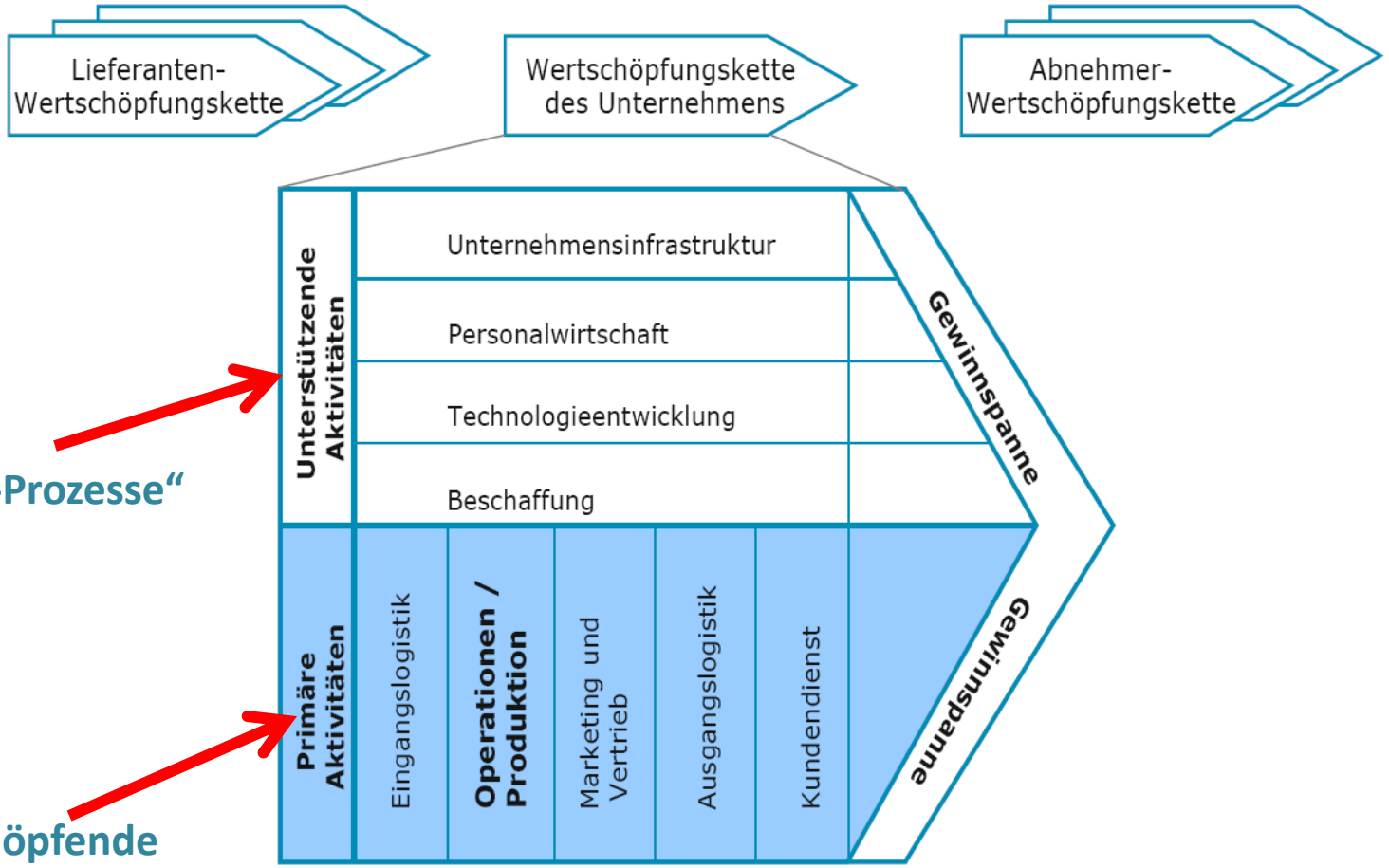
- **Organizational business processes**
  - Represent coarse grained entities that cover the main activities of an organization
- **Operational business processes**
  - Cover process activities and their logical ordering from a business perspective
- **Implemented business processes**
  - Add execution information of processes, including organizational and technical aspects



Value Chain
(by Michael Porter)



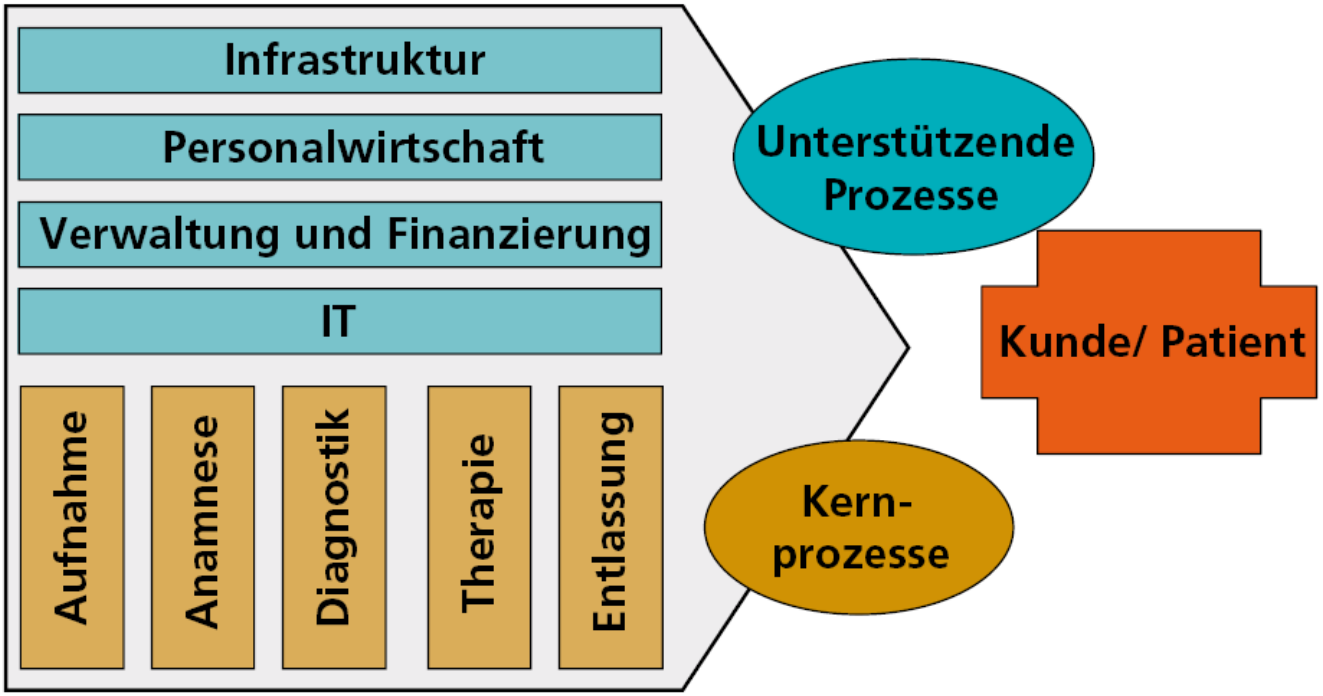
Wertschöpfungskette (nach Porter)



„Support-Prozesse“

Wertschöpfende Aktivitäten, „Kernprozesse“

Wertschöpfungskette im Krankenhaus



Quelle: Schuller, S.: Ablauforganisation im Gesundheitseinrichtungen – Grundsätze und Nutzen des Prozessmanagements, in: Professional Process 11/2008, S. 6-8

Organizational Business Processes

- Are defined in textual form
  - Input and output
  - Persons responsible
  - Supplier/customer relationships with other organizational business processes
  - Each organization has about a dozen organizational business processes

- Remark
  - Relationships of organizational business process are captured by process landscapes

Process Name: Product Development Process	**Responsible Process Manager:** Dr. Myers
Process Inputs: Product specification, Budget Plan, Prototypes	**Supplier Processes:** Product Planning Process, Innovation Process
Process Results: Integrated and completely tested innovative product	**Customer Processes:** Order Management Process

Sample Process Landscape

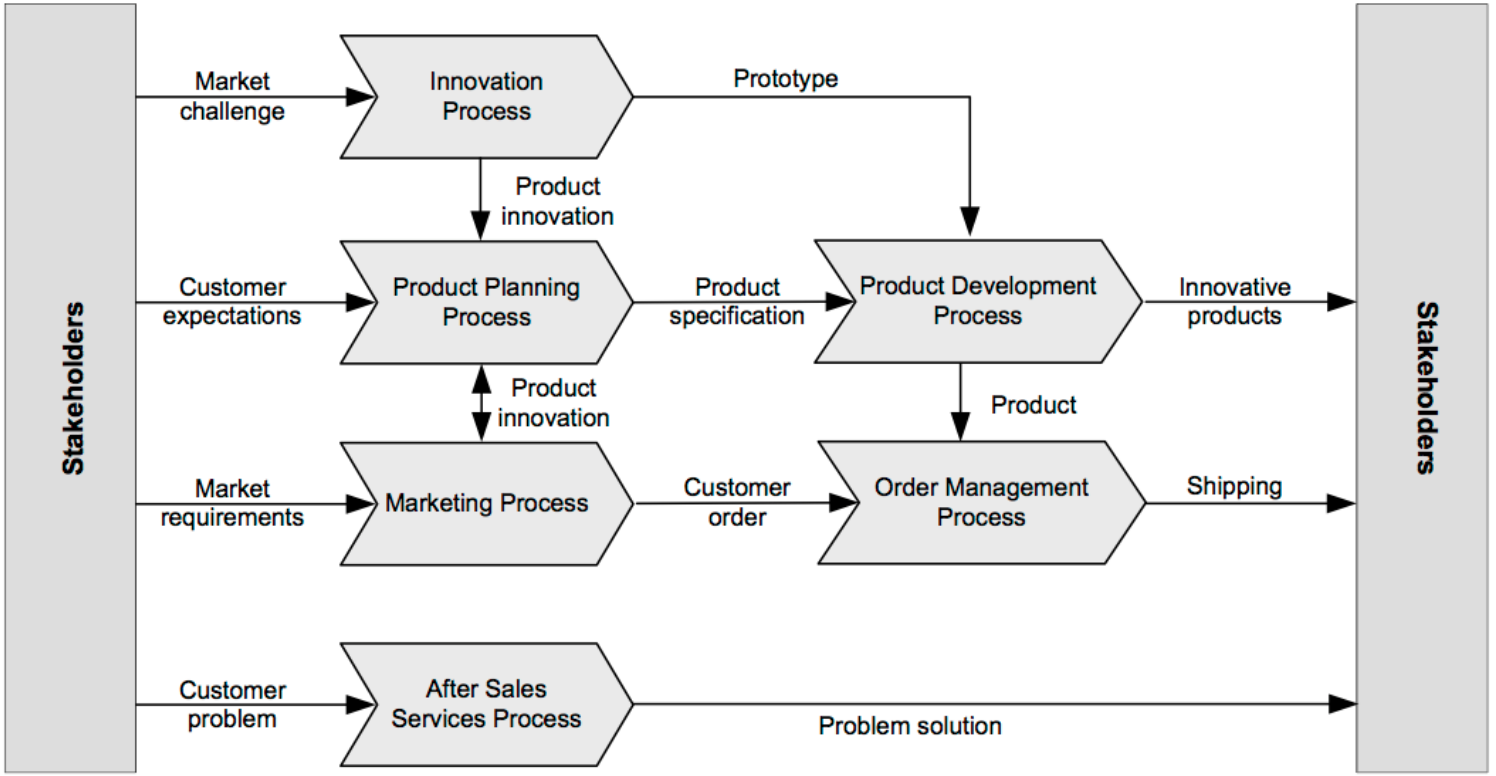
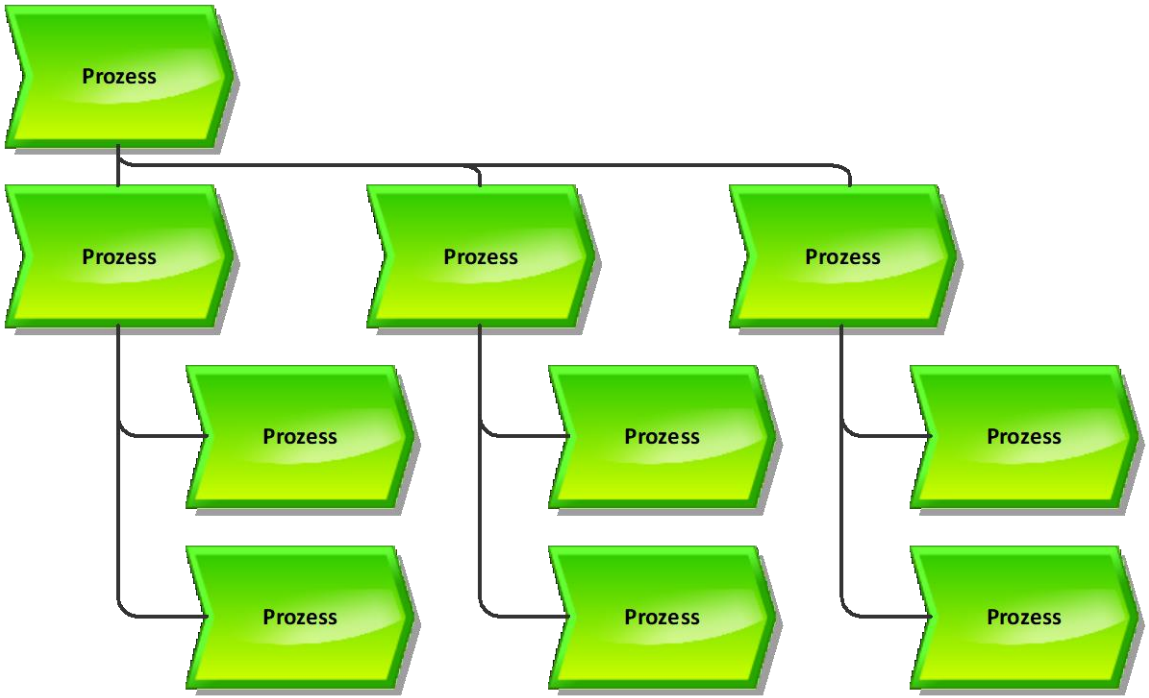


Fig. 2.14. Process landscape relating organizational business processes with stakeholders, based on Schmelzer and Sesselmann (2010)

Prozess Landscapes

- **Model (Visualization) in ARIS „Wertschöpfungskettendiagramm“**

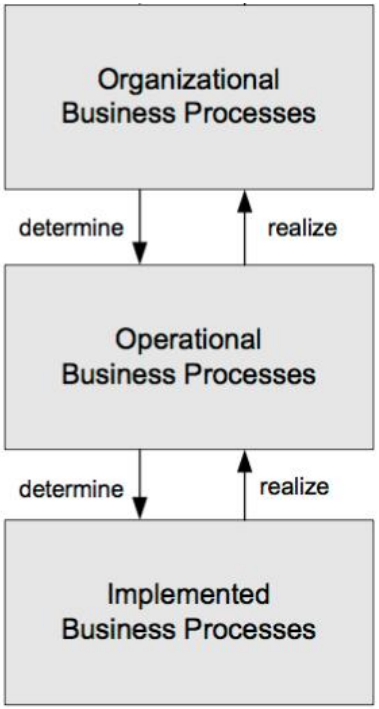


Prozesslandkarte einer Versicherung

Quelle: Gadatsch 2010, S. 45

Operational Business Processes

- Are defined by process models, focusing on business aspects rather than technical aspects
  - Activities and their logical ordering
  - Organizational aspects
  - Decision points and responsibilities
  - Main data objects involved



- Use of graphical process modeling languages, for instance BPMN

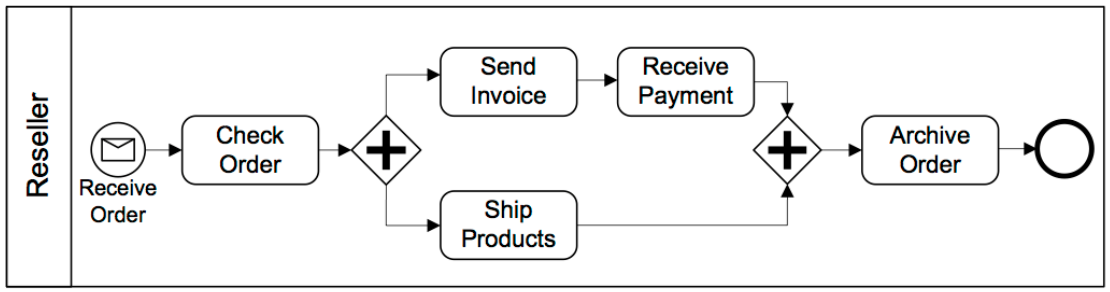
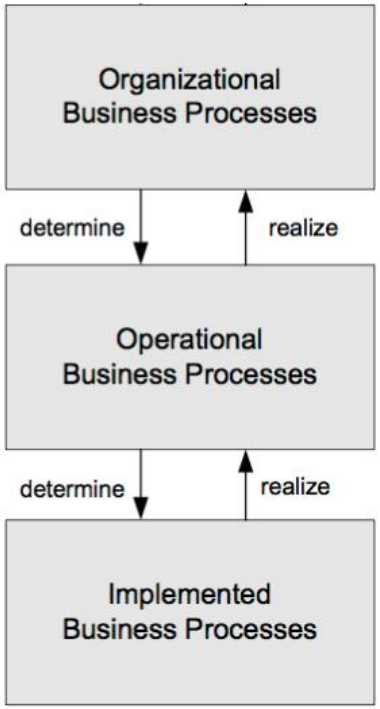


Fig. 1.1. Simple ordering process of reseller

Implemented Business Processes

- **Can be defined by process models, enriched with technical and organizational information**
  - **Software systems and services are used to implement process activities**
  - **Details organizational aspects of the process implementation, including responsibilities and access rights of process participants**
  - **Details operational business processes, but can also differ in structure from them**



Levels of Business Processes

- **Business processes are part of a bigger system.**

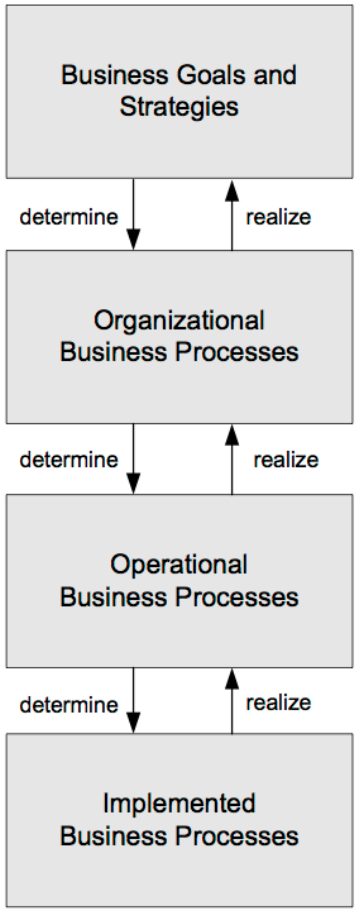


Fig. 1.6. Levels of business processes: from business goals and strategies to implemented business processes

Another „Framework“

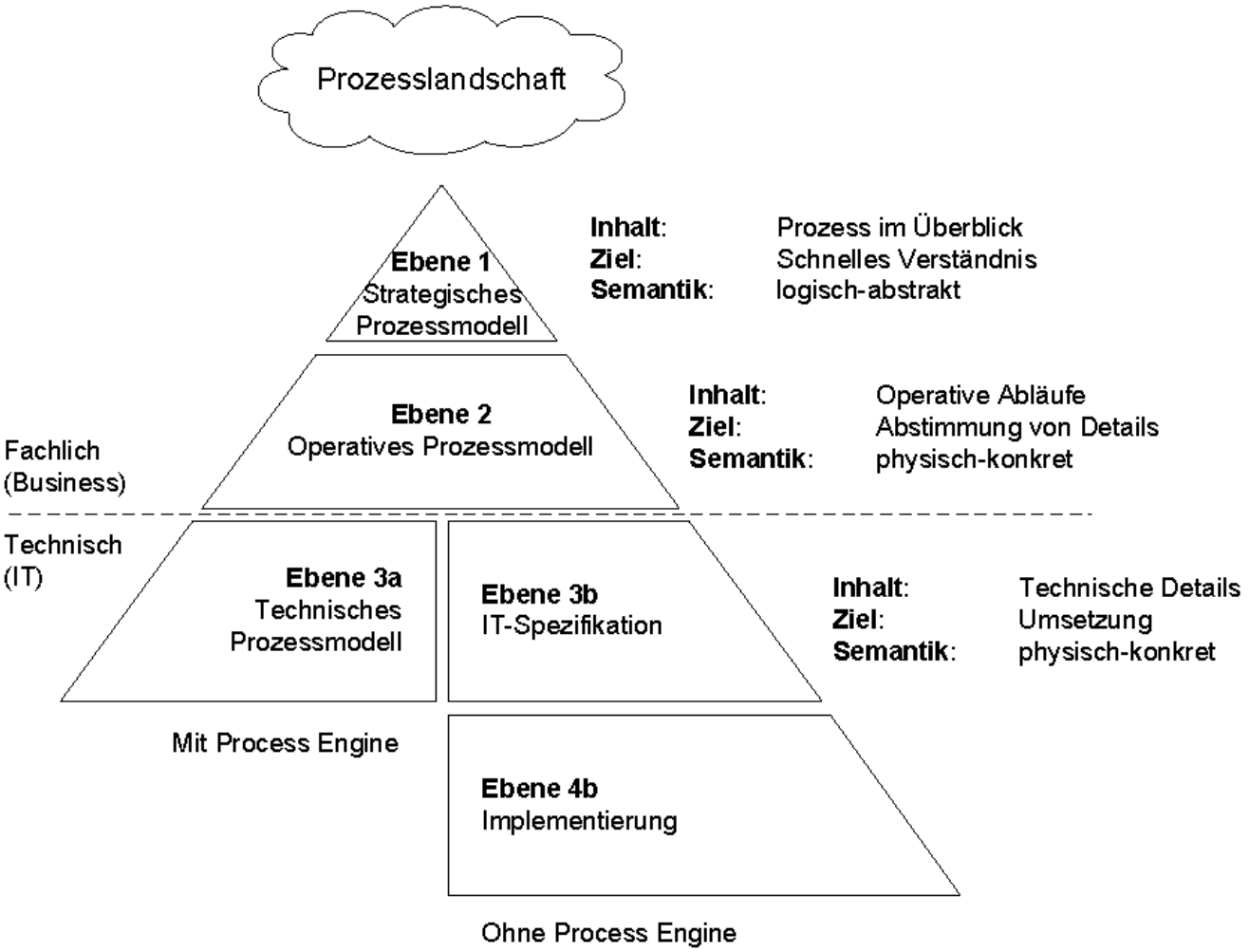


Abbildung 1.5: camunda BPMN-Framework (caBPMN)

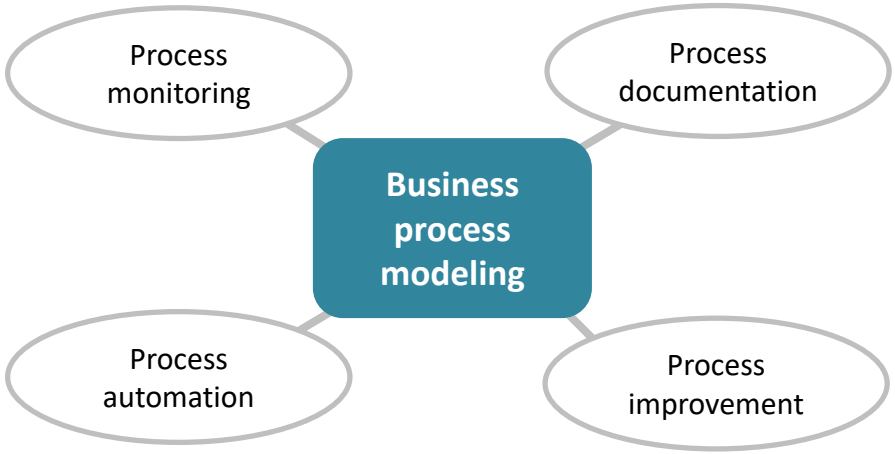
Outline

1. Defining Business Processes
2. On Modeling
3. Business Process Models
4. Interacting Business Processes
5. Models and Instances
6. Levels of Process Models
7. **Business Process Lifecycle**

Business Process Lifecycle

- Idea
  - Business processes traverse different phases
  - Each phase focuses on specific aspects and produces artifacts that are used for the succeeding phase
  - An iterative repetition of the phases leads to continued improvement of the business process

- In practice there are many variants of BP lifecycles



A Business Process Lifecycle

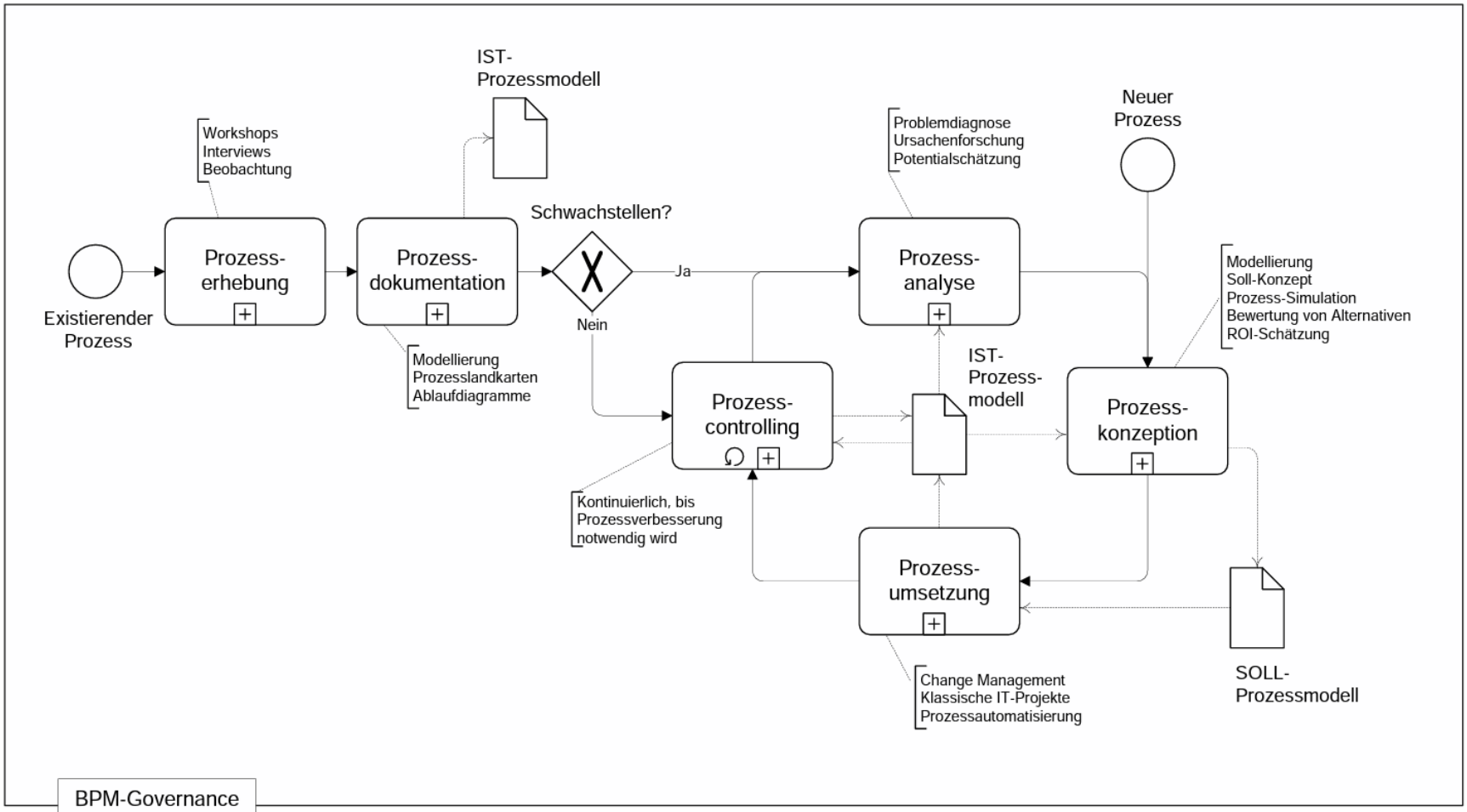
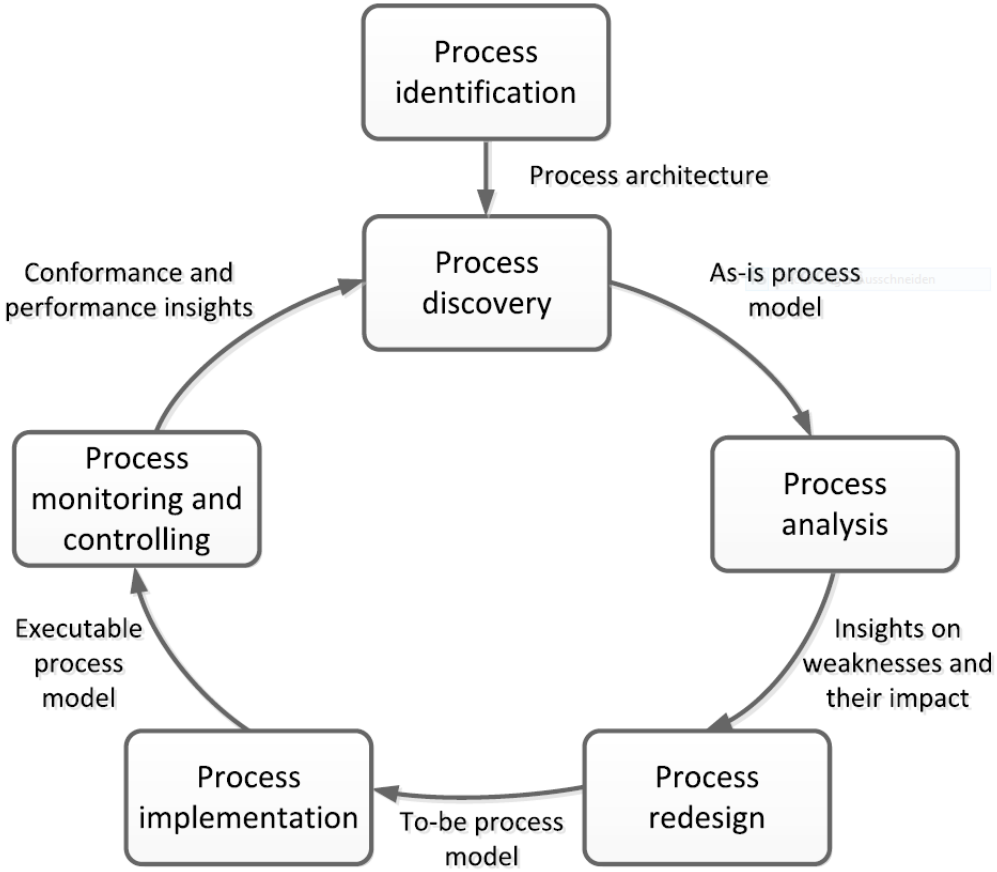


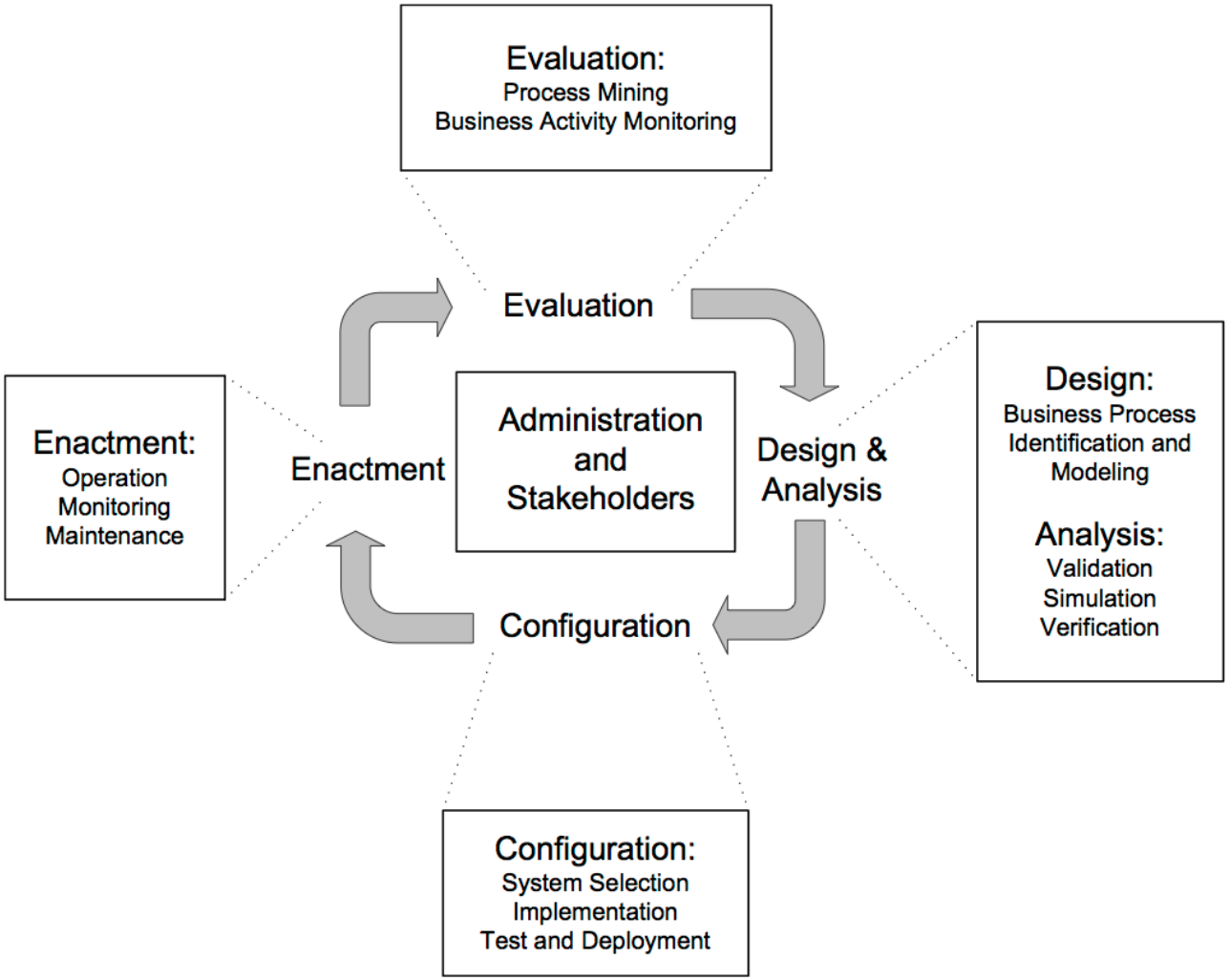
Abbildung 1.1: Der camunda BPM-Kreislauf (caBPMK)

Another BPM-Lifecycle



Source: Dumas, M./ La Rosa, M./ Mendling, J. et al.: Fundamentals of Business Process Management, Heidelberg 2013, p. 21

A Business Process Lifecycle



M. Weske: Business Process Management,
© Springer-Verlag Berlin Heidelberg 2012, 2007

Fig. 1.5. Business process lifecycle

Design and Analysis

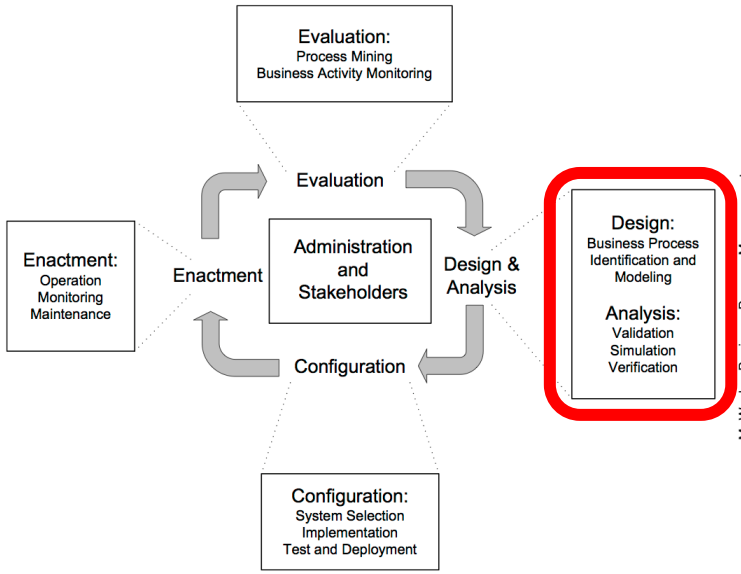


Fig. 1.5. Business process lifecycle

- **Design**
  - Identification and elicitation of business processes
  - Explicit documentation with business process models
  - Performance metrics might be designed as well
- **Analysis**
  - Validation of models using reviews, discussions, and simulation
  - Verification of formal properties, e.g., the absence of behavioral anomalies
- **Artifacts produced**
  - Operational business process models and process landscapes

Configuration

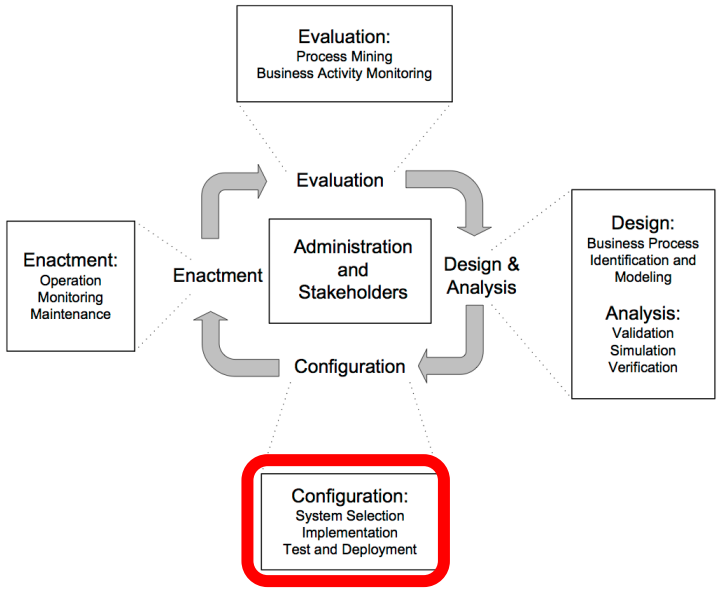


Fig. 1.5. Business process lifecycle

- Organizational aspects
  - Performance metrics are implemented
  - Sometimes requires renovation of organizational structures
  - Assignment of responsibilities, change management
- Configuration of software systems
  - Configuration of business process management systems
  - Enrichment of process models with technical aspects
  - Integration of applications, data and services, coding
- Artifact
  - Implemented business process model

Enactment

- Runtime of business processes
  - Process instances are performed and execution data is collected
- Monitoring
  - Observe progress of process instance(s)
  - Identify exceptions and deviations
  - Provides information about conducted tasks, execution time, and resources involved
- Maintenance
  - Make sure the process runs in presence of system modifications
- Artifacts
  - Execution data

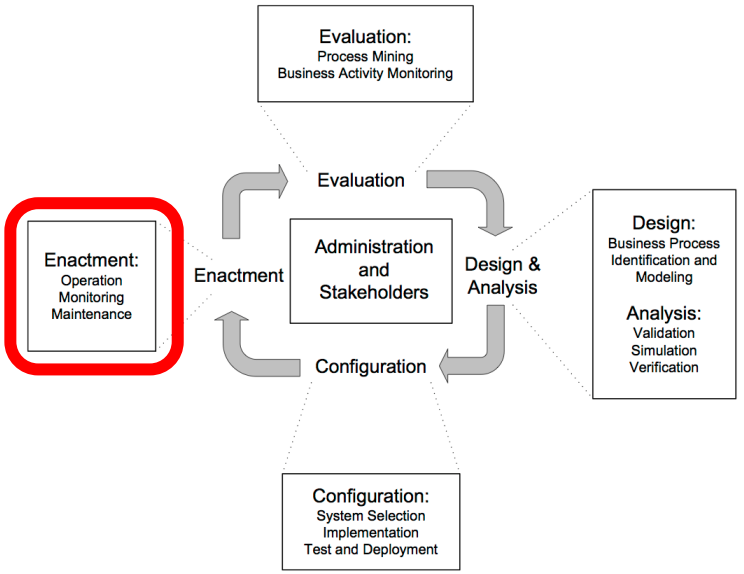


Fig. 1.5. Business process lifecycle

Evaluation

- Identification of weak-nesses, potentials for improvement
  - Using execution data
  - Comparison with performance indicators
  - Process mining techniques used

- Artifacts are used as input for succeeding phases
  - to improve the business process model (design & analysis) and
  - improve the process implementation (configuration phase)

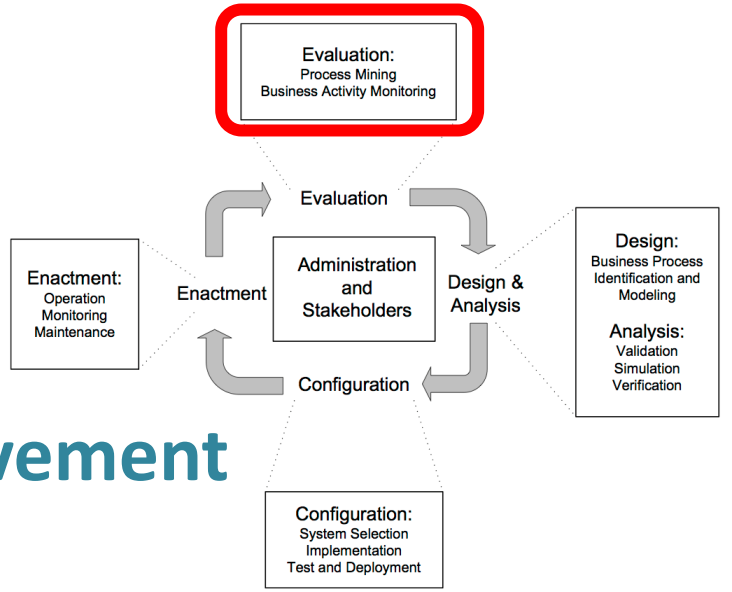


Fig. 1.5 Business process lifecycle

Summary

- Defining Business Processes
- On Modeling
- Business Process Models
- Interacting Business Processes
- Models and Instances
- Levels of Process Models
- Business Process Lifecycle

Q&A