

BPMN Meets DMN: Business Process and Decision Modeling

*Week 1:
Introduction to Business Process Management*

An openHPI Course

Prof. Dr. Mathias Weske

Hasso Plattner Institute at the University of Potsdam
Business Process Technology

Week 1

Introduction to Business Process and Decision Modeling

- 1.1 Defining Business Processes
- 1.2 On Modeling
- 1.3 Business Process Models
- 1.4 Interacting Business Processes
- 1.5 Models and Instances
- 1.6 Levels of Process Models
- 1.7 Business Process Lifecycle

Video Clip 1.1

Defining Business Processes

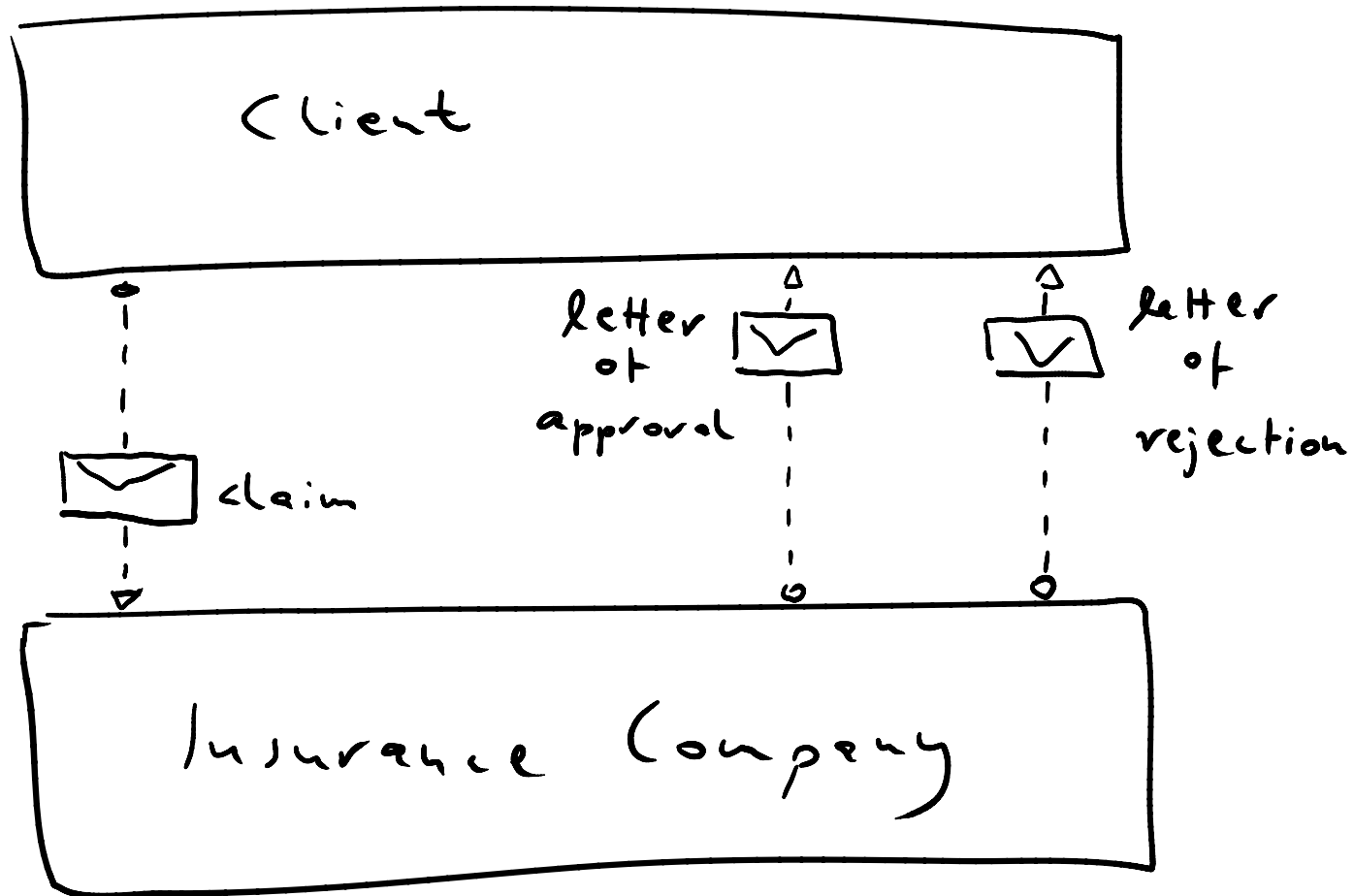
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Business Processes are Everywhere

- 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

We try to be visual ...

- ... and represent participants and the flow of messages



Role of Business Processes

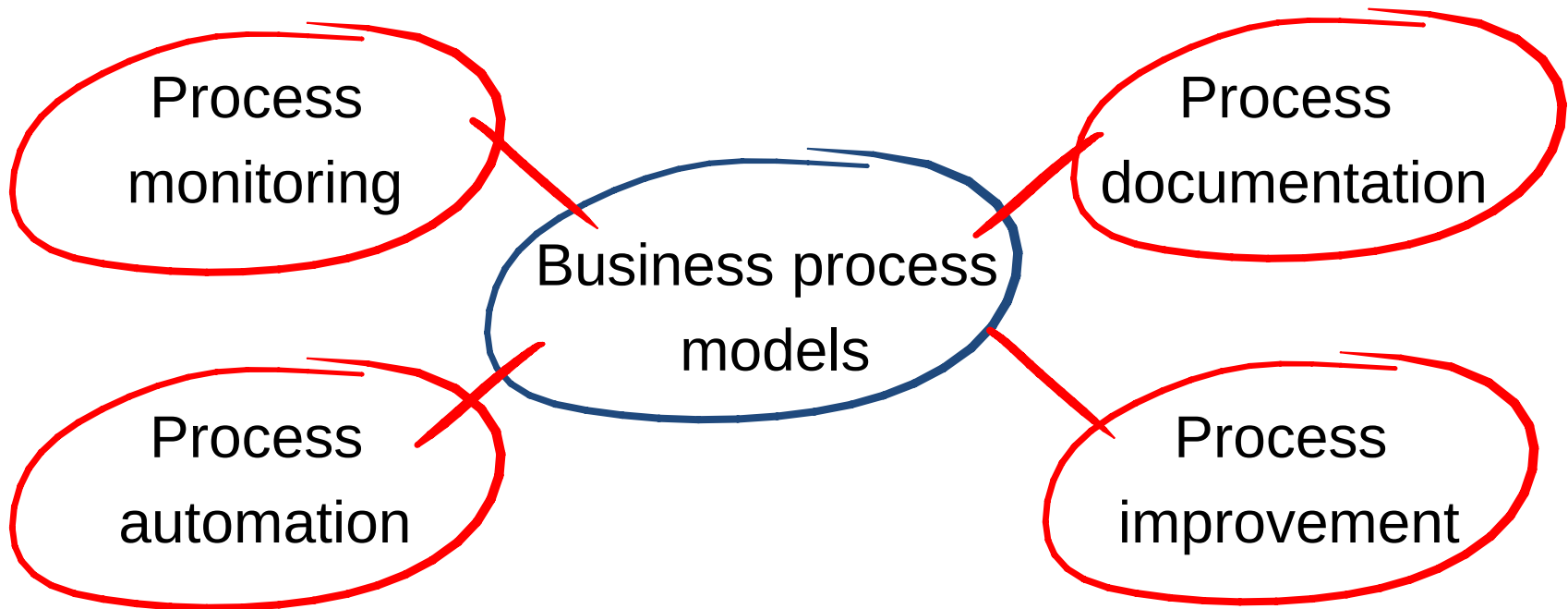
- Companies and public administrations provide services and products to their clients by enacting business processes
- Business processes are at the core of organizations and an important success factor
- People are the key to business processes

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

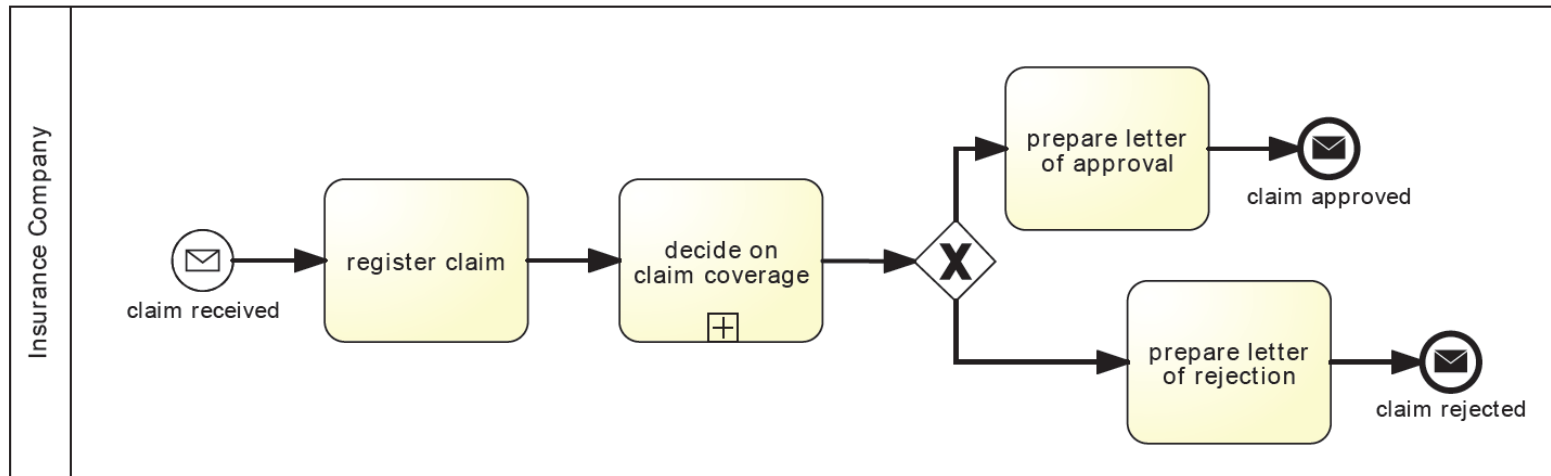
- Common understanding requires a common language



- *This is why process modeling is at the core of this course!*

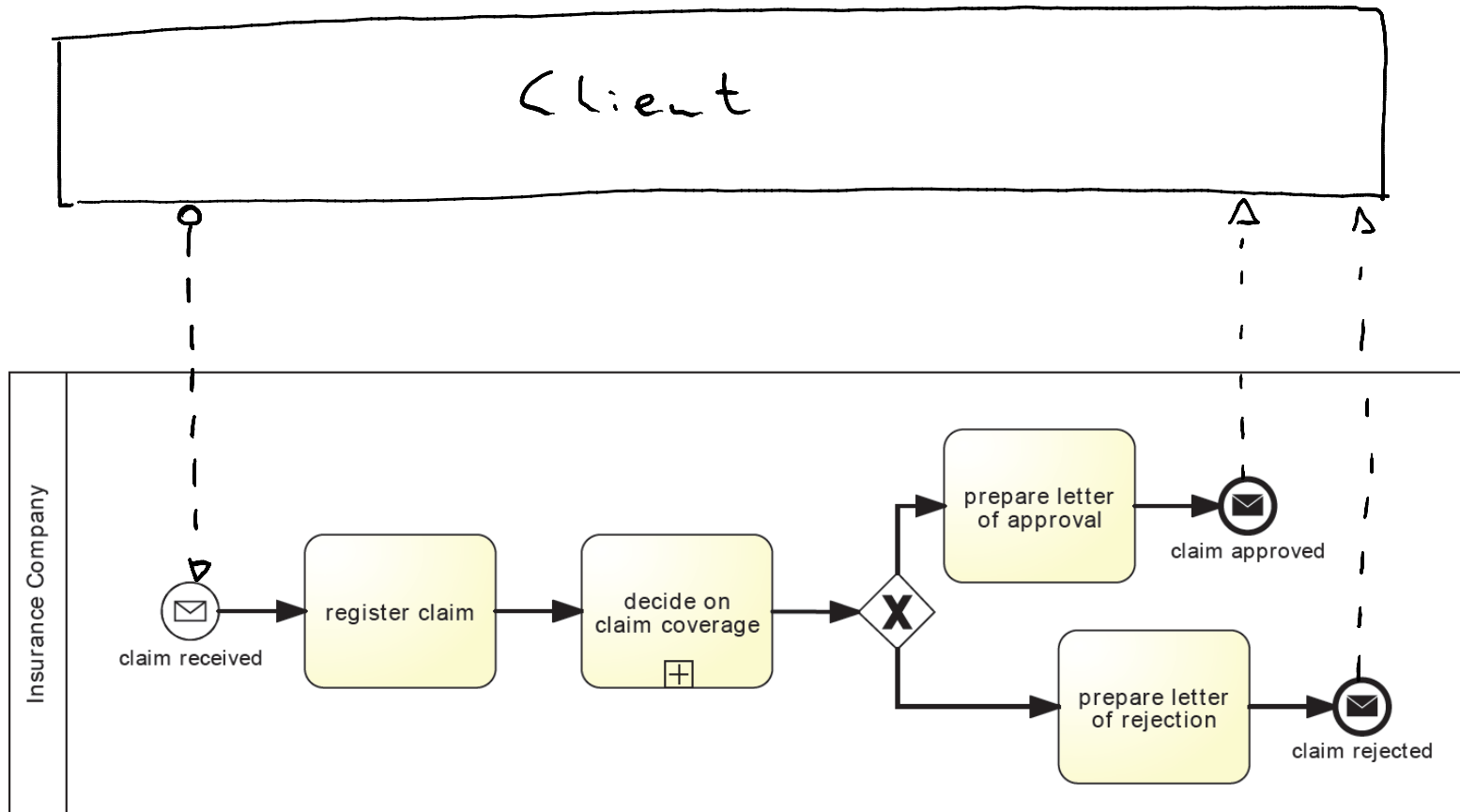
Business Process

- *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.*



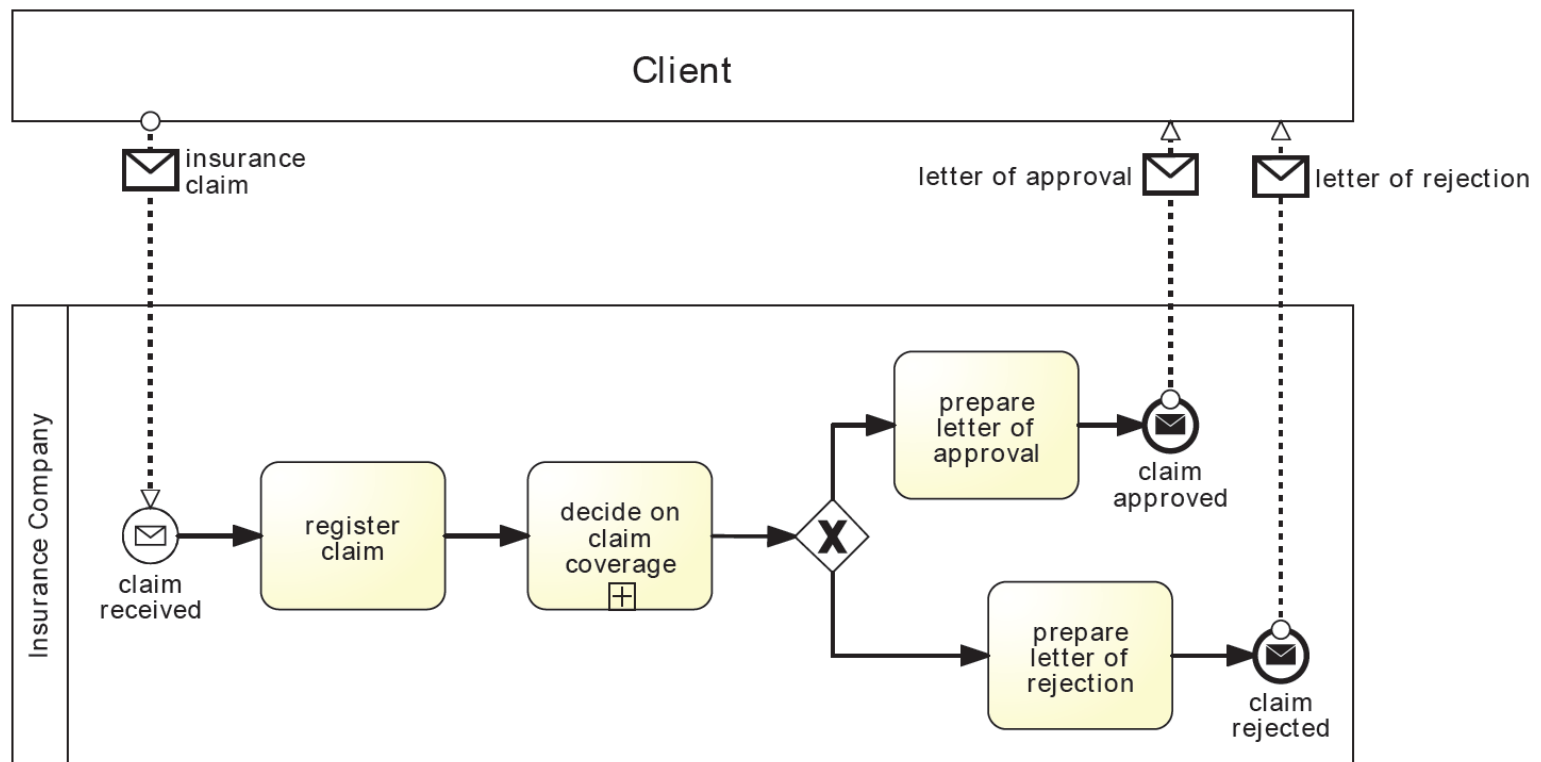
Interacting Business Process

- Each business process is enacted by a single organization, but it may interact with business processes performed by other organizations.*



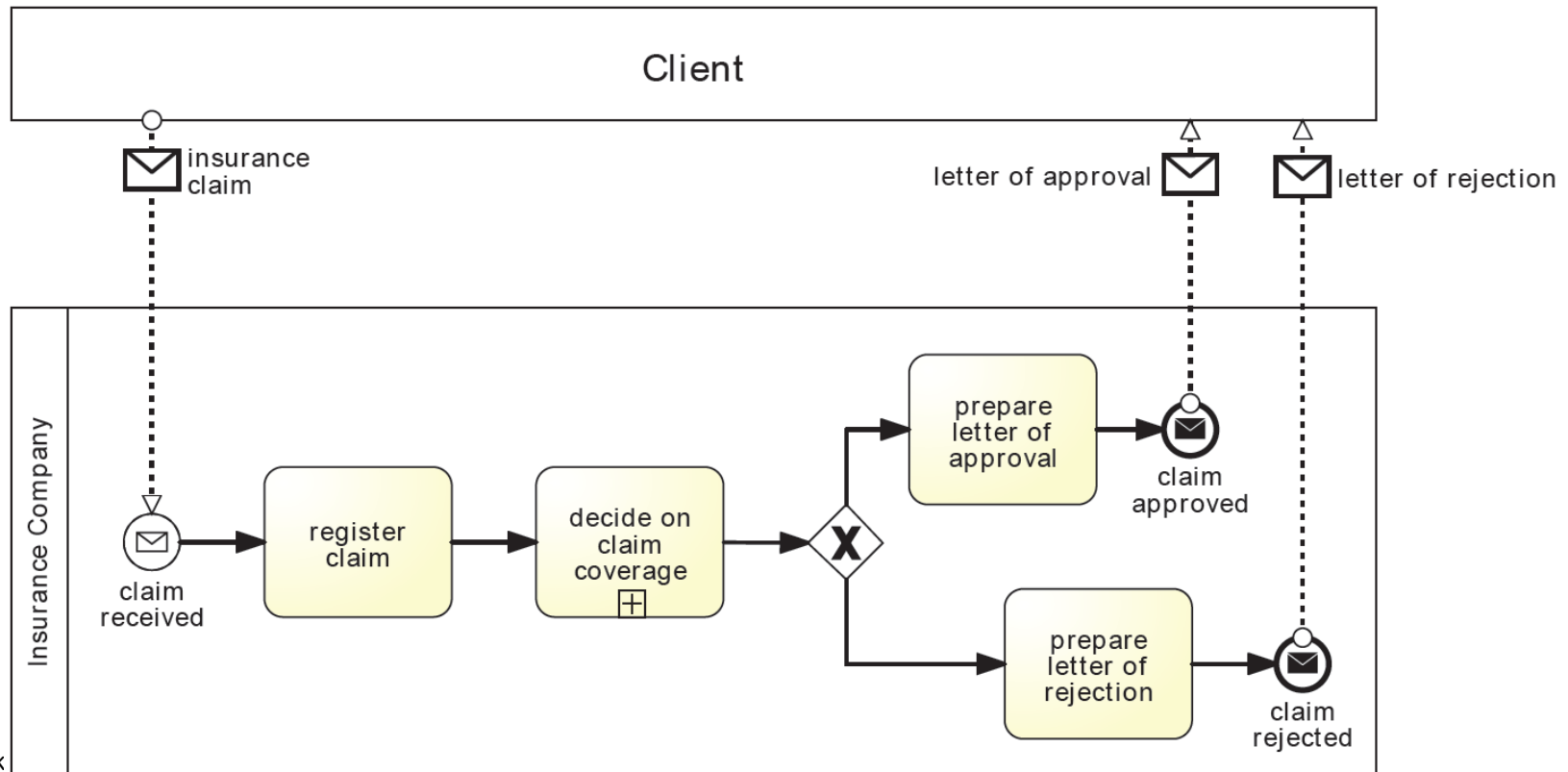
Business Process Management (BPM)

- Business process management includes concepts, methods, and techniques to support the design, administration, configuration, enactment, and analysis of business processes.*



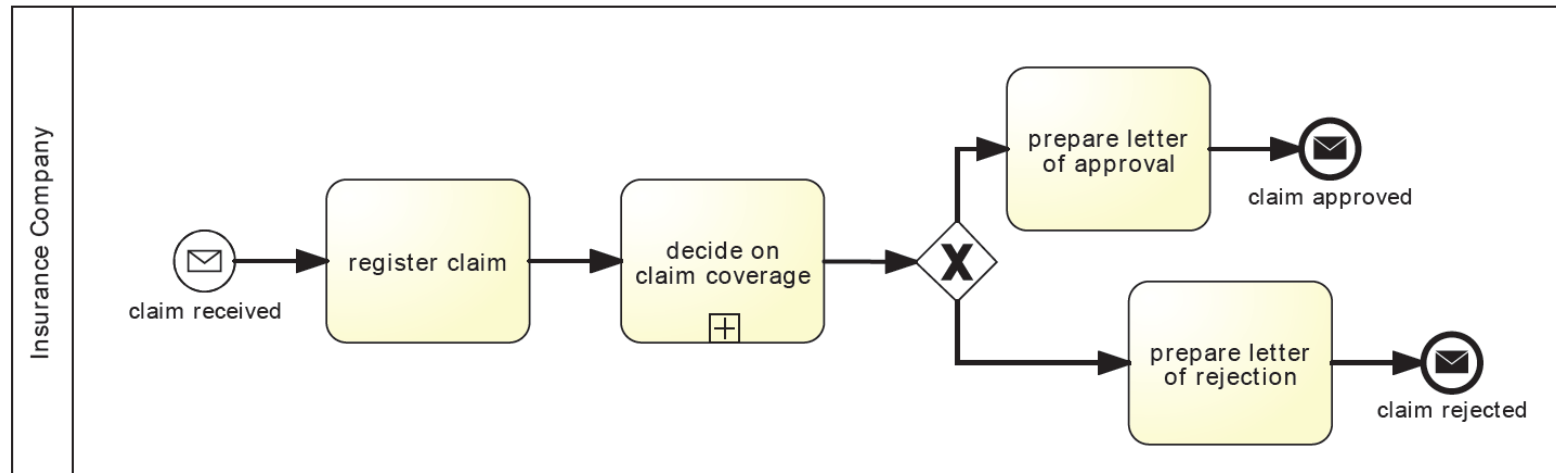
What Business Processes Describe

- *Business processes describe the execution ordering of activities and the interaction with partners.*
- *They do not describe the implementation of activities and interactions, nor the way the coordination is achieved.*



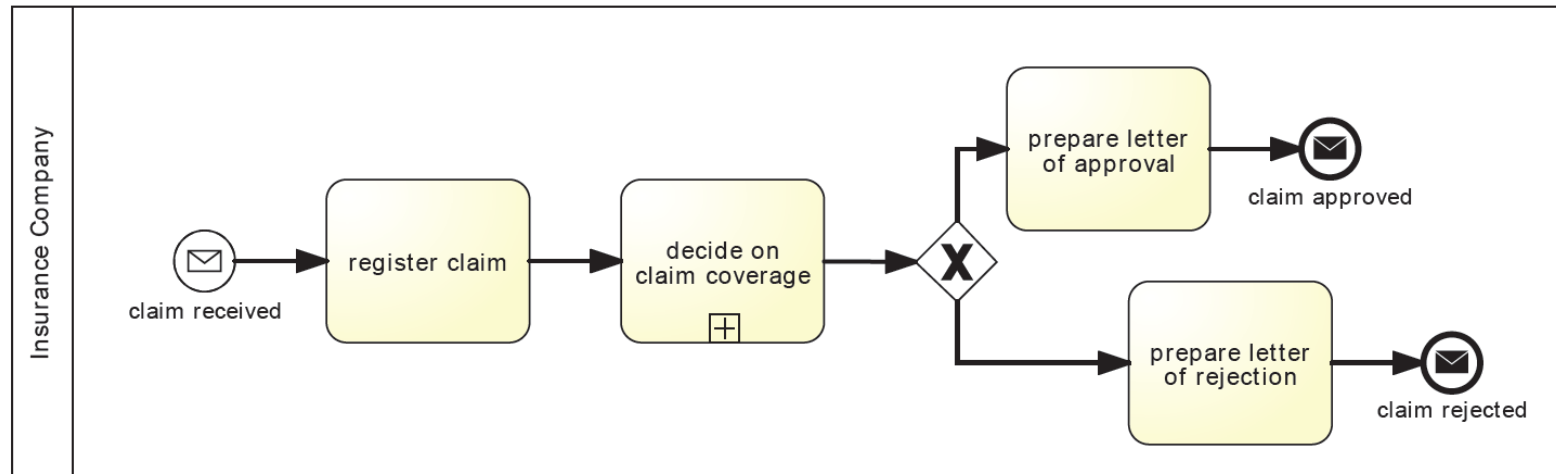
BPM System

- *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.*



Process Orchestration

- *A business process management system 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



Video Clip 1.1

Defining Business Processes

- Business processes
- Interacting business processes
- Business process management
- Business process management system
- Process orchestration

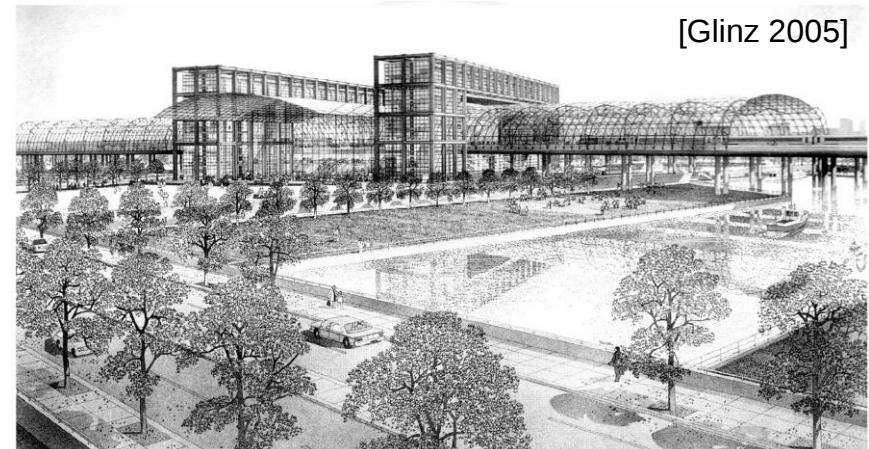
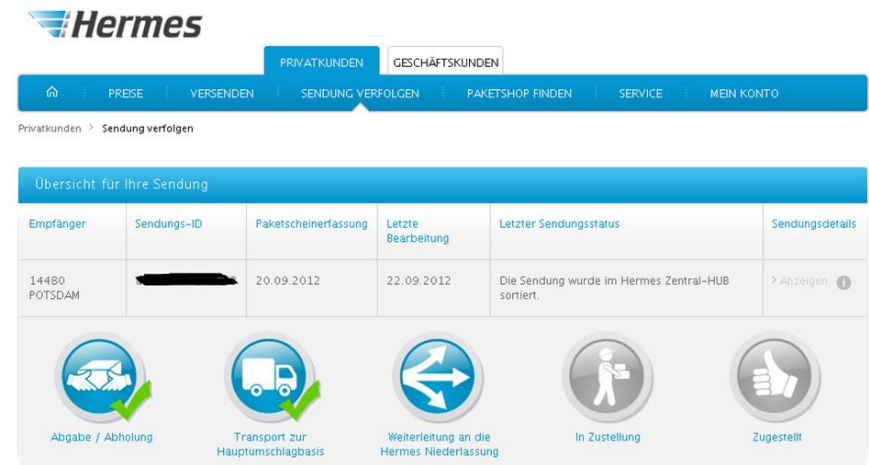
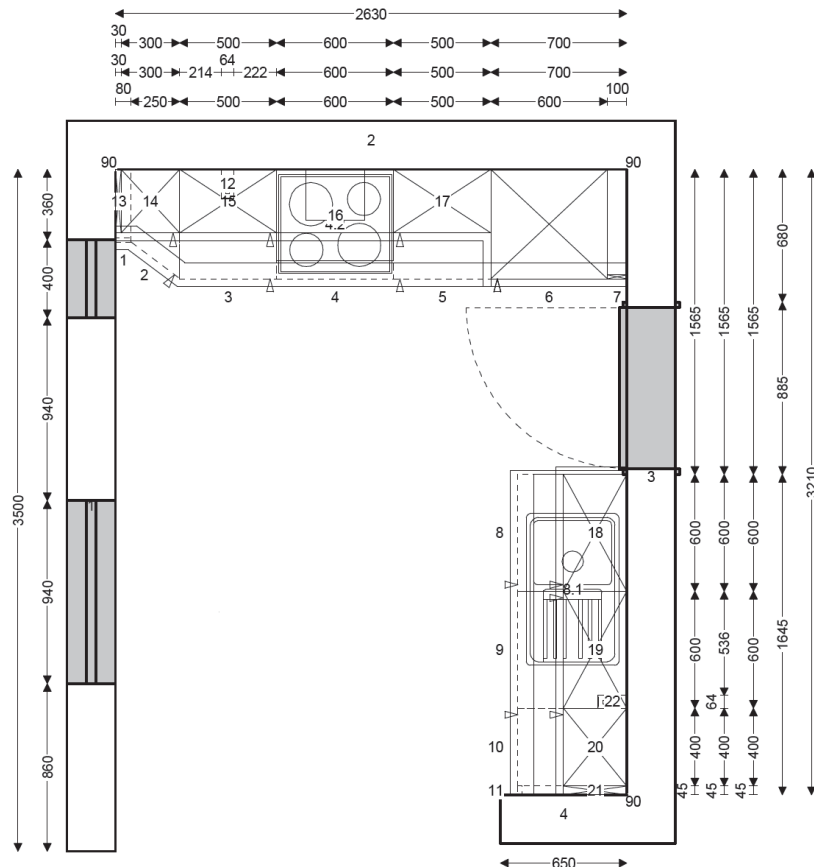
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On Modeling

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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
- 

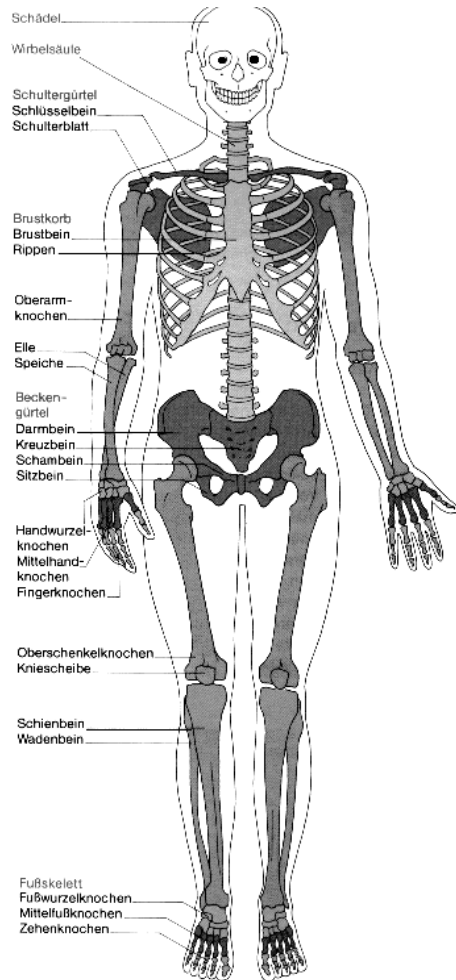


Properties of Models [Stachowiak 1973]

- 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“)

Descriptive Models

- Descriptive models describe an existing original



PRIVATKUNDEN | GESCHÄFTSKUNDEN

HOME | PREISE | VERSENDEN | SENDUNG VERFOLGEN | PAKETSHOP FINDEN | SERVICE | MEIN KONTO

Privatkunden > Sendung verfolgen

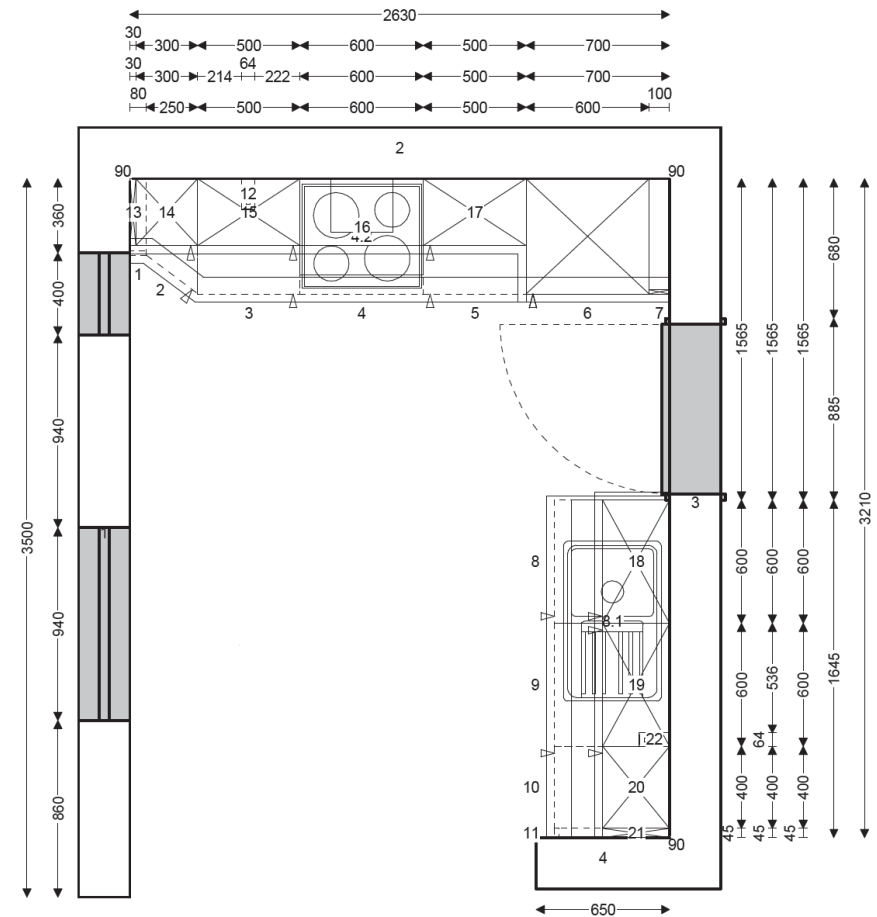
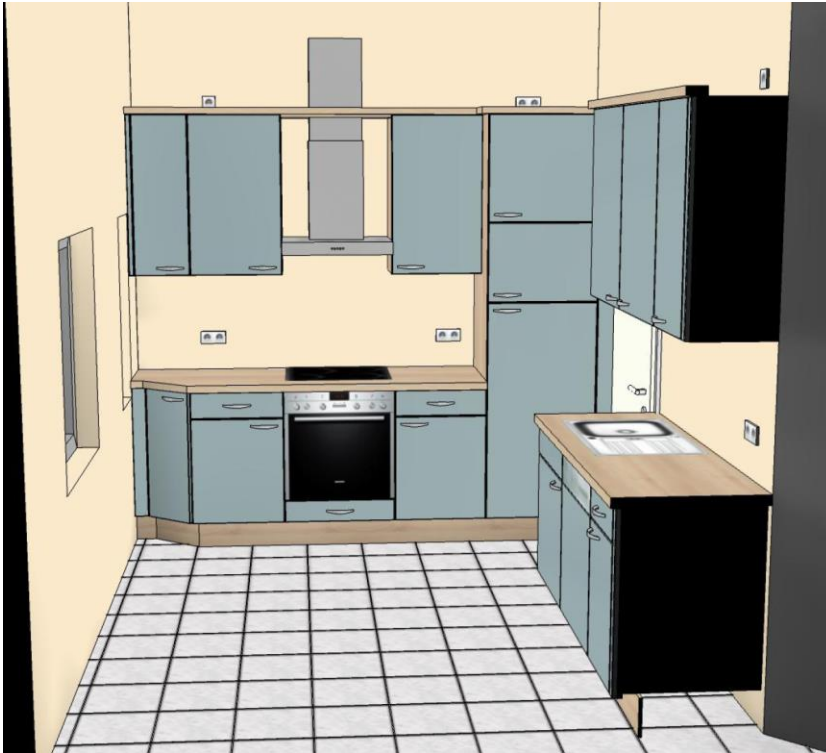
Übersicht für Ihre Sendung

Empfänger	Sendungs-ID	Paketscheinerrfassung	Letzte Bearbeitung	Letzter Sendungsstatus	Sendungsdetails
14480 POTSDAM	[REDACTED]	20.09.2012	22.09.2012	Die Sendung wurde im Hermes Zentral-HUB sortiert.	> Anzeigen ⓘ

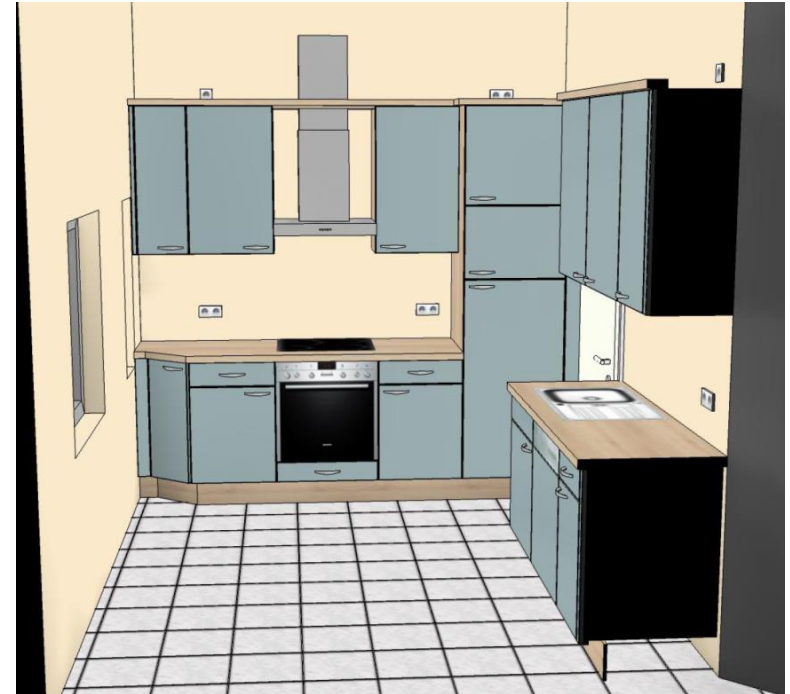
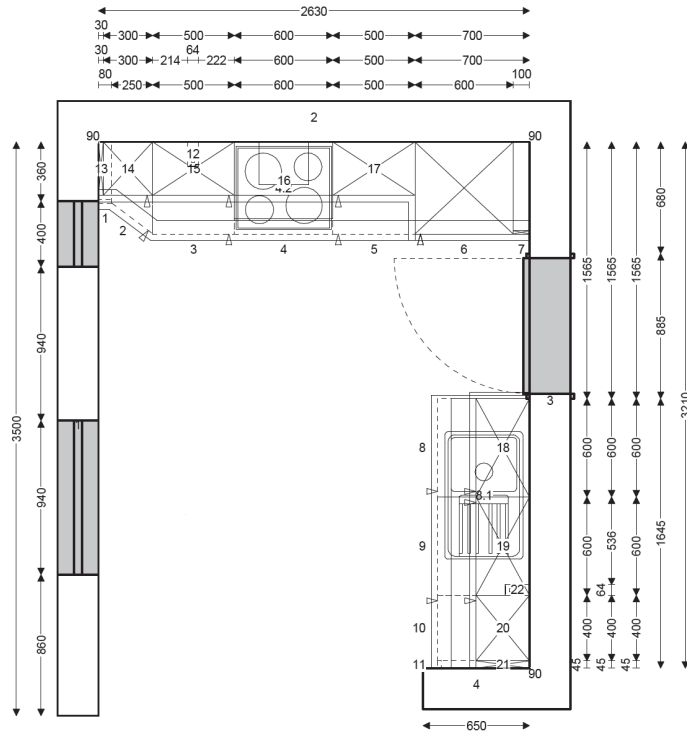
Abgabe / Abholung
 Transport zur Hauptumschlagbasis
 Weiterleitung an die Hermes Niederlassung
 In Zustellung
 Zugestellt

Prescriptive Models

- Prescriptive models prescribe how to build an original



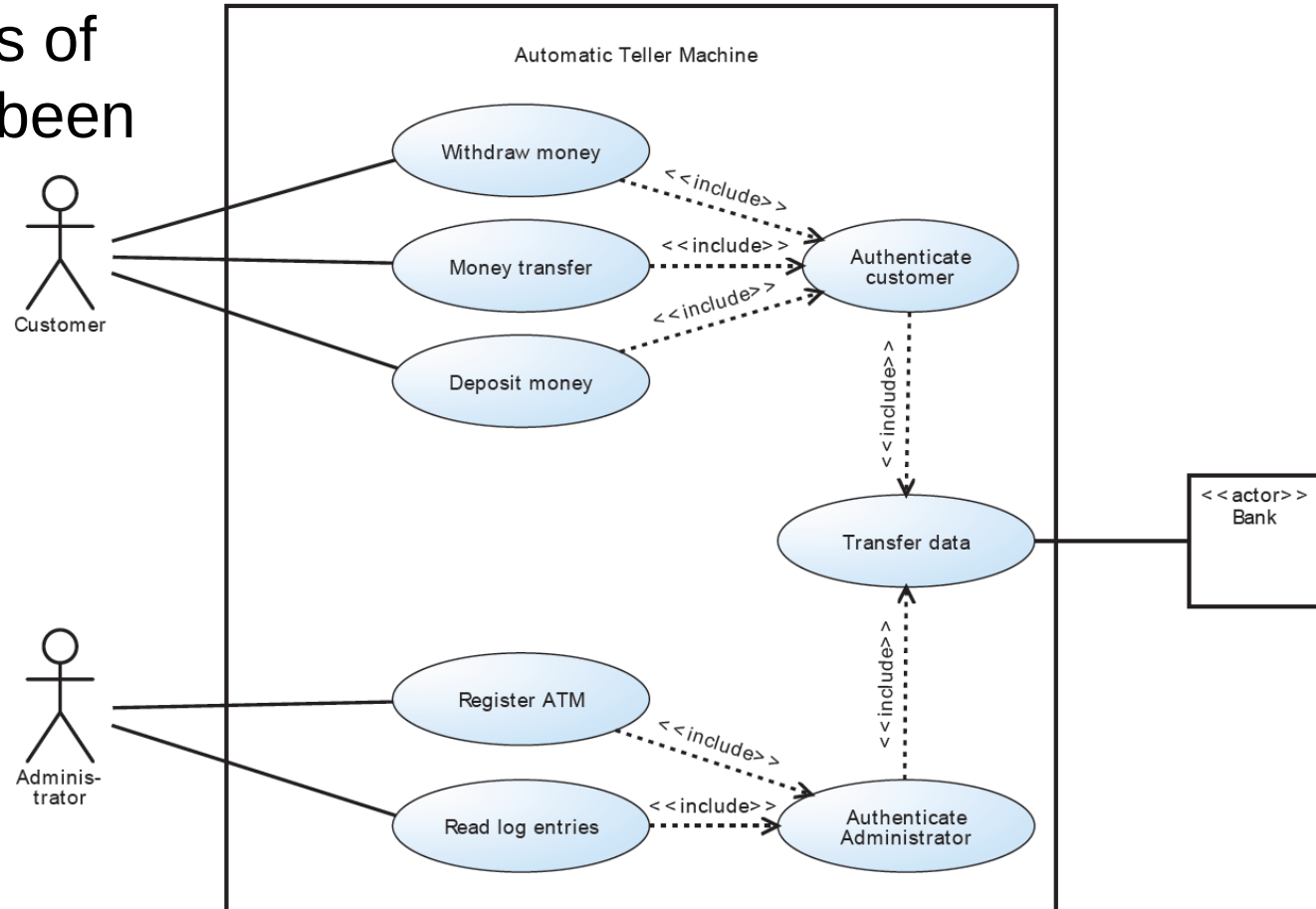
Is a model descriptive or prescriptive?



- Descriptive or prescriptive
 - Cannot be told from the model itself
 - Can be told from the modeling goal
 - During the design of a system, models typically first have a prescriptive, later a descriptive character

Modeling in Computer Science

- Models play a key role in the design of systems, especially IT systems
- Different types of models have been developed
- UML
Use Case Diagrams, ...



Modeling in Computer Science

- ... Data Models ...

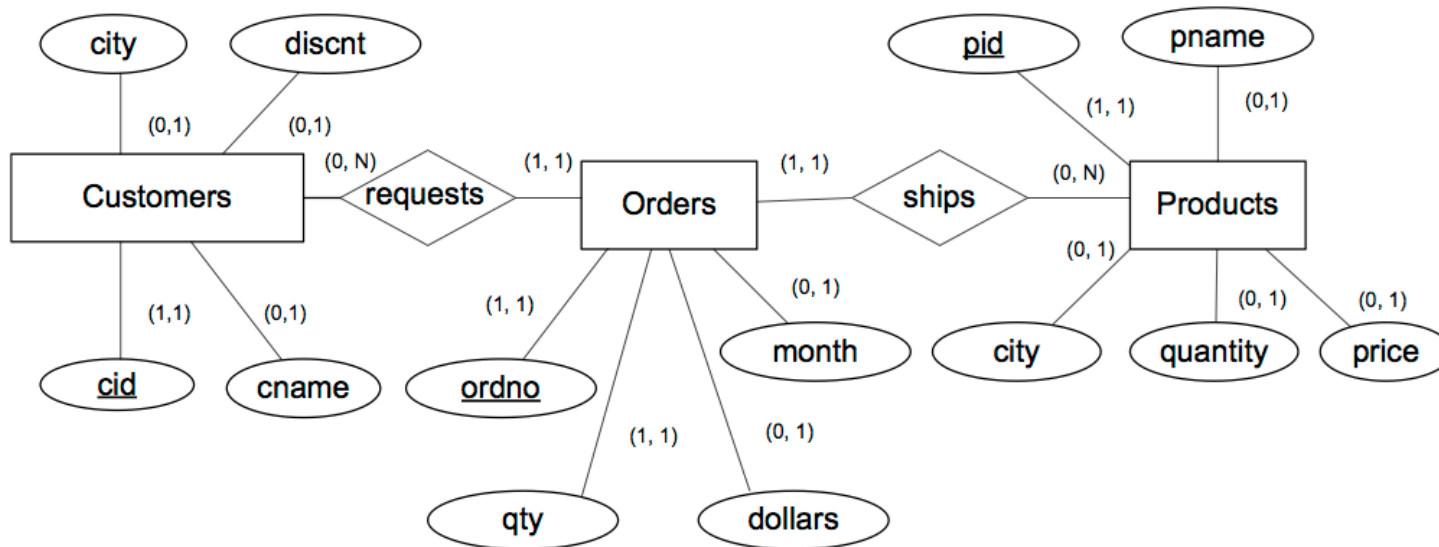
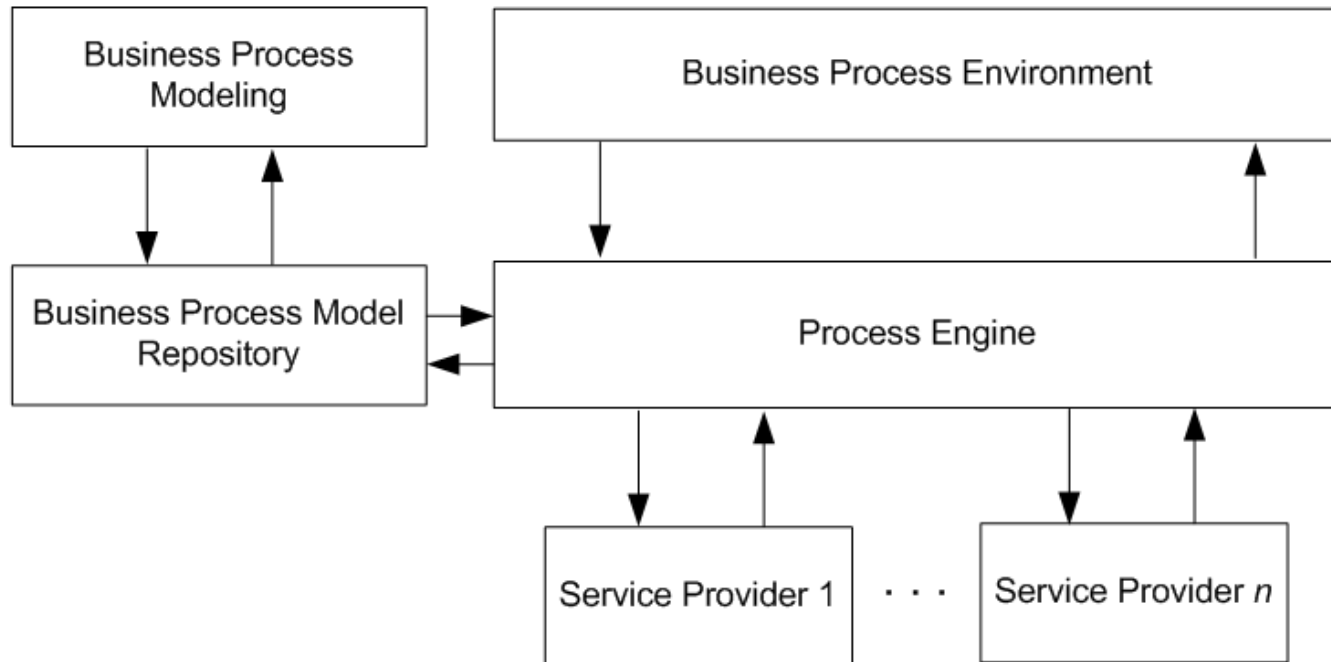


Fig. 3.23. Entity relationship diagram involving customers, orders, and products, O'Neil and O'Neil (2000)

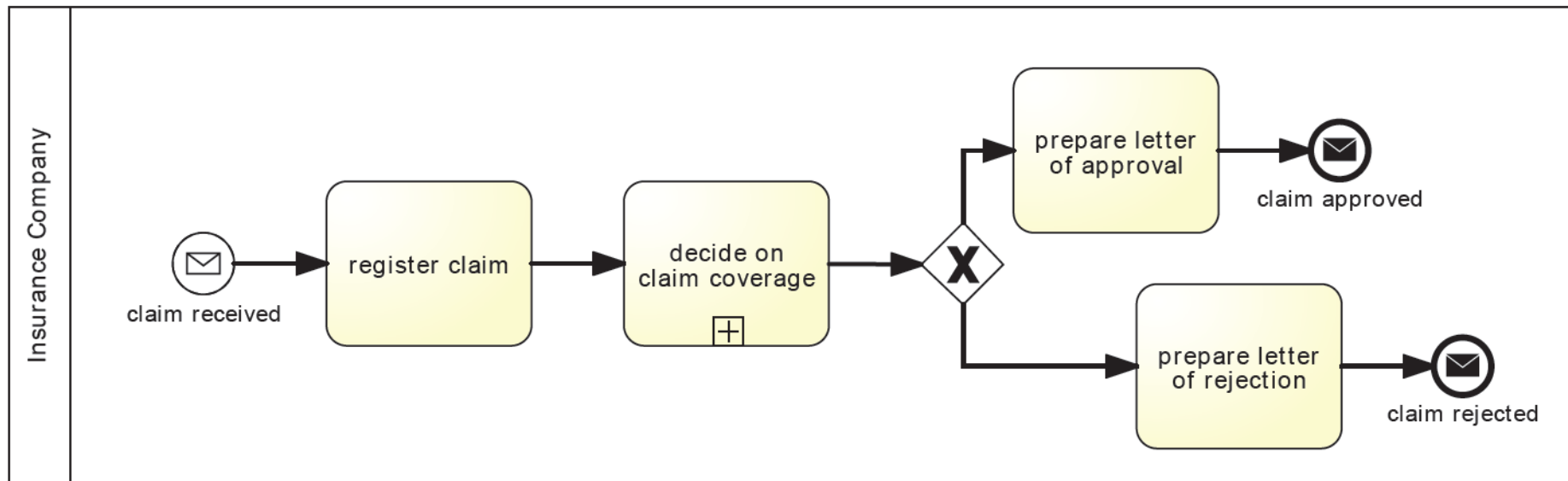
Modeling in Computer Science

- ... Architecture Models ...



Modeling in Computer Science

- ... and Process Models!



Video Clip 1.2

On Modeling

- Modeling basics
- Properties of models
 - Mapping feature
 - Abstraction feature
 - Pragmatic feature
- Descriptive models and prescriptive models
- Modeling in Computer Science

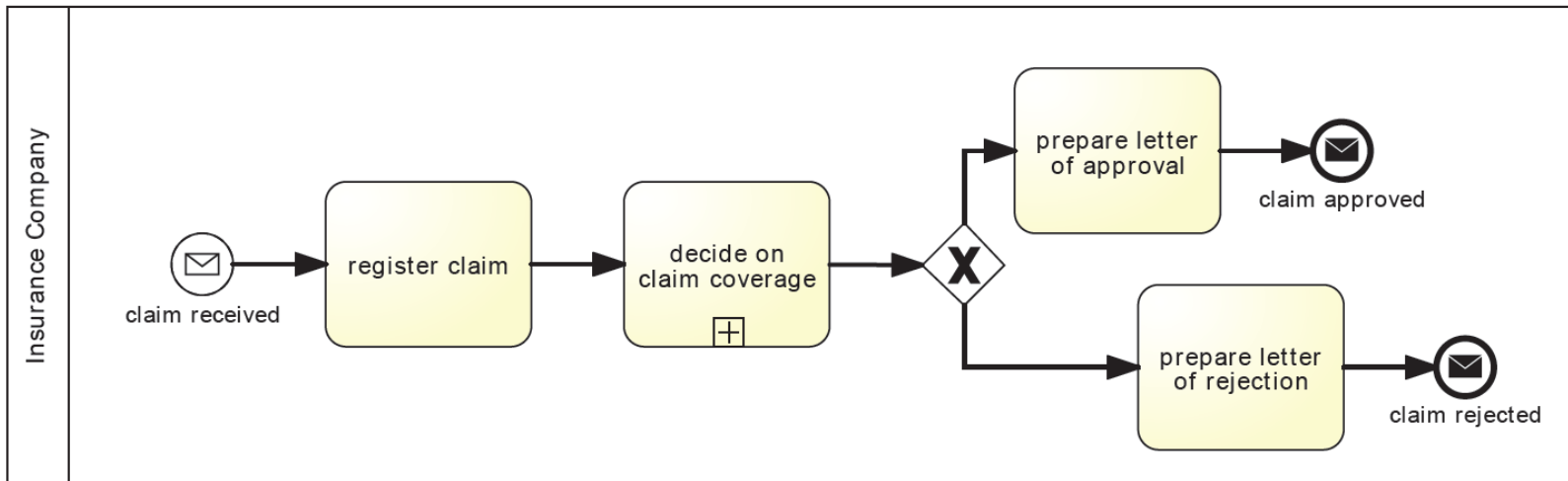
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Business Process Models

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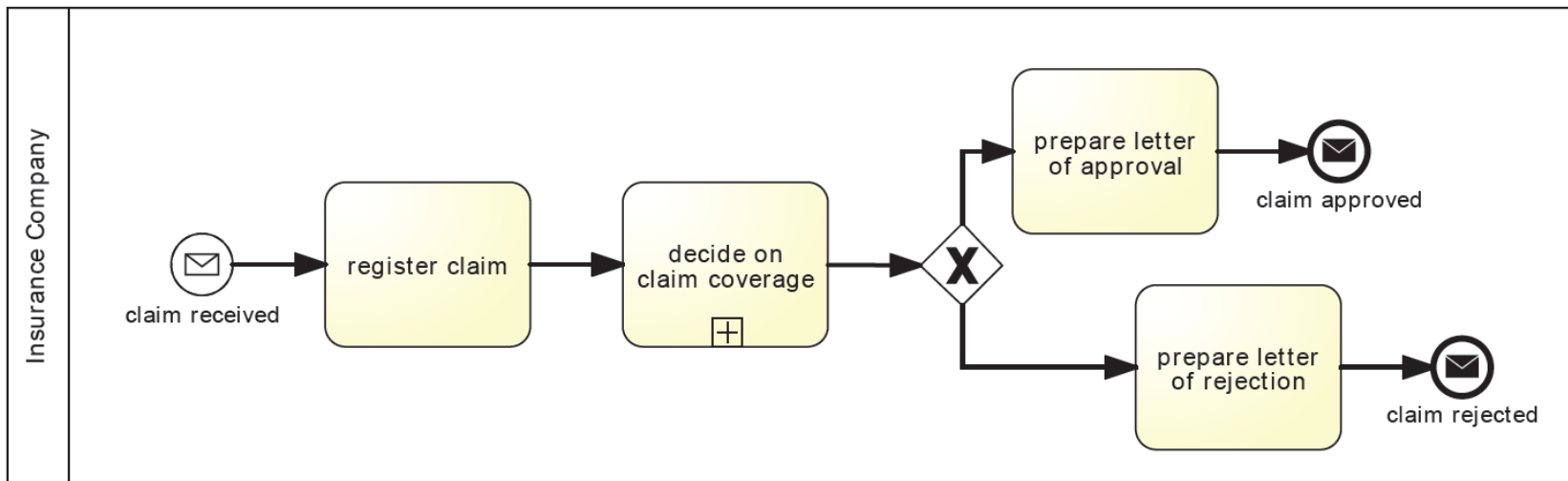
Business Process Models

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



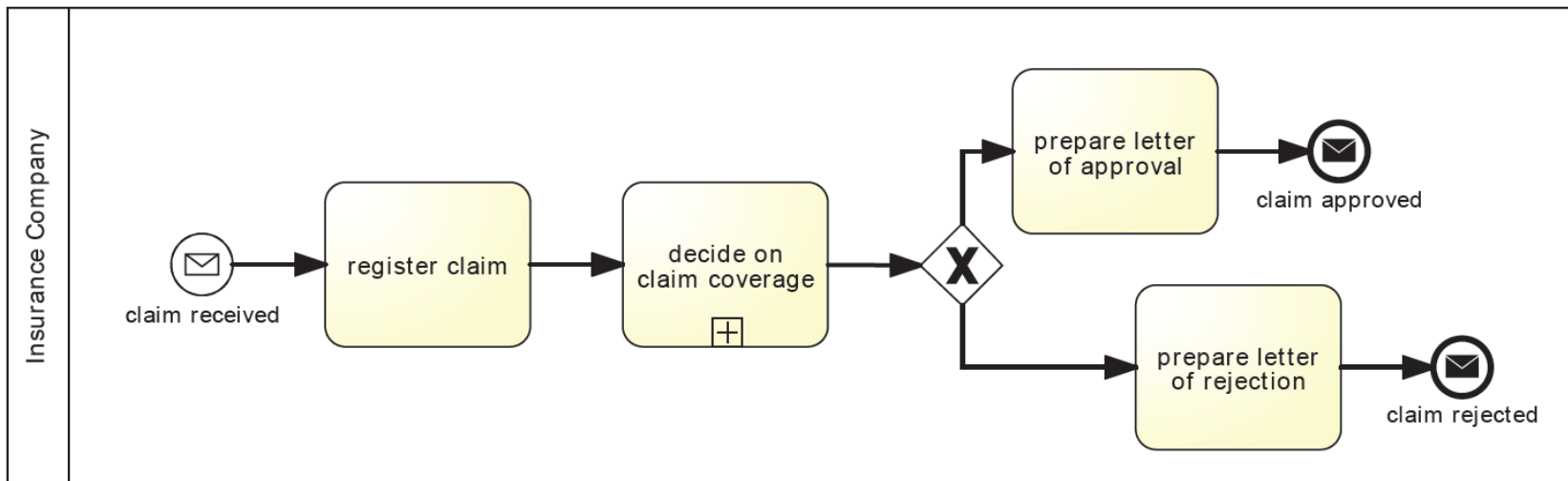
Business Process Models

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



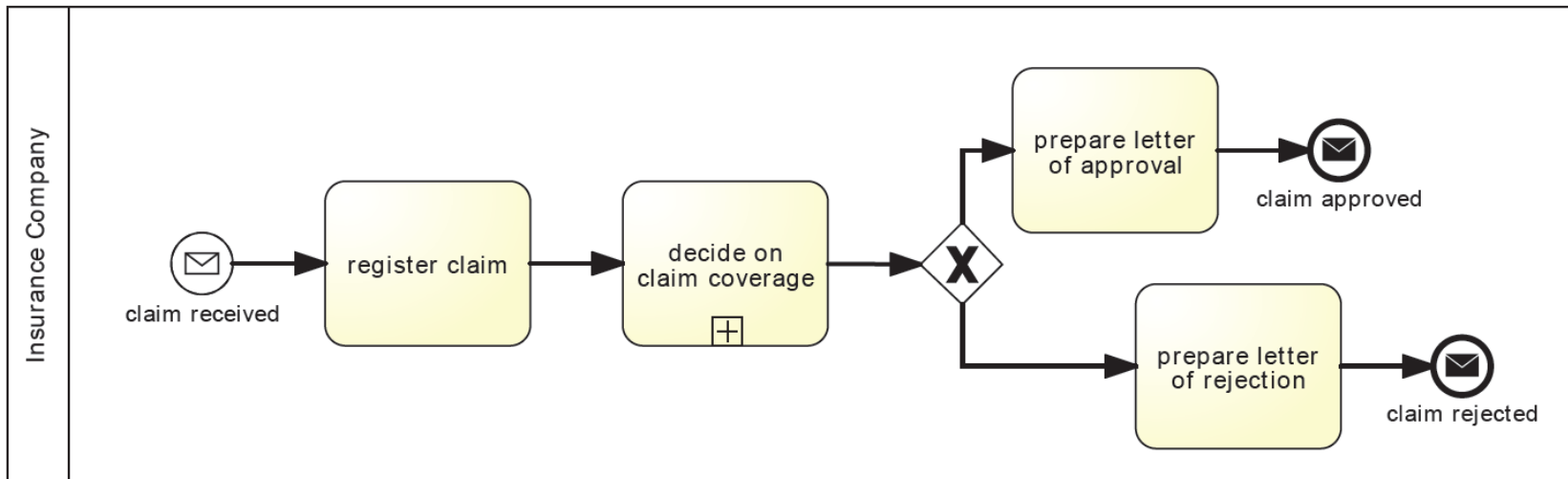
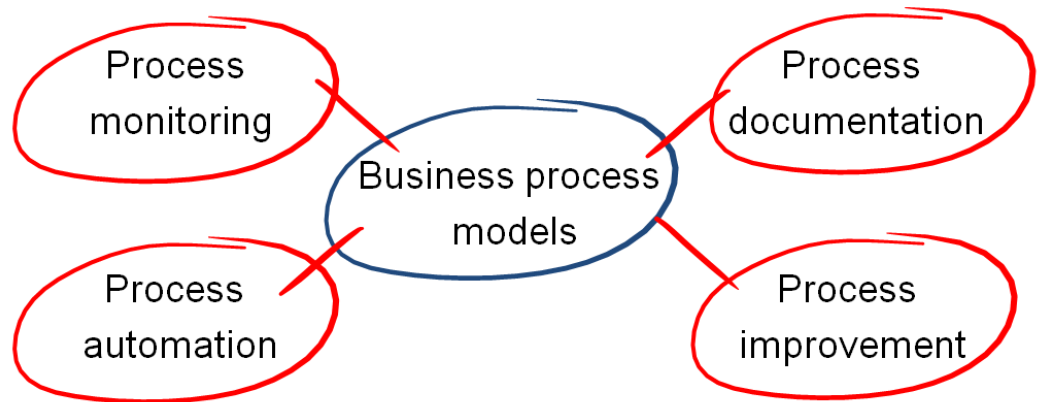
Modeling Theory and Process Models

- Abstraction feature
 - Each business process model abstracts from aspects that are not relevant for the modeling goal
 - Space is precious: Each process model should only have elements that are relevant for the particular modeling goal



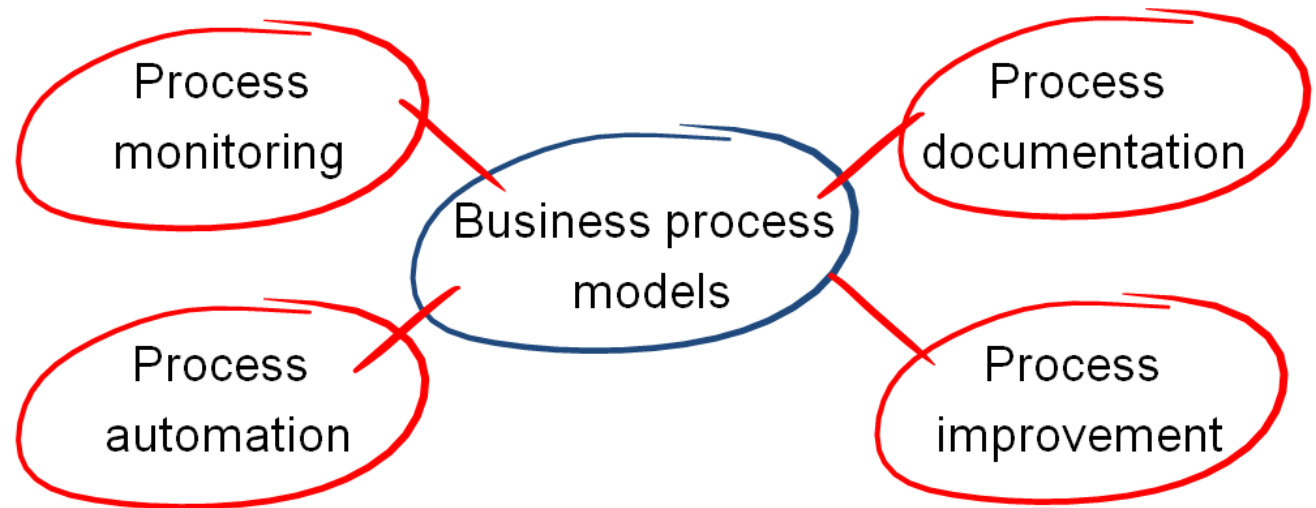
Modeling Theory and Process Models

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



Descriptive or Prescriptive?

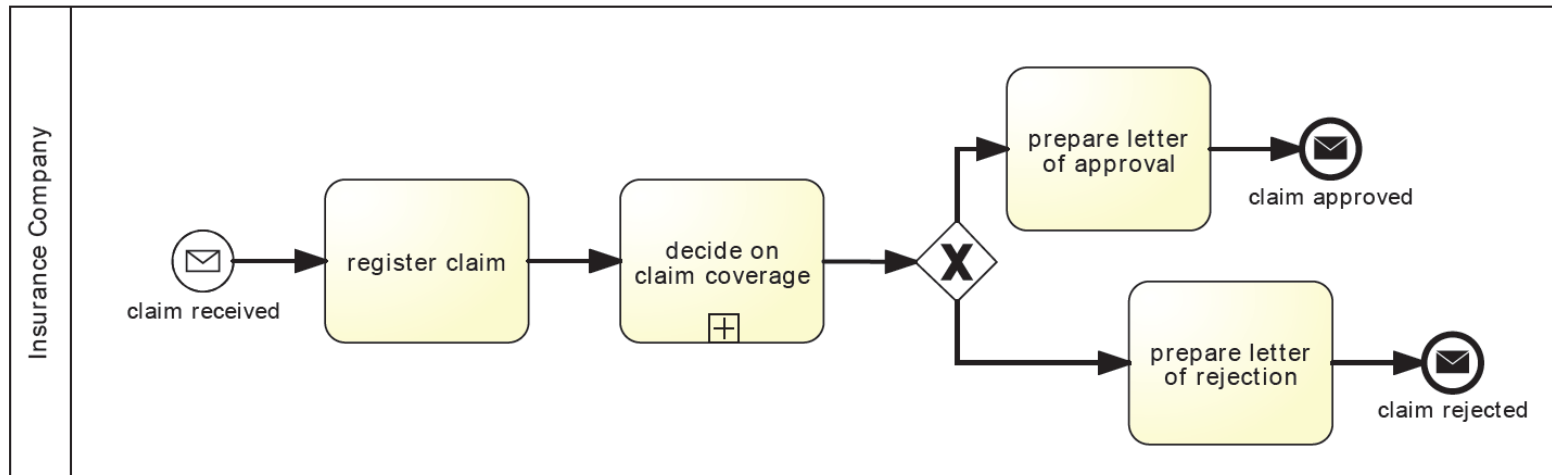
- Process models can have a descriptive character or a prescriptive character



- Descriptive character
 - Process documentation and process monitoring
- Prescriptive character
 - Process improvement and process automation

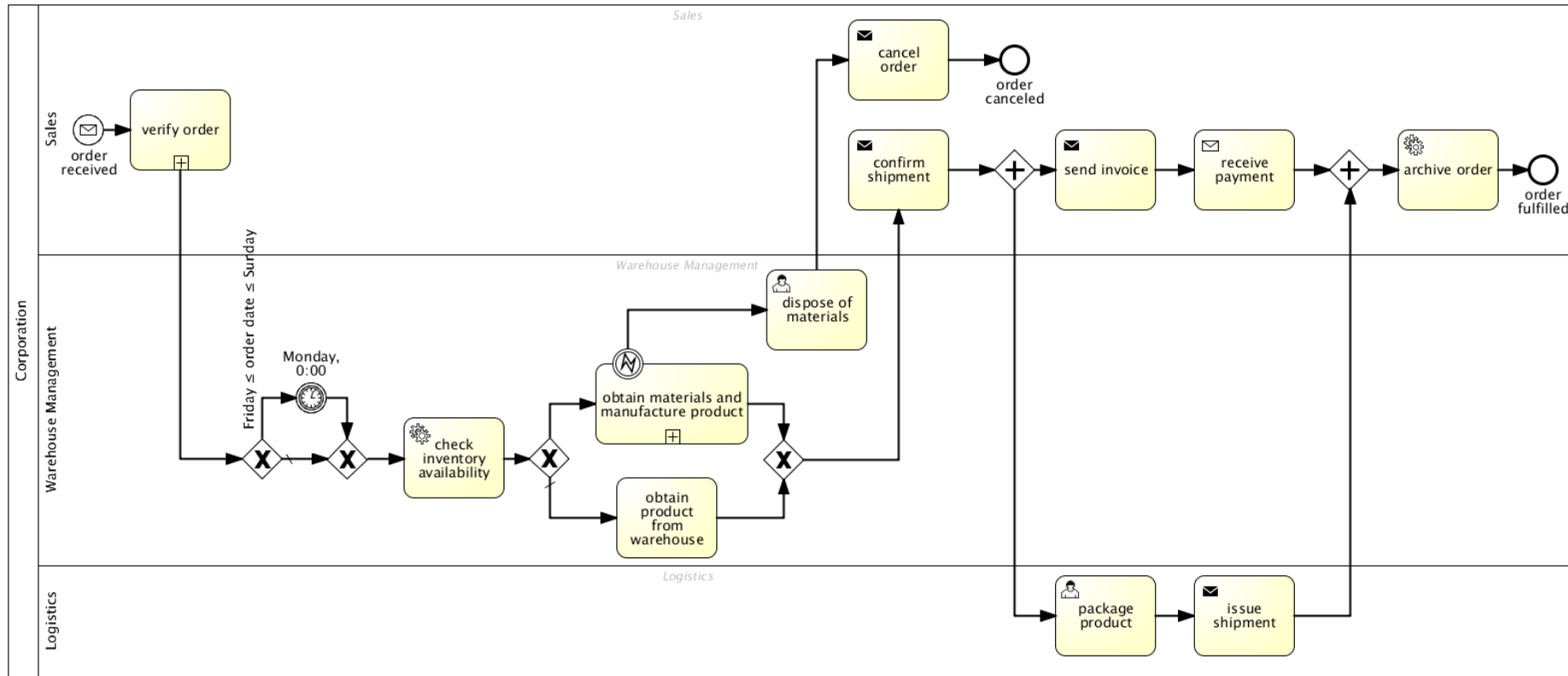
Process Models answer Questions

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, and activities?
- Which are the possible outcomes of the process?

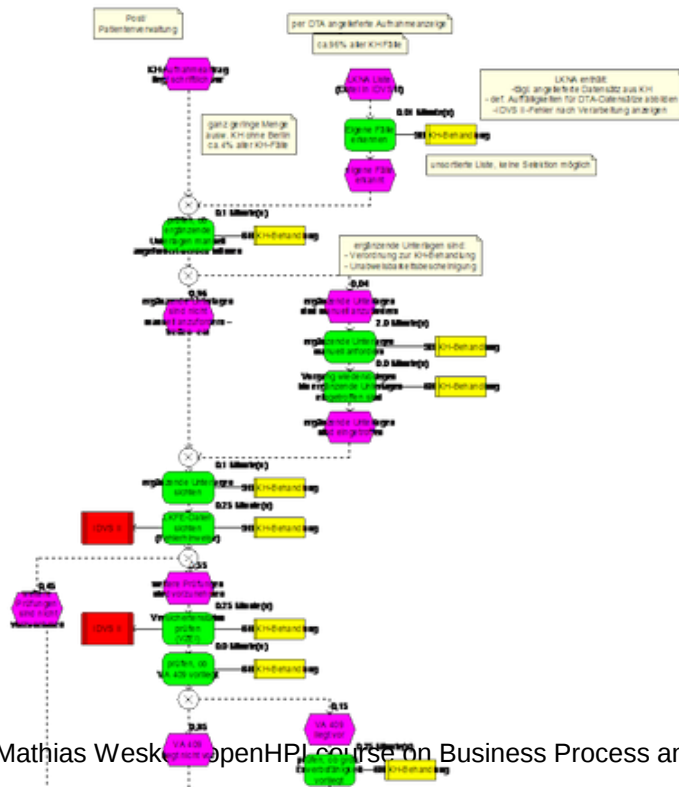
Process Models answer Questions



- 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?

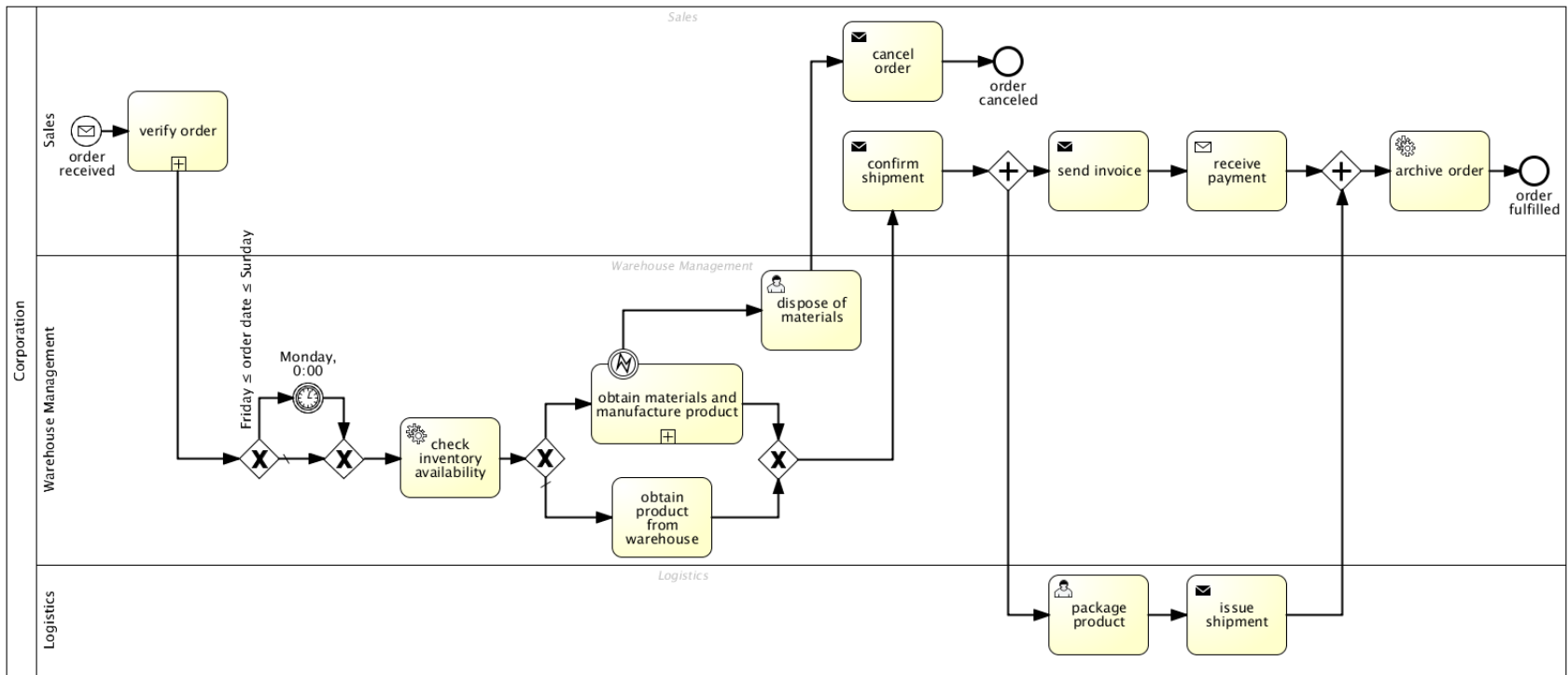
Process Models: Simple or Complex?

- 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 (discussed later in this course)

Video Clip 1.3

Business Process Models

- Defining business process models
- Mapping feature
- Abstraction feature
- Pragmatic feature
- Can be descriptive or prescriptive
- Process models answer questions

Video Clip 1.4

Interacting Business Processes

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Interacting Business Processes

- In the definition, we saw that a business process can interact with other business processes
- Example: Order fulfillment by a reseller
 - To focus on the interaction, almost only send and receive activities are shown

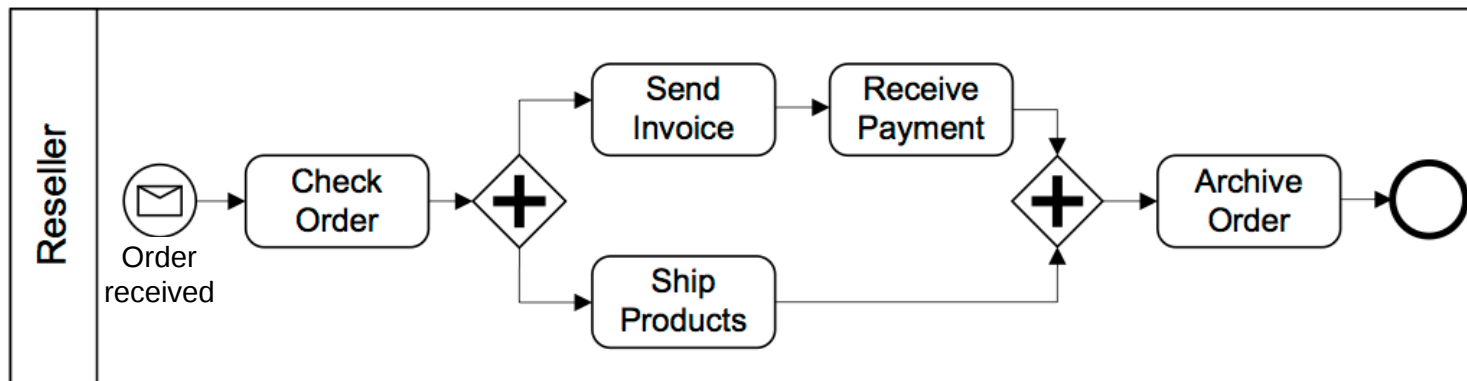


Fig. 1.1. Simple ordering process of reseller

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

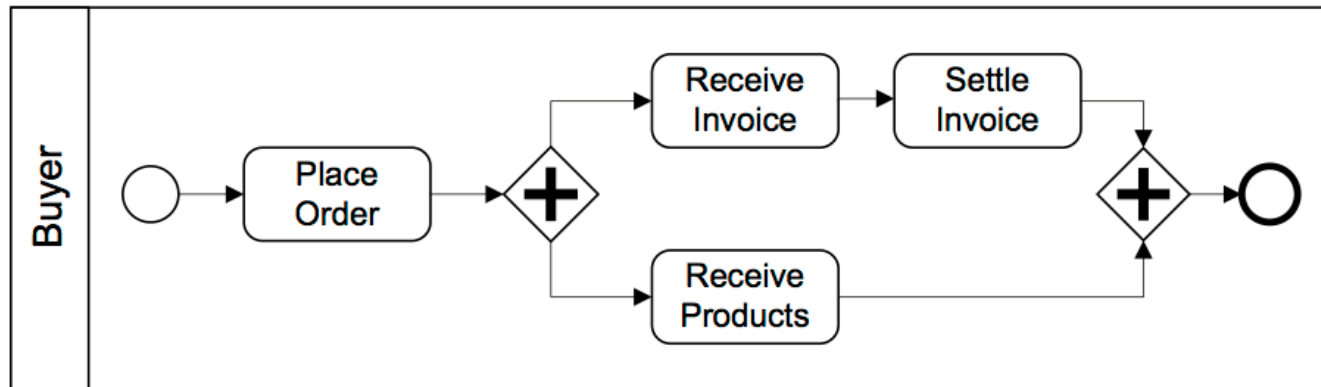
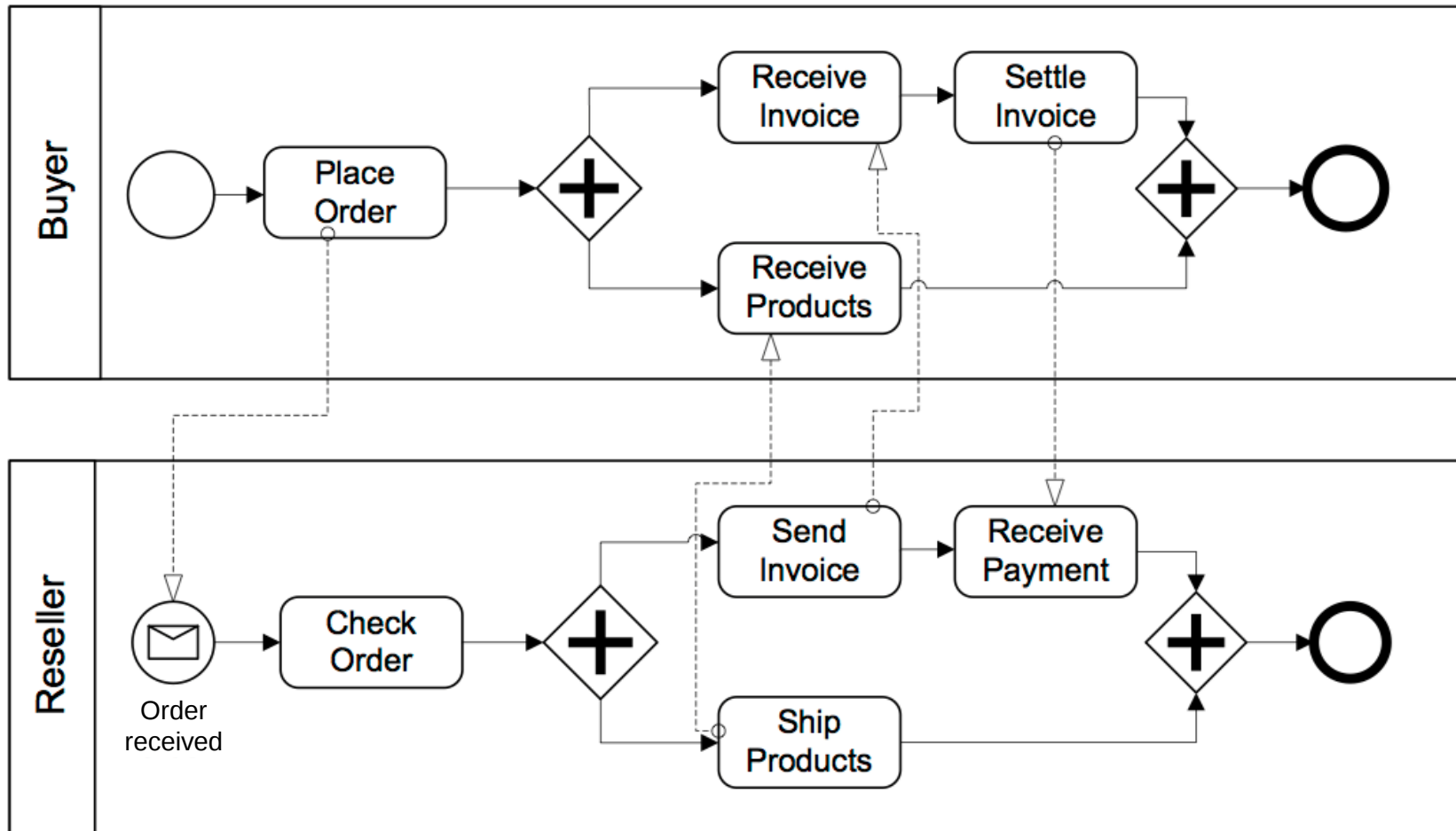


Fig. 1.2. Ordering process of a buyer

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Interacting Business Processes



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Fig. 1.3. Interacting business processes form process choreography

Interacting Business Processes

- Interaction between business processes
 - Performed by sending and receiving messages
 - No common data store assumed
 - These assumptions match reality quite well

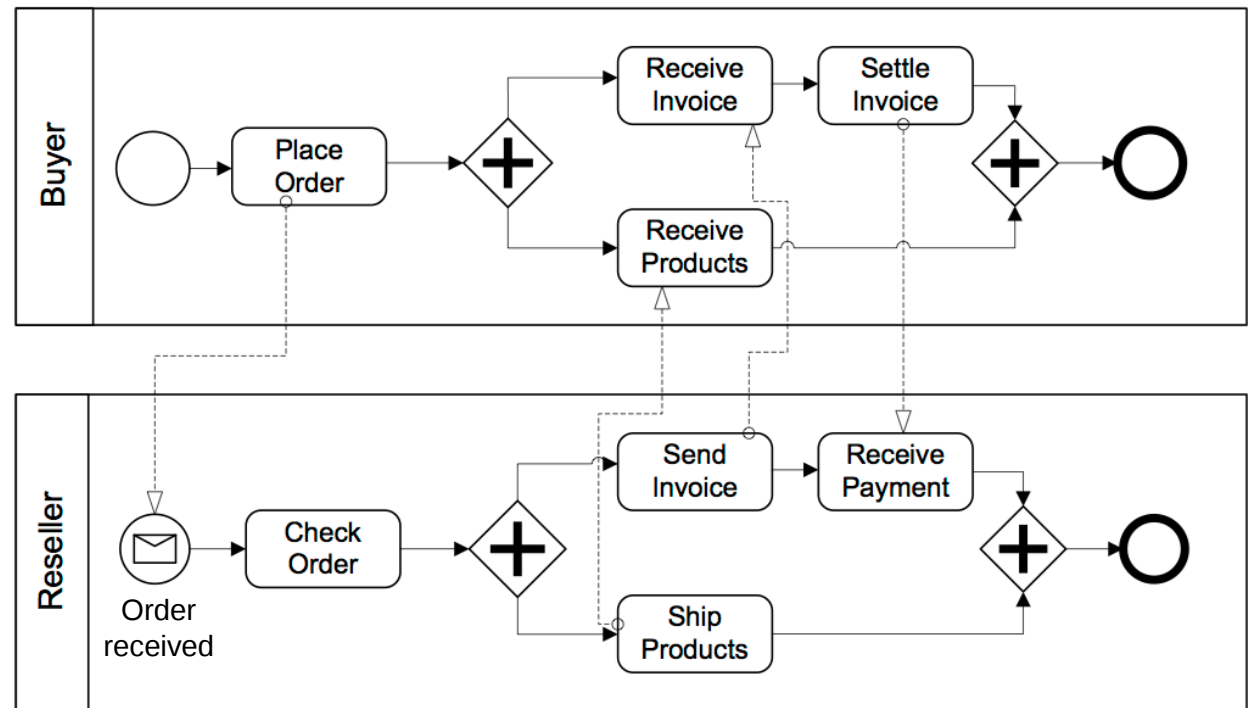
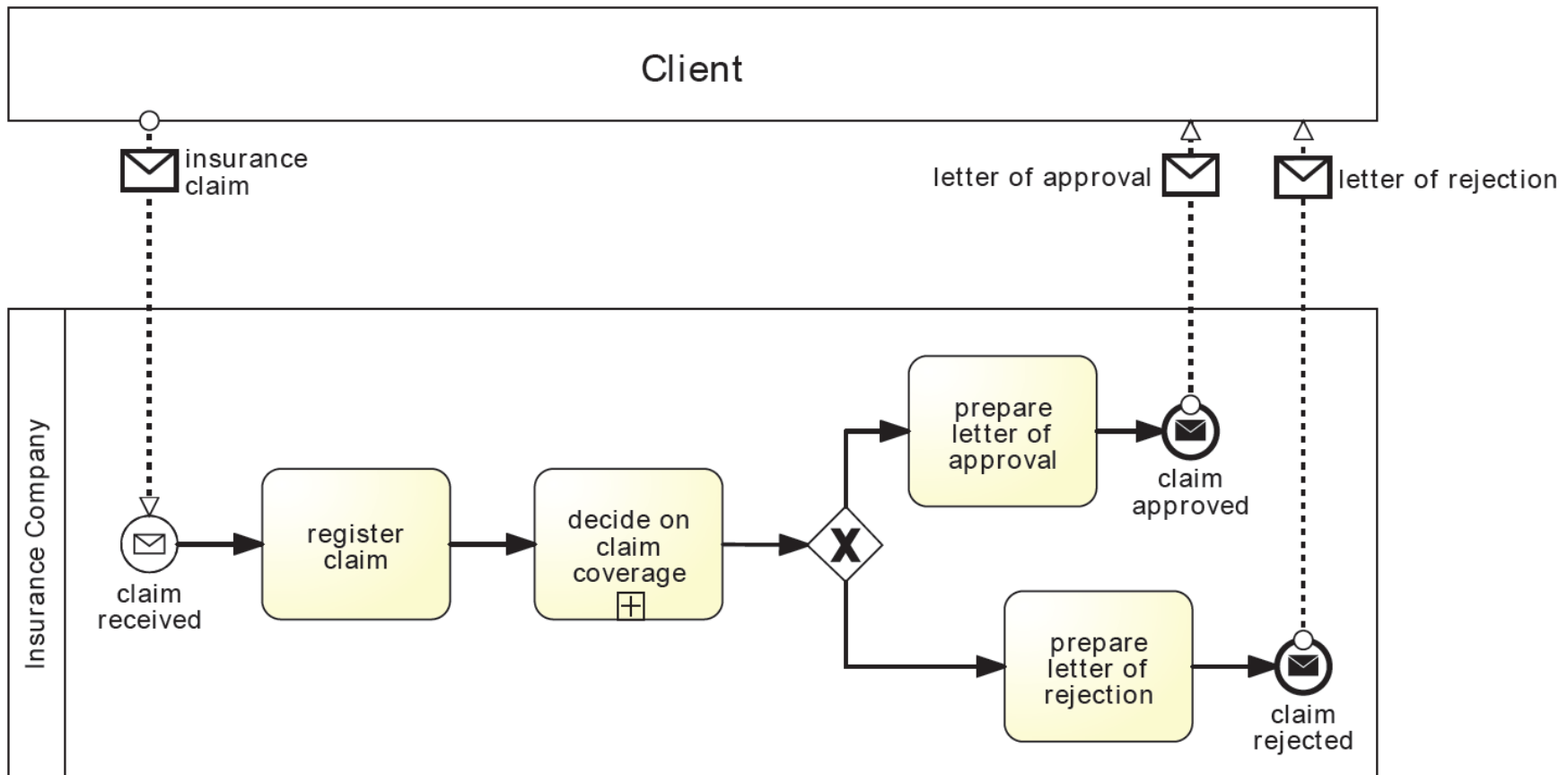


Fig. 1.3. Interacting business processes form process choreography

Interacting Business Processes

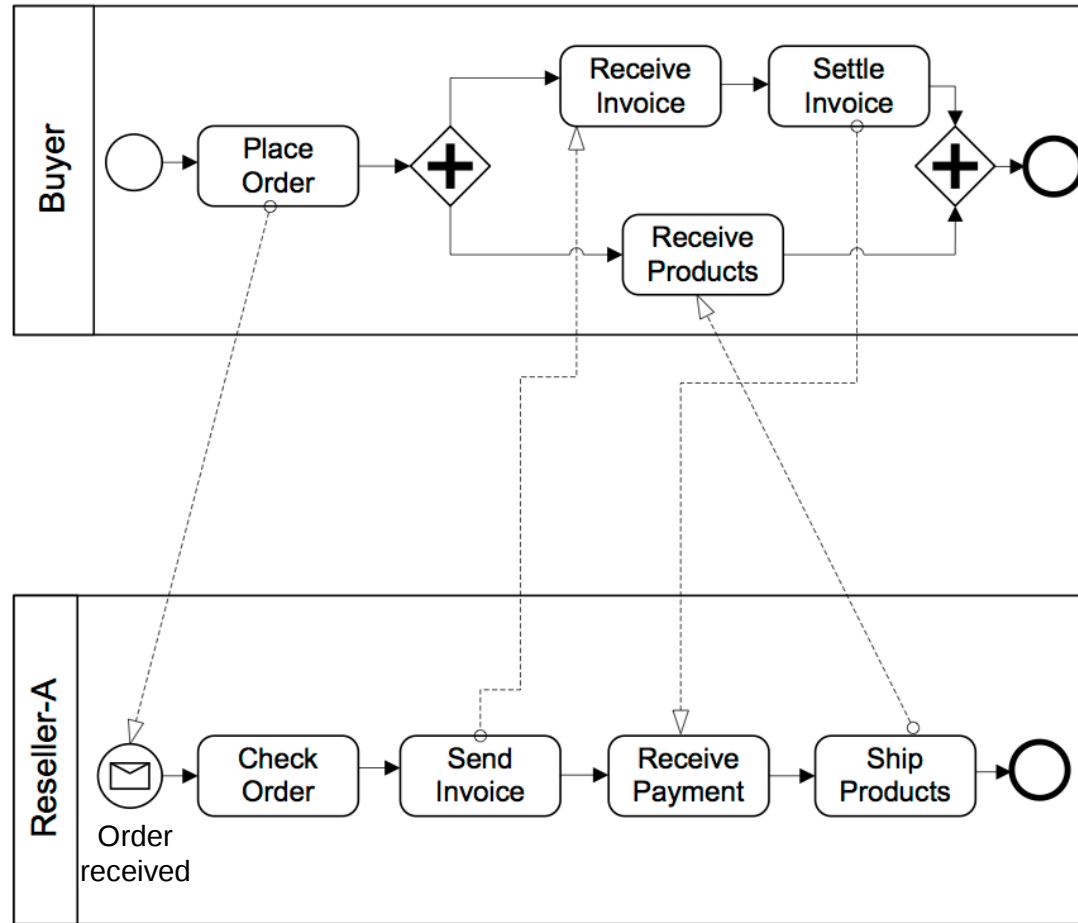
- These assumptions also fit nicely with the insurance claim example



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



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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

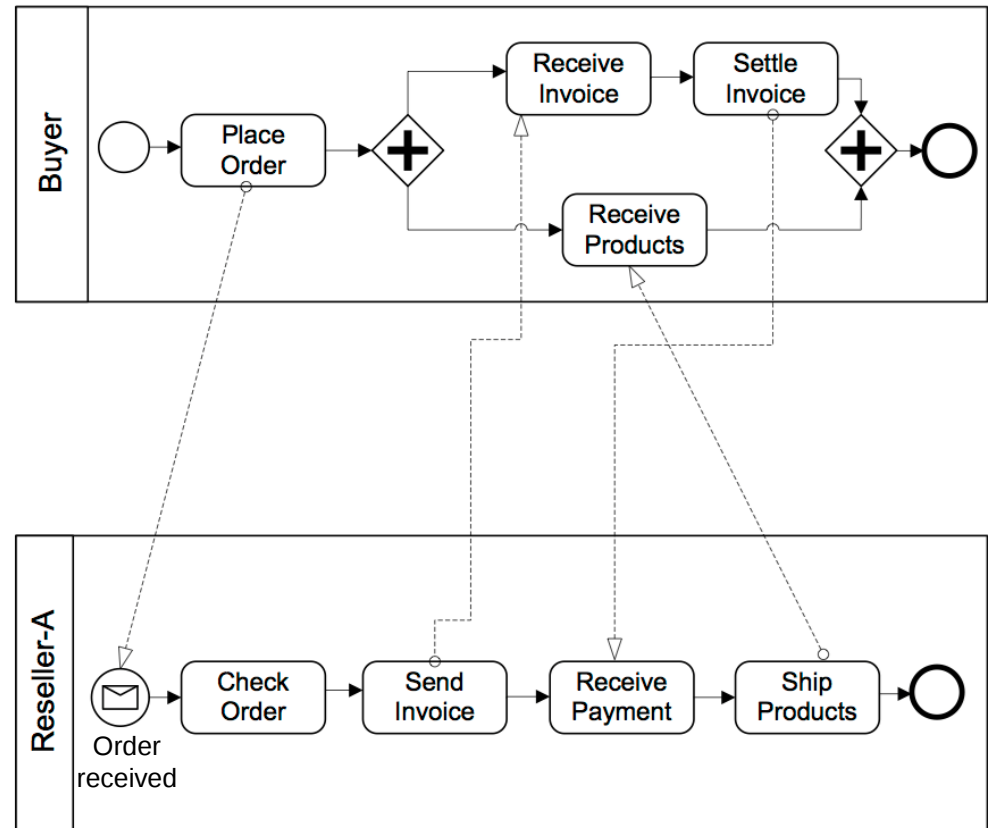
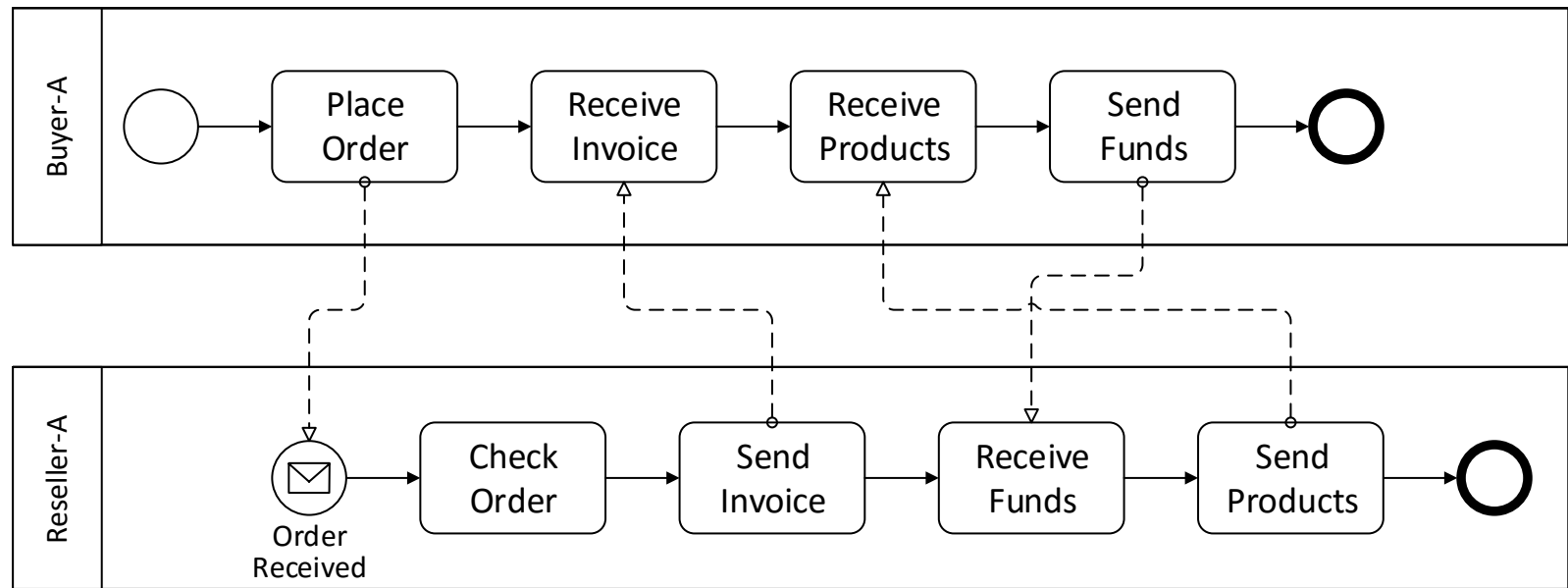


Fig. 1.4. Variant of reseller process with interacting business process

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
- We study process choreographies in more detail in Week 6

Video Clip 1.4

Interacting Business Processes

- Processes interact by messages
- Definition of process choreographies
- Processes may need to wait for messages
- Incorrect interactions may lead to infinite waiting

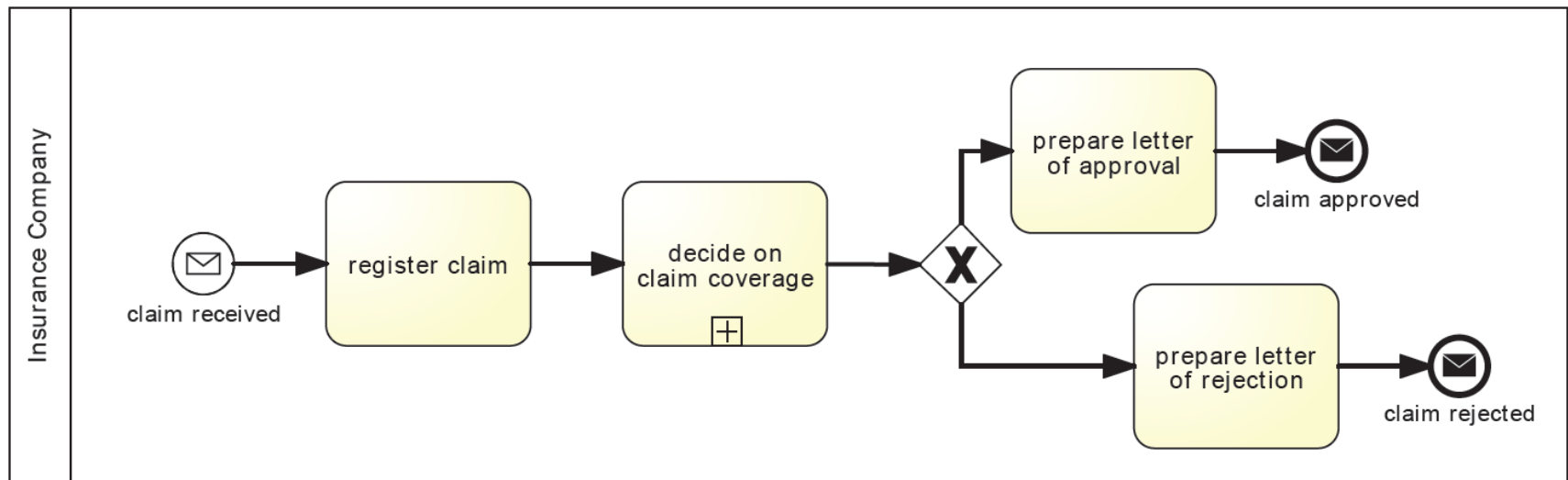
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Models and Instances

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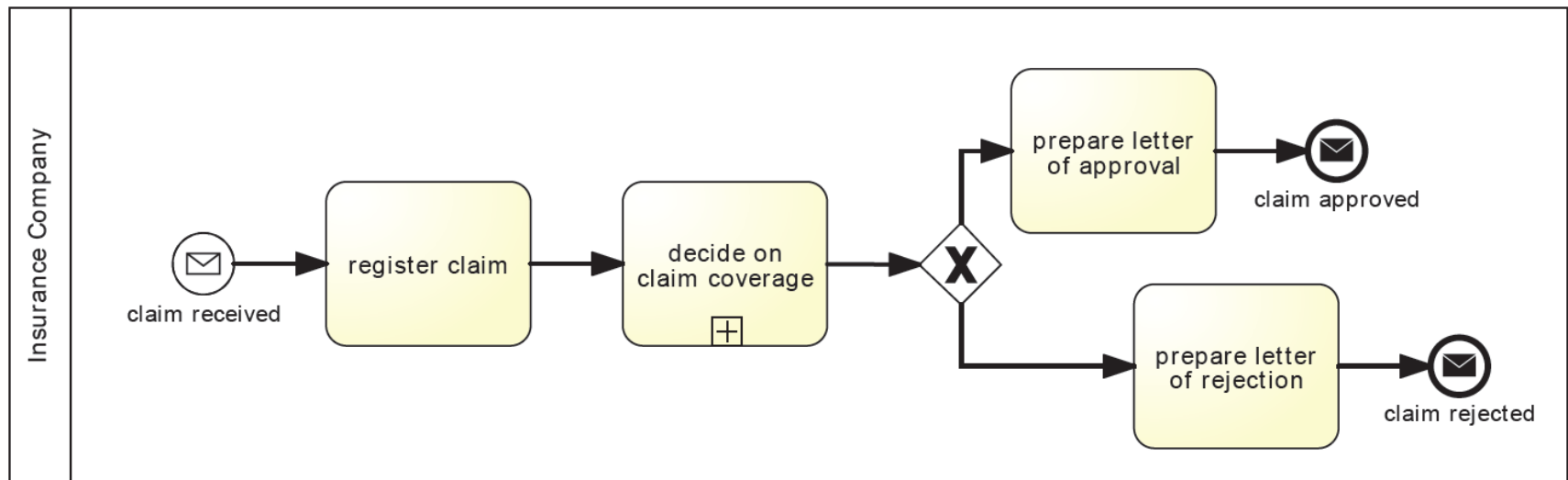
Models and Instances

- *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*



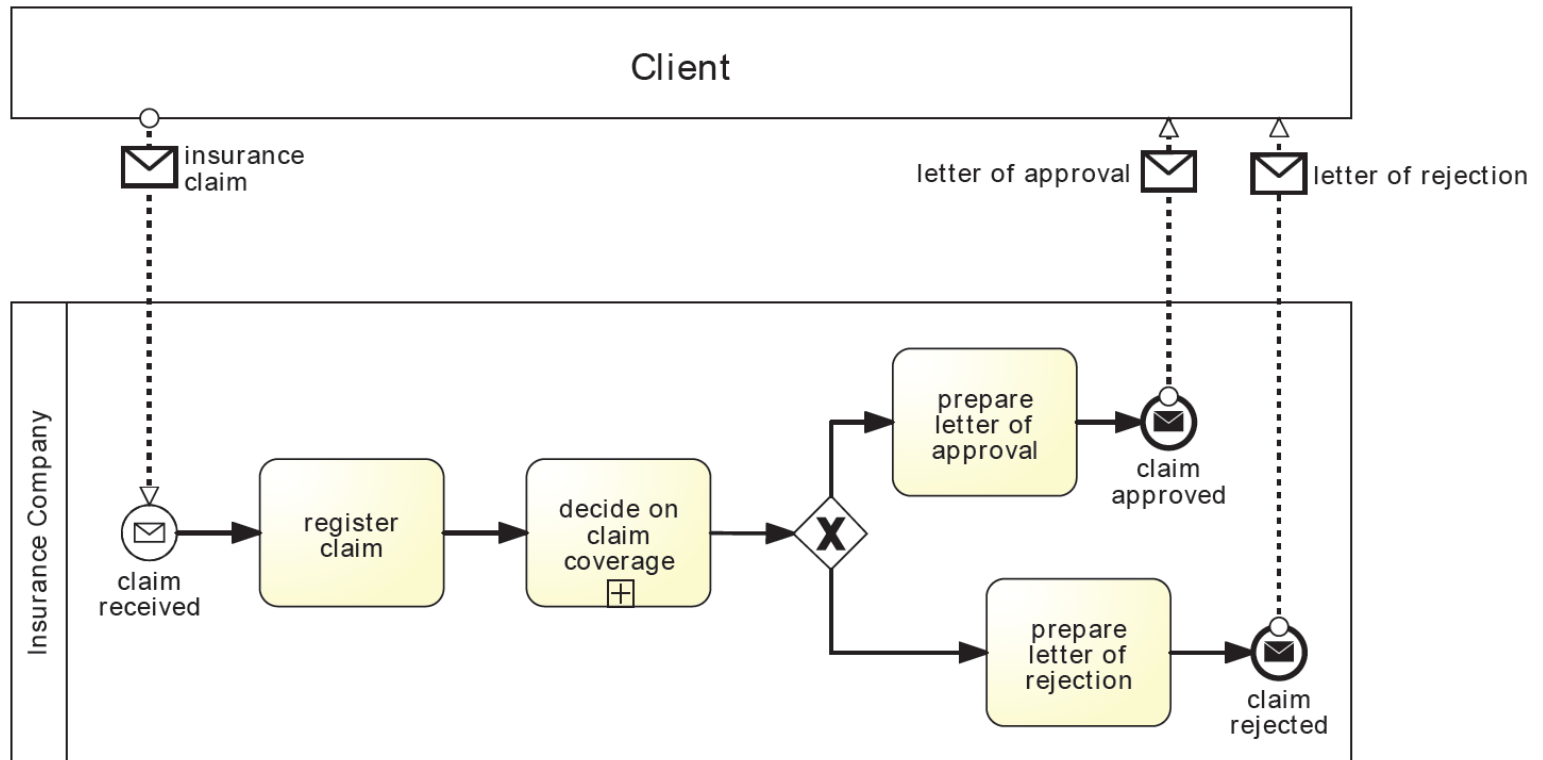
Models and Instances

- *A business process instance represents a concrete case in the operational business of a company.*
 - Claim (142, Weber, 7671, Sept 18, 2013, „Road bike“, € 1590)
 - Claim (143, Petersen, 7479, Sept 19, 2013, „MTB“, € 1490)
 - Claim (144, Lose, 7963, Sept 19, 2013, „MTB“, € 1890)
- Each process model has any number of instances



Process Instances

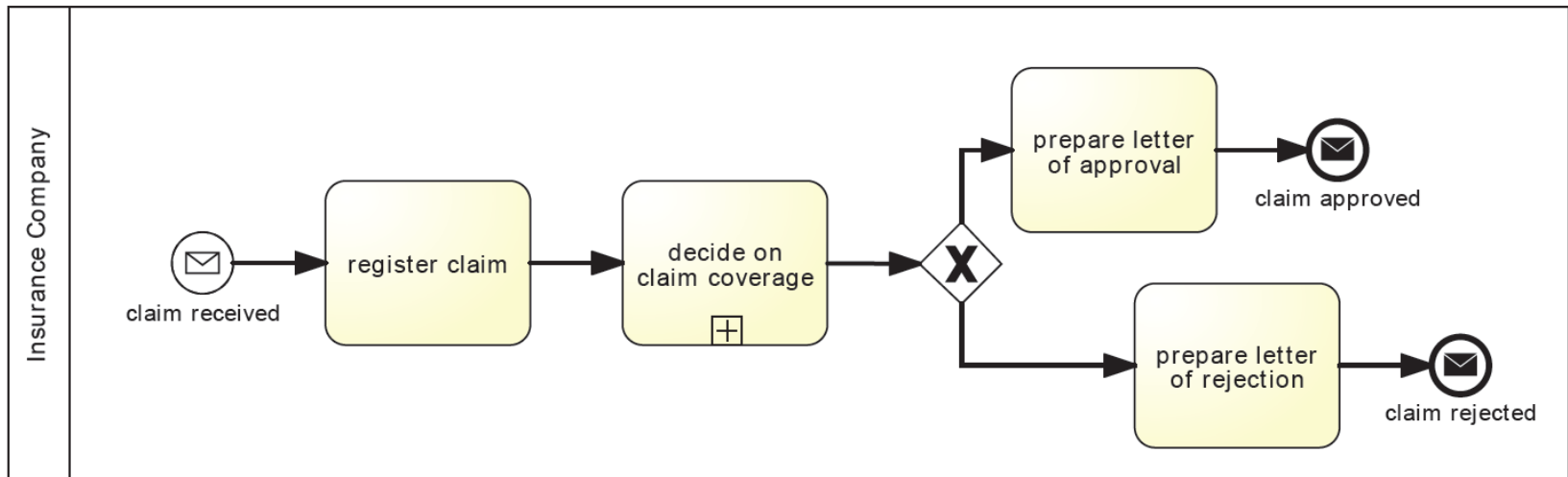
- As clients, we trigger business process instances



- Notice
 - There is no visual representation of process instances
 - (We come back to this point when talking about process simulation)

Terminology is important

- We need to be careful when using the term „process“
 - Do we mean a process model or a process instance?



- 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!

Video Clip 1.5

Models and Instances

- Process models as blueprints
- Process instances represent concrete cases
- One-to-many-relationship
- “Do you mean process model or process instance?”

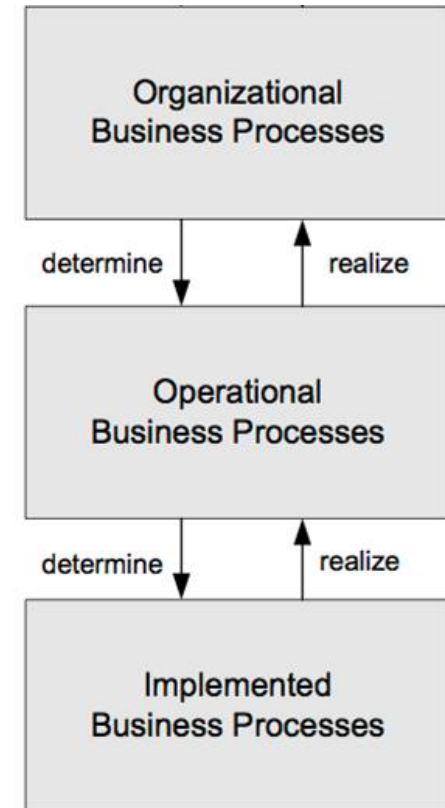
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Levels of Process Models

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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

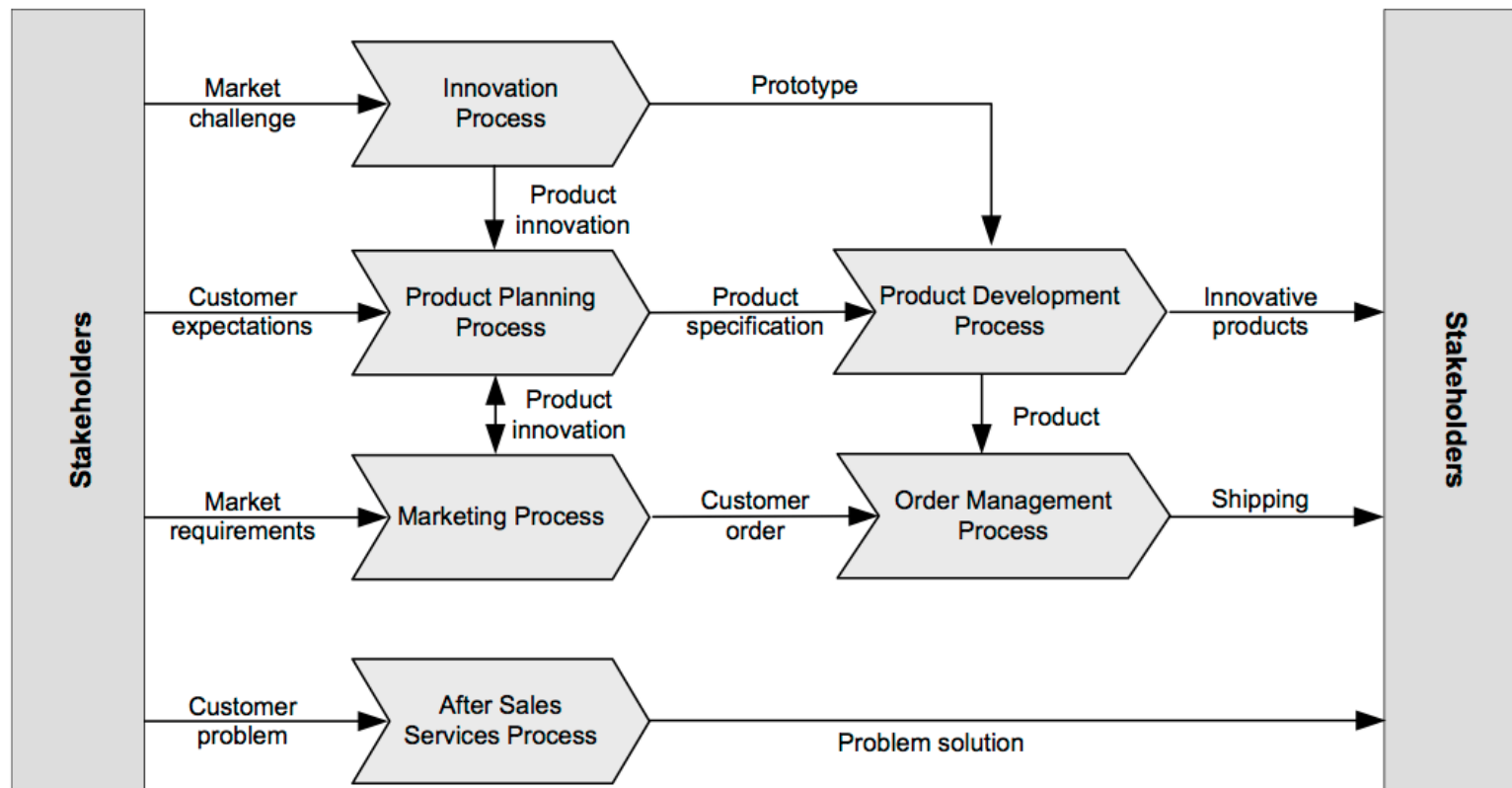


Organizational Business Processes

- 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



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

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

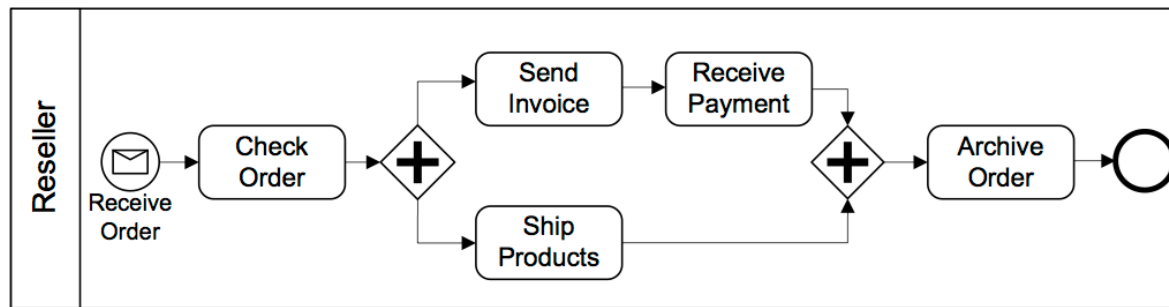
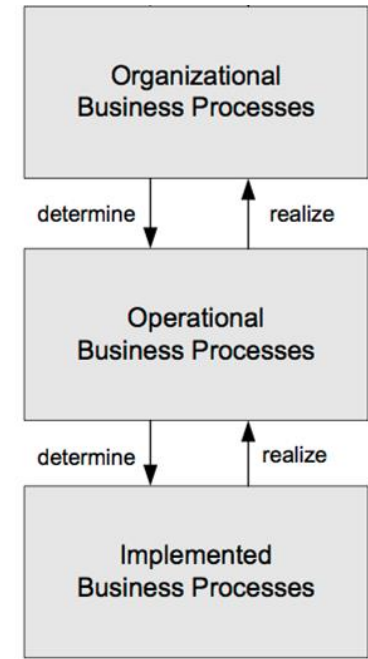
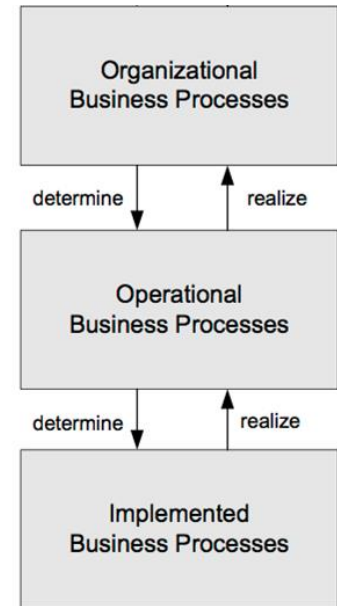


Fig. 1.1. Simple ordering process of reseller

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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
 - (implemented processes not covered in this course)



```

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Video Clip 1.6

Levels of Business Processes

- Organizational business processes
- Process landscapes
- Operational business processes
- Implemented business processes

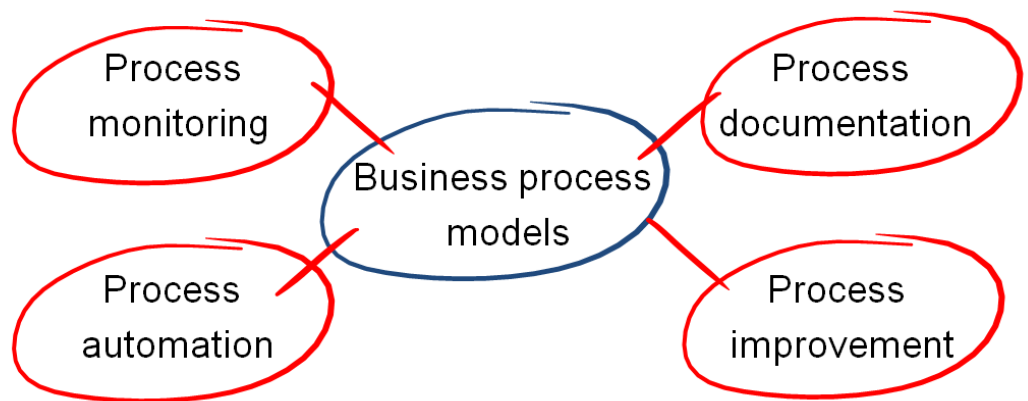
Video Clip 1.7

Business Process Lifecycle

BPMN Meets DMN: Business Process and Decision Modeling:
An openHPI Course by Mathias Weske

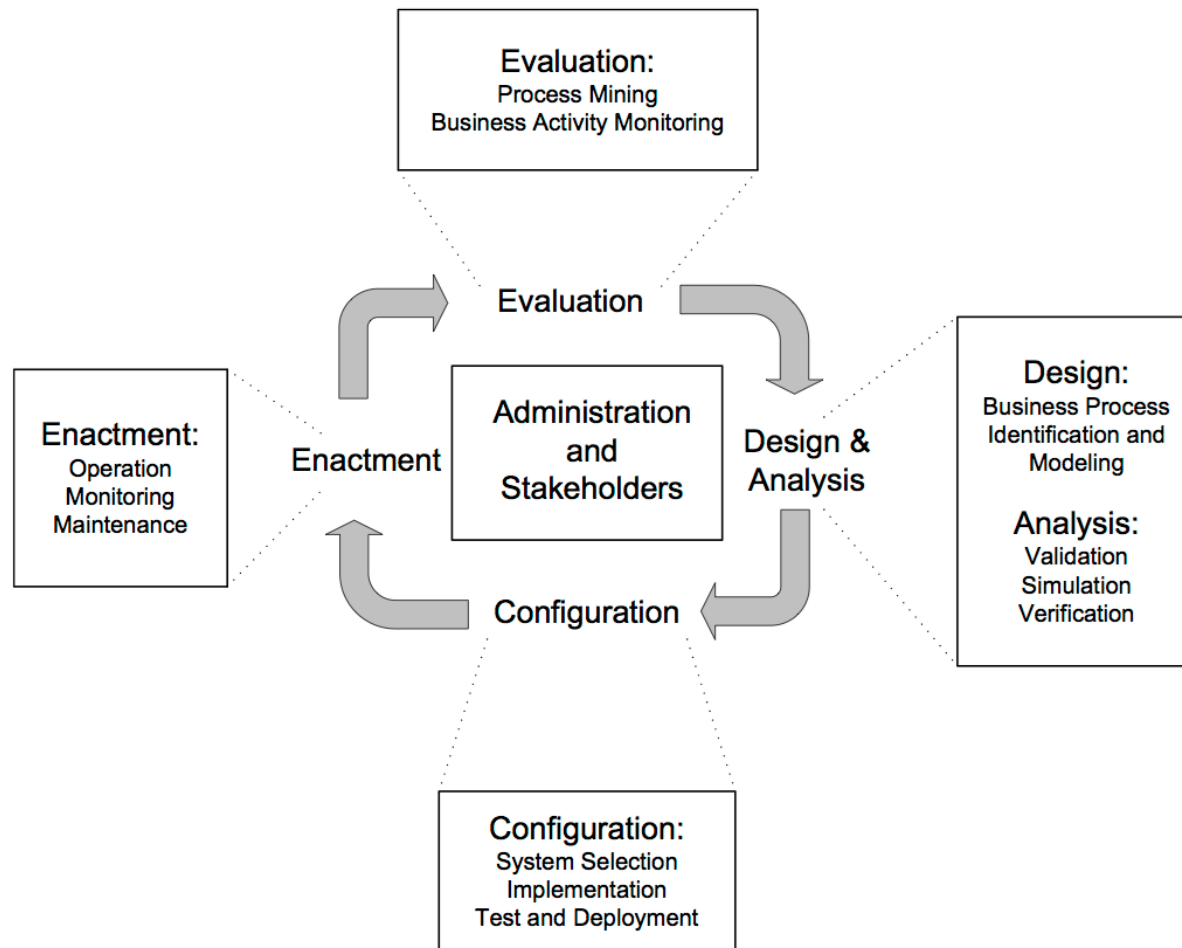
Business Process Lifecycle

- 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
- We have already seen a simple BP lifecycle
 - That uses well-known terms and was used to motivate process models



The Business Process Lifecycle

- Academia mostly uses this lifecycle

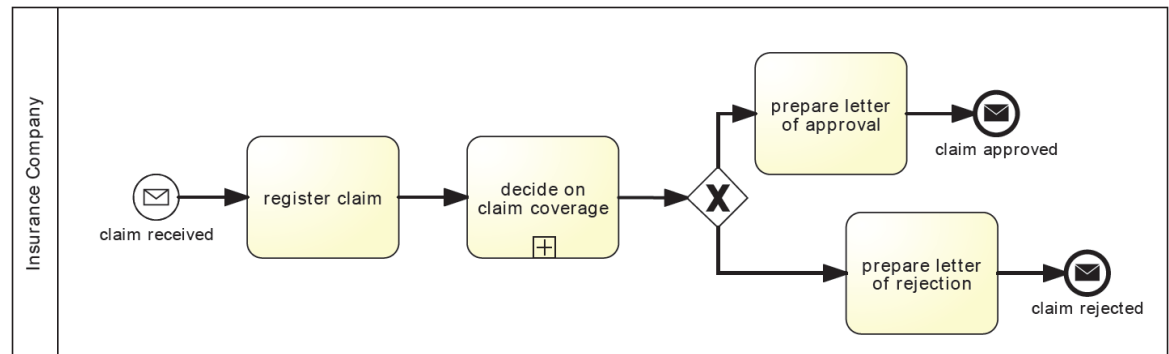


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Fig. 1.5. Business process lifecycle

Design and Analysis

- 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
- Artifact produced
 - Operational business process models and process landscapes



Configuration

- 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

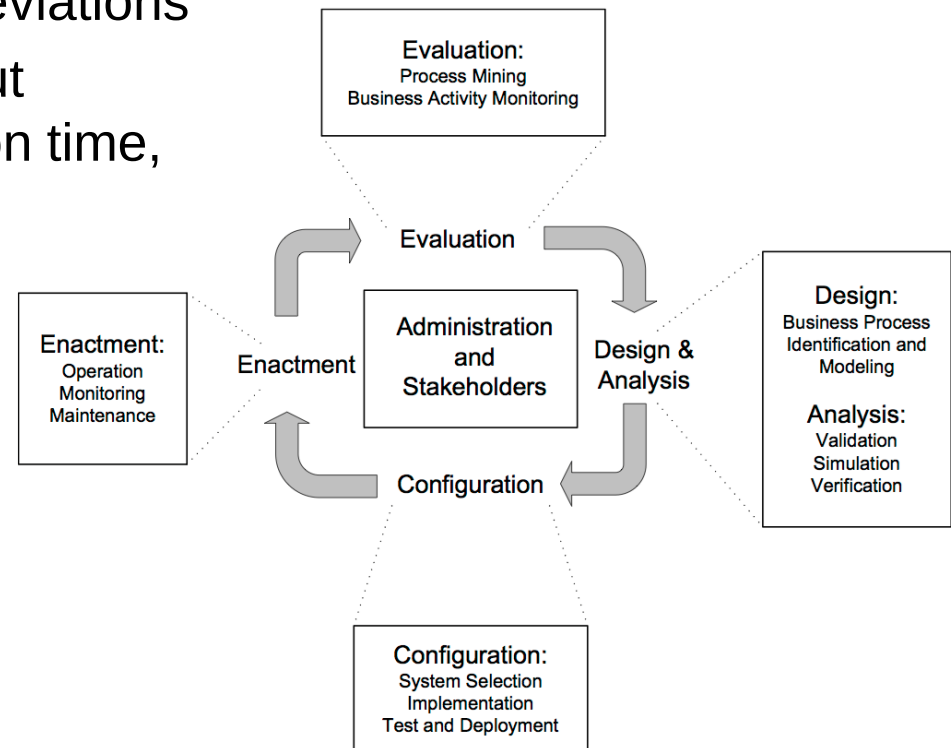
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20    <sequenceFlow id="flow3" sourceRef="start_bestellliste_erstellen" targetRef="zutatenliste_erstellen"></sequenceFlow>

```

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
- Artifact
 - Execution data



Evaluation

- Identification of weaknesses, 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)

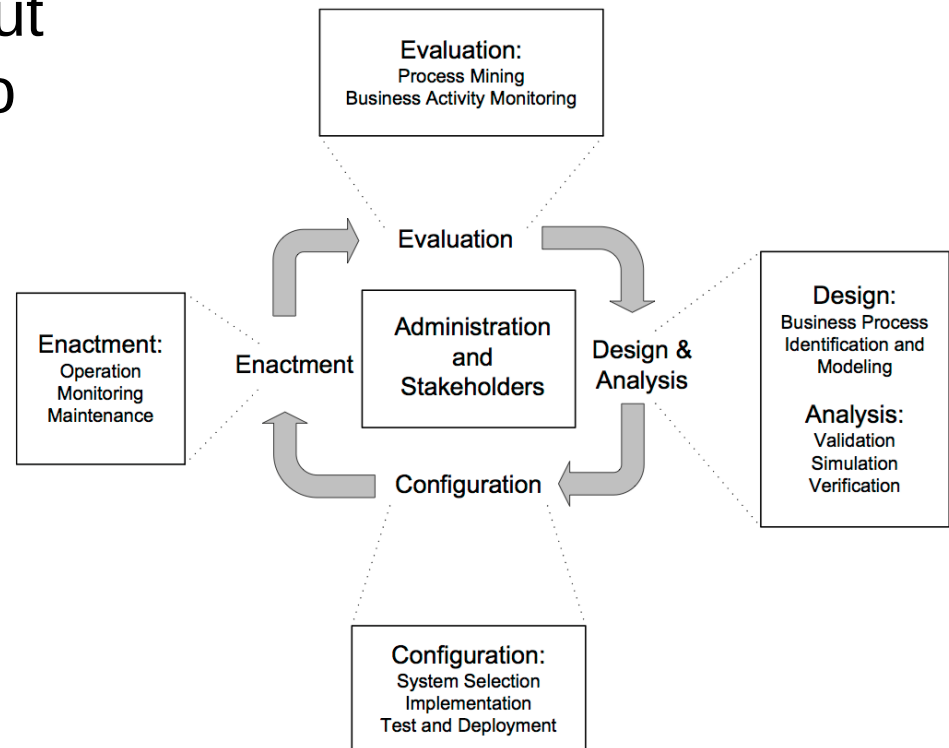
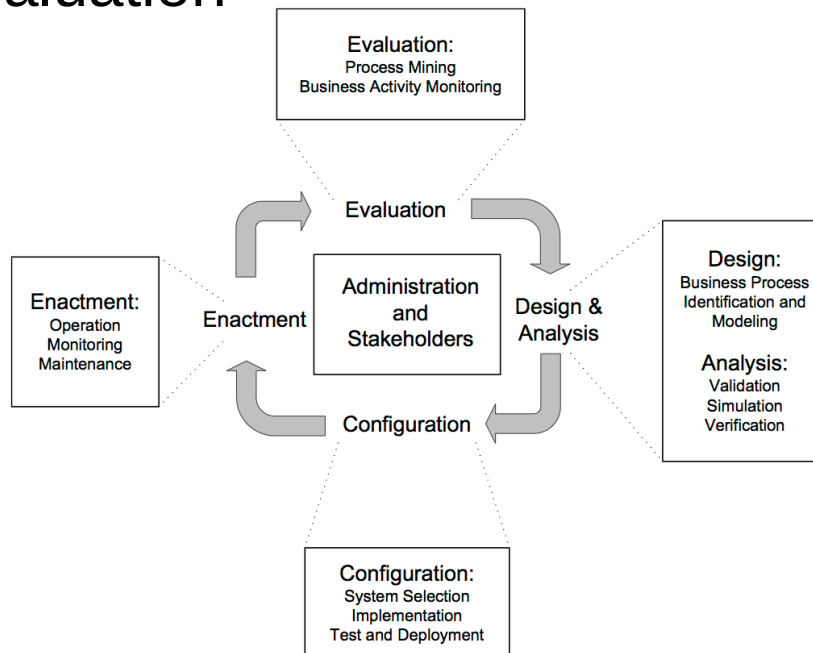
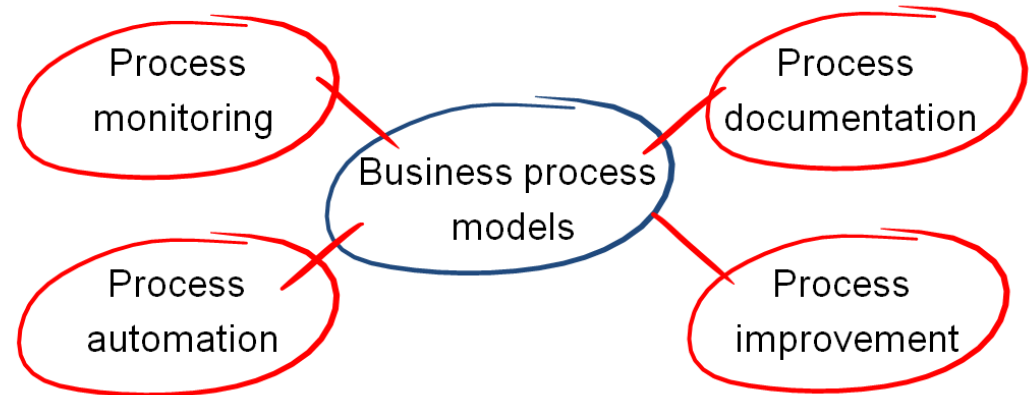


Fig. 1.5. Business process lifecycle

Video Clip 1.7

Business Process Lifecycle

- Design and Analysis
- Configuration
- Enactment
- Evaluation



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Summary of Week 1

- Defining
 - Business Processes
 - Business Process Orchestrations, and
 - Business Process Choreographies
- Introduction to Modeling, and Process Models
- Interacting Business Processes
- Process Models and Process Instances
- Process Landscapes
- Business Process Lifecycle

Course Outline

Week 1: Introduction to Business Process Management (✓)

Week 2: Basic Business Process Modeling

Week 3: Analyzing Business Process Behavior

Week 4: Advanced Business Process Modeling

Week 5: Data in Process Models

Week 6: Business Decision Modeling

Week 7: Final Examination

