Erasmus+

AIBA

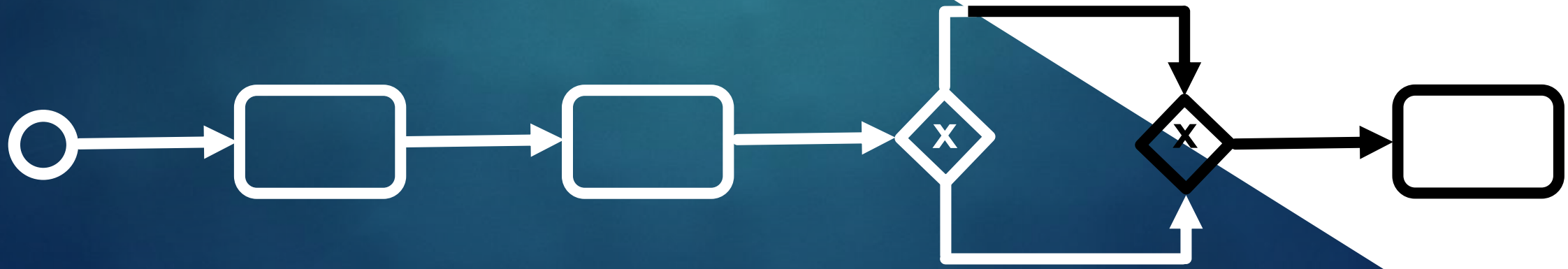
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

COURSE ORGANIZATION & INTRO TO ORGANIZATIONAL PROCESSES



Agenda Unit 1

1. Course Registration
2. Personal introduction – you and me!
3. Goals and contents of the course
4. Course organization
5. What are organizational processes?

Erasmus+

AIBA

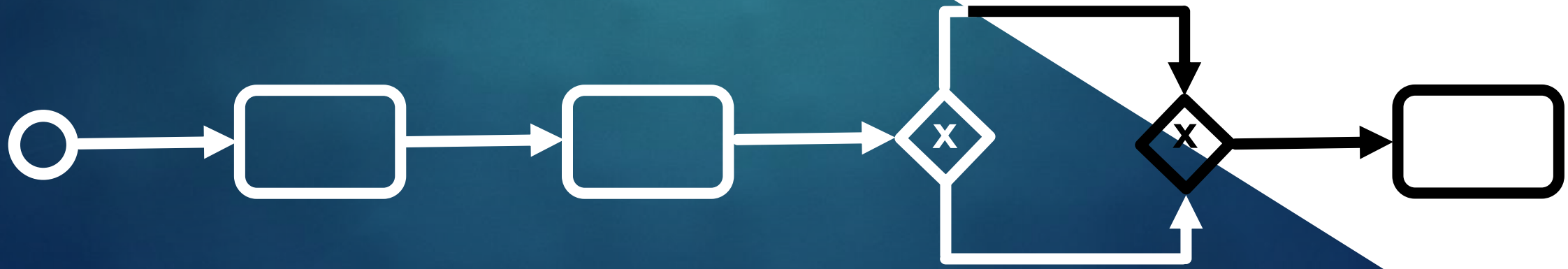
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

COURSE ORGANIZATION



Course Registration

- Is everyone registered for the course?
- Anybody on the waiting list?

Rules for Class

- Have your camera on
- Put your phone away and do not open taps other than the ones needed for class

Be active, ask questions, discuss with your peers and with me

The more you pay attention and contribute in class the fewer you will have to learn for the exam

Warm-up I: Let‘s get to know each other

- How are you today?
- Name, education, study progress, personal info …
- IT-Knowledge, (Job-)Experience
- Why did you choose **this SBWL** and **this course**?
- Expectation about the course (content and design)
- Why did you choose this course?

Warm-up I: Let‘s get to know each other

- How are you today?
- Name, education, study progress, personal info …
- IT-Knowledge, (Job-)Experience
- Why did you choose **this SBWL** and **this course**?
- Expectation about the course (content and design)
- Why did you choose this course?

Goals and Learning Outcomes

You will get to know…

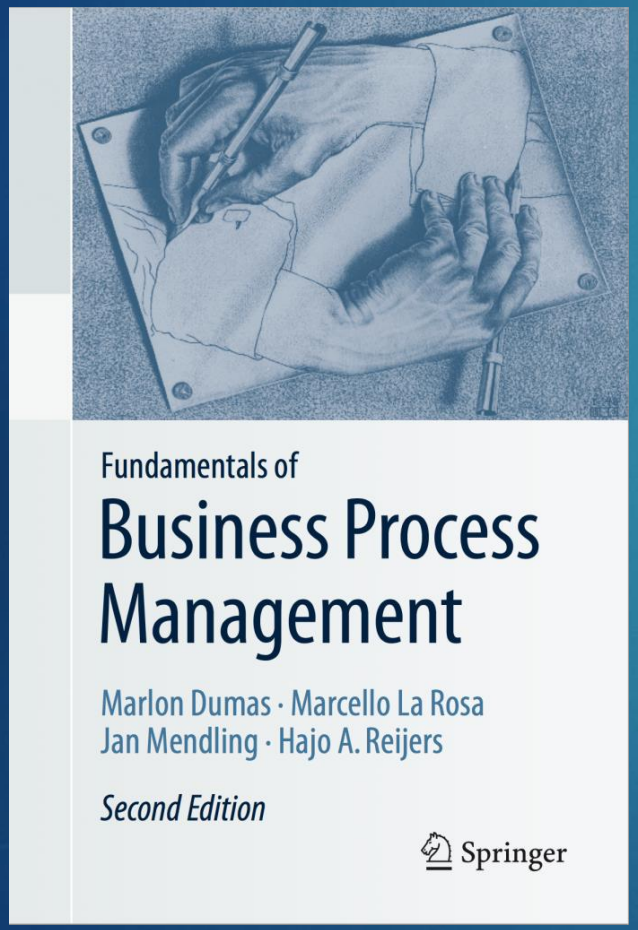
- Introduction to Business Process Management
- Introduction Organizational routines
- Intra-organizational dynamics of processes and endogenous change

You will learn to….

- Model organizational processes
- Understand how processes change
- Be aware of “model reality-divides"
- Distinguish between intended and unintended change

Reflective Process Expert

References and further readings

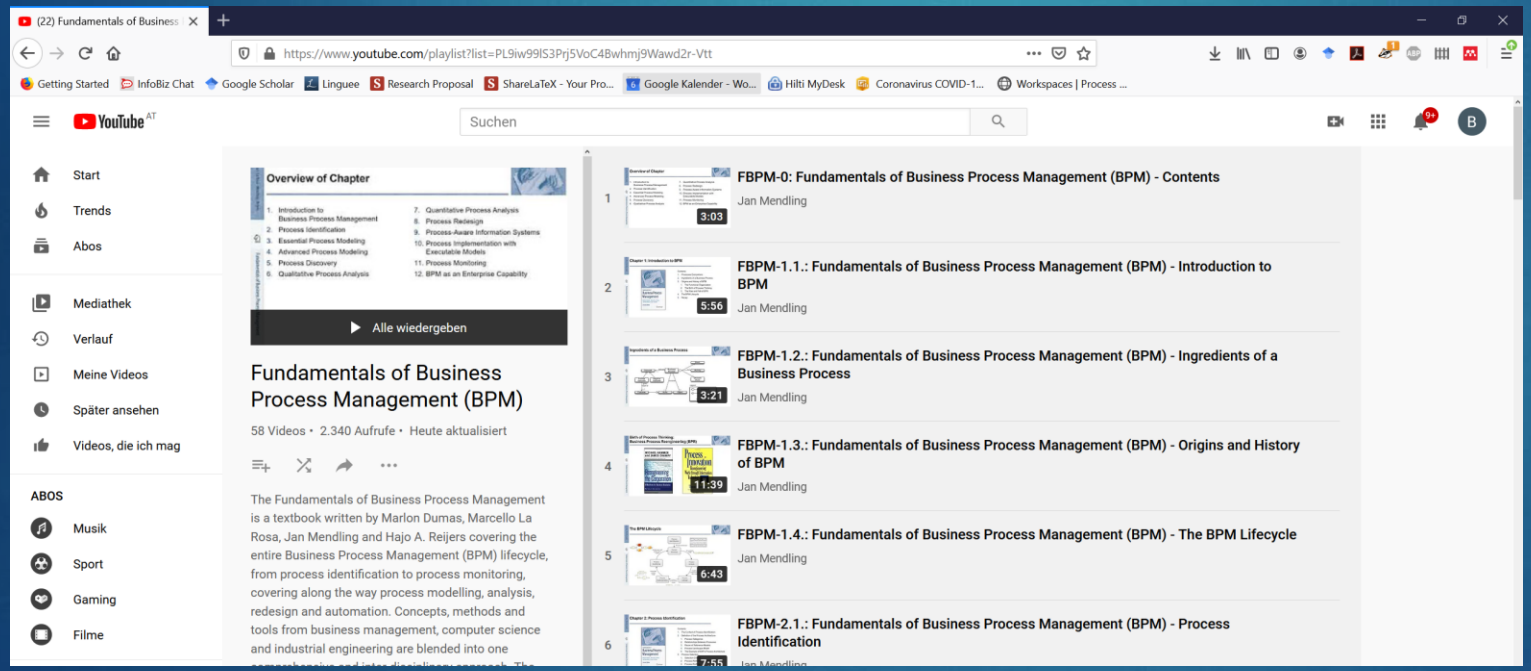


- Business Process Management: Fundamentals of Business Process Management (2nd ed.)
- Check out the website of the book
- Organizational Routines: Based on papers that will be provided via the Learn platform
- Slide decks contain the references to papers and chapters used

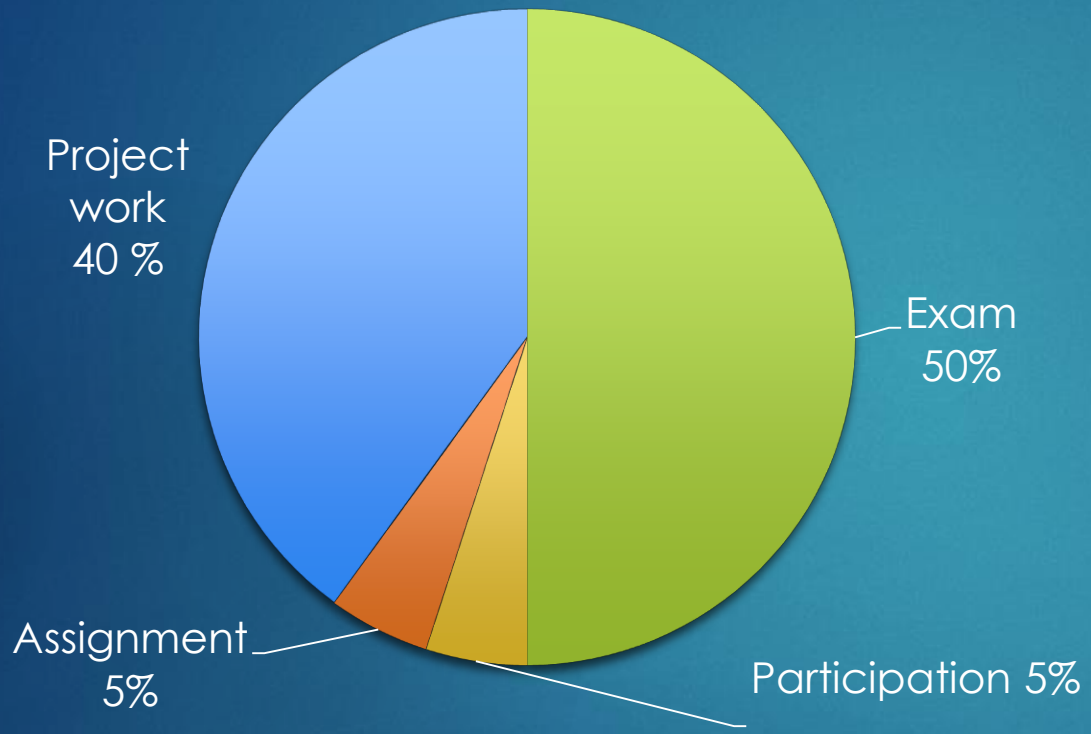
References and further readings

- Video series that covers the content of Fundamentals of Business Process Management

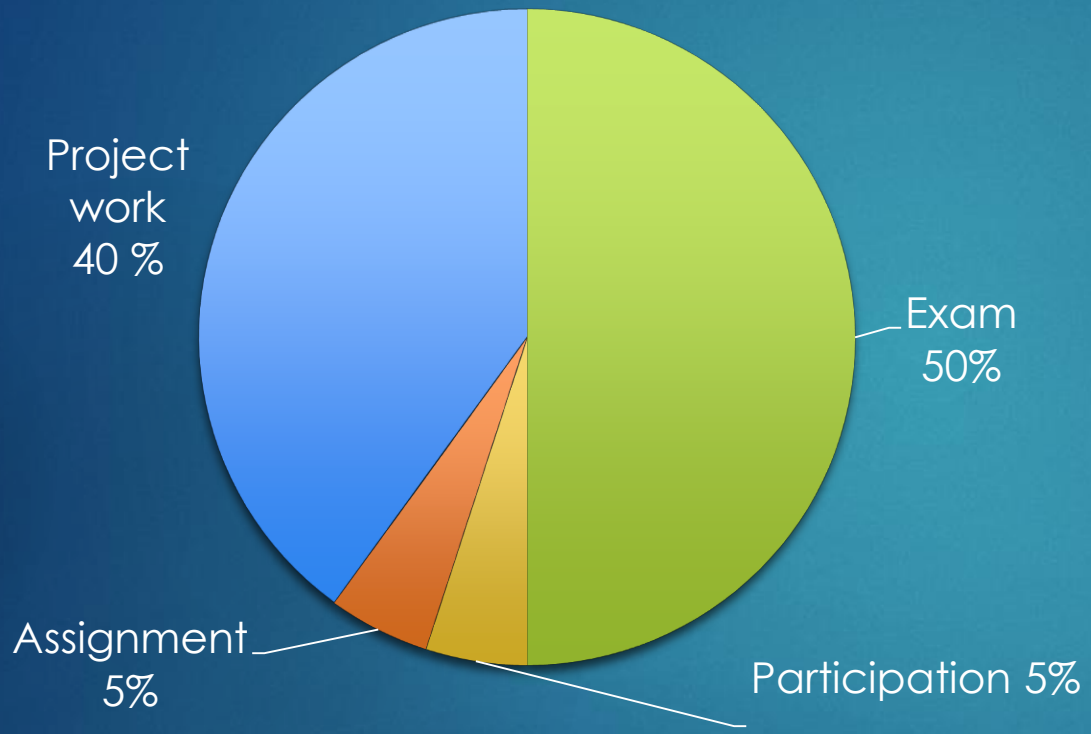
https://www.youtube.com/playlist?list=PL9iw99lS3Prj5VoC4Bwhmj9Wawd2r-Vtt



Grading

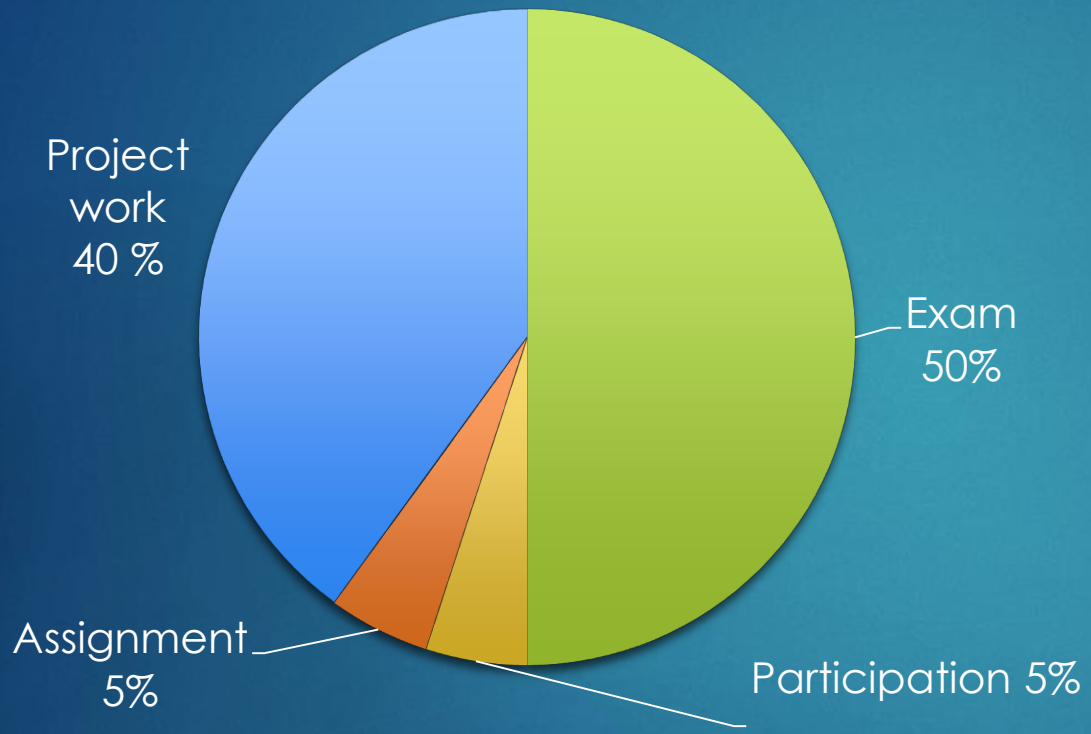


Grading: **Exam**



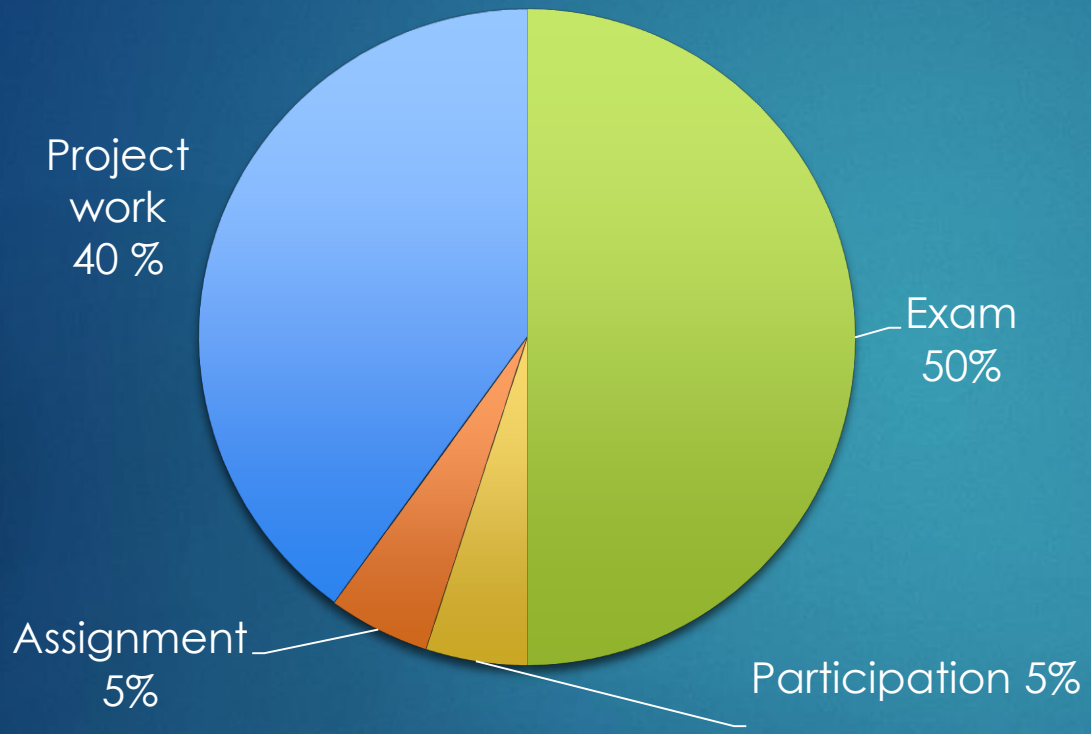
- One hour test
- Covering the whole content of the lecture
- Open questions, exercises, no multiple choice
- Relevant are slides and discussions in class

Grading: **Assignment**



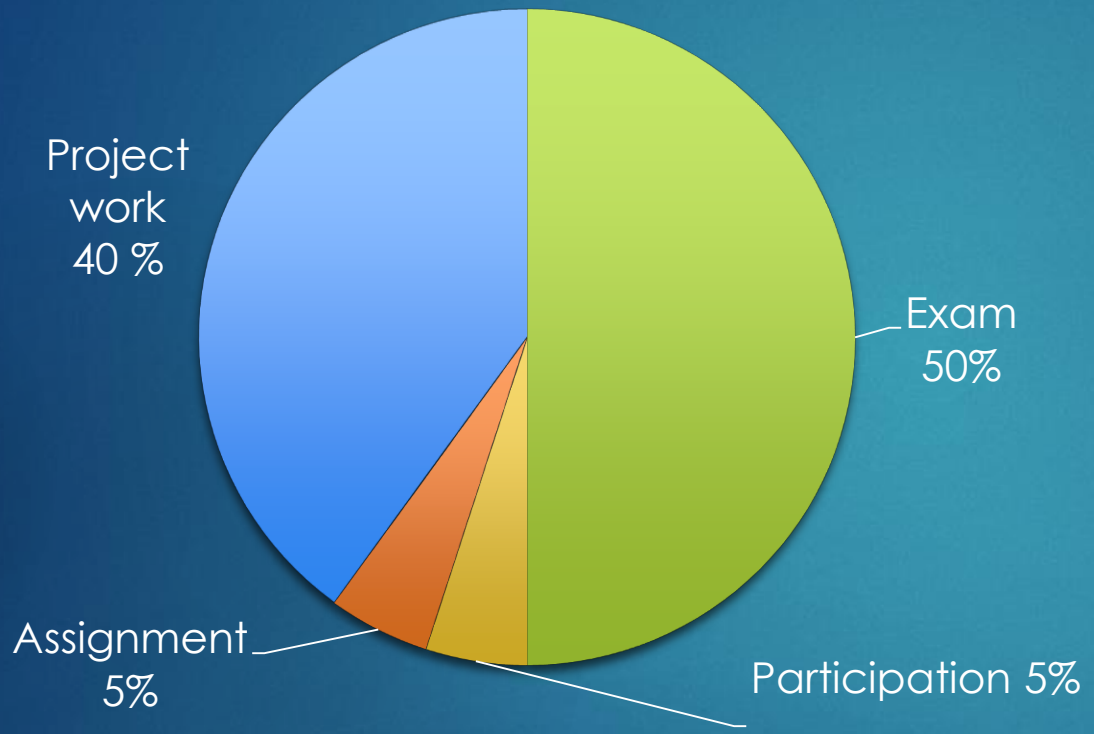
- Take home exercise
- Modelling of business processes
- Preparation for exam

Grading: **Participation**



- Attendance and contributions in class

Grading: **Project Work**



- Individual small project on processes that you observe in real life
- Collect data in form of observations
- Analyze data with process mining software
- **Insights into how real processes behave**

Project Work

1. Select a process that you are interested in
   - Can be (almost any process)
2. Observe what happens in the process and take notes
3. Use these notes and feed them into a process mining software
4. Analyze how the process changes over time or from execution to execution

Project Work: Structure

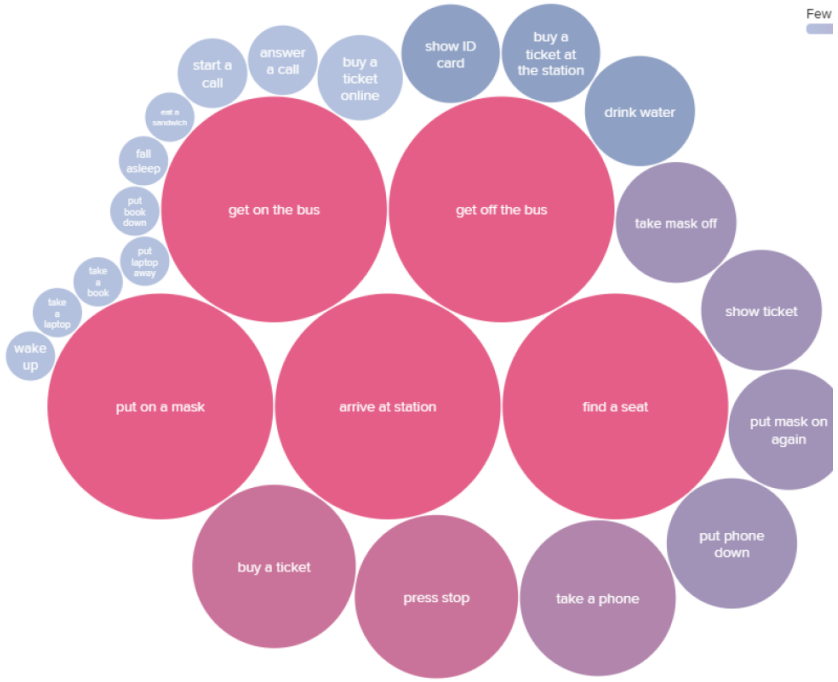
1. Motivation
   - Why this process?
2. Data Collection
   - How did you collect the data?
3. Analysis
   - How do you analyze the data?
   - How many cases are there?
   - What are the activities?
   - **Proceed from general to specific!**
   - **Goal: Understand the process, not necessarily improvement**
4. Findings
   - What are interesting observations?
5. Conclusion
   - Put everything "in a nutshell"

Approximately
7-10 pages

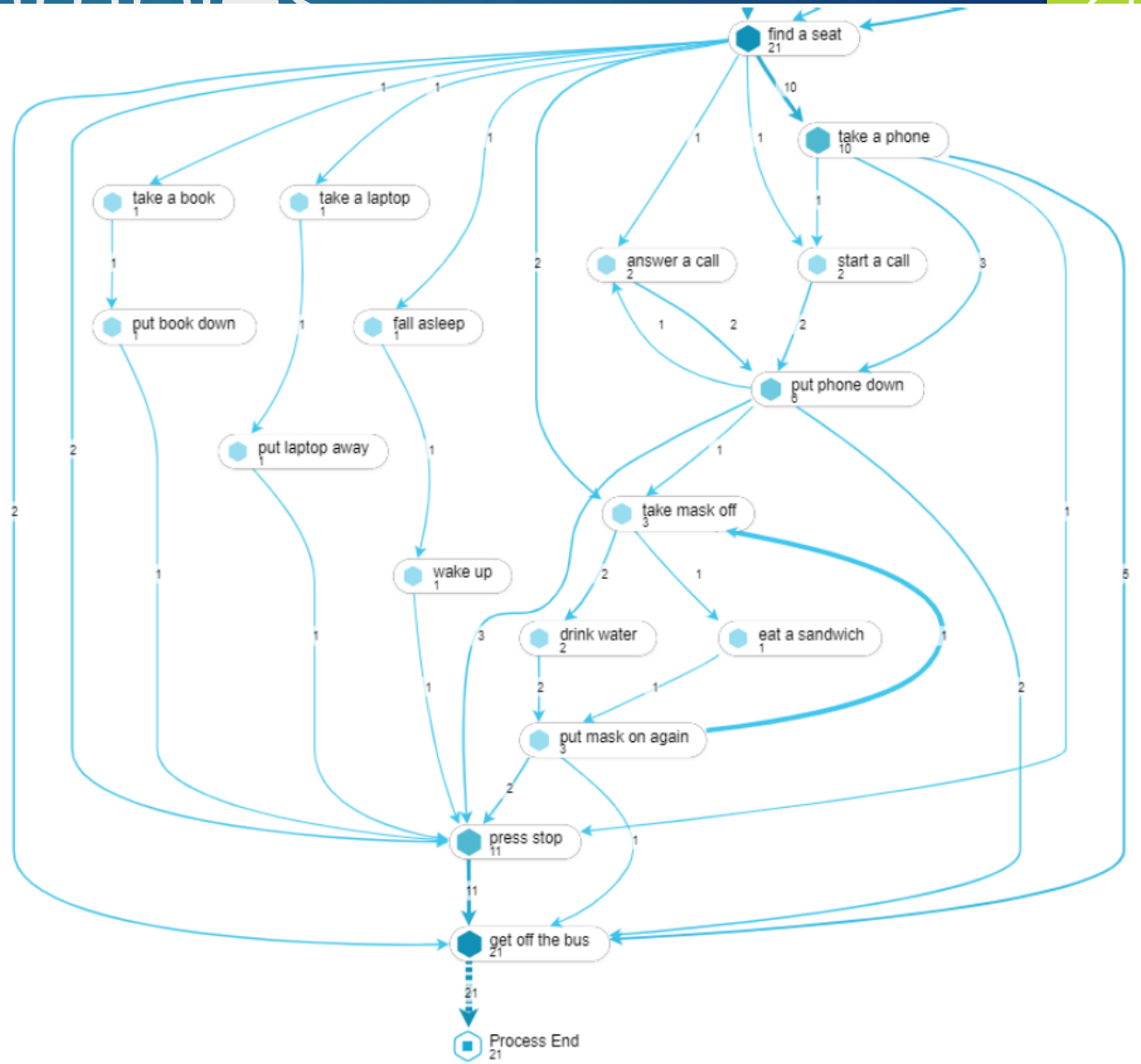
Project Work: How to choose a Process?

- Choose a process that‘s interesting! (**to you**)
- The process should not be too big
  - Not more than 15 activities
- The process should not be too small
  - Multiple actors involved
  - At least 5 activities

Project Work: Examples



3. Figure - Activities



Project Work: Evaluation Criteria

- Quantity and **quality** of data collection
- Quality of analysis

- Writing
  - Style
  - Grammar
  - Spelling

Project Work: Quotes of former Students

- *"The results will be discussed with my flatmates and maybe one or the other will change their behavior at the coffee machine"*

- *„Give process mining a try, it might change your way of thinking or improve your daily life“*

Software Tools: **Process Modelling**

Signavio

Inform yourself and get a free account!

https://academic.signavio.com/p/register

Software Tools: **Process Mining**

Celonis

Inform yourself and get a free account!

https://www.celonis.com/academic-signup

Erasmus+

AIBA

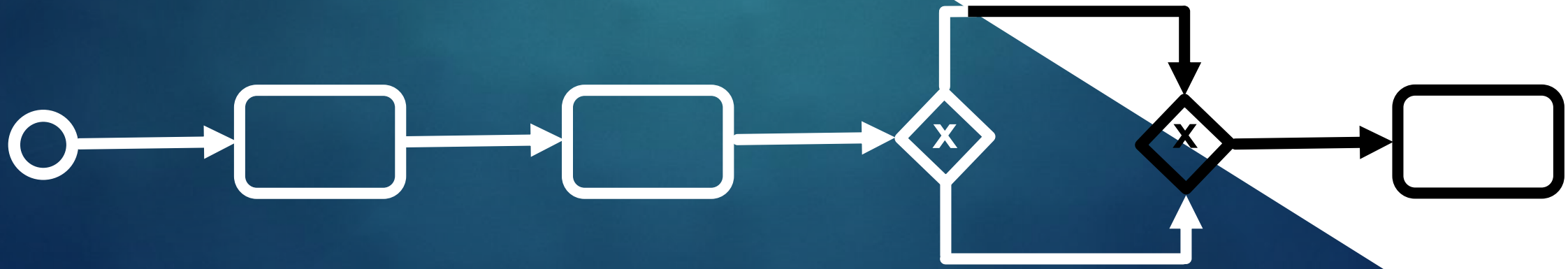
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

INTRODUCTION TO ORGANIZATIONAL PROCESSES



Exercise

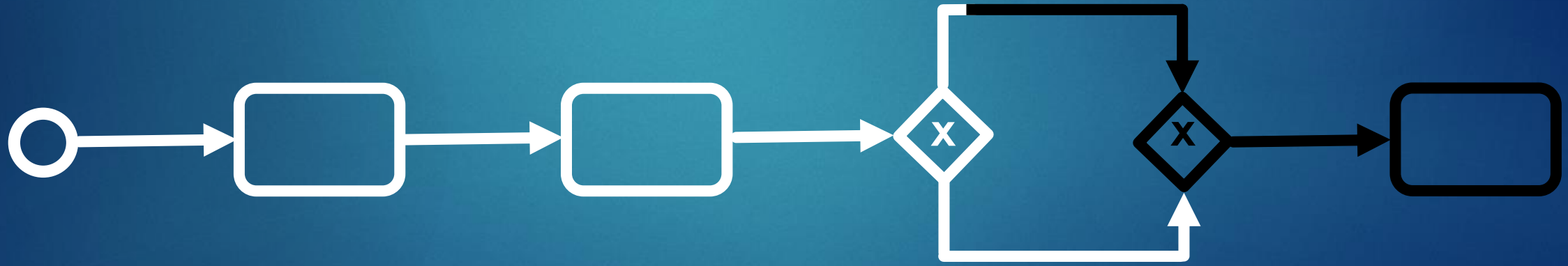
Gather in groups of 2.

Think of a process from your own experience and do the following tasks:

- Create a shared understanding of what the process is
- Specify 10-15 process steps that are typically performed. For each step, consider:
  - What is the activity?
  - Who is performing it?
  - What (IT) system is being used?

What is a (organizational) process?

- "A collection of activities that takes one or more kinds of input and creates an output that is of value to the customer" (Hammer and Champy, 1993) BPM Definition
- „repetitive, recognizable patterns of interdependent organizational actions carried out by multiple actors" (Feldman and Pentland, 2003) Routine Dynamics Definition



Different streams of process research

Business Process Management

- Emerged from computer science and operations research
- Process improvement, workflow management, etc.

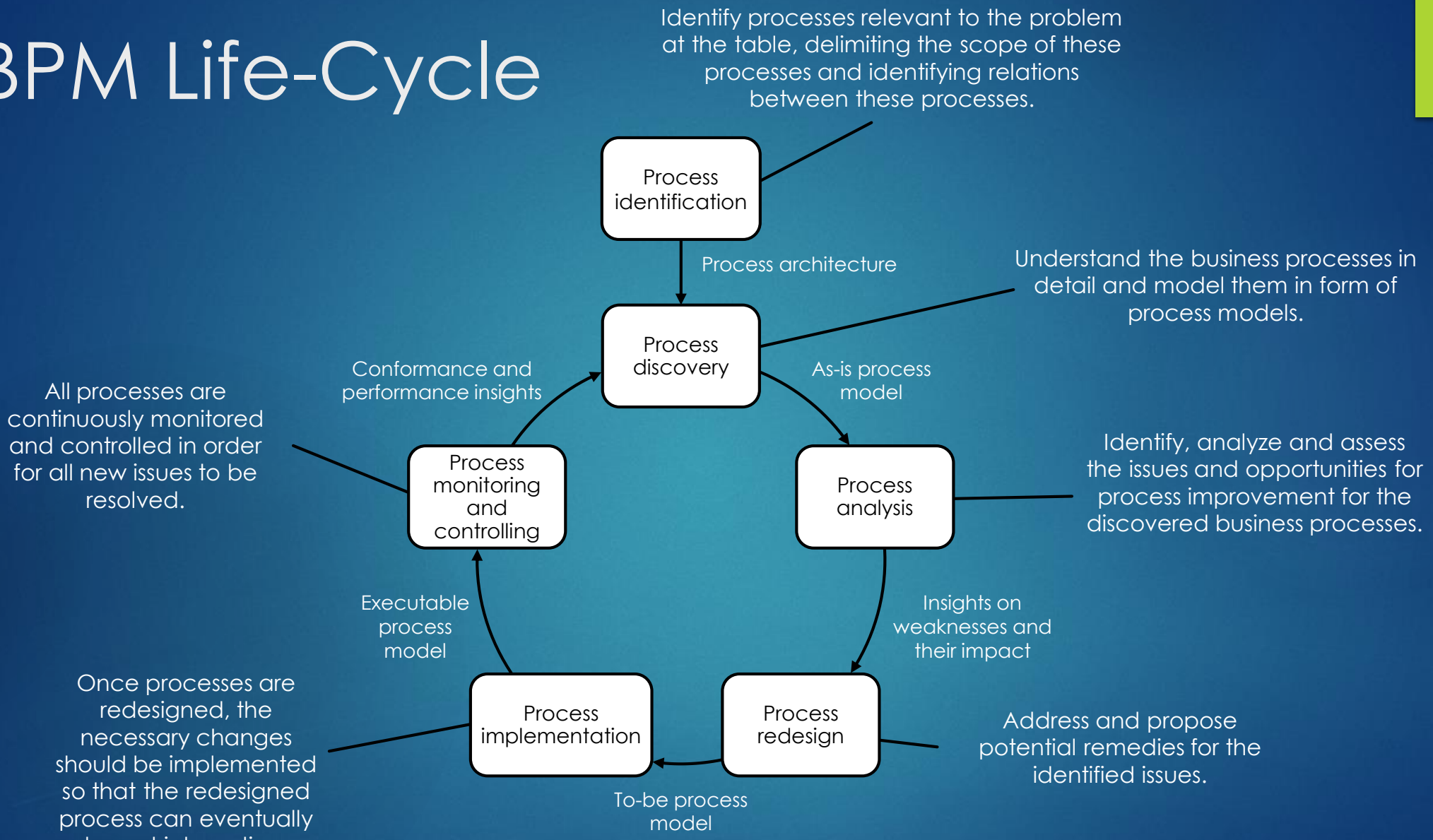
→ Focus on the management of processes
(How should things be done?)

Routine Dynamics

- Has its roots in sociology and organization science
- How does the introduction of IT affect a process?

→ Focus on the emergent dynamics in processes
(What happens?)

BPM Life-Cycle



Goals of Business Process Management

- Get holistic view on how an organisation works
- Understand activities of an organisation and their relations
- Understand embedding of activities within an organisational and technical context
- Modeling of processes is a key component of BPM (descriptive and prescriptive)

Insights into how organizational work can be improved

Business Process vs. Process Instance

- Business process
- Activity
- Business process attributes

Car Assembly Process

- **Mount doors**
- **Car body number**
- **Car color**

- Case (process instance)
- One instance of a business process
- Instance activity (work item)
- Case attributes

One instance of the car assembly process

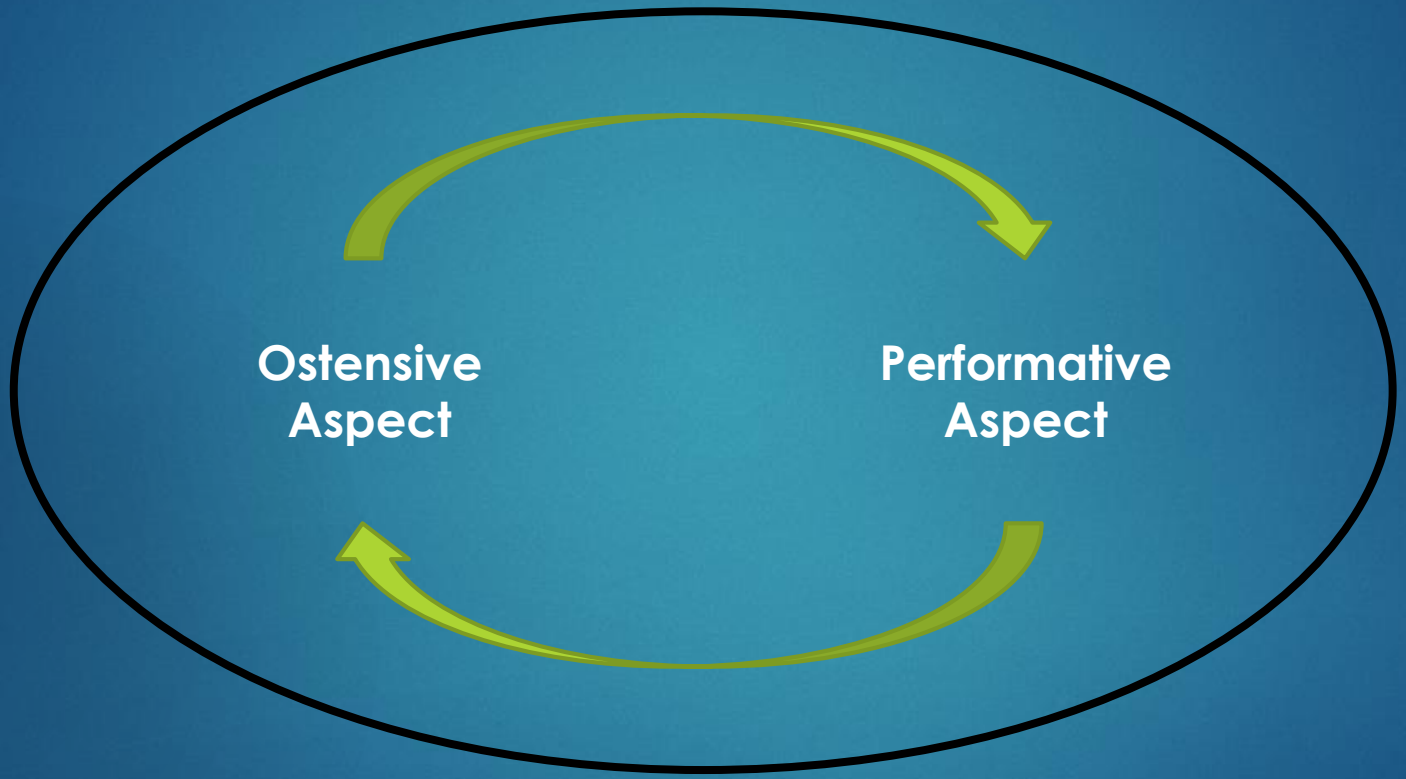
- **Car Assembly Case**: 1050
- **Mount doors on**: 1050
- **Car body number**: 1050,
- **Car color**: *white?* ☺

Organizational Routines

- „repetitive, recognizable patterns of interdependent organizational actions carried out by multiple actors" (Feldman and Pentland, 2003)

- A routine consists of two components:
- ***Ostensive aspect***: how the routine is understood, communicated etc.; an (ideal) schemata of the routine
- ***Performative aspect***: specific actions that are taken at specific times in specific contexts

Organizational Routines as generative Systems

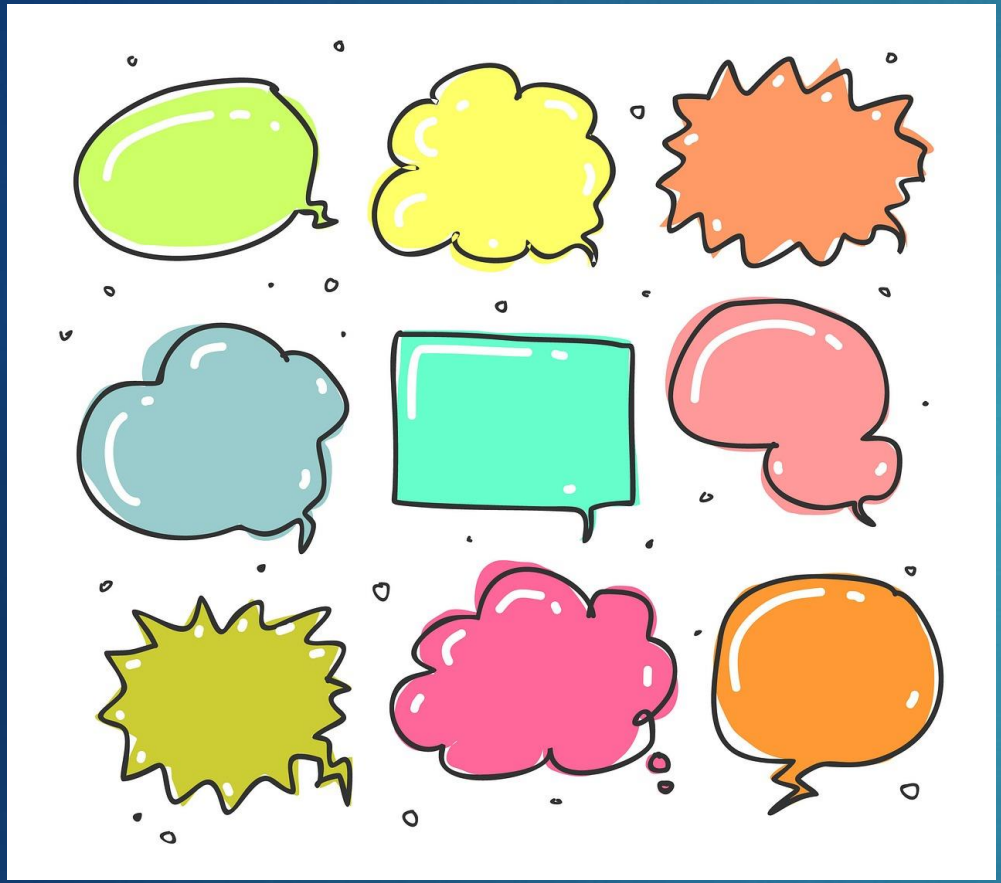


Any similarities to business processes?

Goals of Routine Dynamics Research

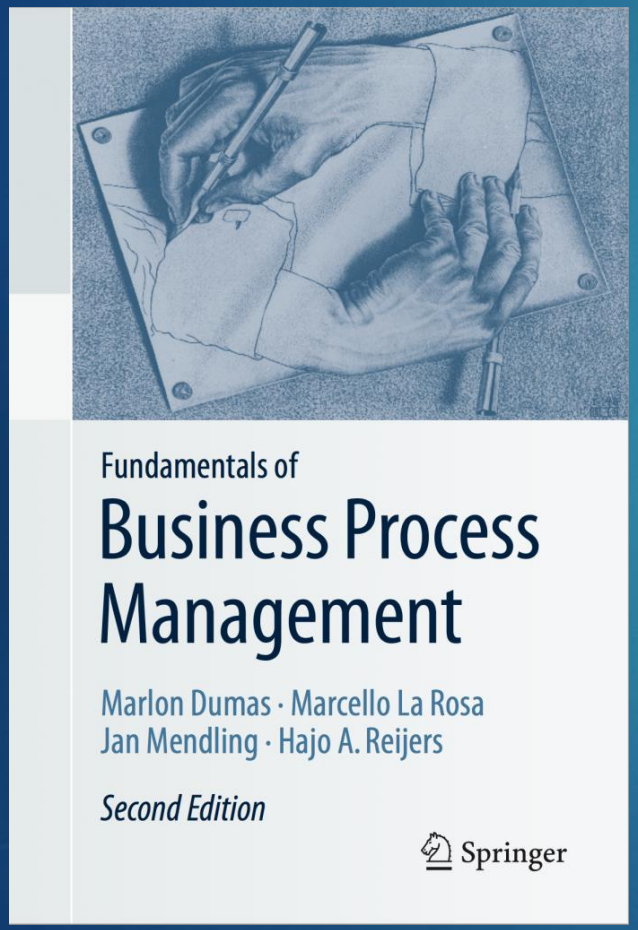
- Understand how and why organizational processes change
  - Over time
  - From one execution to the next
- Understand the role of actors in routine change
  - Reflective talk
- Understand the role of information technology in routine change

Discussion



- Are routines and business processes the same?
- In how far are they different?
- What do you think about the differences between BPM and routine dynamics?

References



- Chapter 01 in Fundamentals of Business Process Management
- Wurm, B., Grisold, T., Mendling, J., and vom Brocke, J.: Business Process Management and Routine Dynamics, forthcoming in the Cambridge Handbook of Routine Dynamics

One sentence about this lecture…

- Go to **menti.com** and use the indicated code

- What did you like about the lecture?
- What did you **not** like about the lecture?
- What are questions you still have?
- What caught your interest?
- What would you like to discuss in future sessions?

Erasmus+

AIBA

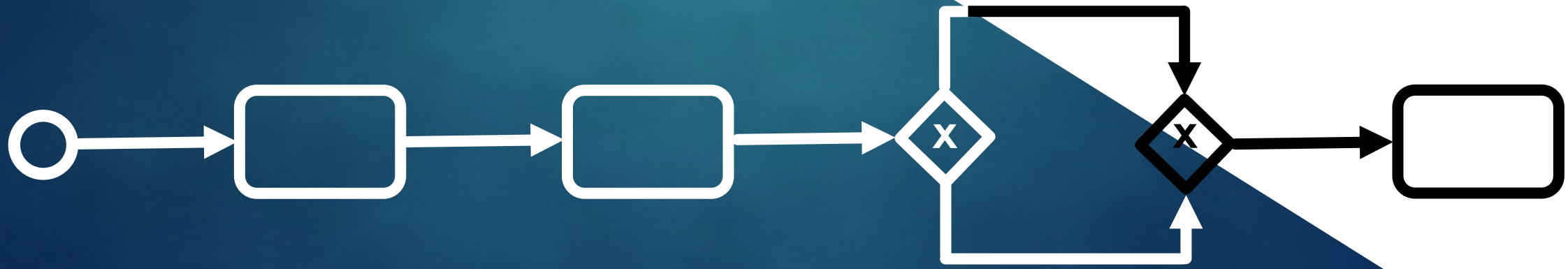
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

PROCESS IDENTIFICATION & PROCESS DISCOVERY

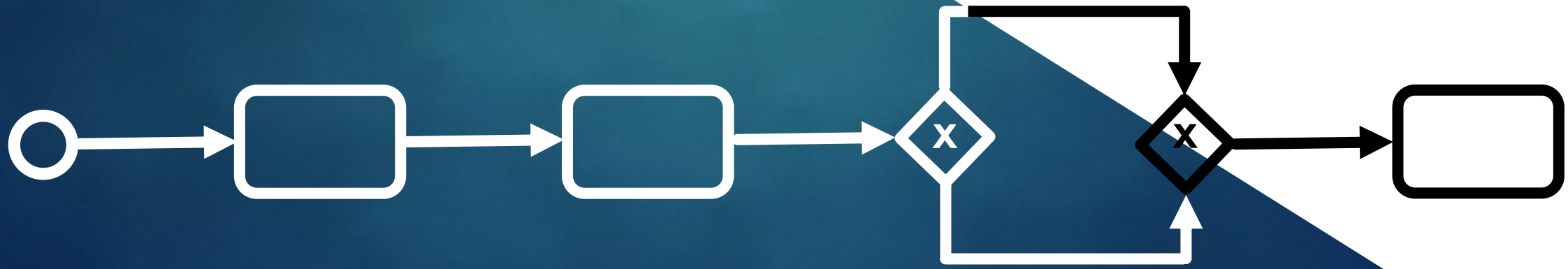


Agenda Unit 2 - BPM

1. Recap and Discussion
2. Process Identification
3. Process Discovery

BPM & OP

RECAP AND DISCUSSION



Let‘s recap

- What did we do last time?
- Go to **menti.com** and use the indicated code

https://www.wu.ac.at/en/students/my-program/bachelors-student-guide/volunteering-support-and-honors-programs/student-counselling

Corona hotline by the city of Vienna: 01 4000 53000

General telephone counseling: 142

Erasmus+

AIBA

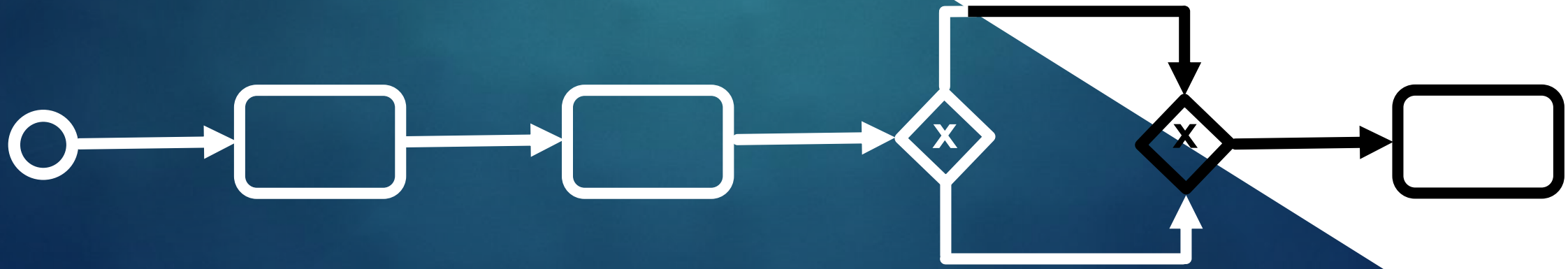
UNIVERSITÄT LIECHTENSTEIN

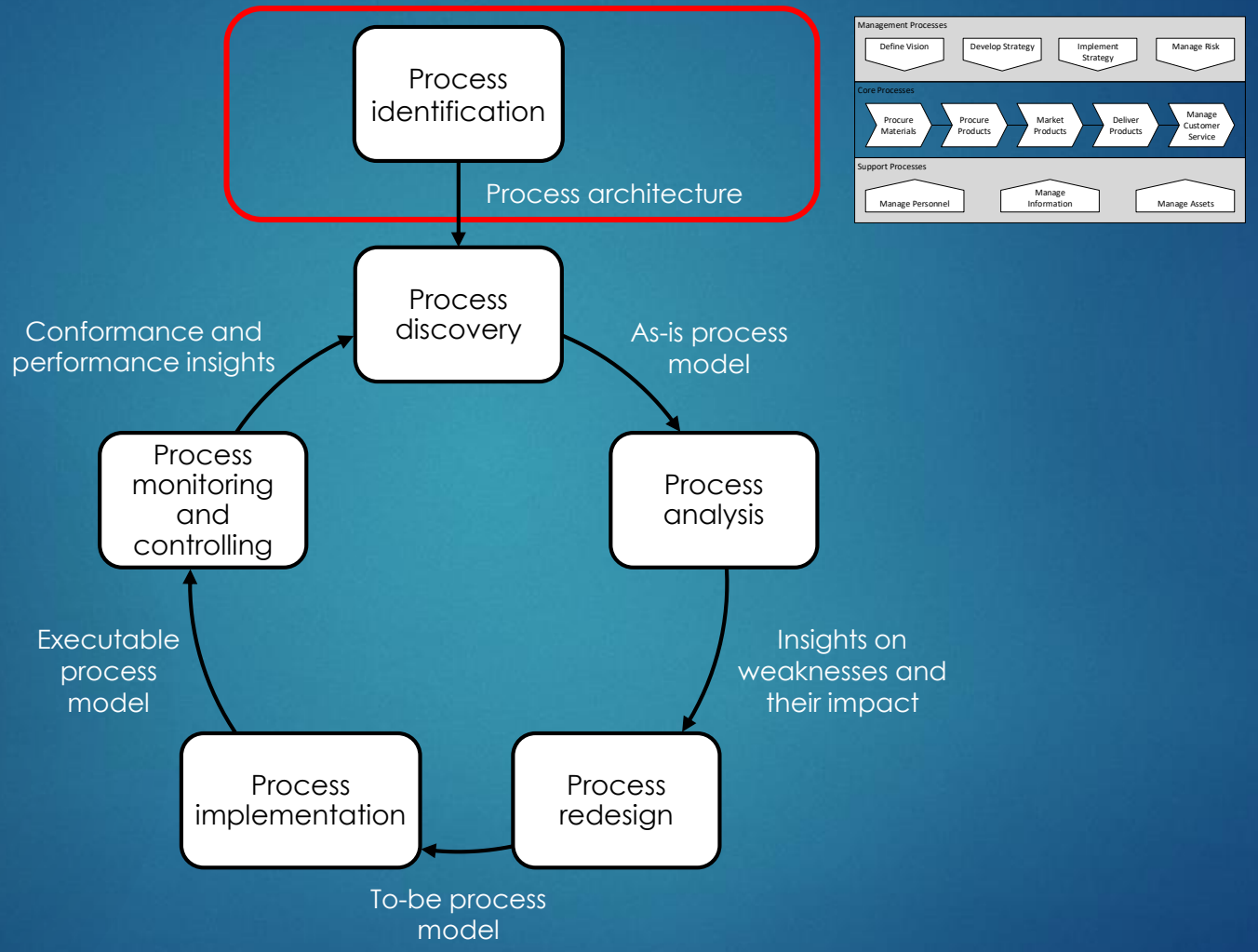
WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

PROCESS IDENTIFICATION





Process Identification – Overview

- **Process identification**
  - Systematically define the set of business processes of an organization
  - Establish clear criteria for selecting specific processes for improvement

- Process landscape model, which is the first level of a process architecture and represents the processes and their interrelations.
  - The **process landscape model** serves as a framework for defining the priorities and the scope of process modeling and redesign project

Process selection

Processes and Business Strategy

- Not all process can and should be managed
- Organizations need to focus their attention on a relevant subset of processes
- Some processes need to receive priority because they are of strategic importance to the organization‘s survival

- For business strategy see e.g. Kaplan and Norton or Mintzberg

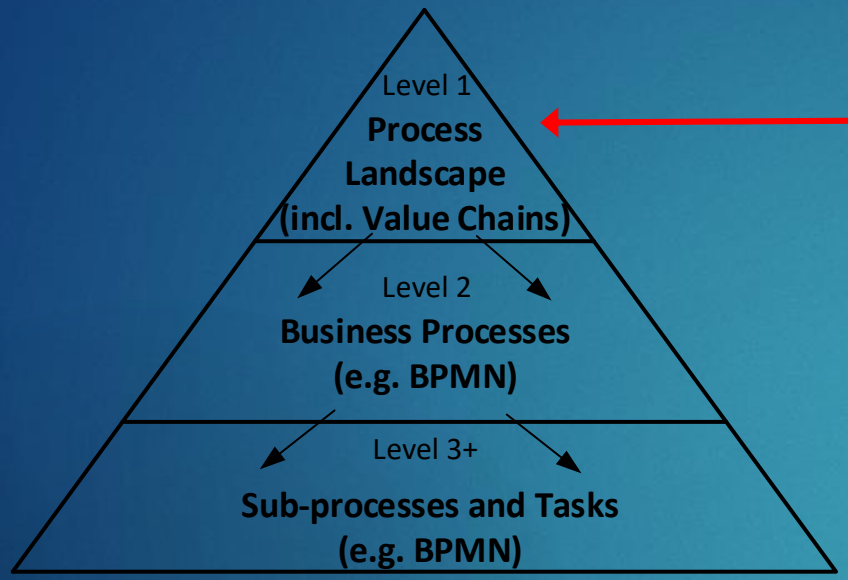
- Starting Point for process identification
  1. What processes are executed in the organization?
  2. Which ones should the organization focus on?

⇒ Map of key processes as well as criteria for to rate their importance

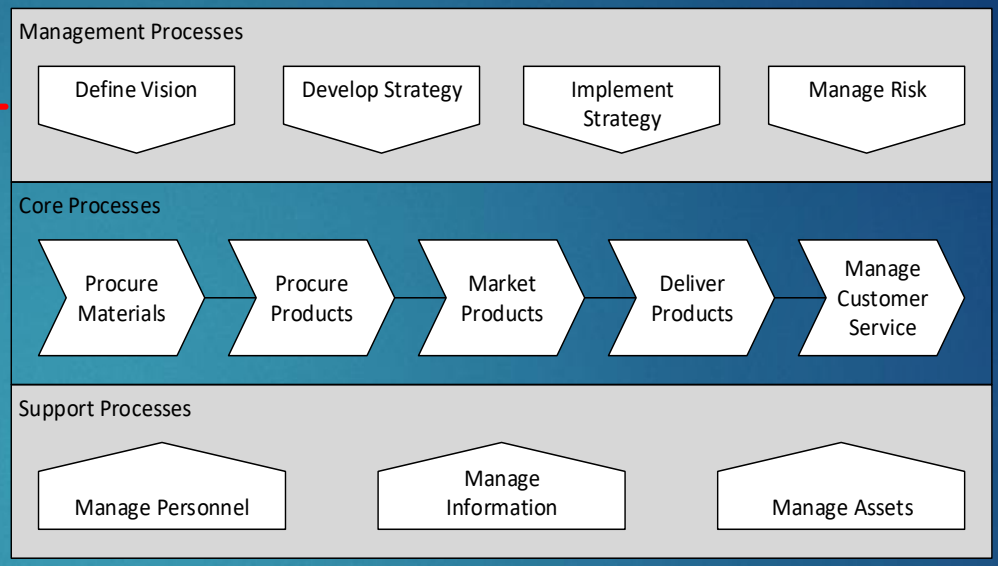
Process Checklist

- Is it a process at all?
  - A department is not a process. Neither is a manager or email.
  - For any proper process, it must be possible to identify the main action, that is applied to a category of cases.
- Can the process be controlled?
  - Something that is ongoing or active may resemble a process, while it is not.
  - Look at business processes as a repetitive series of events and activities to execute individually observable cases.
- Is the process important enough to manage?
  - Some processes do not even reach the minimum threshold to be considered as such.
  - (a) A process should have a customer who is willing to pay for its outcomes, (b) the organization would be willing to pay another party for taking over, and (c) there is a legal framework that compels an organization to execute it
- Is the scope of the process not too big?
  - The process activities should contribute to its purpose.
- Is the scope of the process not too small?
  - For something to be a process there should be at least three different actors involved.

Process Landscape Model



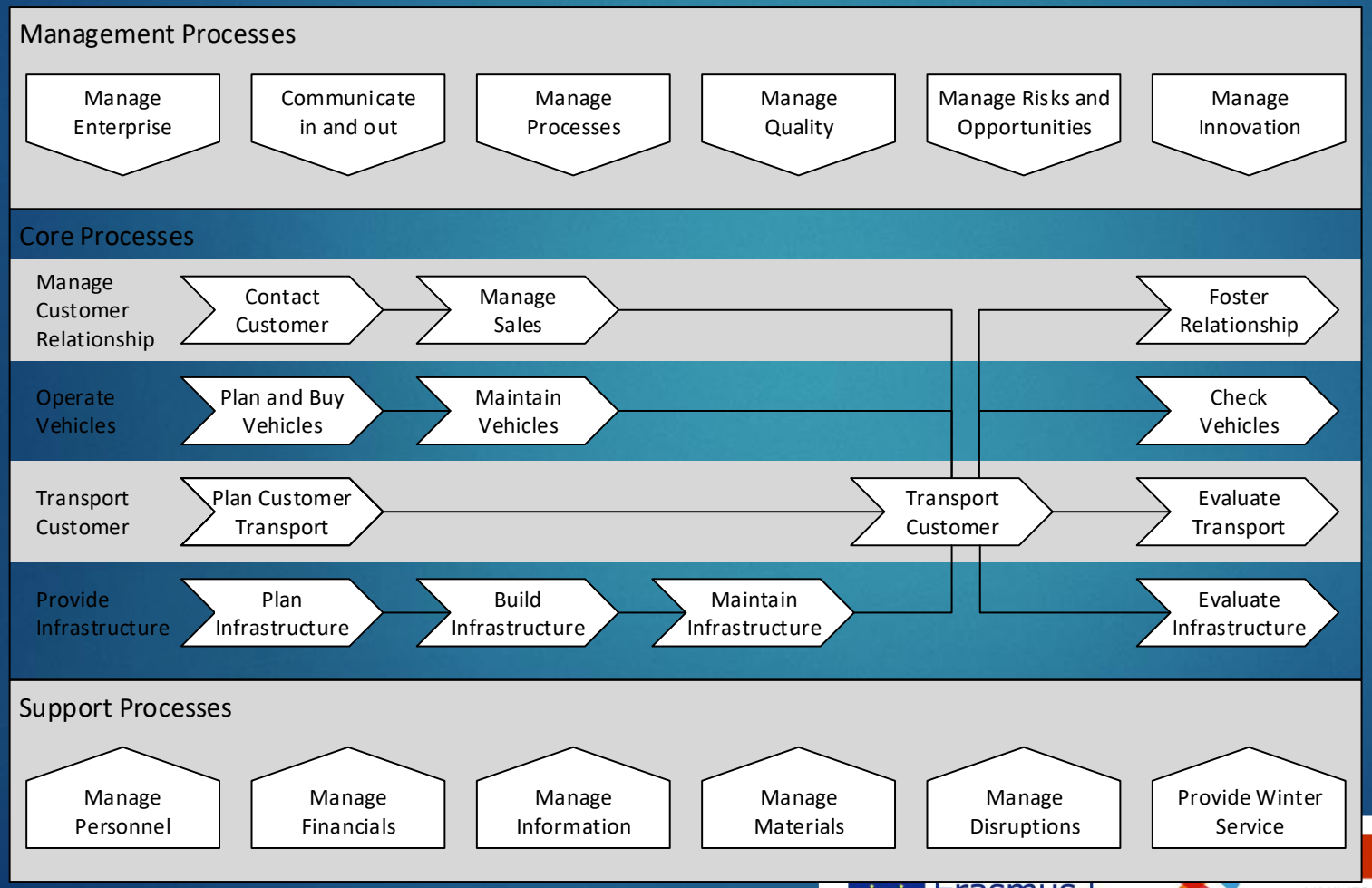
Process Architecture



Process Landscape Model

- Shows the core processes on a very abstract level
- Has to be understandable by all major stakeholders
- Should **not** show more than 20 business processes of an organization

Process Landscape Model Example of Wiener Linien



Process Categories

- **Core processes**
  - Cover essential value creation of a company: production of goods and services for which customers pay
  - E.g.: Design and development, manufacturing, marketing and sales, delivery, after-sales
- **Support processes**
  - Enable the execution of core processes
  - Human resource management, information technology management, accounting, financial management, legal services
- **Management processes**
  - Provide directions, rules, and practices for the core and support processes
  - Strategic planning, budgeting, compliance and risk management, investors, suppliers, partner management

How to define a Process Architecture 1/2

1. Clarify terminology
   - Use reference models. It helps to make sure that all stakeholders have consistent understanding of the process landscape
2. Identify end-to-end processes
   - Processes that interface with customers and suppliers of an organization. Pay attention on product types, service types, channels and customer types.
3. For each end-to-end process, identify its sequential processes
   - Identify internal, intermediate outcomes of such processes. Different things can help us set boundaries of these processes (product lifecycle, customer relationship, supply chain, etc.)

Erasmus+ AIBA UNIVERSITÄT LIECHTENSTEIN WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS Radboud Universiteit Nijmegen

How to define a Process Architecture 1/2

4. For each business process, identify its major management and support processes
   - Identify what is required in order to execute the previously identified processes
5. Decompose and specialize business processes
   - Each process of the process landscape should be subdivided into an abstract process on levels 2 and 3.
6. Compile process profile
   - Each identified process should be modeled and described

How to define a Process Architecture 1/2

4. For each business process, identify its major management and support processes
   - Identify what is required in order to execute the previously identified processes
5. Decompose and specialize business processes
   - Each process of the process landscape should be subdivided into an abstract process on levels 2 and 3.
6. Compile process profile
   - Each identified process should be modeled and described
7. Check completeness and consistency
   - Use reference models to check whether all major processes that are relevant to one organization are included

For a detailed example see Fundamentals of BPM

Process Selection: **Selection Criteria**

- **Strategic importance**
  - Which processes have the greatest impact on the strategic goals of an organization, for example considering profitability, uniqueness, or contribution to competitive advantages
    - Select those processes for active process management that most directly relate to the strategic goals of an organization
- **Health**
  - Which processes perform the poorest? These processes are the ones that may profit the most from BPM initiatives
    - Employee and customer surveys
- **Feasibility**
  - Determine for each process how possible it is to undergo a BPM initiative, either incidental or continuously
    - Most notably, culture and politics involved in a particular process may be obstacles to achieving results from such initiatives. BPM should focus on those processes where it is reasonable to achieve benefits

Process Performance Measures

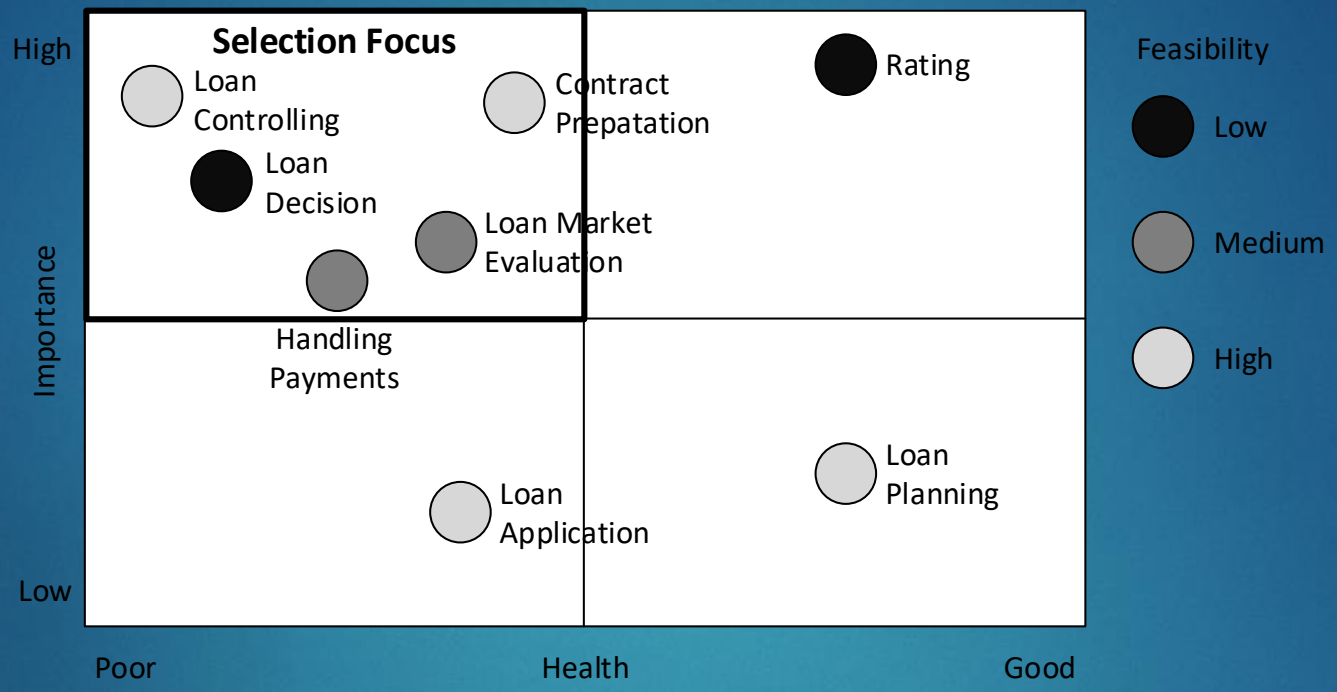
- **Time**
  - *Cycle time*: time it takes to handle one case from start to end
  - *Processing time*: time that resources (process participats, software applications) spend on handling one case
  - *Waiting time:* time that a case spends in idle mode
- **Cost**
  - *Labor cost*: the cost related to human resources in producing a product or delivering a service.
- **Quality**
  - *External quality*: the client's satisfaction with either the product or the process
  - *Internal quality*: relates to the process participant's viewpoint (e.g. the level that a process participant feels in control of the work performed)
- **Flexibility**
  - The ability of resources to execute different tasks within a process setting
  - The ability of a process to handle various cases and changing workloads
  - The ability of the organization to change the responsiveness of the process to wishes of the market or business partners

Example: Performance Measures in a Restaurant

- A restaurant has recently lost many customers due to poor customer service. The management team has decided to address this issue first of all by focusing on the delivery of meals. The team gathered data by asking customers about how quickly they liked to receive their meals and what they considered as an acceptable wait. The data suggested that half of the customers would prefer their meals to be served in 15 minutes or less. All customers agreed that a waiting time of 30 minutes or more is unacceptable.

- What is the relevant performance dimension that needs to be addressed?
  - Cost OR Time OR Quality OR Flexibility
- What should the performance objective be?
  - Avoid waiting times above 30 minutes
  - Average meal serving time below 15 minutes
  - Minimizing the number of meals served above 15 minutes

Process Portfolio



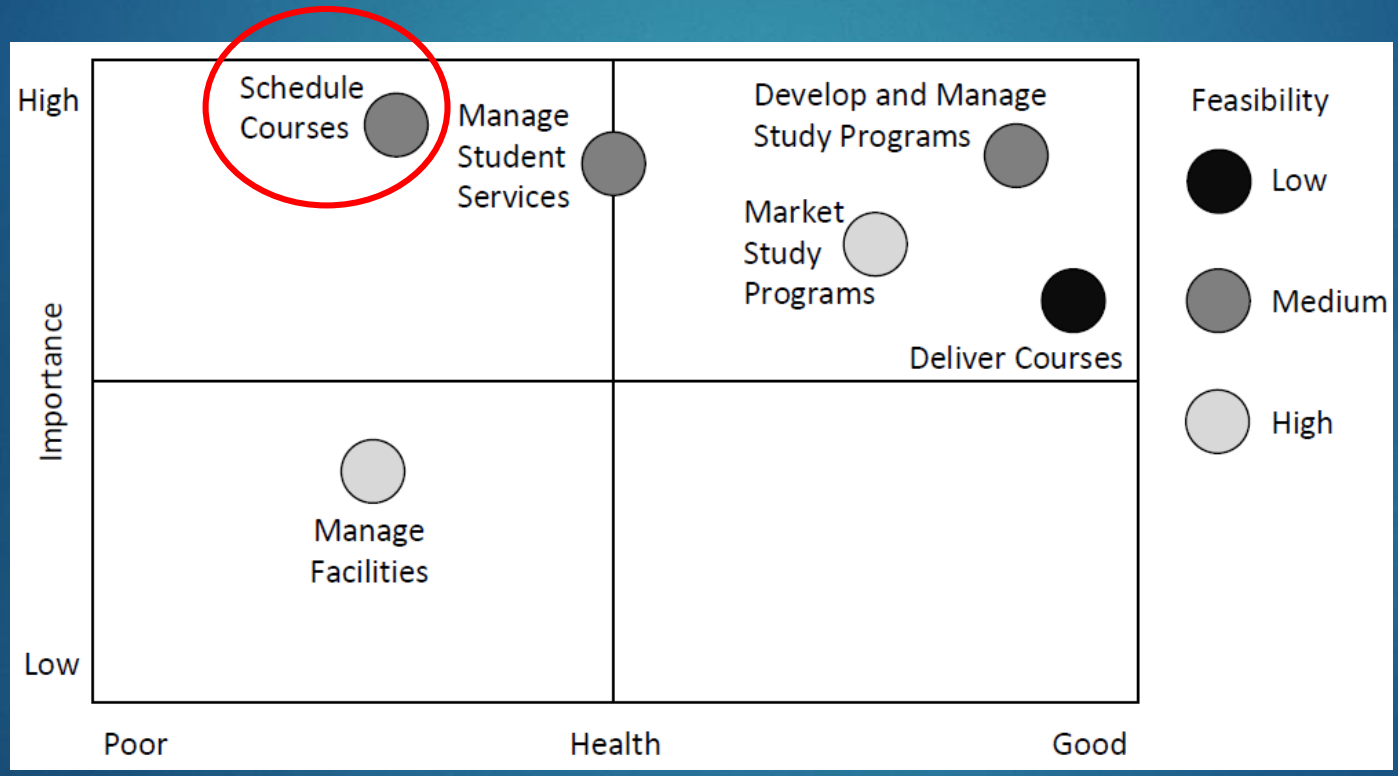
- **Strategic importance:** How important is a process for achieving our overall organizational strategy? (Board)
- **Health:** Difference between envisioned and actual performance (customers, process participants)
- **Feasibility:** How easy is it to change the process? (process owner)

Exercise: University Process Portfolio

- A university defined four core processes in relation to teaching. An evaluation of strategic importance, health, and feasibility using a survey among the department chairs has resulted in the following assessment:
  - Develop and Manage Study Programs: Importance 90%, Health 90%, Feasibility 40%.
  - Market Study Programs: Importance 75%, Health 80%, Feasibility 60%.
  - Schedule Courses: Importance 95%, Health 30%, Feasibility 50%.
  - Deliver Courses: Importance 95%, Health 70%, Feasibility 30%.
  - Manage Student Services: Importance 85%, Health 50%, Feasibility 40%.
  - Manage Facilities: Importance 40%, Health 35%, Feasibility 70%.

- **Draw a process portfolio and suggest one process to be selected for process improvement. Justify your choice.**

Solution: University Process Portfolio



Summary: **Process Identification**

- Process landscape provides an abstract overview of all processes within a company
- Process portfolio as a tool to evaluate which process to focus on

Erasmus+

AIBA

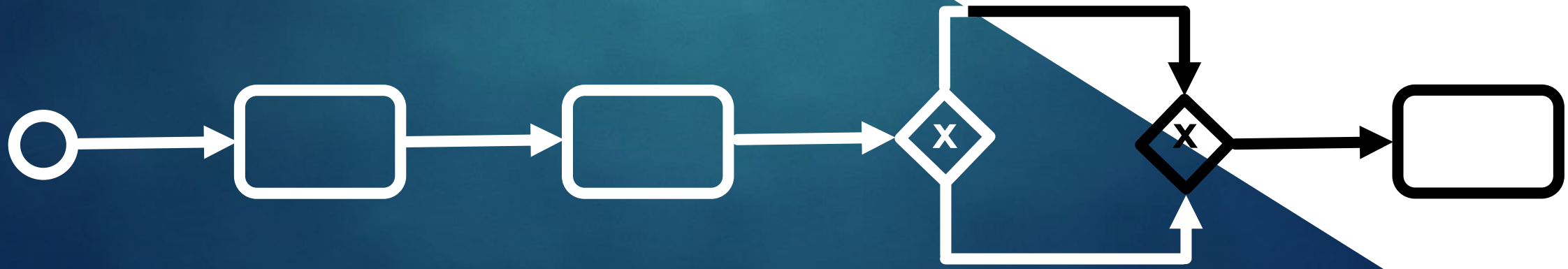
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

PROCESS DISCOVERY

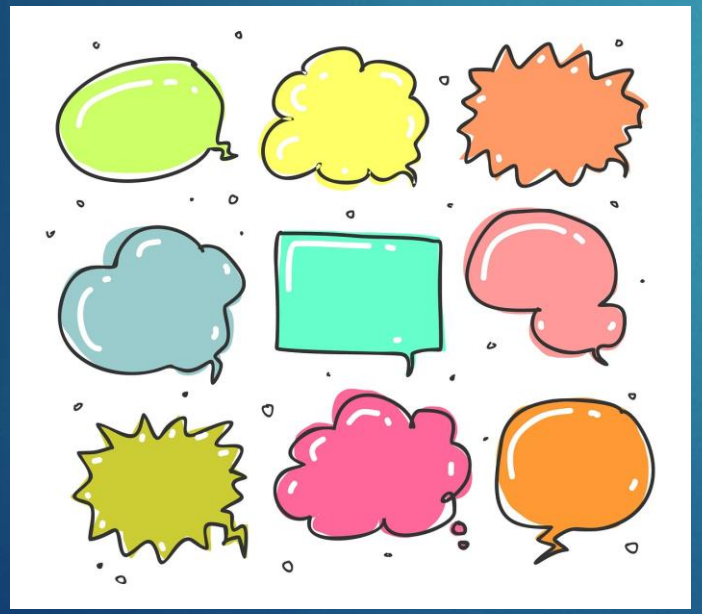


Process Discovery

The act of **gathering information** about an existing process and organizing it in terms of an as-is process model

How can we gain knowledge about business processes?

What might be problems that could occur?



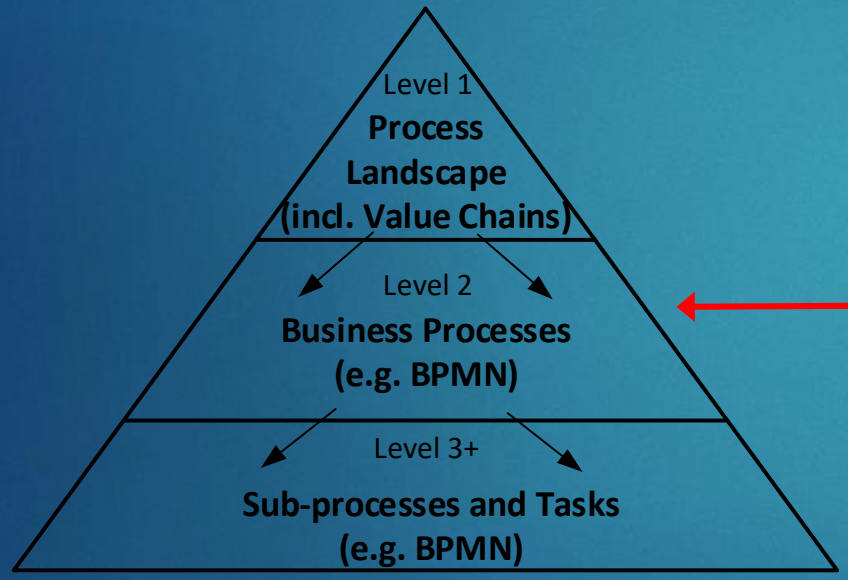
Erasmus+ AIBA UNIVERSITÄT LIECHTENSTEIN WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS Radboud Universiteit Nijmegen

Process Discovery

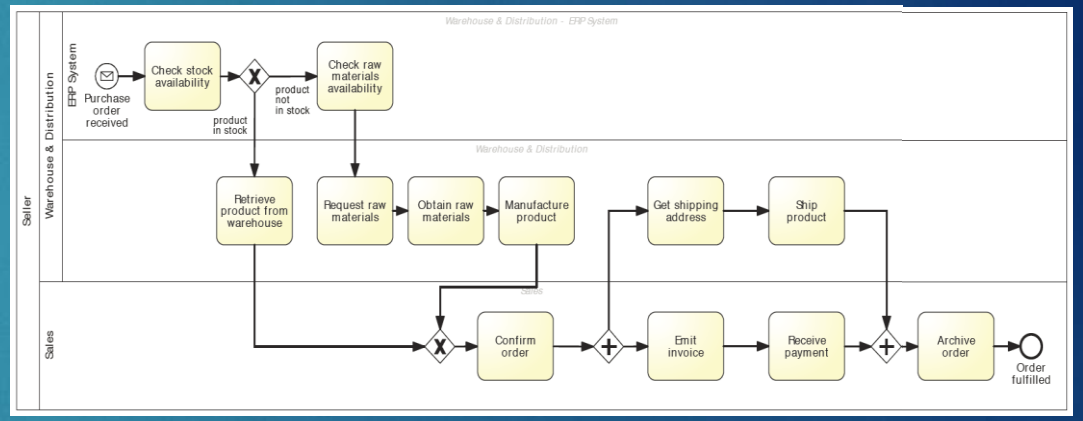
The act of **gathering information** about an existing process and organizing it in terms of an as-is process model

1. **Defining the setting:** *Assemble a team* that is responsible for working on the process
2. **Gathering information:** Gain an *understanding of the process*. Different discovery methods can be used to acquire information on a process
3. **Conducting the modelling task:** Organize *the creation of the process model*. The modelling method gives guidance for mapping out the process in a systematic way
4. **Assuring process model quality:** Guarantee that the resulting process models meet different quality criteria. This phase is important for establishing trust in the process model

Goal: Process Model



Process Architecture



Who is involved in process discovery?

Domain Expert

- Has intimate knowledge of the process
- Can be process participant, process owner, customers, …
- Not proficient in modelling

Process Analyst

- Has strong modeling skills
- Not very familiar with the process
- Work together with domain experts in organizing knowledge on the process and modeling it

Consider two modeling tasks

- Modeling the process for ordering books through an online bookstore, from the perspective of the customer
- Modeling the same process form the perspective of the bookstore

- What would be the challenges here?

- Mike is working for 10 years as an online retailer. He worked in different teams involved with order-to-cash process of the online retailer

- Sara has five years of experience working as a process analyst in the banking sector. She is familiar with two process modeling languages and with several modeling tools.

- Who would you hire?

Challenges of process discovery

1. Process knowledge is fragmented
2. Domain experts think on instance level
3. Knowledge about process modelling is rare

Expertise of Process Analysts

Getting the right people on board

- Make sure supervisors and all above are on board
- Process participant knows they back up this project

Create a set of working hypotheses on how the process is structured

- Prepare questions and assumptions to be discussed

Identify patterns in the provided information

- Utilize these to construct parts of the process model
- Statements such as conditions, exclusive or activities being alternative point to an XOR-gateway

Pay attention to model aesthetics / appealing

- Models have to look nice to engage the audience
- Use the right level of abstraction for the right people

Process Discovery Techniques

Evidence-based

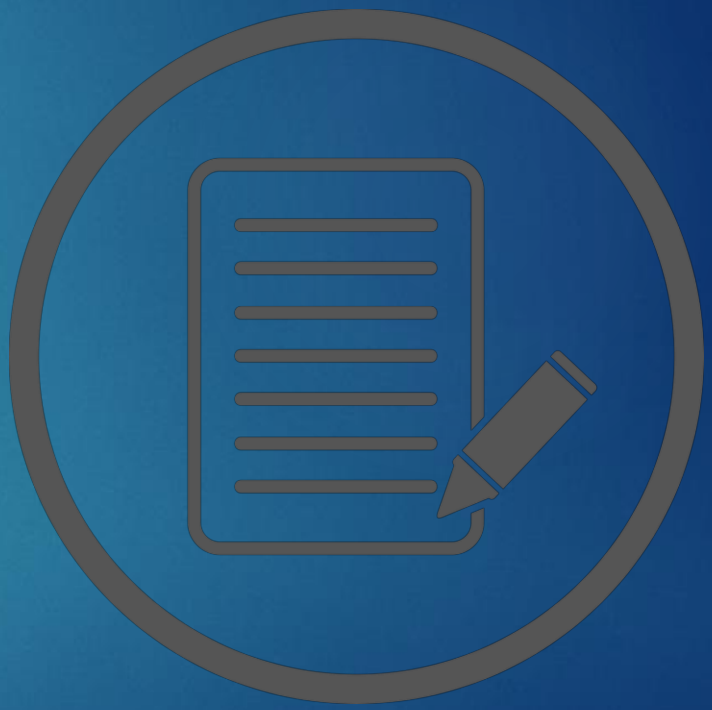
- Document analysis
- **Observation (also called ethnography)**
- Process mining

Interview-based

Workshop-based

Document Analysis

- Documents point to existing roles, activities and business objects
- Formal documentation in terms of
  - Organization chart
  - Employment plan
  - Quality certificate report
  - Internal policies
  - Glossaries and handbooks
- Forms
- Work instructions



Downsides:

- Inappropriate level of granularity
- Outdated documents
- Not organized in a process-oriented way
- Different terms used
- Documents not trustworthy

Automated Process Discovery

- Uses event logs – process execution data stored by common enterprise systems available in an organization
- Automatically discovers a model of the business process
- Advantages:
  - Event logs capture the actual execution of the process
  - Record a rich set of process-related information beyond the tasks that have been performed, including timestamps and the resources that execute tasks
  - This method can be used to reconstruct end-to-end processes that span different systems, which would be hard if we just observe each system separately

Downsides :

- Event logs are not always available
- Sometimes they are not complete and may contain noise or error
- Resulting models can be too low-level and hard to understand

Interviews

- Structured vs. unstructured interviews
- Assumption: analyst and stakeholder share terminology
- Then, questions target at identifying deviations from standard processing
- Can be backward – starting from the project outcomes
- Or forwards – starting from the process triggers
- Advantage:
  - Offers a rich and detailed picture of the process and its particippants
  - Has potential to resolve inconsistent perceptions that different domain experts might have about the process

Downsides:

- Sunny days versus rainy days
- What happens if something goes wrong
- Labour-intensive – requires several iterations

Exercise

Who could you interview to discover the process of:

- Getting married in Vienna?
- Getting a credit loan in a bank?
- Purchasing goods in Spar at WU?

Workshops

- Gather all key stakeholders together
- Participants interact to create shared understanding
- Often: software-supported, a model is directly created during the workshop (separate role)
- Model is reference point for discussions

Downsides:

- Difficult to get all people available at the same time
- Must have an atmosphere of openness
- Encouraged to express their opinion in front of superiors

Strengths and Weaknesses

Technique	Strength	Weakness
Document Analysis	• Structured information • Independent from availability of stakeholders	• Outdated material • Wrong level of abstraction
Observation	• Context-rich insight into process	• Potentially intrusive • Stakeholders likely to behave differently • Only few cases
Automatic Discovery	• Extensive set of cases • Objective data	• Potential issue with data quality
Interview	• Detailed inquiry into process	• Requires sparse time of process stakeholders • Several iterations required before sign-off
Workshop	• Direct resolution of conflicting views	• Synchronous availability of several stakeholders

- Metrics:
  - Objectivity
  - Richness
  - Time consumption
  - Immediacy of feedback

Organizing the Gathered Material

1. Identify the process boundaries
2. Identify activities and events
3. Identify resources and their handovers
4. Identify the control flow
5. (Identify additional elements)

Example: Order-to-Cash

1. Process Boundaries

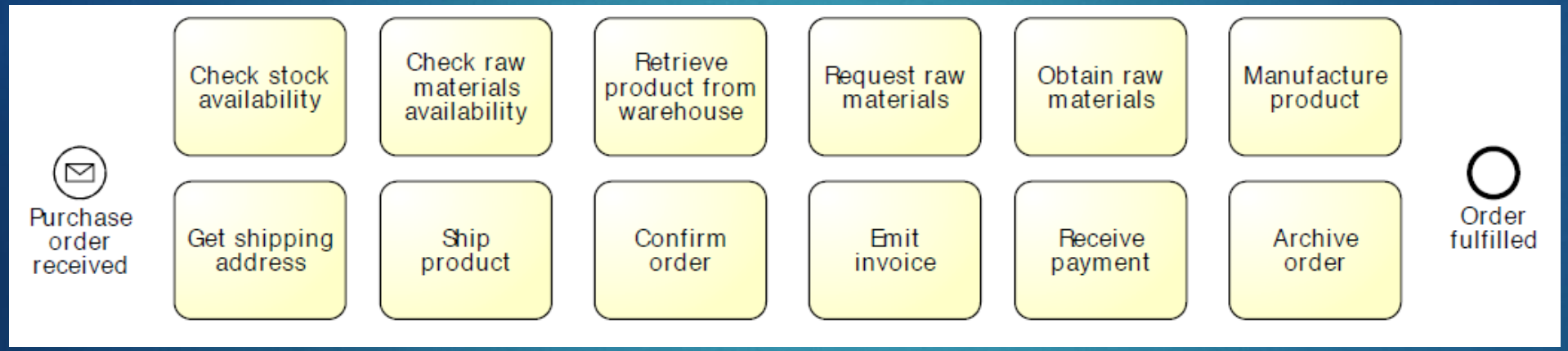
- Under which condition does the process **start**?
- With which result does it **end**?
- Which perspective do you assume?

Example: Order-to-Cash

1. Process Boundaries

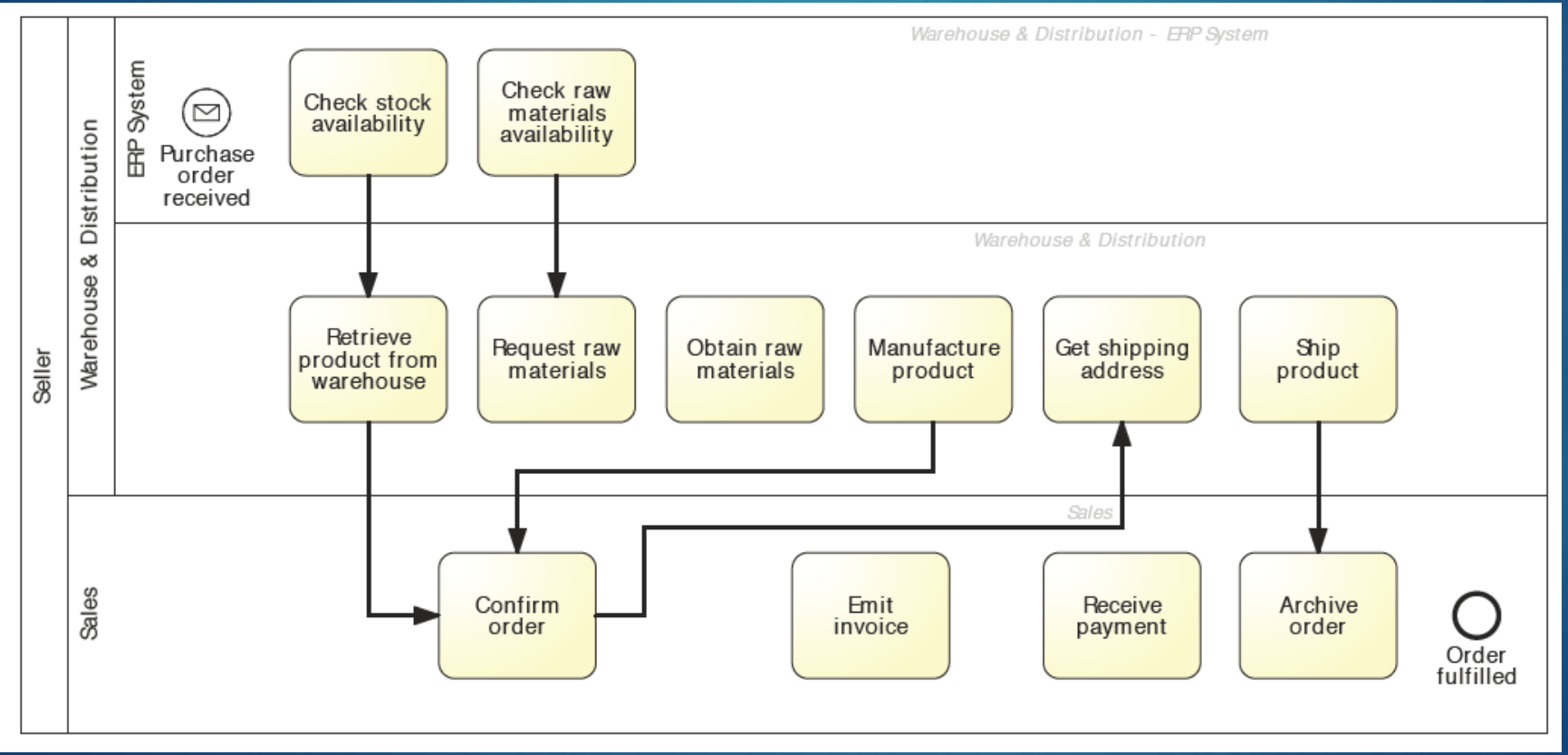
Example: Order-to-Cash

2. Identify Activities and (intermediate) Events

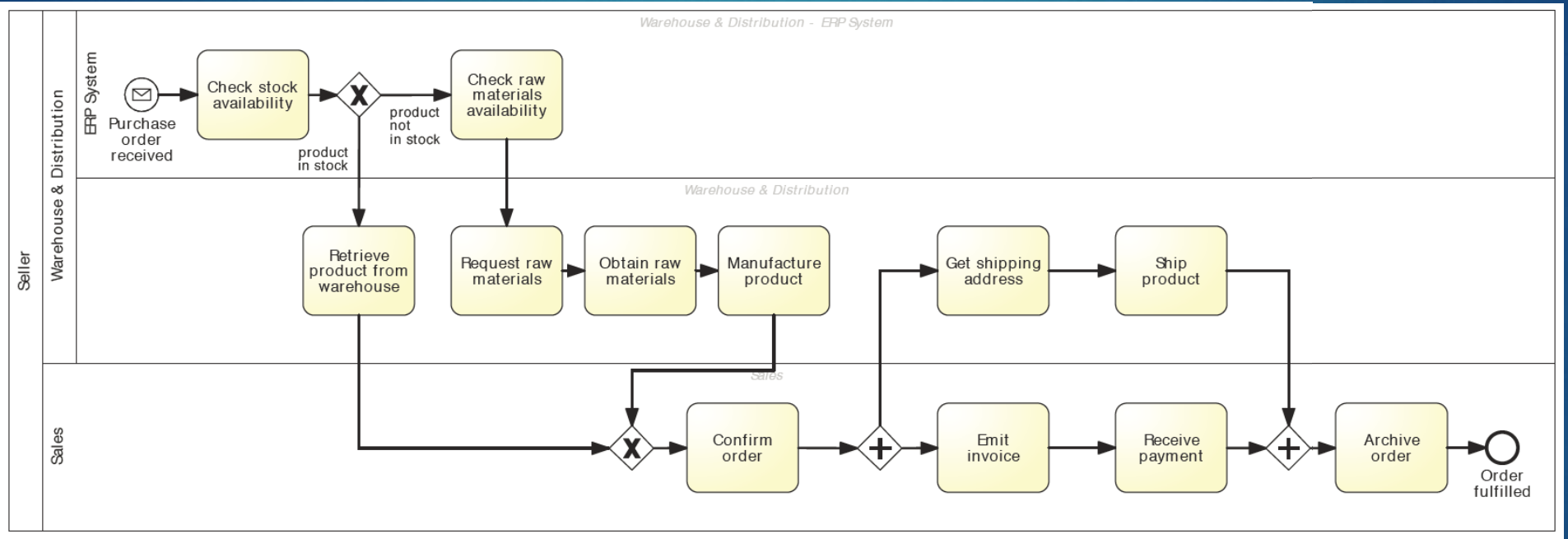


Example: Order-to-Cash

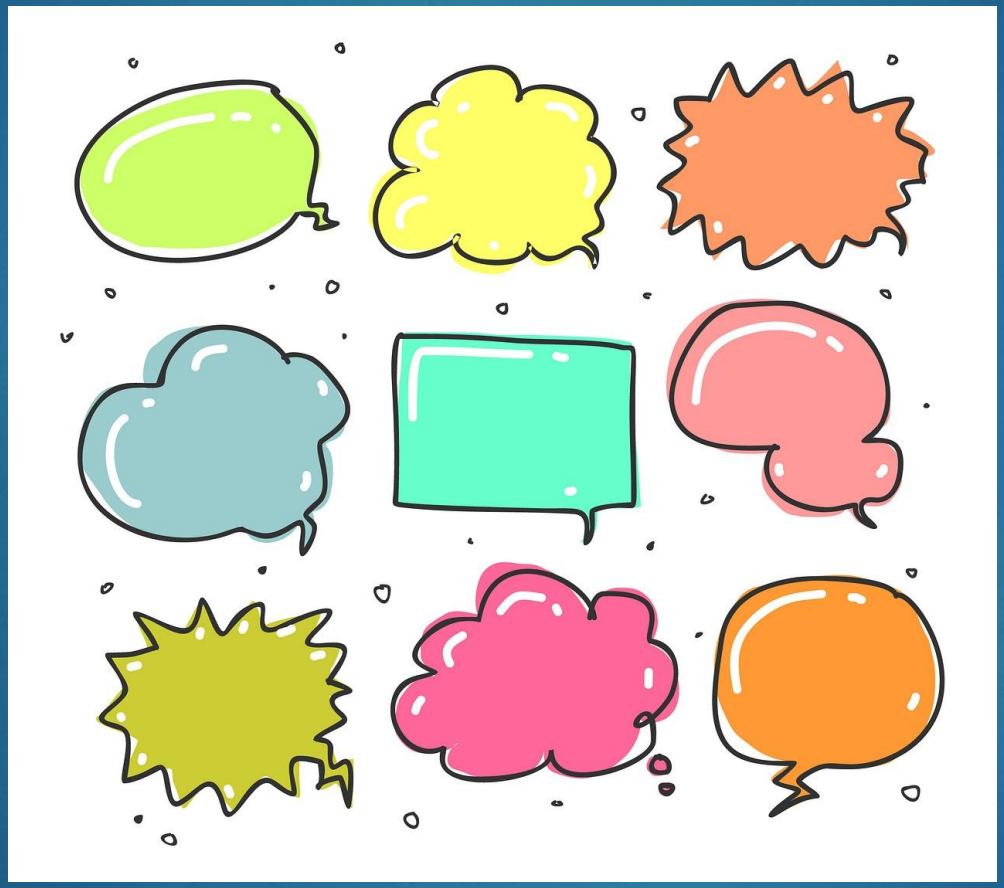
3. Identify Resources and Handovers



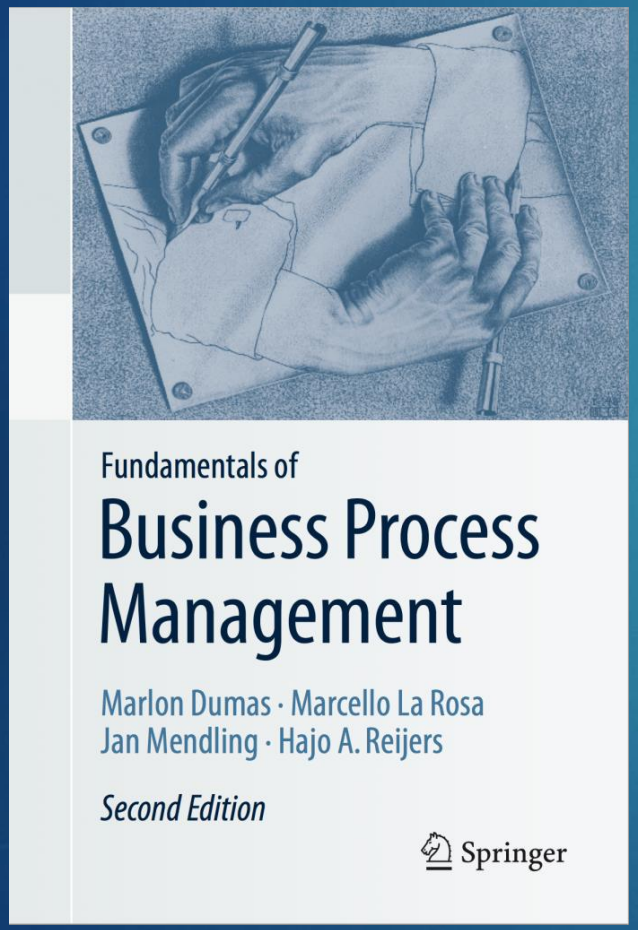
Example: Order-to-Cash
4. Identify Control Flow



Discussion



References



- Chapters 02 and 05 in Fundamentals of Business Process Management

One sentence about this lecture…

- Go to **menti.com** and use the indicated code

- What did you like about the lecture?
- What did you **not** like about the lecture?
- What are questions you still have?
- What caught your interest?
- What would you like to discuss in future sessions?

Erasmus+

AIBA

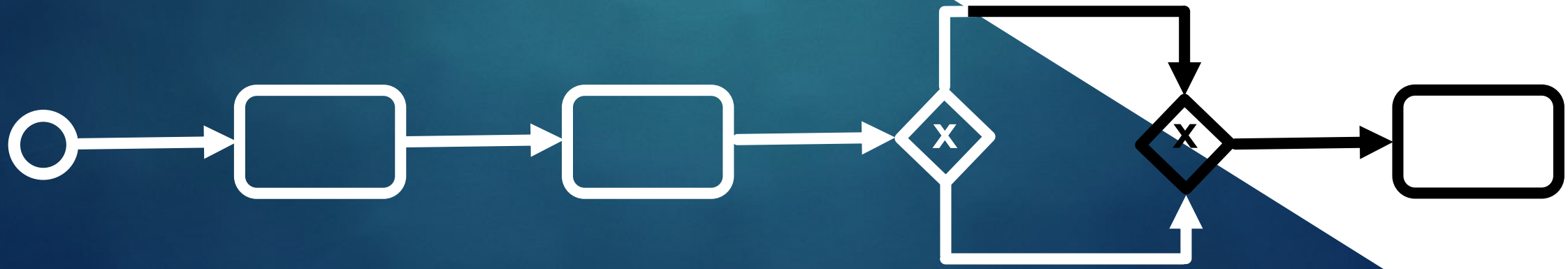
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

BASIC PROCESS MODELING WITH BPMN



Agenda Unit 3 – Basic BPM

1. Recap
2. Basic Process Modeling with BPMN

Erasmus+

AIBA

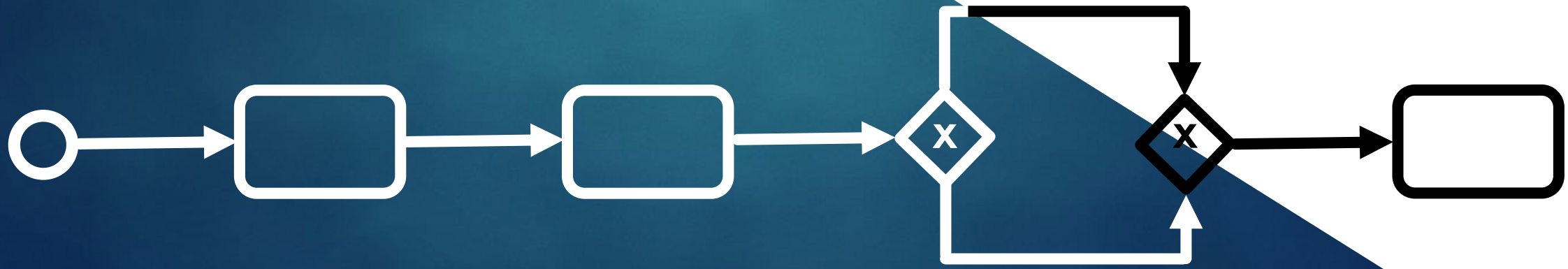
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

RECAP



Let‘s recap

- Go to **menti.com** and use the indicated code
- What did we do last time?

https://www.wu.ac.at/en/students/my-program/bachelors-student-guide/volunteering-support-and-honors-programs/student-counselling

Corona hotline by the city of Vienna: 01 4000 53000

General telephone counseling: 142

Erasmus+

AIBA

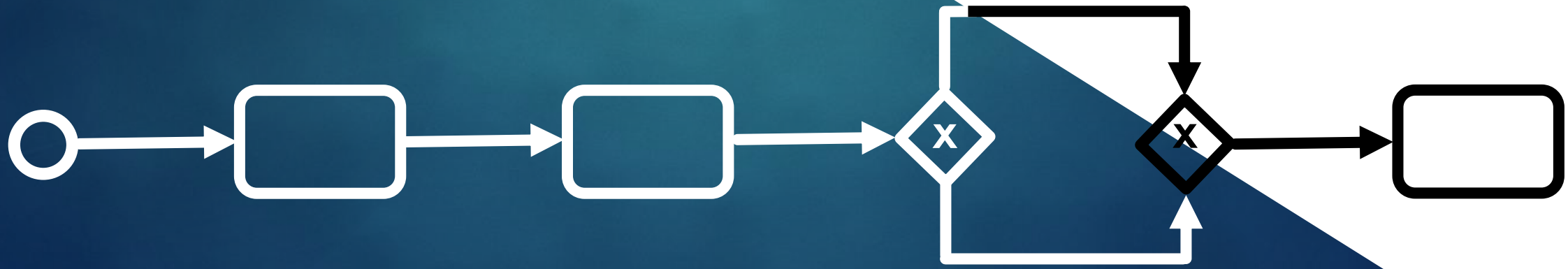
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

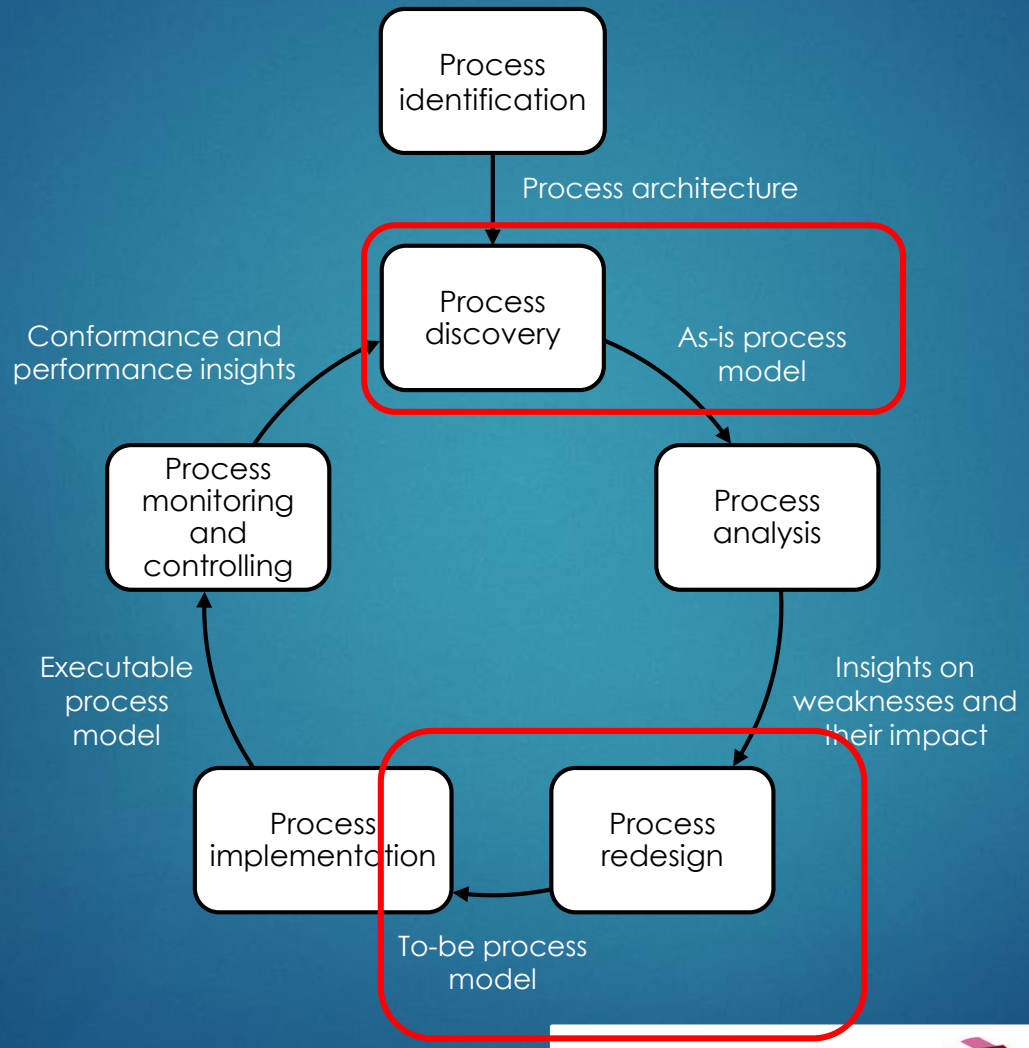
Radboud Universiteit Nijmegen

BPM & OP

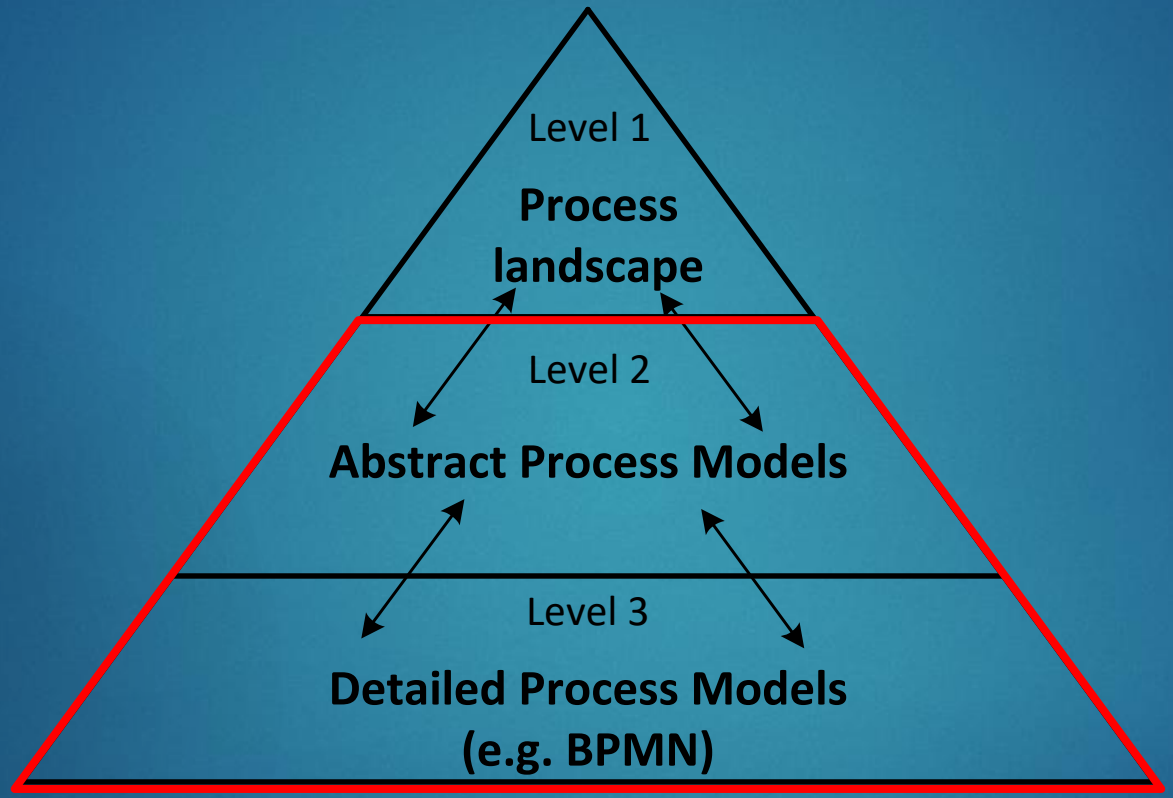
BPMN



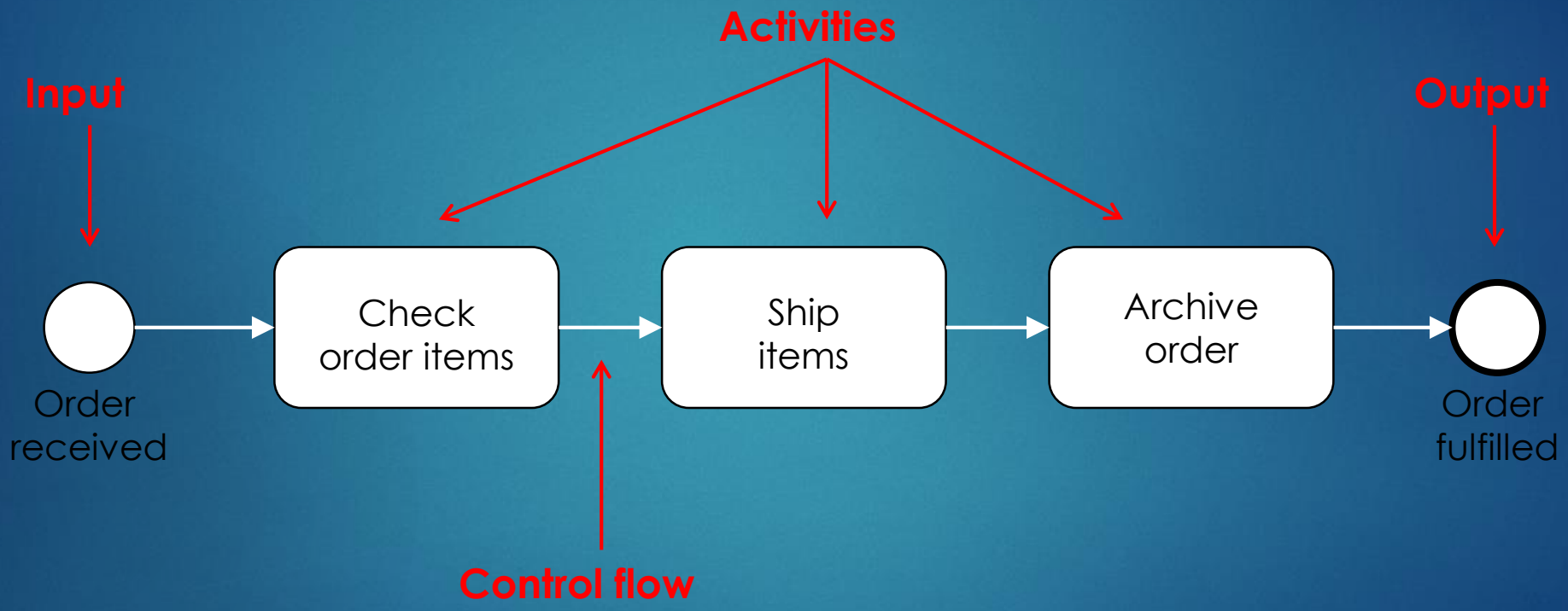
Process Modeling in the BPM Lifecycle



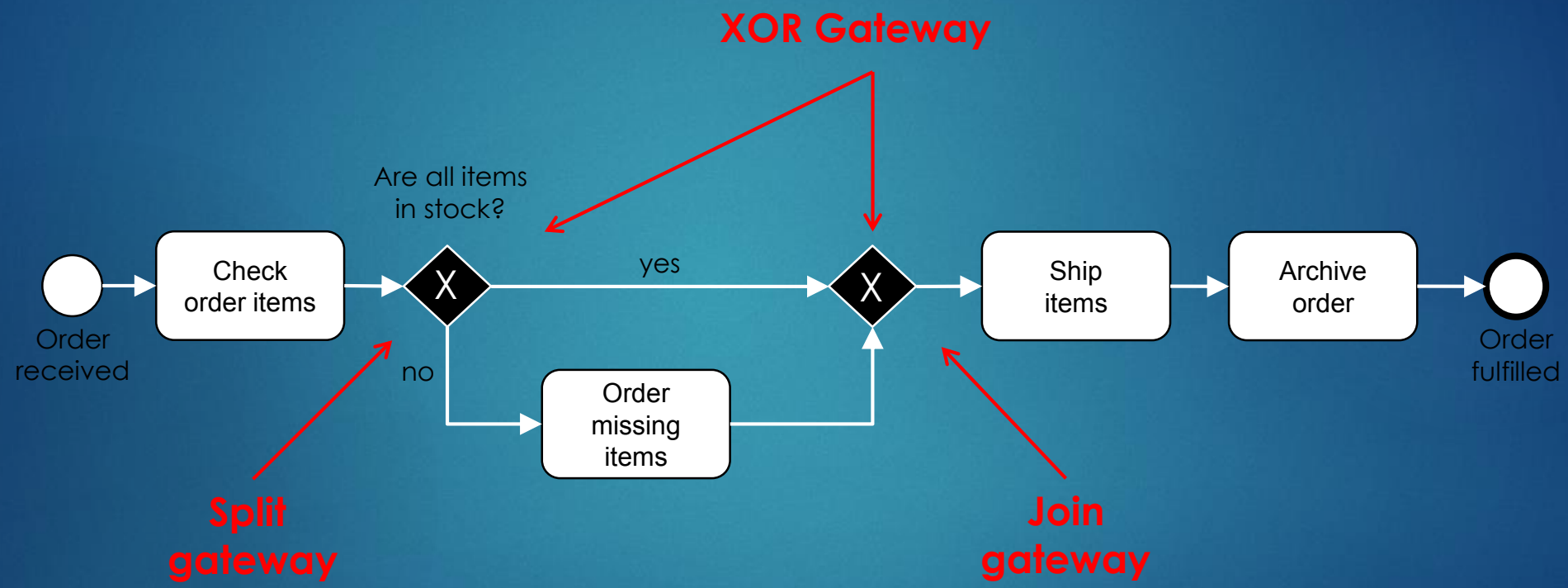
Different Levels of a Process Architecture



Basic BPMN elements
Order-to-pay process



Basic BPMN elements



Gateways

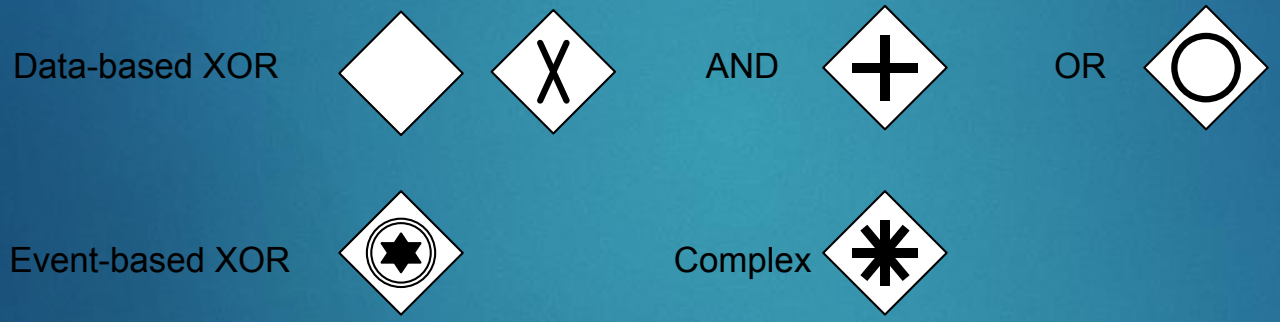
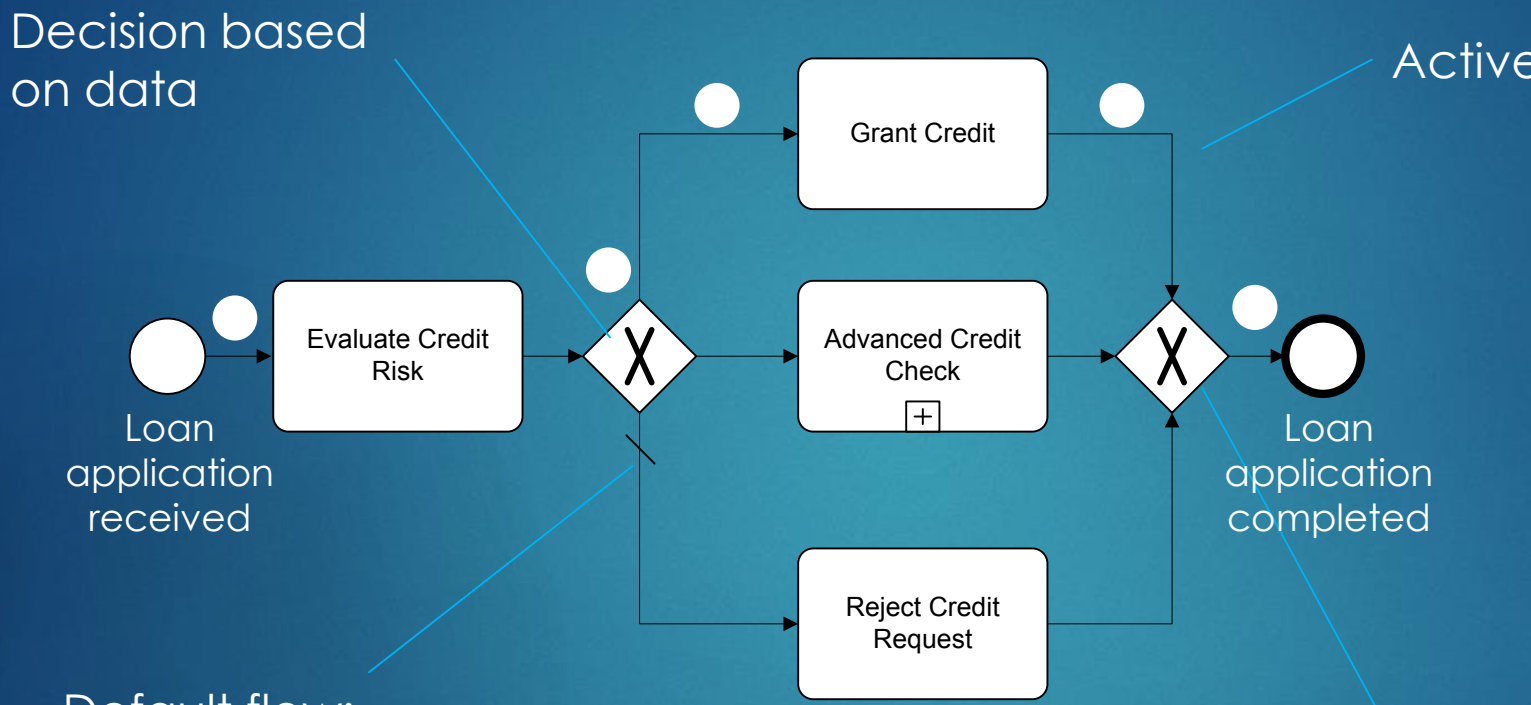


Fig 4.84. Gateway types in the BPMN, Object Management Group (2006)

Exclusive (XOR) Gateways



Naming Conventions in BPMN

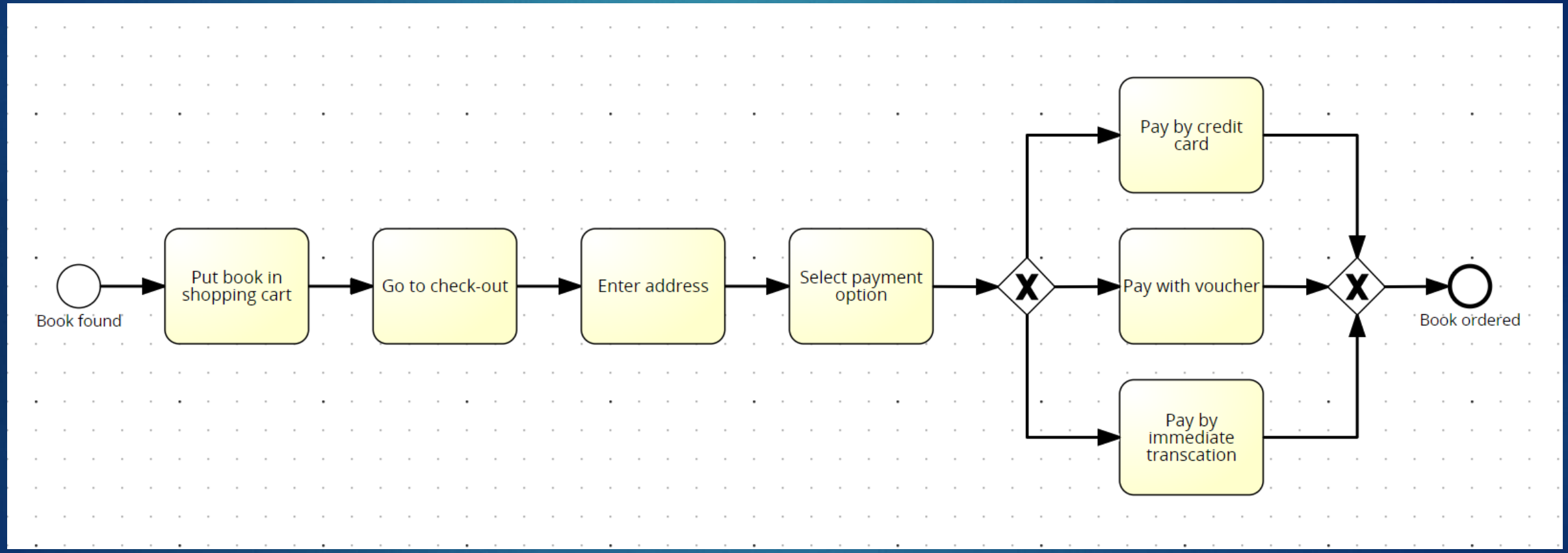
- Activities as Verb-Object (Imperative verb – business object)
- Events as Object-Passive-Participle
- Conditions with reference to Object

- **Every element should be labelled!**

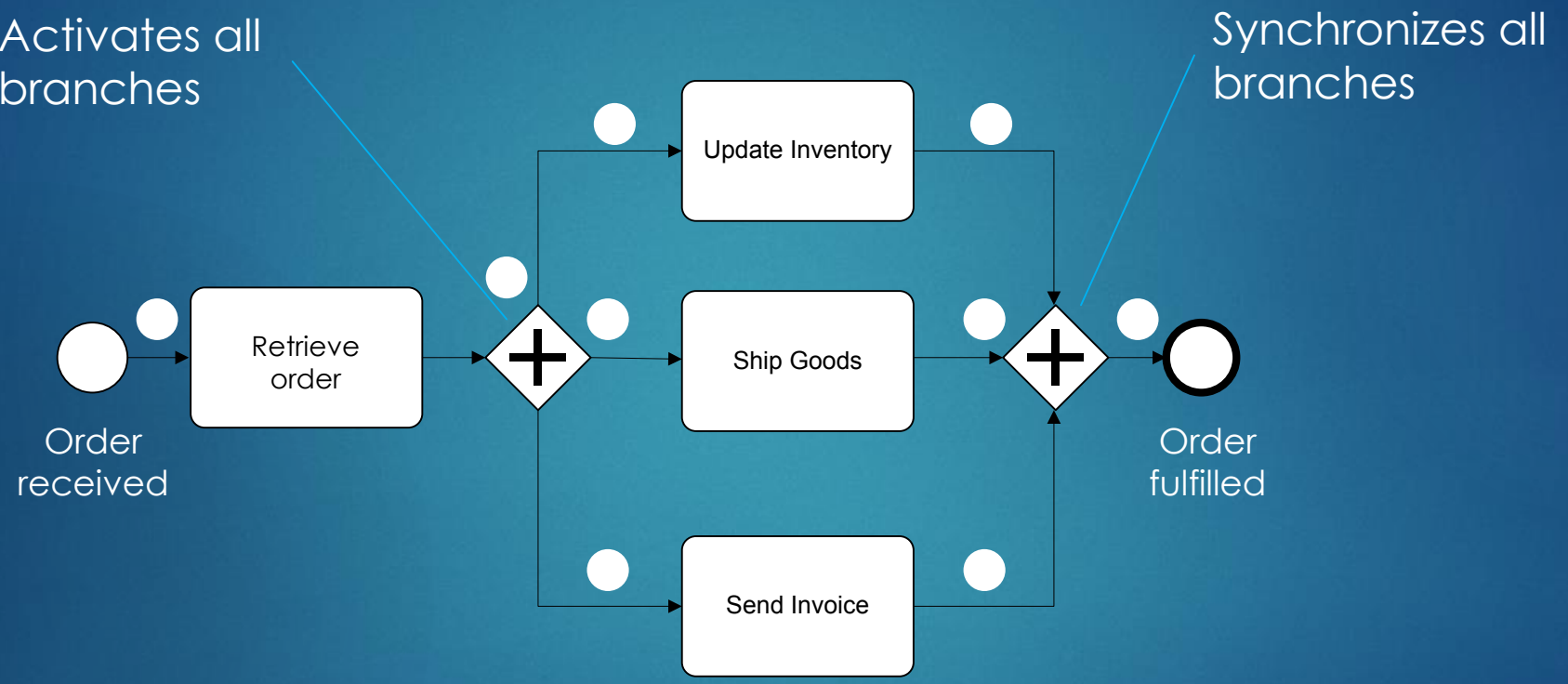
Exercise: Model the ordering process on Amazon

Once you found a book, you select the item and put it in your virtual shopping cart. Afterwards, you go to the virtual cashier. There, you enter your address and then you select your payment option. You can pay either by credit card, with a voucher, or immediate transaction. Once you have paid you receive your order and payment confirmation.

Solution book ordering process



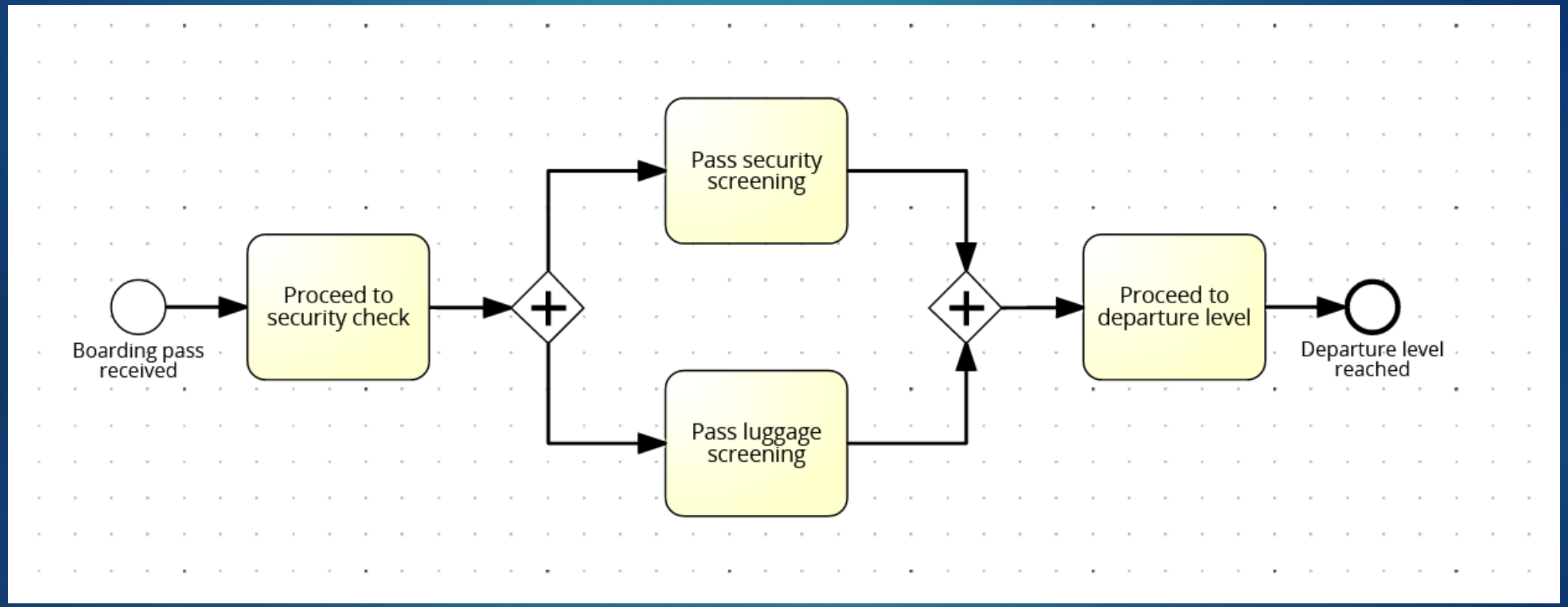
Parallel (AND) Gateways



Exercise
Security check at the airport

Once the boarding pass has been received, passengers proceed to the security check. Here they need to pass the personal security screening and the luggage screening. Afterwards, they can proceed to the departure level.

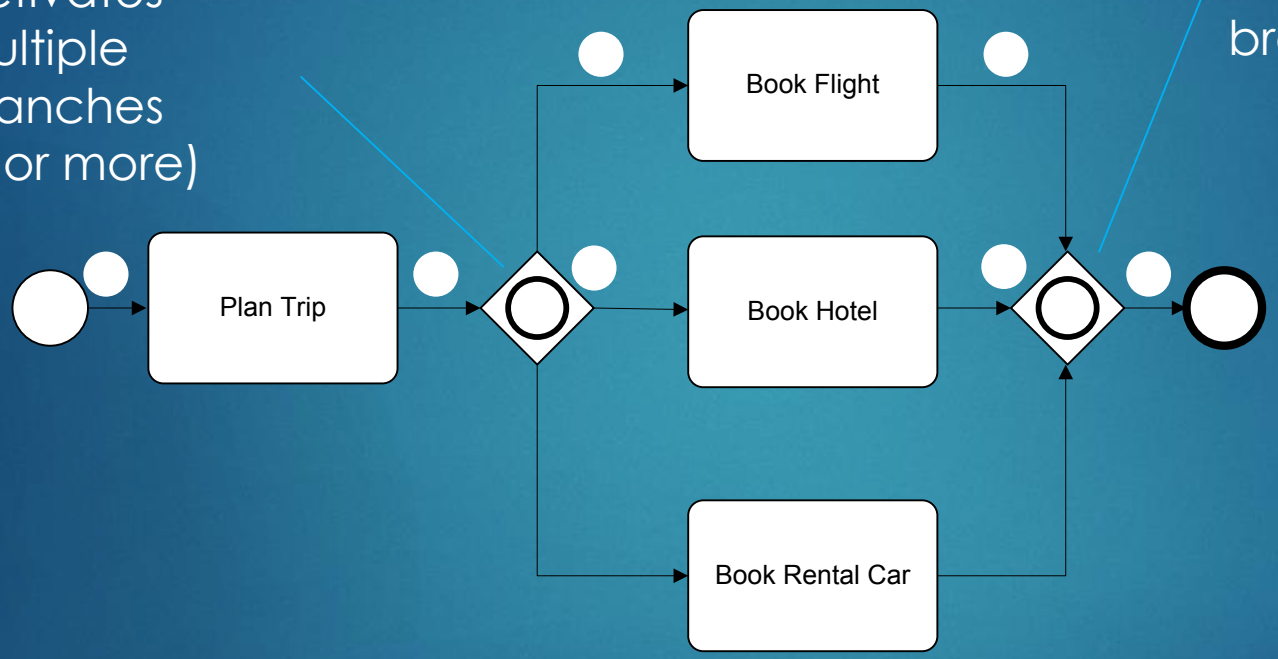
Solution
Security check at the airport BPMN



OR-Gateways

Activates multiple branches (1 or more)

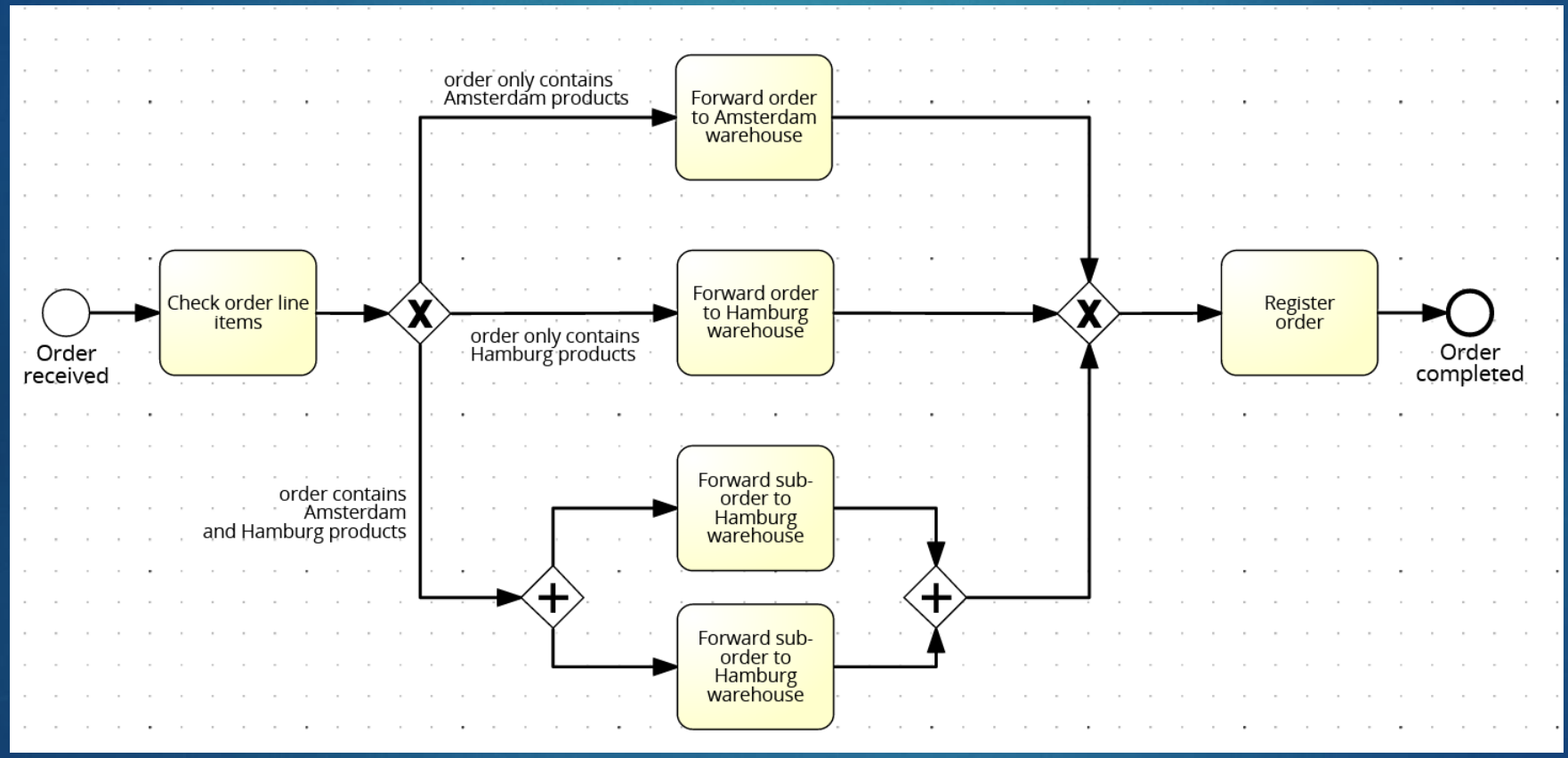
Sychronizes all active branches



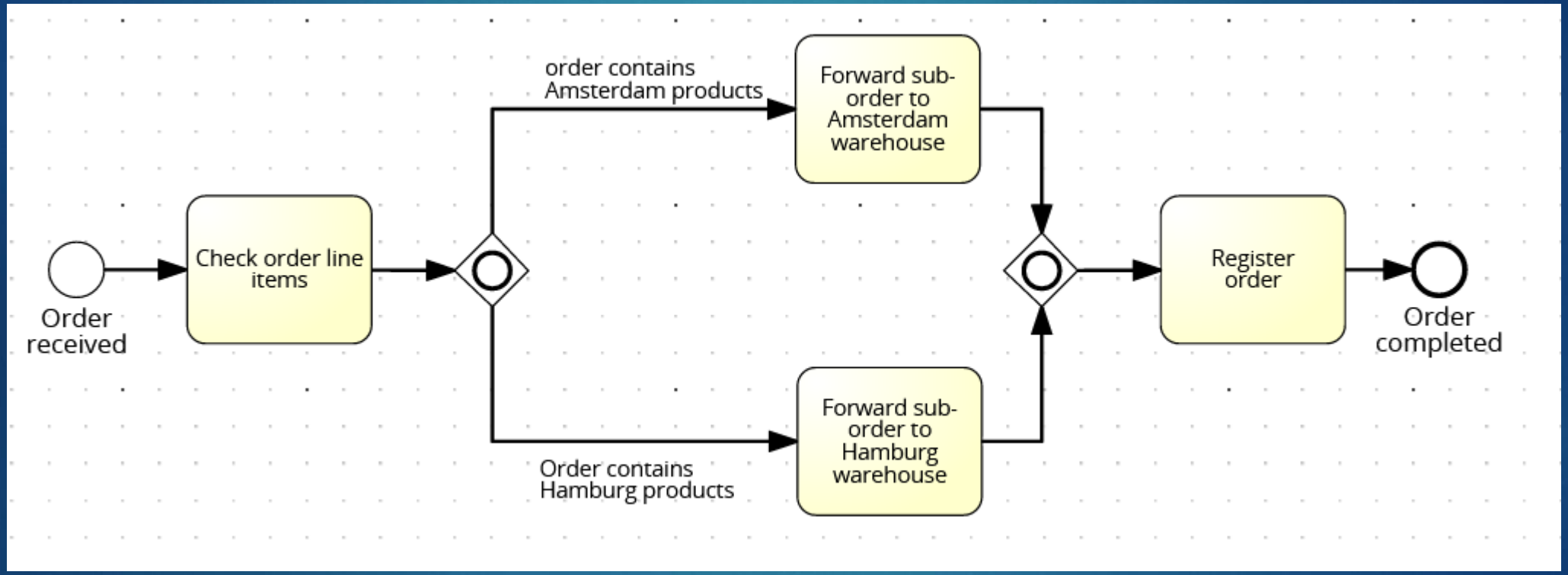
Exercise
Order distribution process

A company has two warehouses that store different products: Amsterdam and Hamburg. When an order is received, it is distributed across these warehouses: if some of the relevant products are maintained in Amsterdam, a sub-order is sent there; likewise, if some relevant products are maintained in Hamburg, a sub-order is sent there. Afterwards, the order is registered and the process completes.

Solution 1
Order distribution process with XOR and AND



Solution 2
Order distribution process with OR



Erasmus+

AIBA

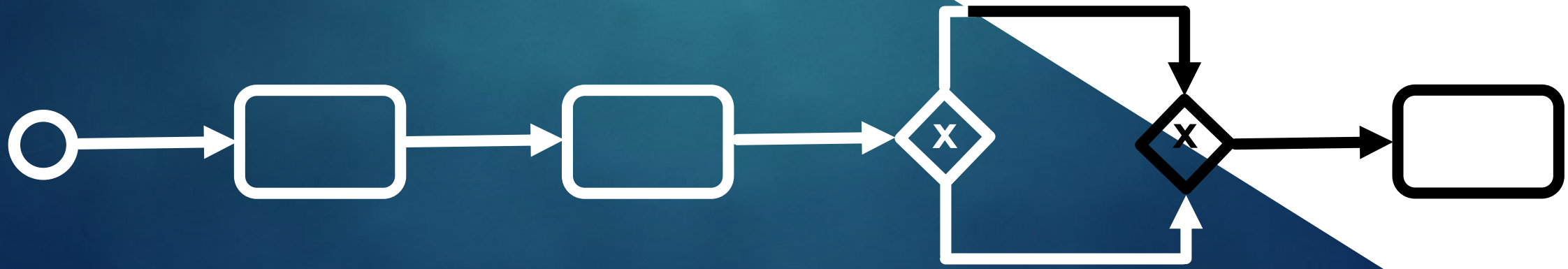
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

ADVANCED PROCESS MODELING WITH BPMN



Agenda Unit 4 – Advanced BPM

1. Recap
2. Administrative Matters
3. Advanced Process Modeling with BPMN

Erasmus+

AIBA

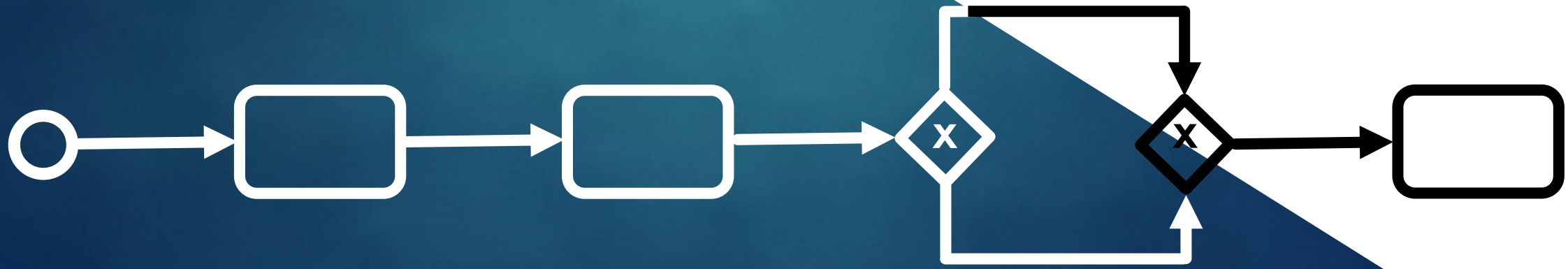
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

RECAP



Let‘s recap

- Go to **menti.com** and use the indicated code
- What did we do last time?

https://www.wu.ac.at/en/students/my-program/bachelors-student-guide/volunteering-support-and-honors-programs/student-counselling

Corona hotline by the city of Vienna: 01 4000 53000

General telephone counseling: 142

Erasmus+

AIBA

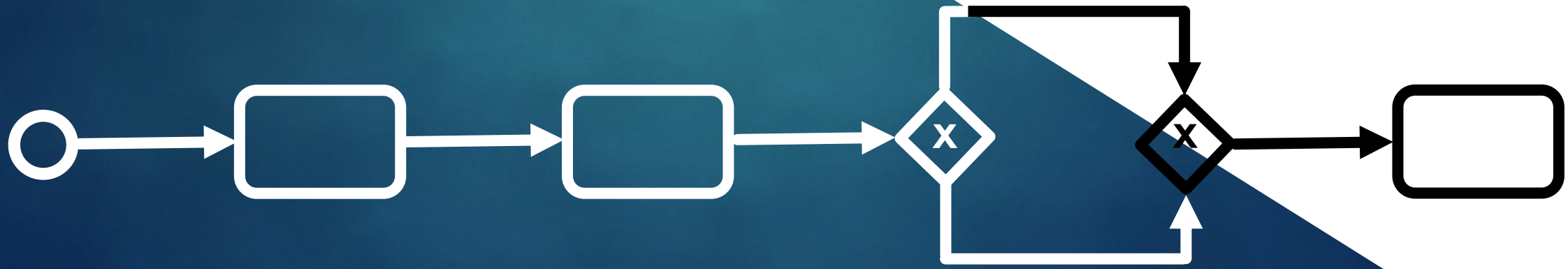
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

ADMINISTRATIVE MATTERS



Assignment

- Assignment on Business Process Modelling
- **Due till 30th of March**

Erasmus+

AIBA

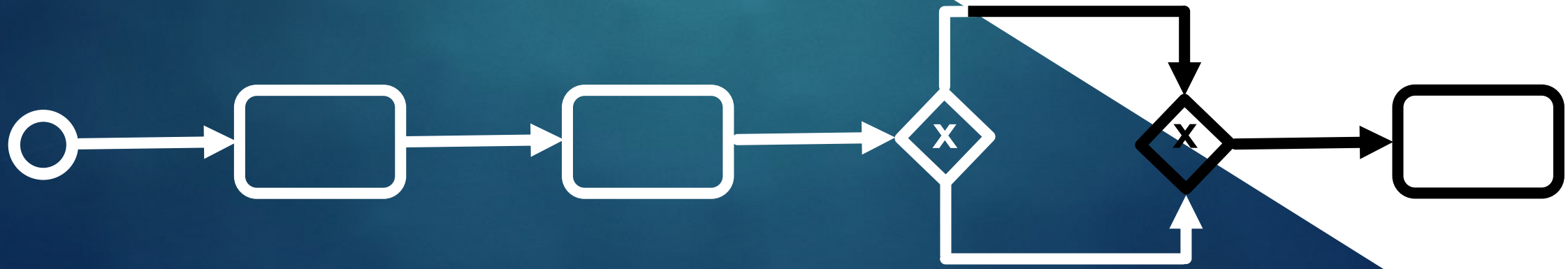
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

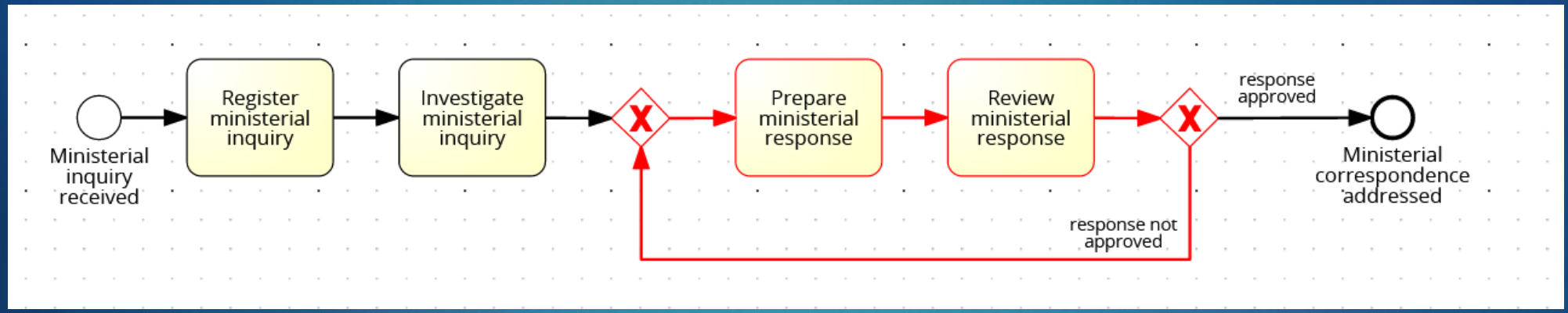
BPMN



Exercise
Ministerial correspondence

In the treasury minister's office, once a ministerial inquiry has been received, it is first registered into the system. Then the inquiry is investigated so that a ministerial response can be prepared. The finalization of a response includes the preparation of the response itself by the cabinet officer and the review of the response by the principal registrar. If the registrar does not approve the response, the latter needs to be prepared again by the cabinet officer for review. The process finishes only once the response has been approved.

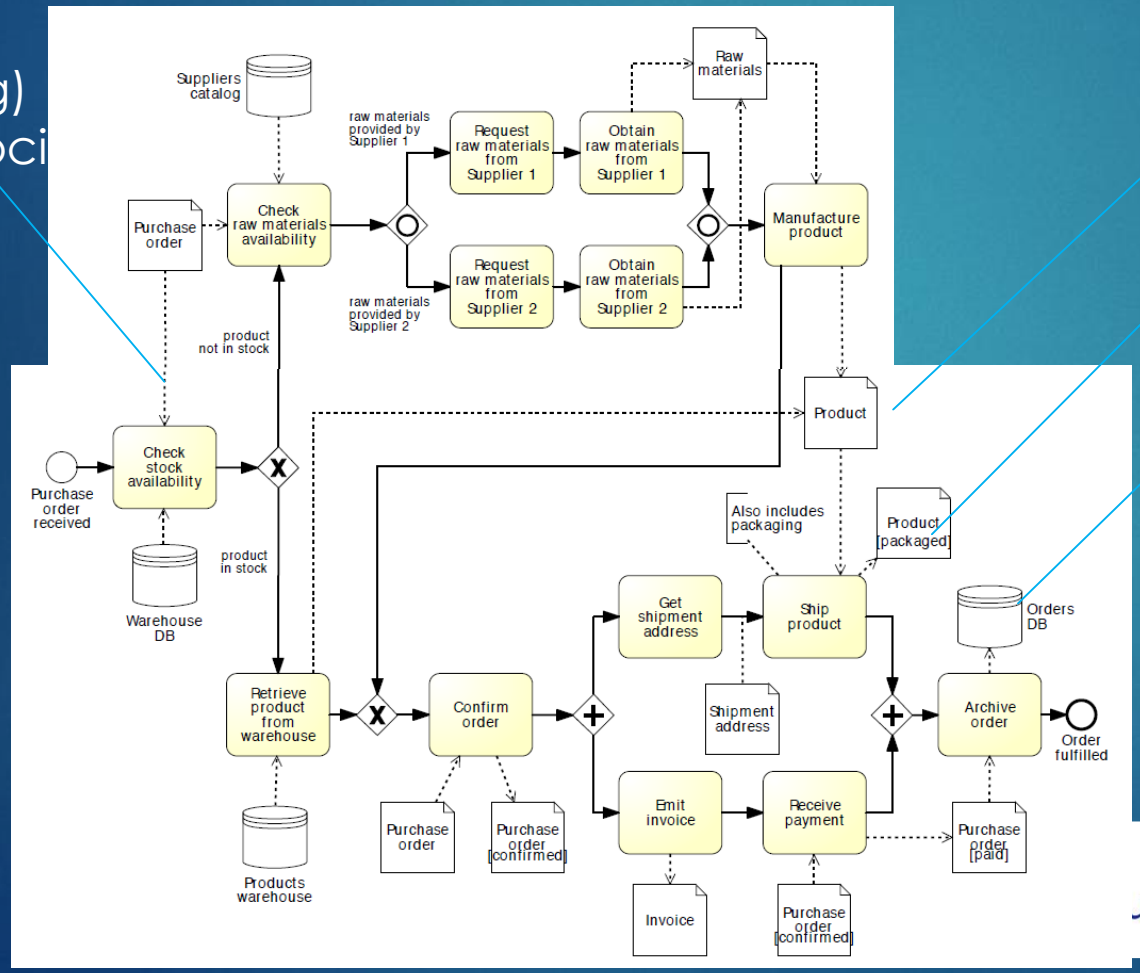
Modelling Rework
Ministerial correspondence BPMN



Artifacts in BPMN

- Data perspective

(incoming)
Data associ

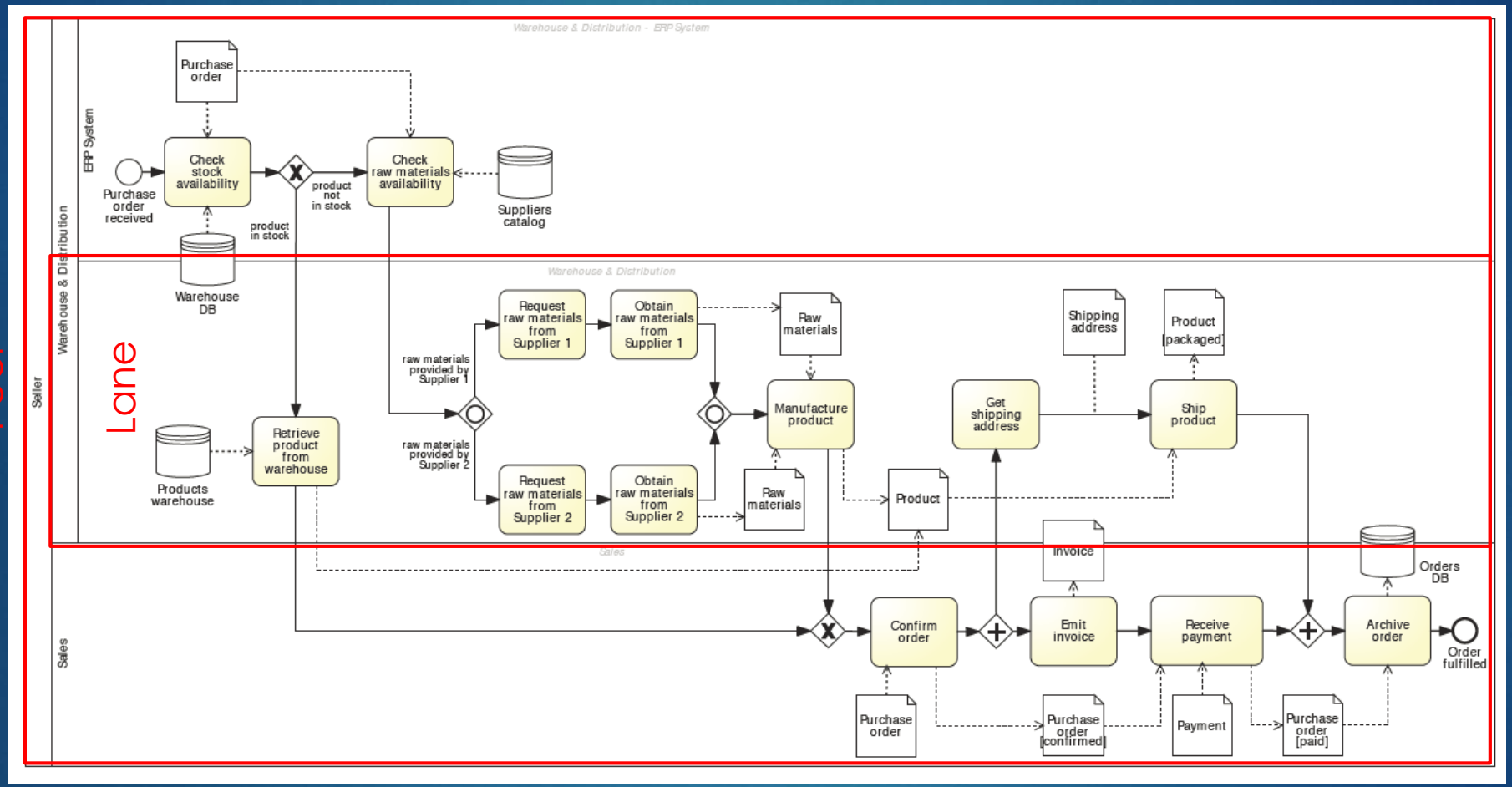


Data object

State

Data store

Resource perspective

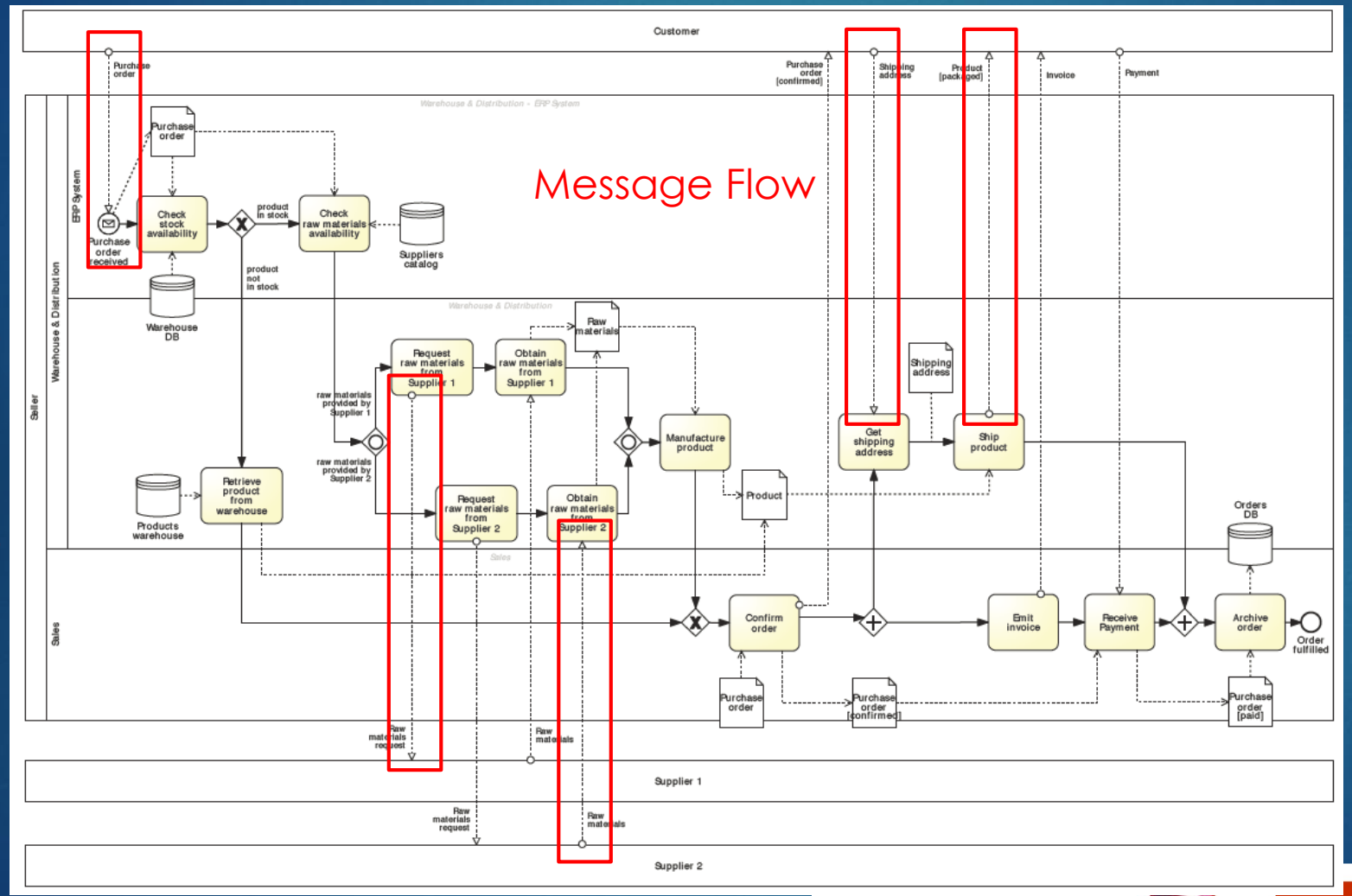


Collaboration diagram

Pool

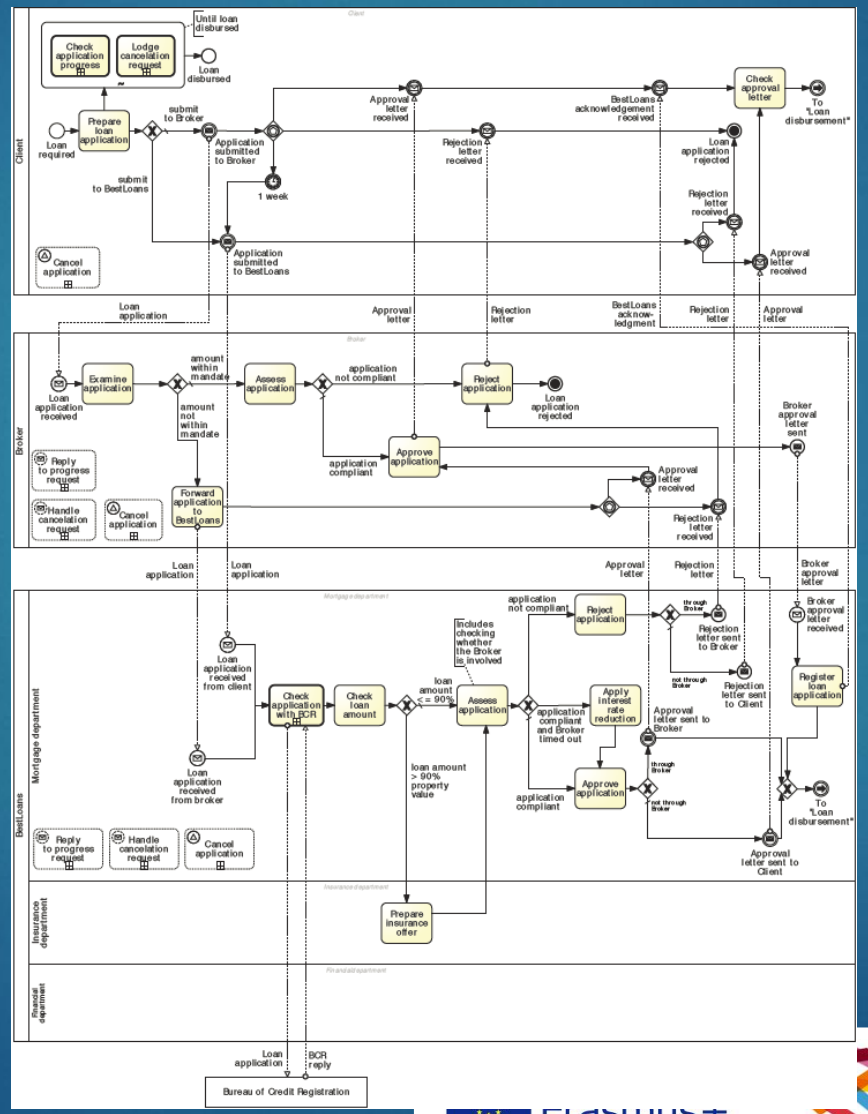
(white box) Pool

Pool Pool



Process Decomposition: How big is too big?

Decompose if more than 30 elements



Sub-process

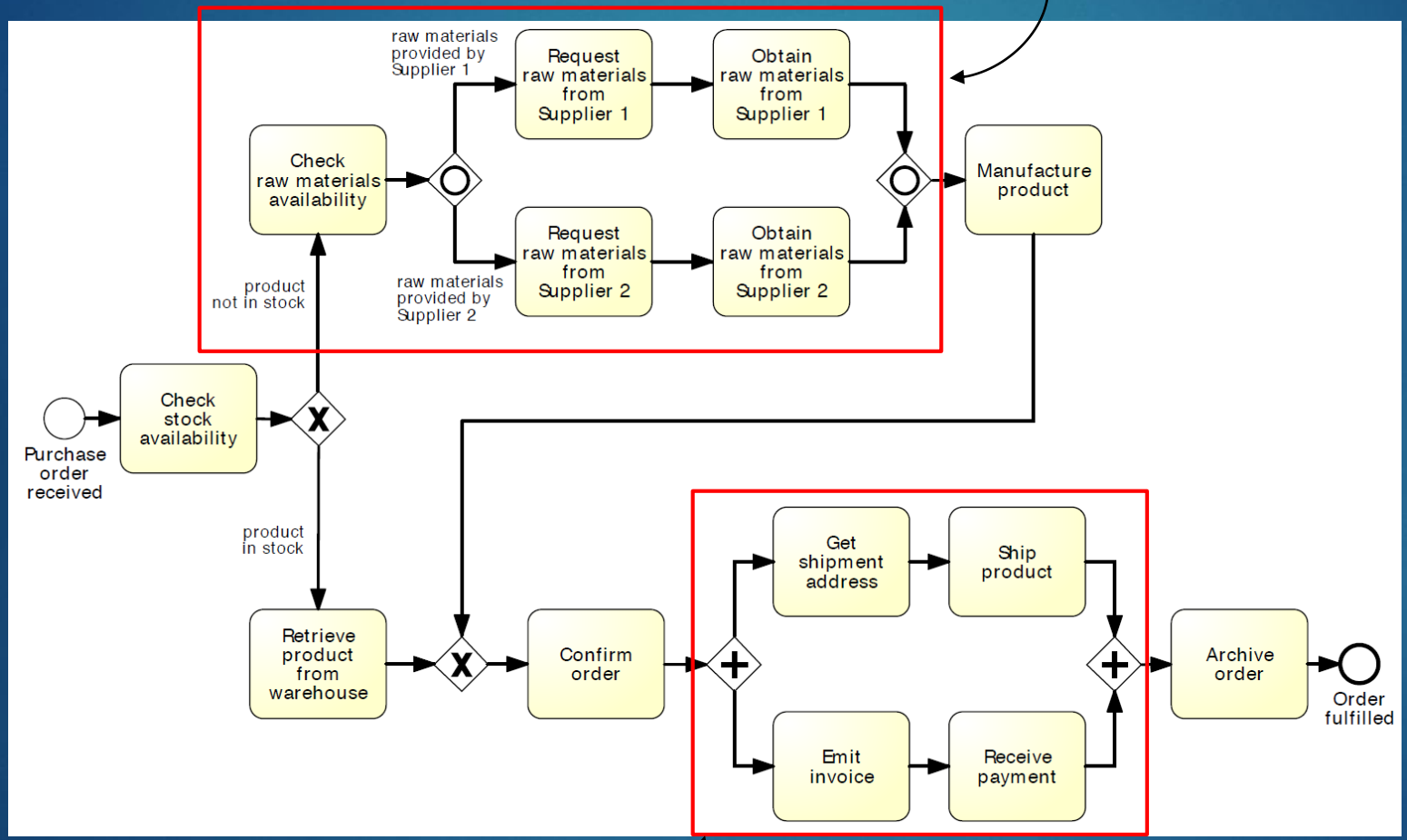
A **sub-process** is a self-contained, composite activity that can be broken down into smaller units of work.

- Identify groups of related activities (together achieve a particular goal or generate a particular outcome)
- Add start and end events to indicate process start/end
- Nest sub-processes in multiple levels – decompose a process model hierarchically

Process Decomposition

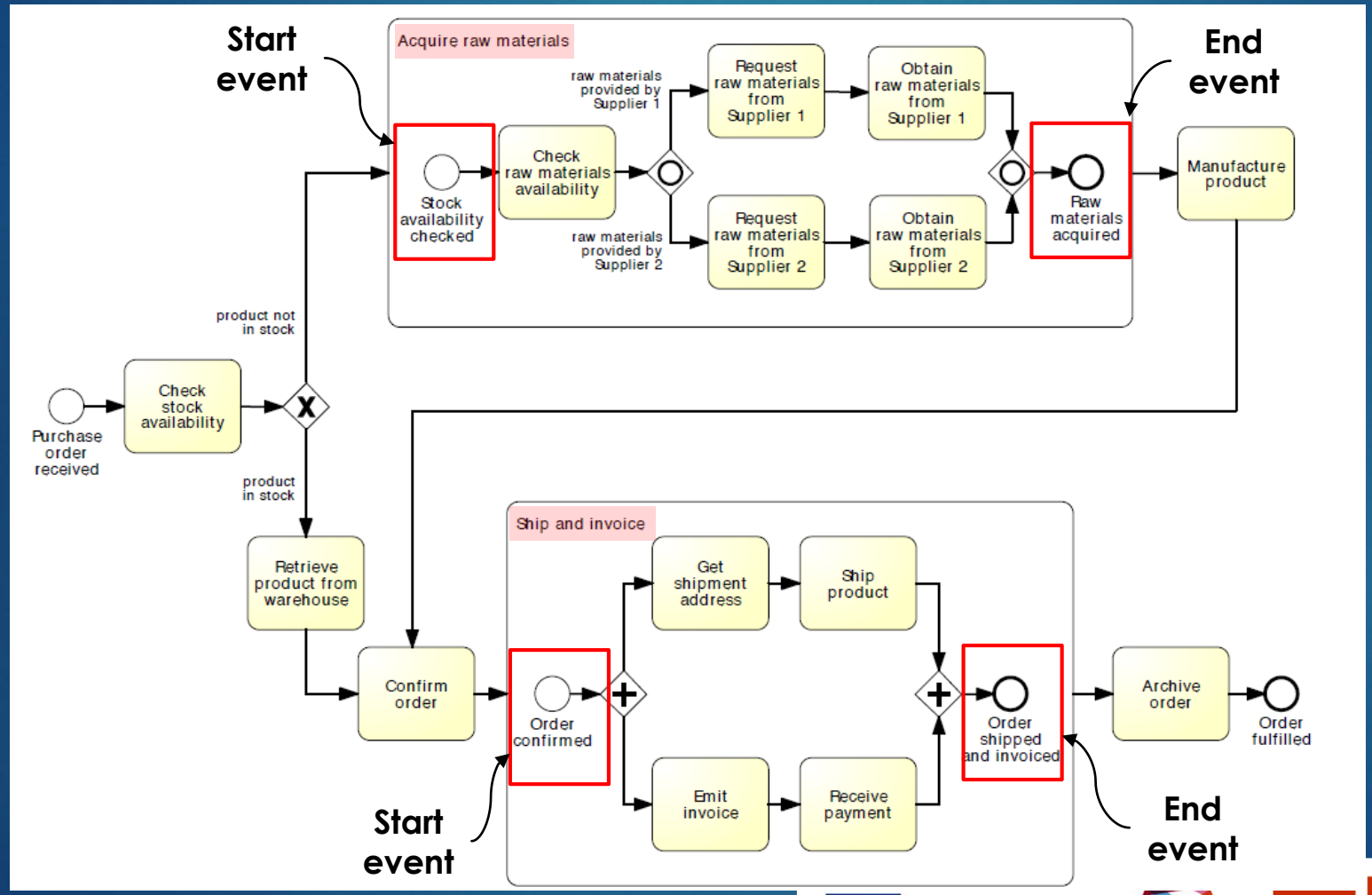
Can you group any activities?

All activities have to do with acquaring raw materials from suppliers.

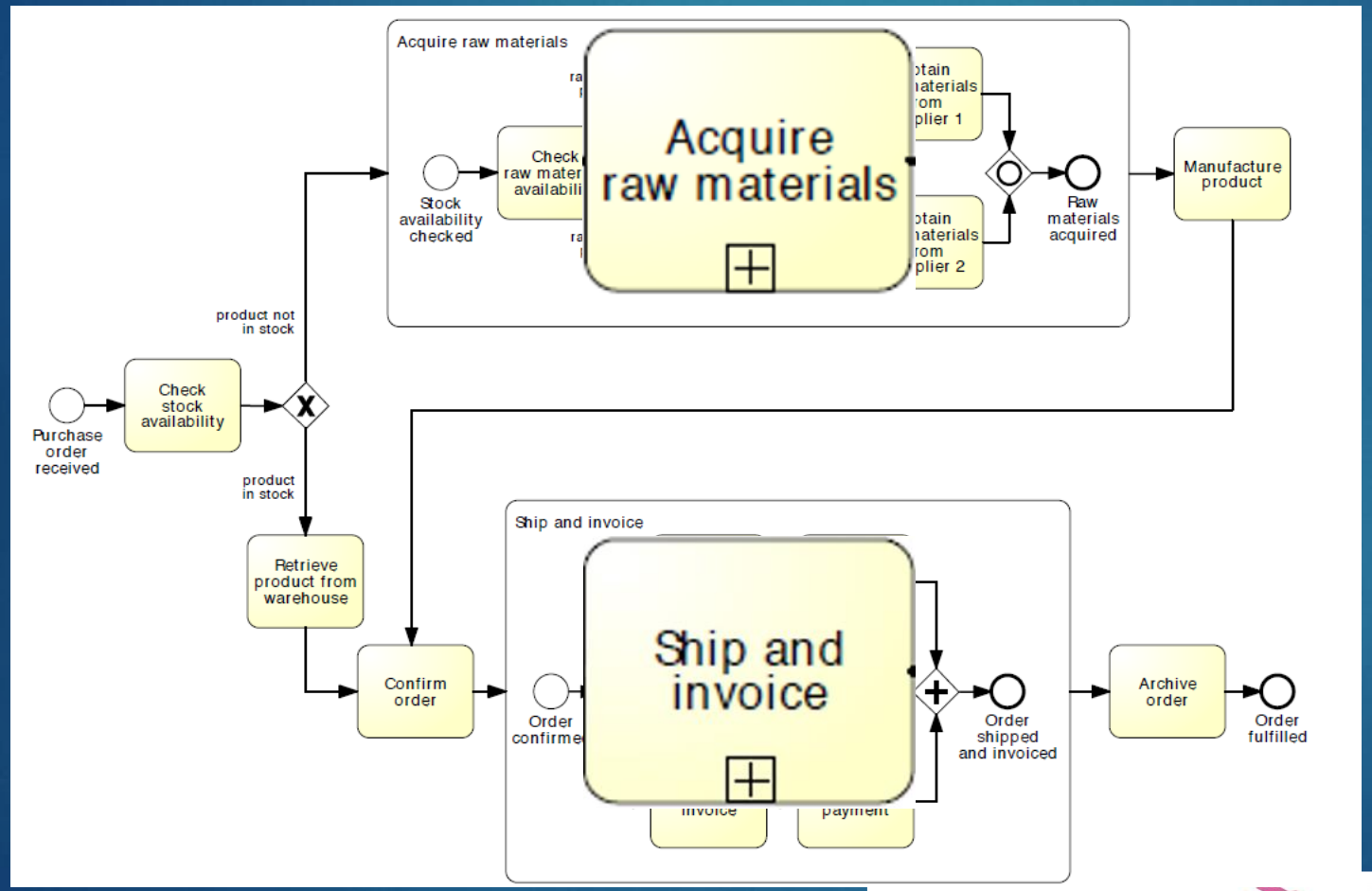


All activities have to do with shipping and invoicing

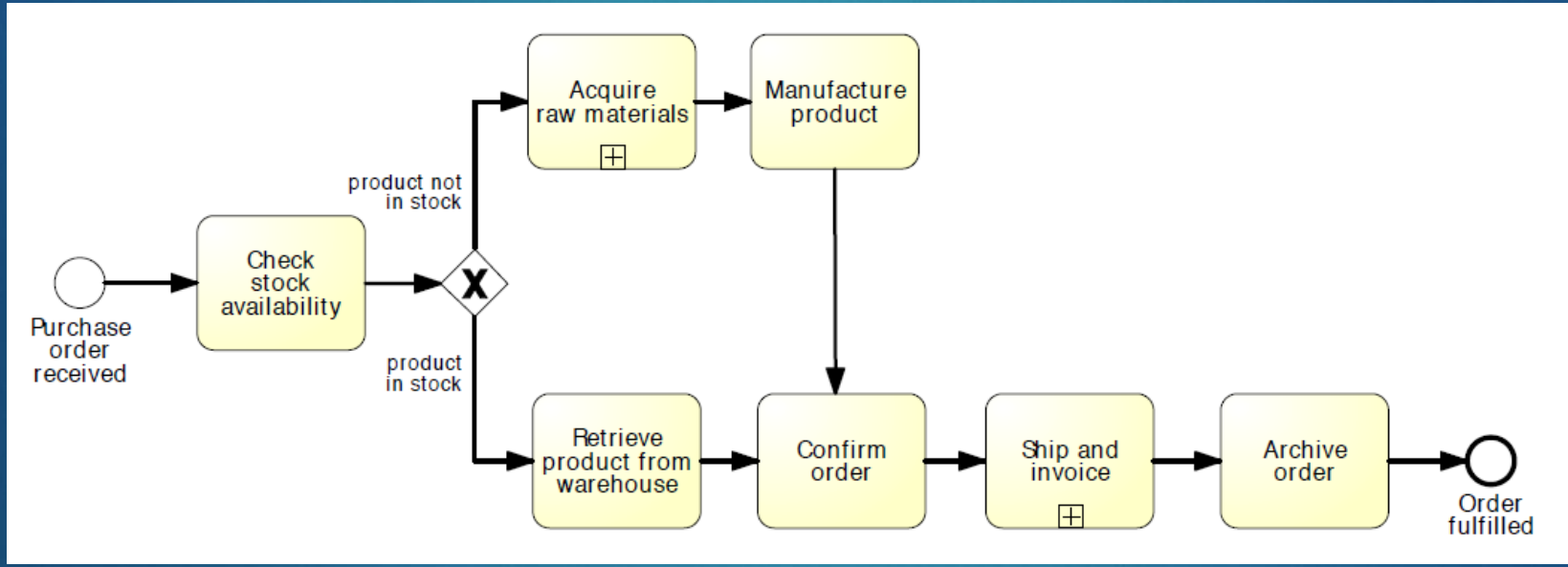
Expanded Sub-process



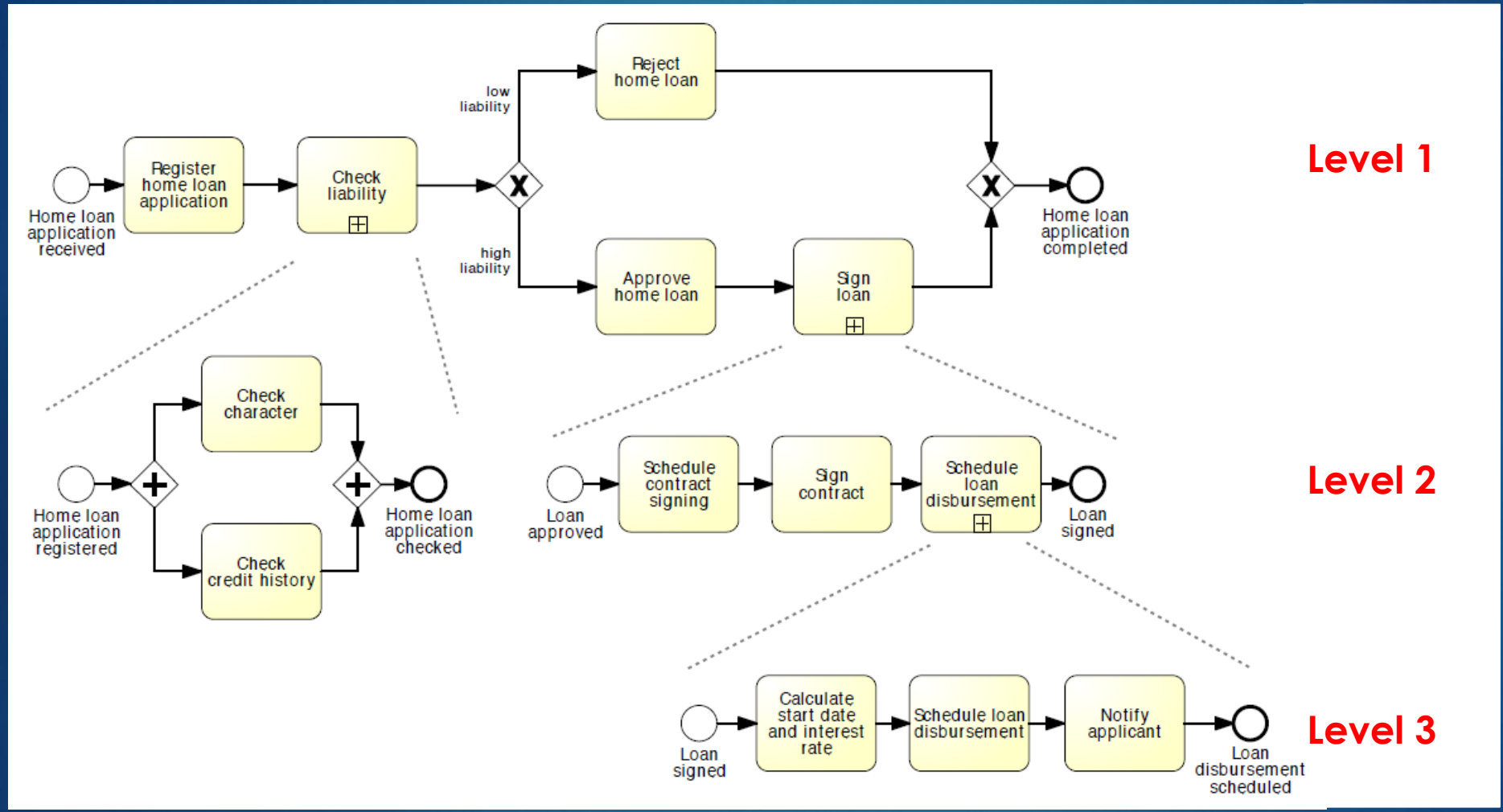
Expanded Sub-process → Collapsed Sub-process



Collapsed sub-process



Levels of Decomposition

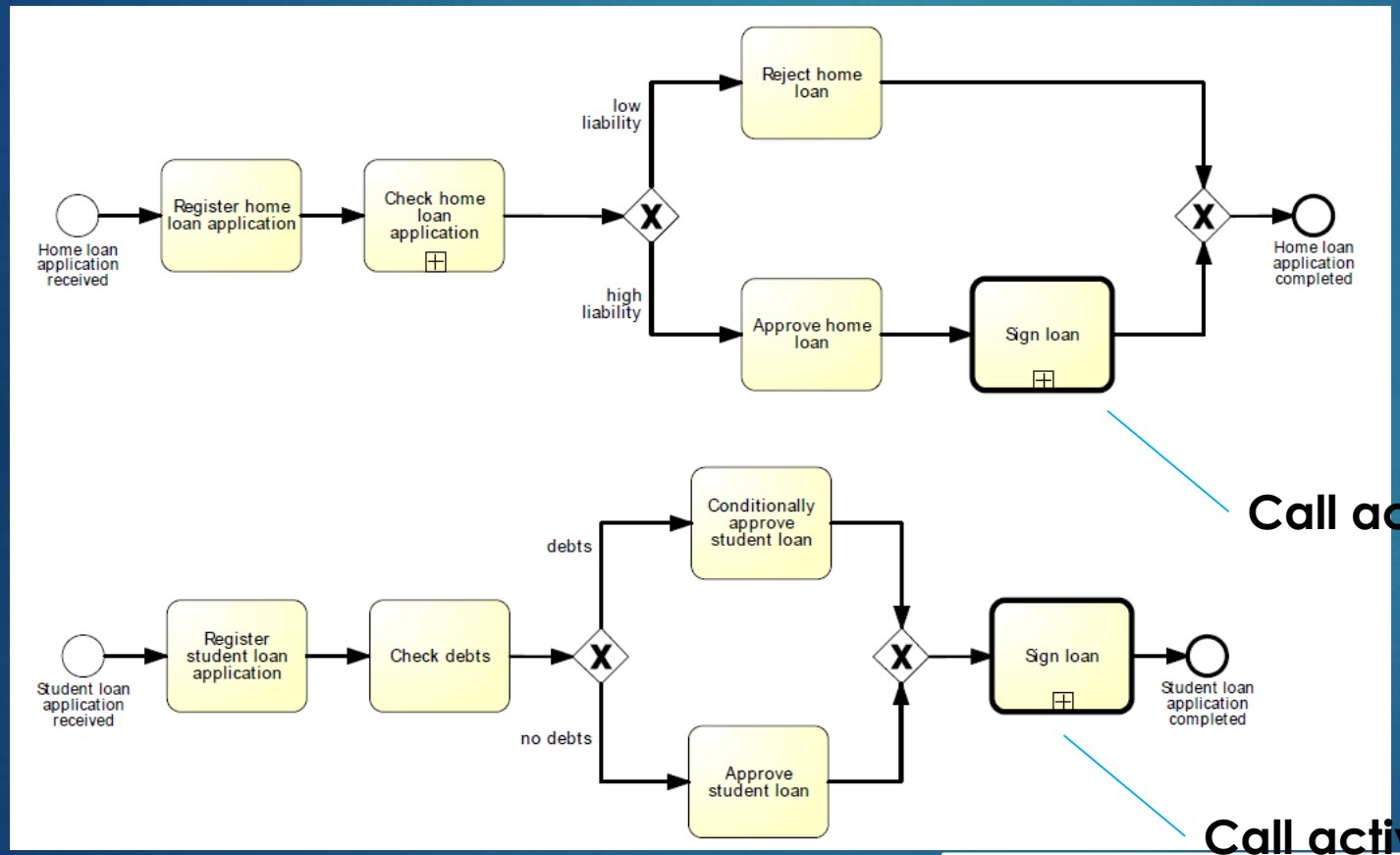


Exercise

- Which activities form our Amazon example can you organize in a sub-process?

Process Model Reuse

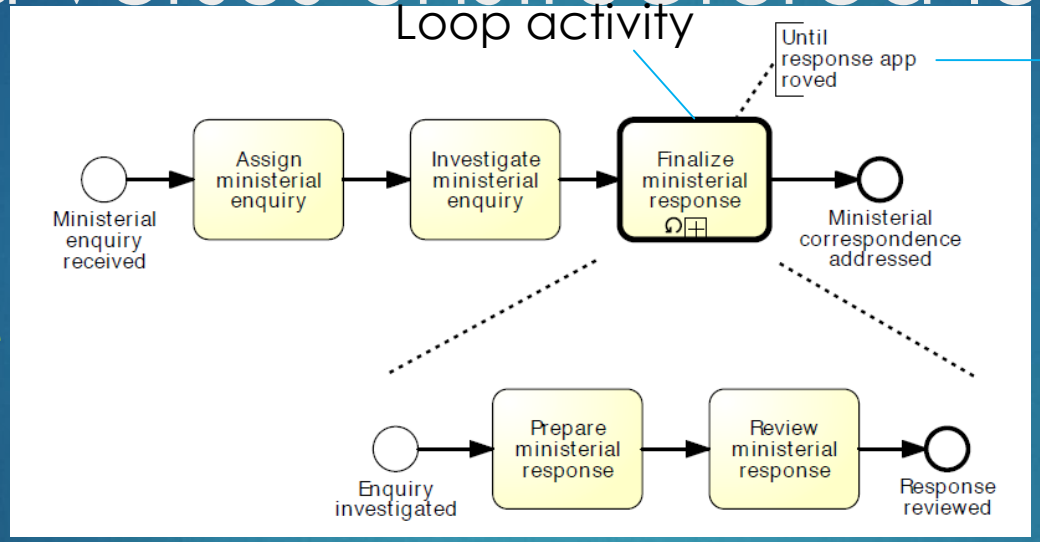
- Defining a sub process as a global process model allows us to re-use ist content



Rework and Repetition
Structured versus unstructured loops

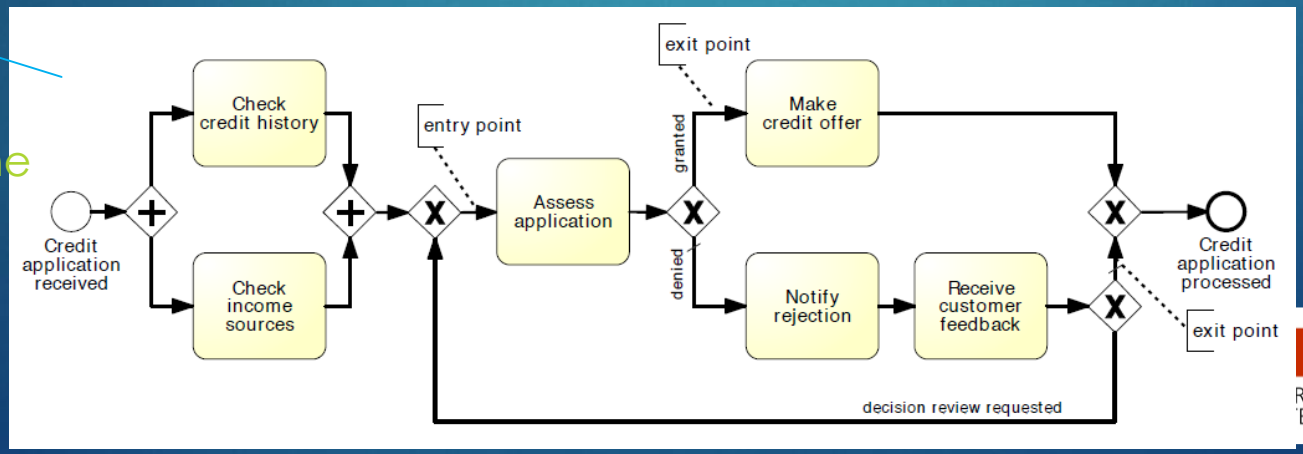
Structured cycle

Single entry/exit point to/from the cycle



Unstructured cycle

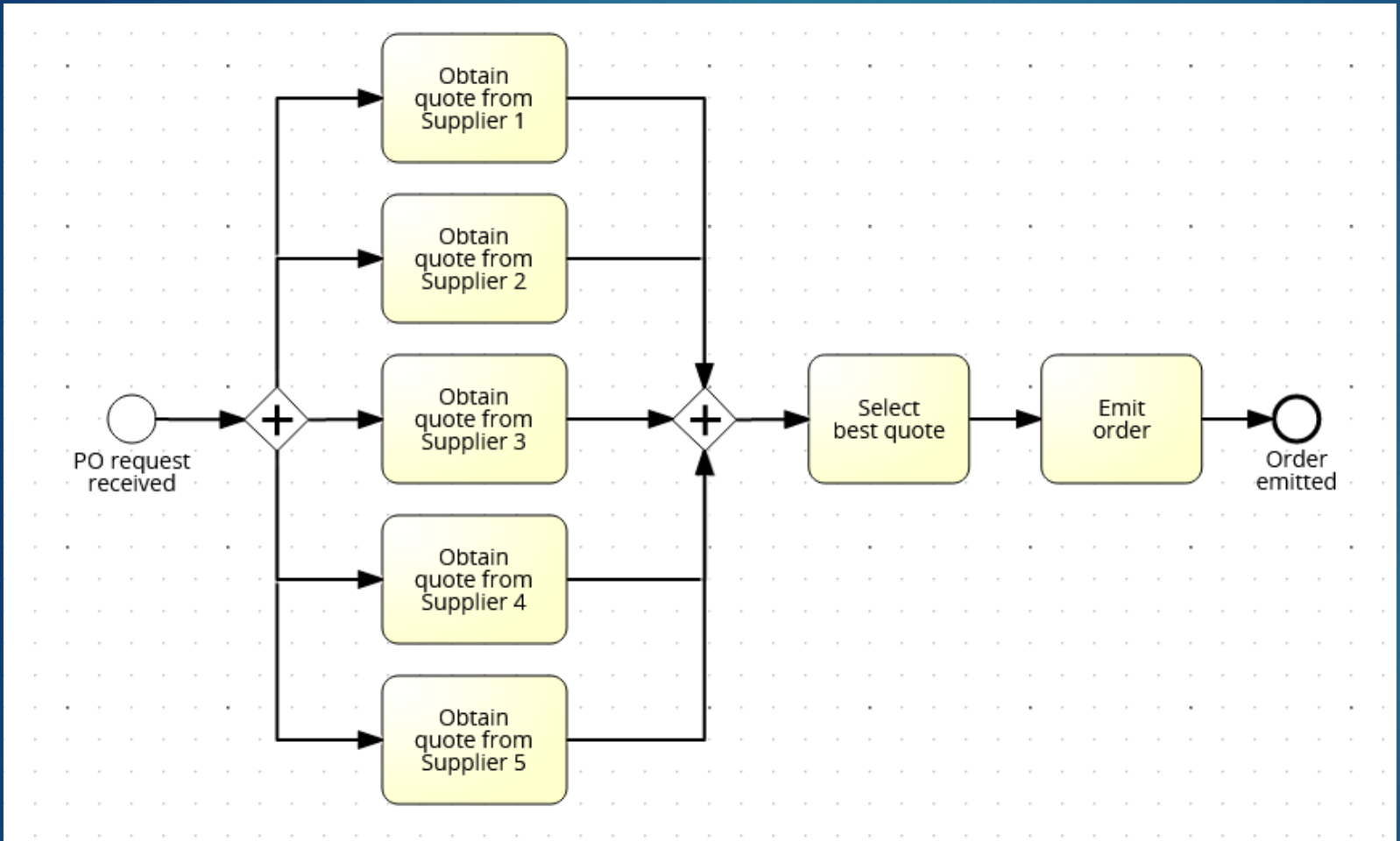
Multiple exit points from the cycle



Parallel Repetition (re-instantiating)

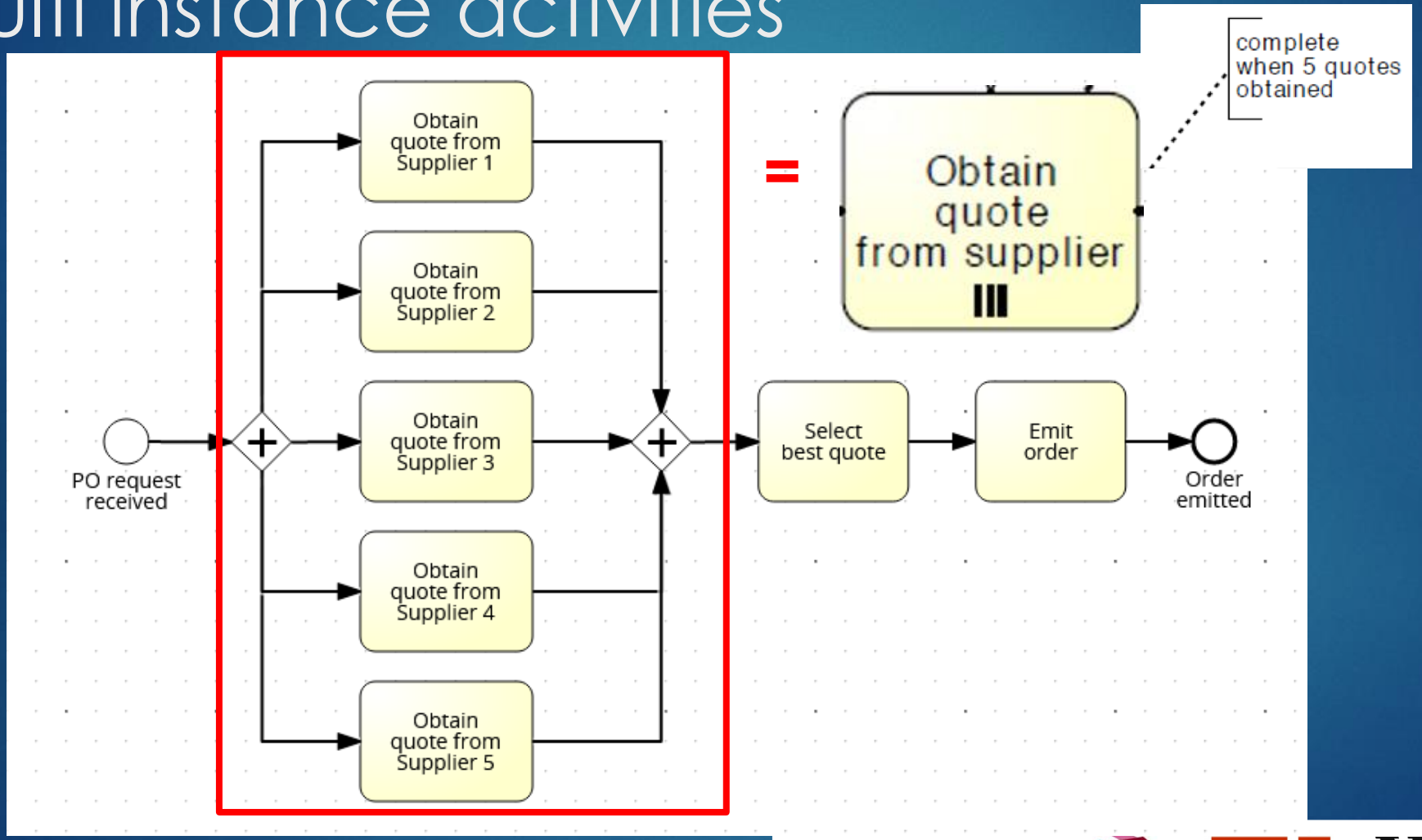
- In a procurement process, a quote is to be obtained from all preferred suppliers. After all quotes are received, they are evaluated and the best quote is selected. A corresponding purchase order is then placed. Let us assume five preferred suppliers exist.

Obtaining Quotes from five Suppliers



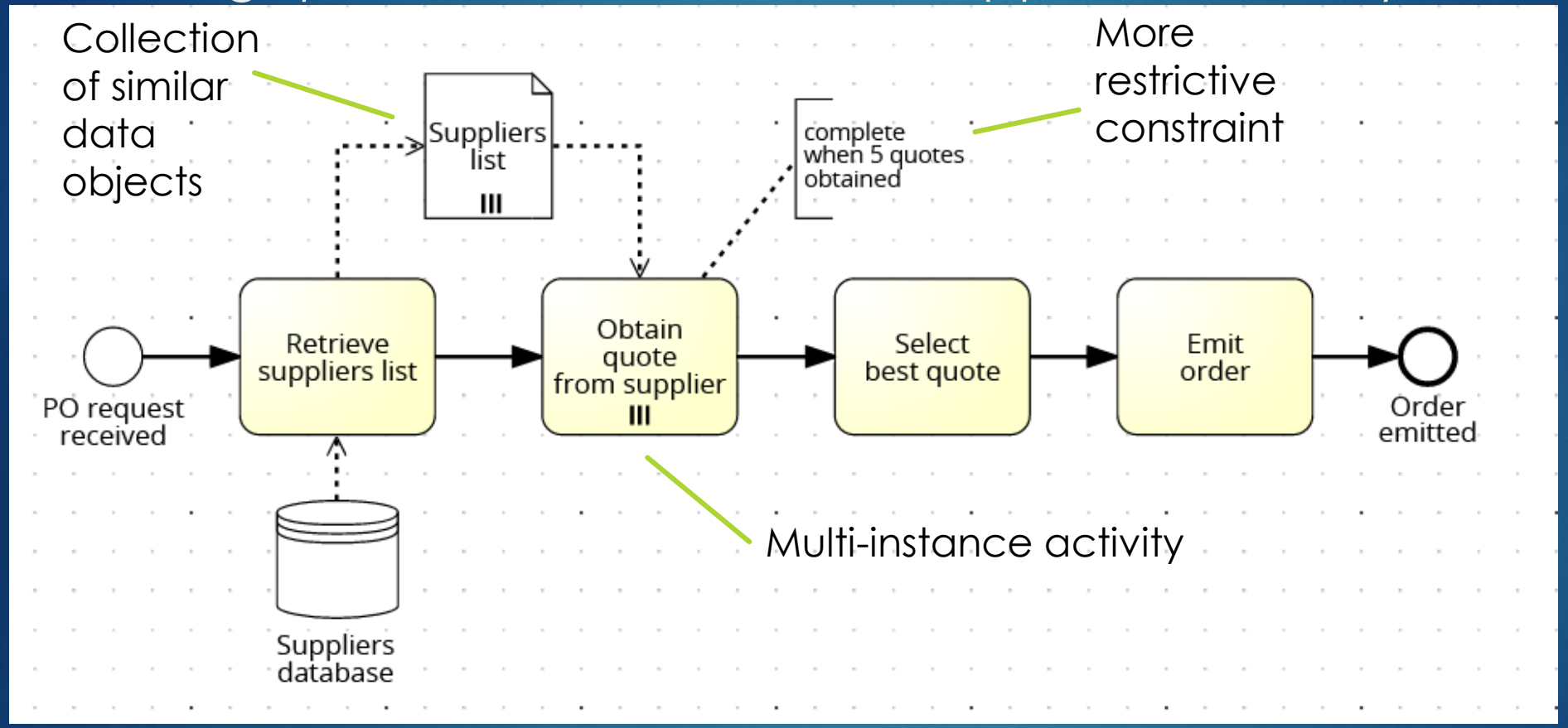
- What might be disadvantageous about this behavior?

Obtaining Quotes from five Suppliers
Multi instance activities



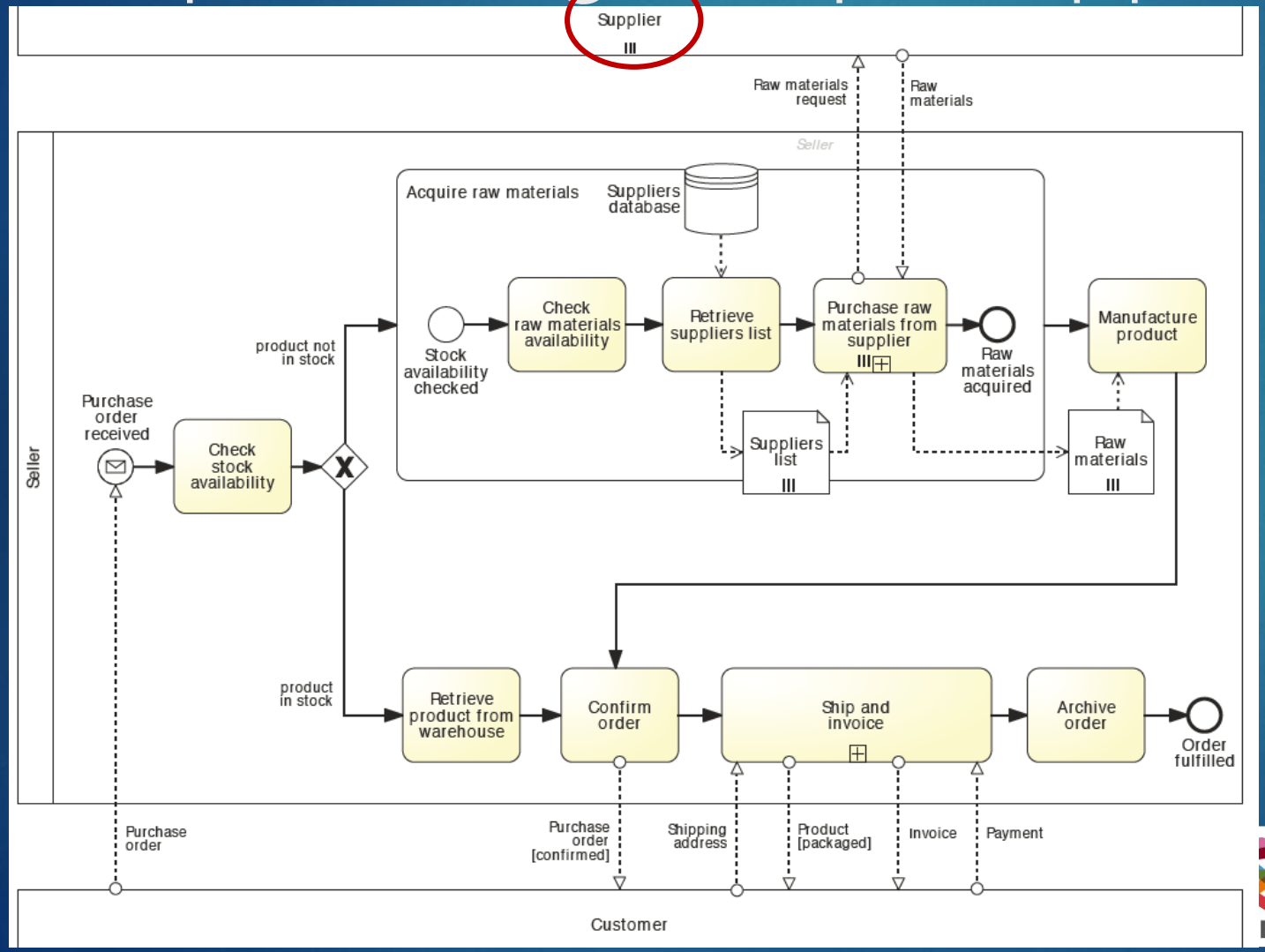
Parallel repetition

Obtaining quotes from a number of suppliers on-the-fly



- **Parallel repetition** executes multiple instances of the same activity at the same time
- (compared to a *loop activity* which captures sequential repetition)

Multi-instance pool
For representing multiple suppliers

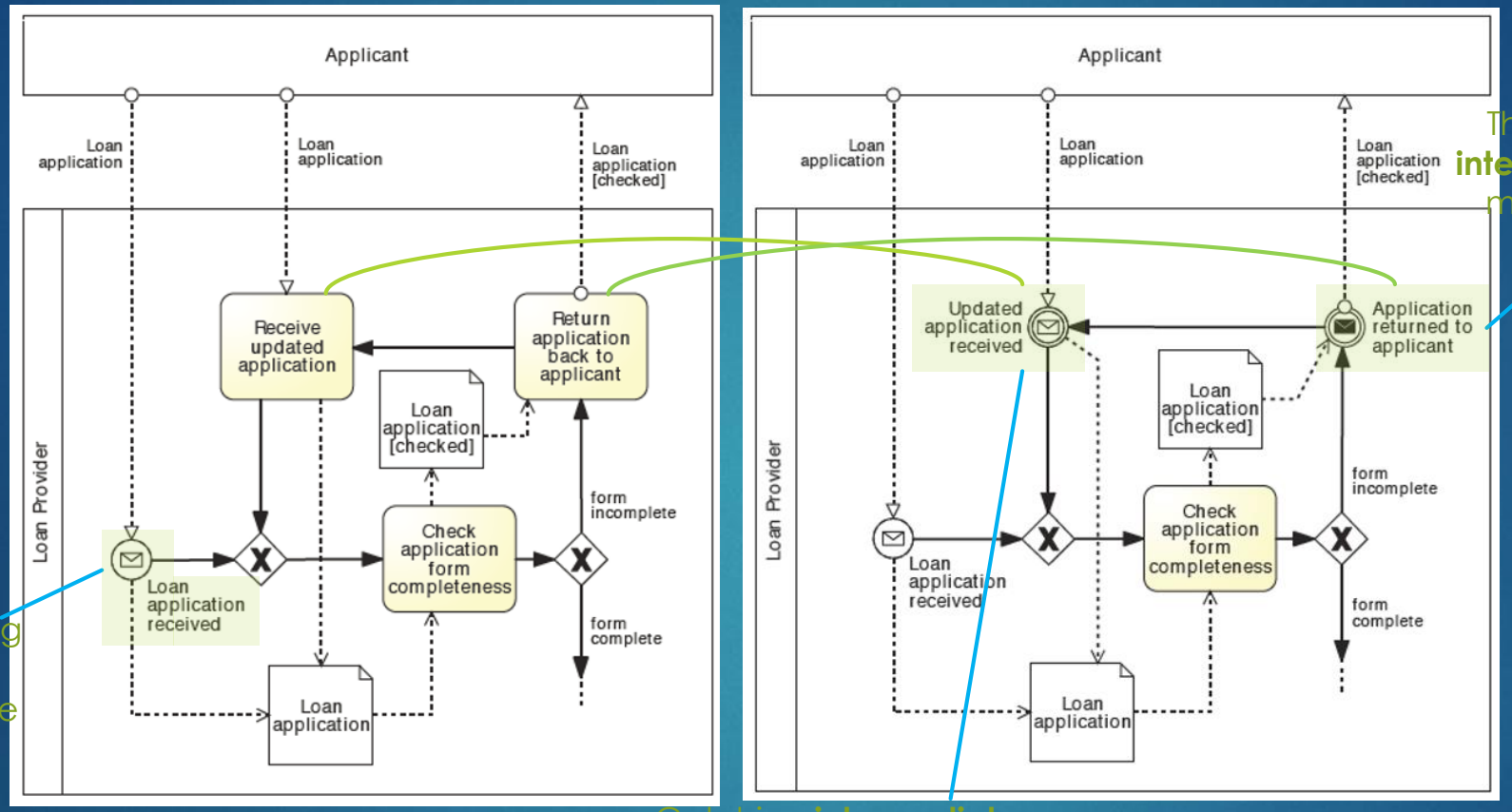


- A **multi-instance pool** represents a set of resource classes, or resources, having similar characteristics.
- Instead of having 2 supplier pools, we can have one multi-instance

Message Events

	Catching	Throwing
Start/ End		
Intermediate		

Message Events



Start/intermediate/end message events – capture the interaction between the process and another party.

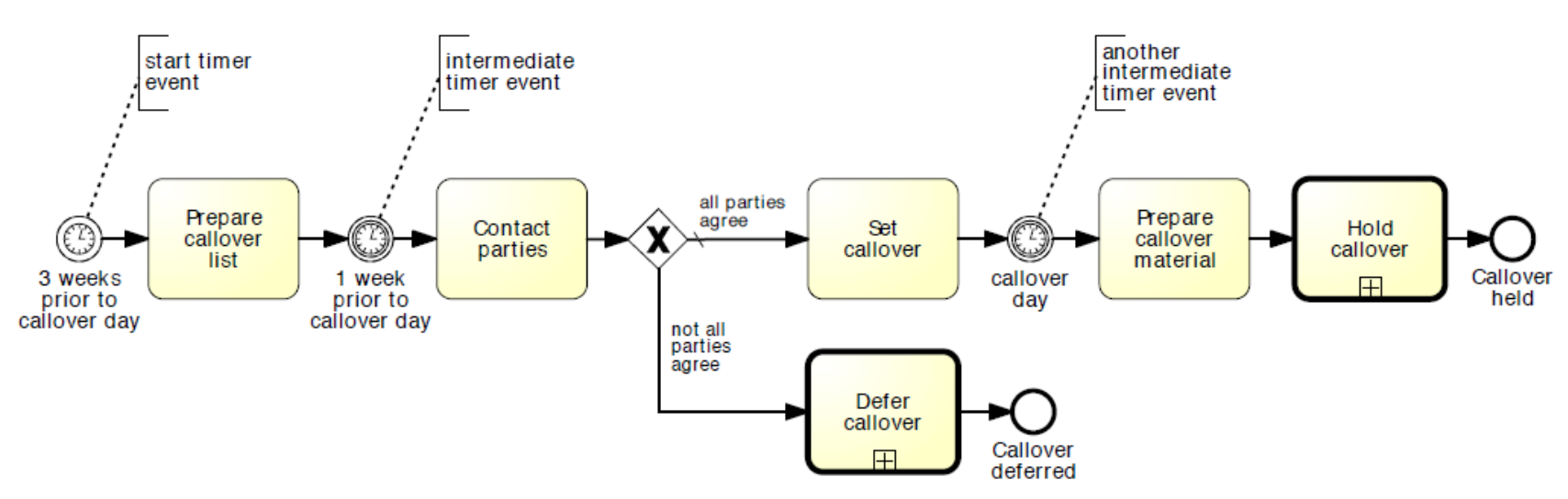
Temporal Events

- Indicates that a process instances start upon the occurrence of a specific temporal event (every Friday morning, every working day of the month, etc.)
- Timer event can be used as an intermediate event to capture that a temporal interval needs to elapse before the process instances can proceed
- Timer events are catching events only, since a timer is a trigger outside the control of the process

Exercise: Temporal Events

- In a small claims tribunal, callovers occur once a month, to set down the matter for the upcoming trials. The process for setting up a callover starts three weeks prior to the callover day, with the preparation of the callover list containing information such as contact details of the involved parties and estimated hearing date. One week prior to the callover, the involved parties are contacted to determine if they are all ready to go to trial. If this is the case, the callover is set, otherwise it is deferred to the next available slot. Finally, on the callover day, the callover material is prepared and the callover is held.

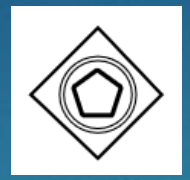
Temporal Events

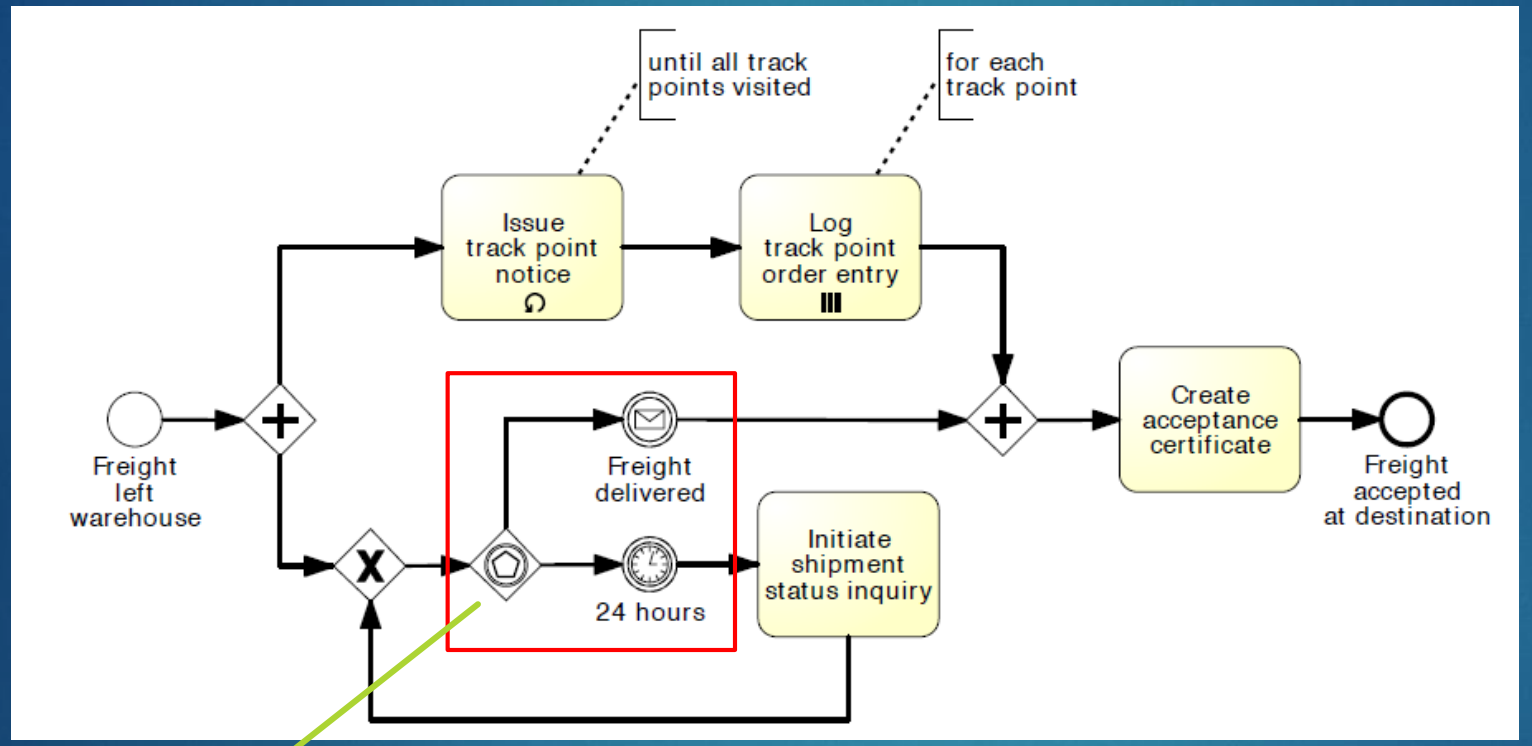


- **Start timer events** – indicate that process instances start upon the occurrence of a specific temporal event.
- **Intermediate timer event** – captures a temporal interval that needs to elapse before the process instance can proceed.

Racing Events

- Sometimes two external processes race against one another
- The first of the two that occurs determines the continuation of the process
- **Race is captured by means of the event-based (XOR) split**
- When the execution of the process arrives at this point, the execution stops until some activity occurs

Racing Events:  + e.g. 

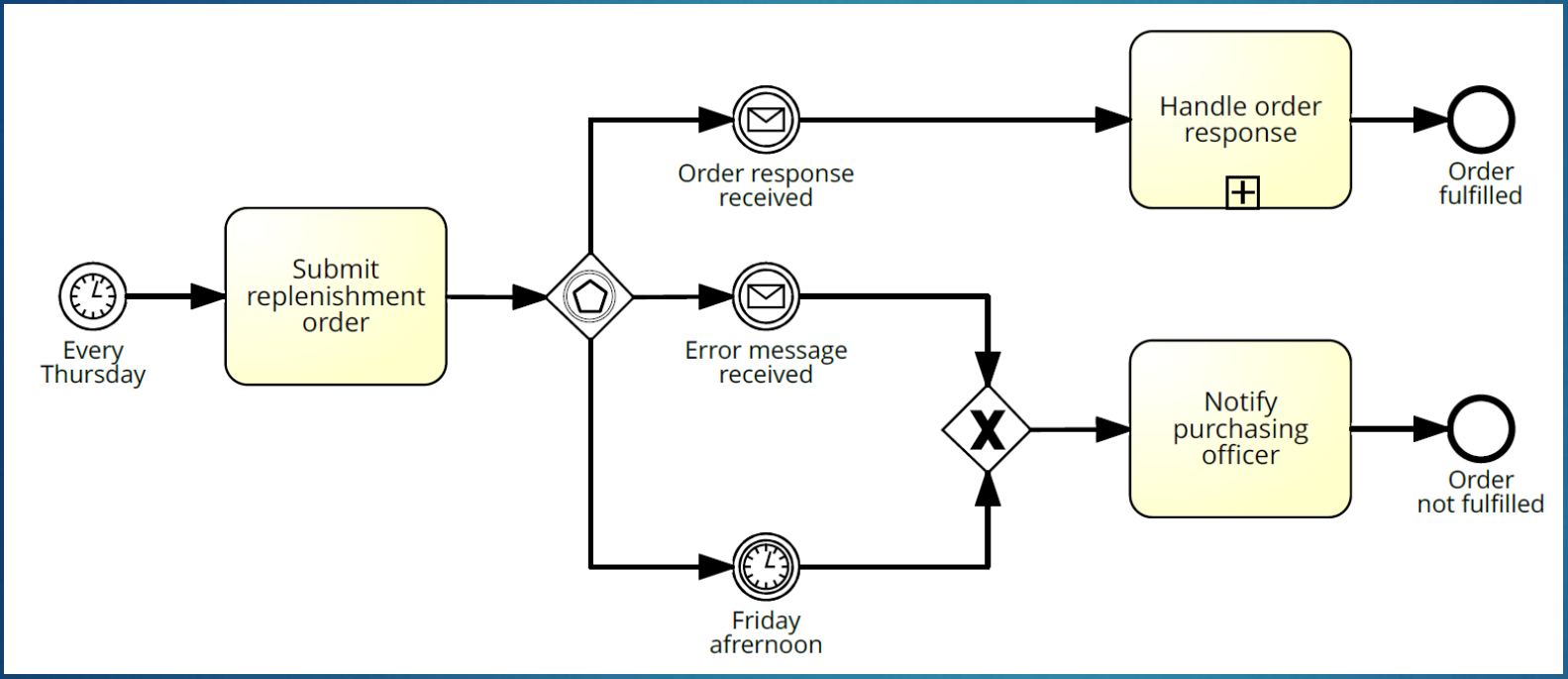


Routes the process instance to the next event that happens

Exercise: Model the following business process

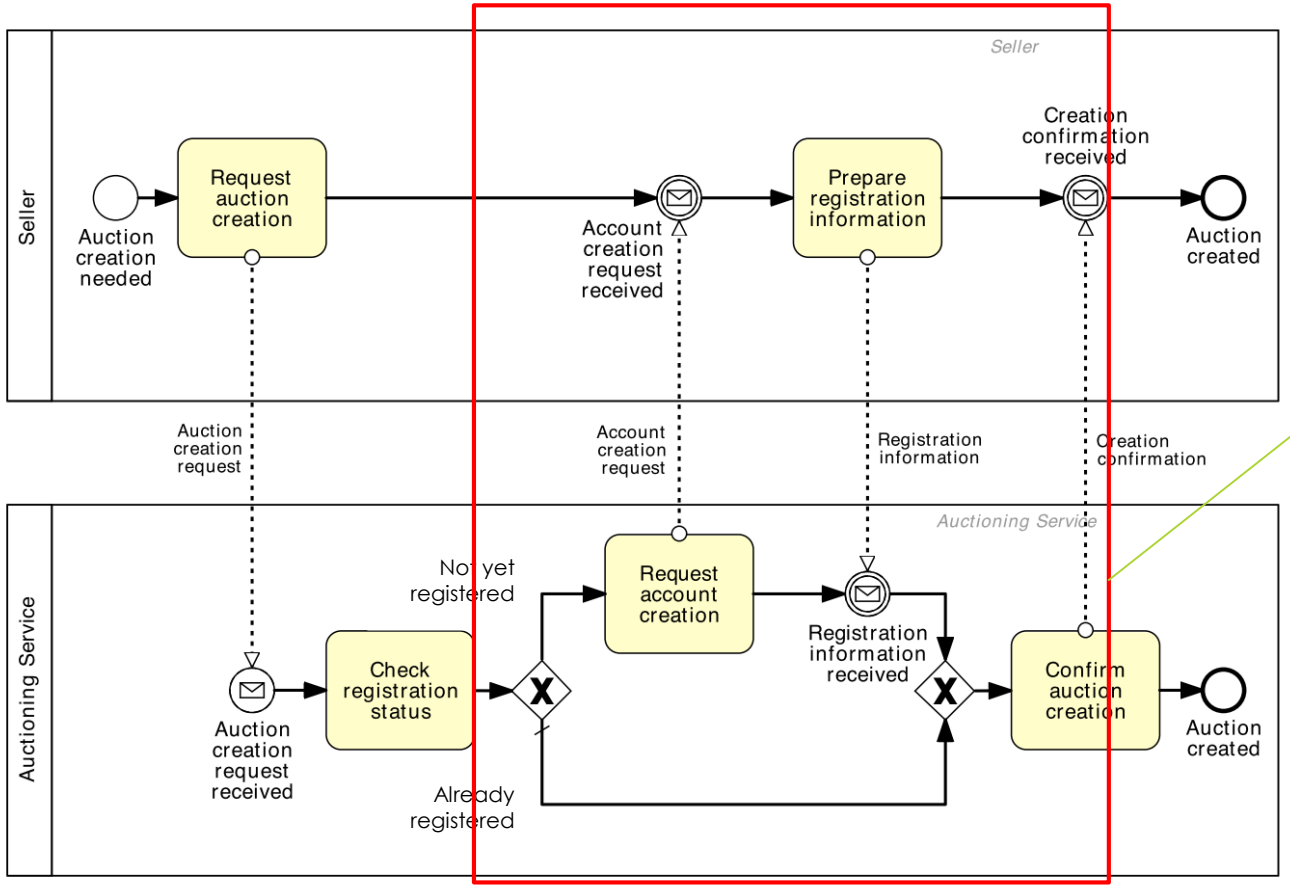
A restaurant chain submits a purchase order (PO) to replenish its warehouses every Thursday. The restaurant chain‘s procurement system expects to receive either a "PO Response" or an error message. However, it may also happen that no reponse is received at all due to system errors or due to delays in handling the PO on the supplier‘s side. If no response is received by Friday afternoon or if an error message is received, a purchasing officer at the restaurant chain‘s headquarters should be notified. Otherwise, the PO Response is processed normally, hence the order is fulfilled.

Solution


Every Thursday
Submit replenishment order
Order response received
Error message received
Friday afrernoon
Handle order response
Order fulfilled
Notify purchasing officer
Order not fulfilled

Racing between two pools

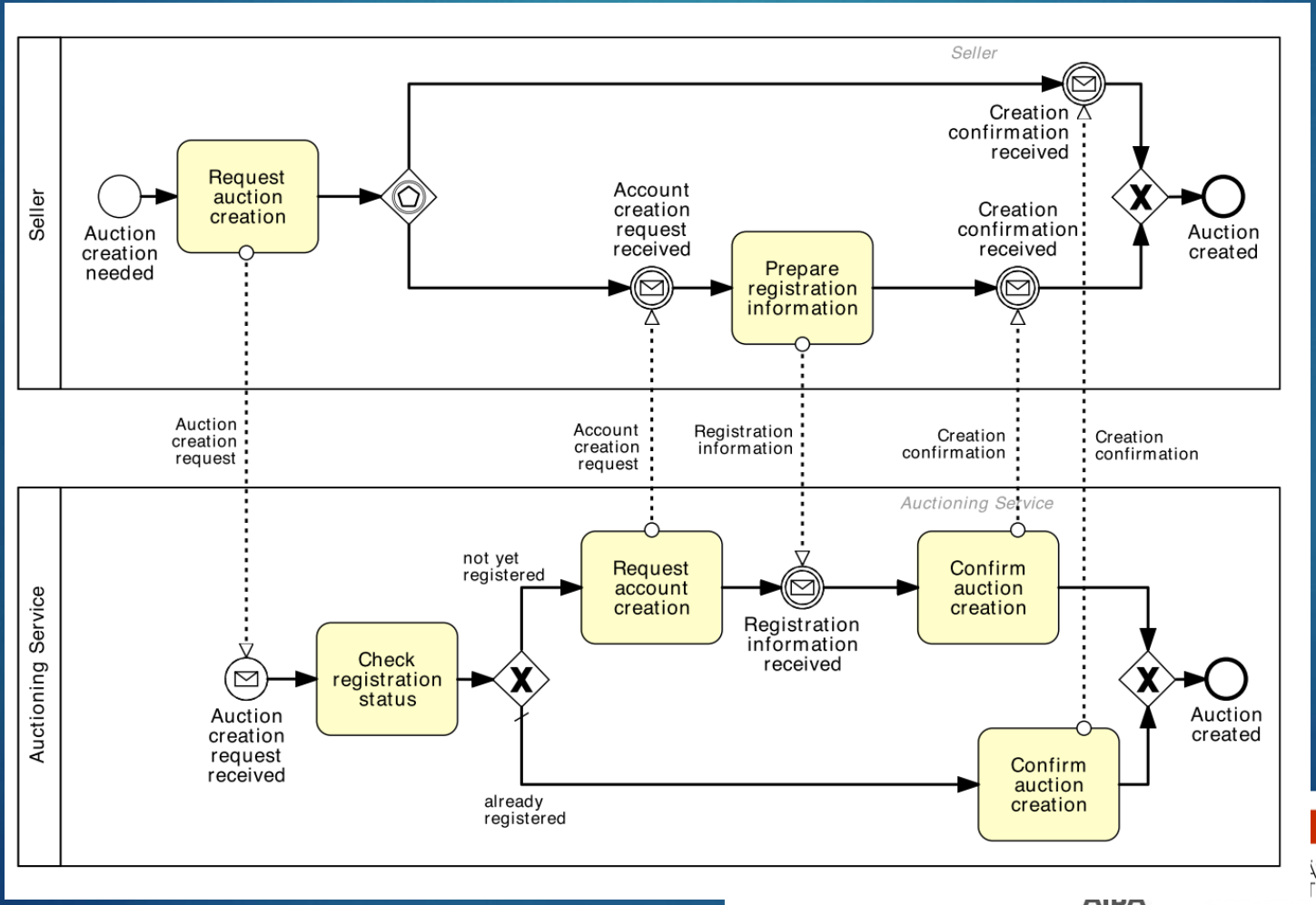
- Racing events can be used to avoid behavioural anomalies in the communication between pools



Will lead to deadlock if the seller is already registered

Racing between two pools

- The event-based XOR split can be used as the counterpart of an internal decision on a collaborating party.



BPMN Dos and Don'ts

Structure

- In every pool there must be a path of sequence flow arcs from start event to end event
- A sequence flow is not allowed to cross pool boundaries
- A message flow always has to cross pool boundaries

BPMN Dos and Don'ts

Names

- Activities are written as VERB OBJECT like "send bill"
- Events are written as OBJECT PASSIVE like "bill sent"
- Decision gateways are annotated with a question like "Send bill how?"
- Arcs after decisions are annotated with answer to question like "via post" or "via email"

Seven Process Modelling Guidelines (7PMG)

G1 Use as few elements in the model as possible

- models of a large size tend to be more difficult to understand and have higher syntactic error rate

G2 Minimize the routing paths per element

- high number => difficult to understand, larger number of mistakes

G3 Use one start and one end event

- Models satisfying this are easier to understand

G4 Model as structured as possible

- Unstructured models have behavioural anomalies and are harder to understand

G5 Avoid OR routing elements

- Empirical findings state that it is easier to understand other types of routing elements

G6 Use verb-object activity labels

- Using Verb-object is more useful than action-noun labels („Complaint analysis“)

G7 Decompose a model with more than 30 elements

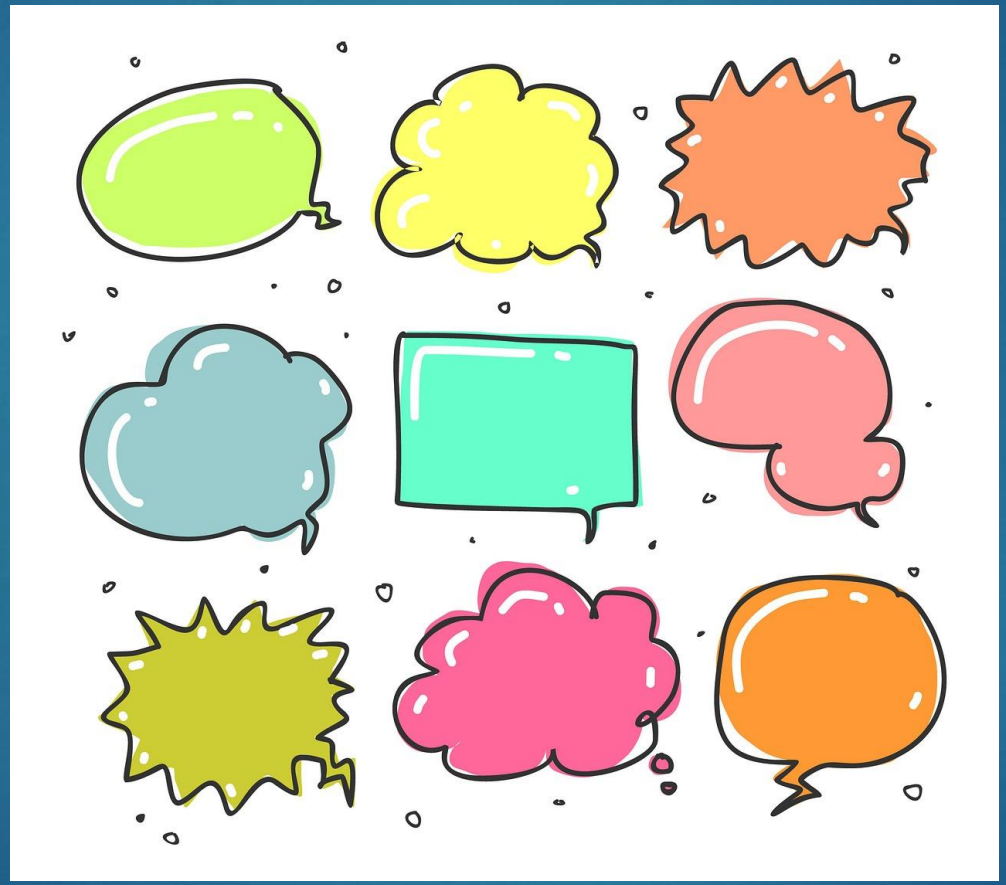
- Relates to G1, if number of elements is over 30, then the error probability is higher

Summary

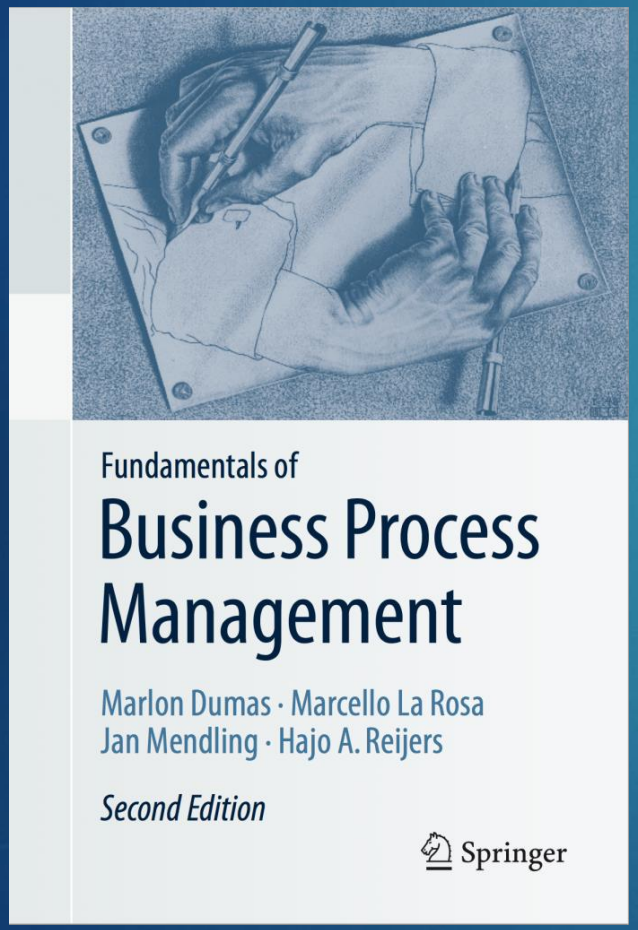
- BPMN is a standardized process modeling language
- Rich set of symbols
- Control flow is defined using gateways
- Artefacts show data flow
- Pools and lanes depict resources

- To know more: http://www.bpmn.org/

Project Work Discussion



References



- Chapter 03 and 04 in Fundamentals of Business Process Management

One sentence about this lecture…

- Go to **menti.com** and use the indicated code

- What did you like about the lecture?
- What did you **not** like about the lecture?
- What are questions you still have?
- What caught your interest?
- What would you like to discuss in future sessions?

Erasmus+

AIBA

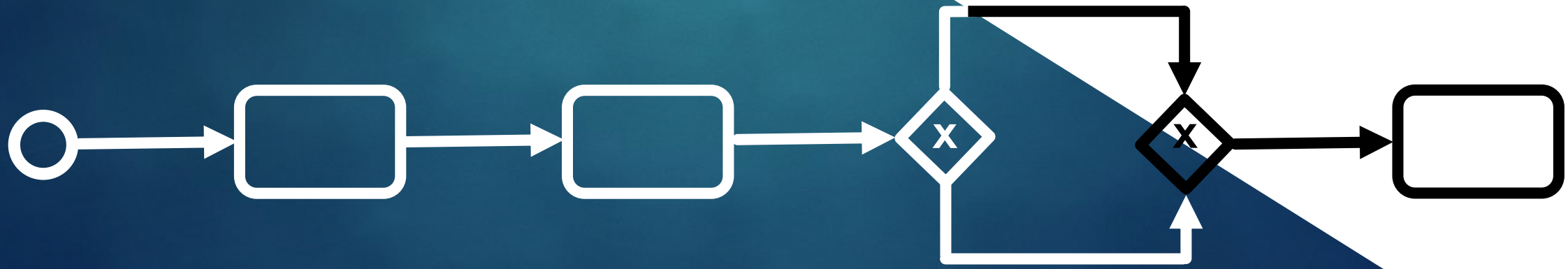
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

ETHNOGRAPHY AND PROCESS MINING



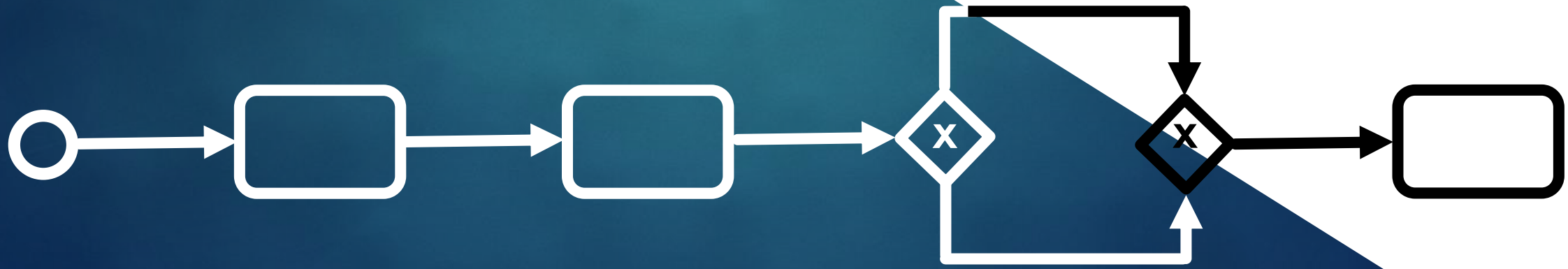
Agenda Unit 5

1. Ethnography
2. Process Mining

BPM & OP

ETHNOGRAPHY

BASED ON SLIDES FROM BLAGOY BLAGOEV



Ethnography: Overview

- Originally applied in **Anthropology** to study „foreign cultures“ (Malinowski)
  - Problematic history (colonialism) and othering
- Since mid of the 20th century also used to study ones own culture
  - Chicago School
  - Street Corner Society
- Assumption: One can only understand a (foreign) culture by immersing in it („going native“)

Example: Ethnographic Research on Teams

https://www.youtube.com/watch?v=MXLg9nsuo9I

Features of Ethnography

- Core: Long-term participative observation (field work)
- Cultures and practices as central object of investigation
- Alienation as central heuristic

Observation as a Scientific Method

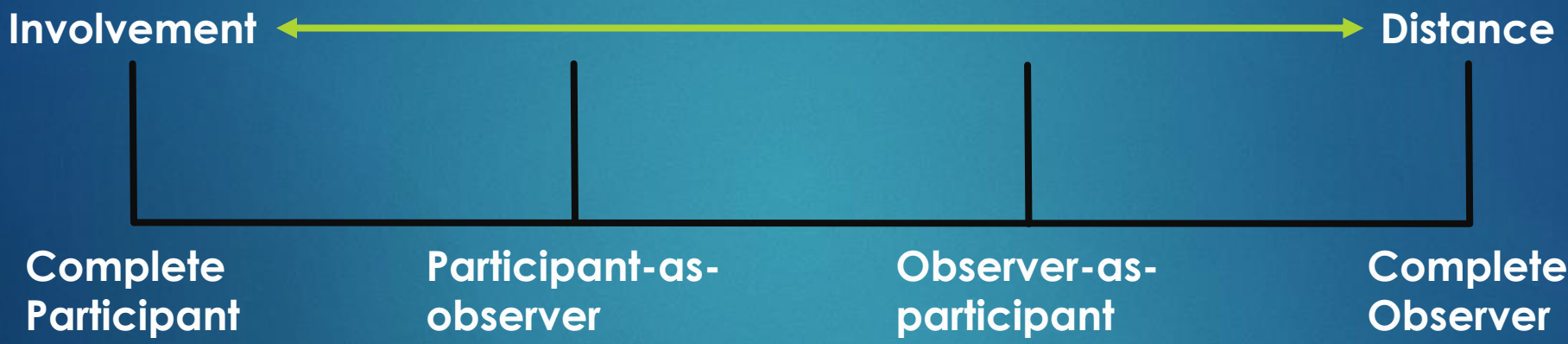
- Central method for data collection in qualitative research
- Data is generated by interacting with and observing people in their „natural“ context
- Focus: *What do people do?*
- Application in longitudinal studies to capture processes and activities when they happen

Interviews	Observation
Fixed place and time	Flexible place and time
Short encounter	Long-term „living together“
Rather formalized	Usually very informal
„The official story“	„The unofficial story“

What should one observe?

- Actors
- Places
- Objects
- Goals
- Events
- Feelings
- Activities
- Time/ Timing

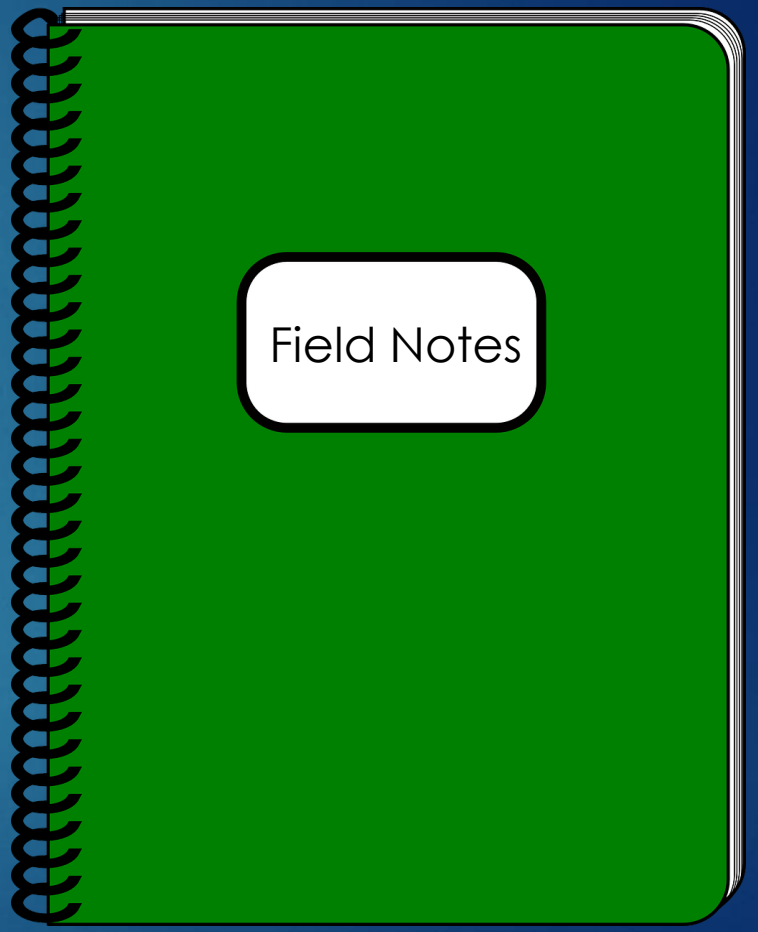
Different roles in Observation



Important: People should always know that they are being observed

Data: Field Notes and Observation Protocols

- Make notes as soon as possible after something happened!
- Note down as much as possible!
- Insert diagrams of the environment
- Leave space for comments
- Highlight quotes by
- Note own statements/ actions
- Note feelings, interpretations and future plans

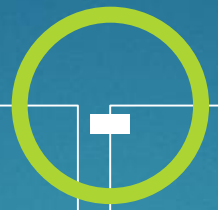


Alienation as a central Heuristic

- The extraordinary as a catalyst for knowledge
- Mead: »Taking the role of the other«
- Focus on perspective of the "locals" (emic perspective)
- Active alienation:
  - Socialization as qualitative researcher
  - Definition of roles
  - Use of technical equipment
  - Rhythmic interruption of field work

Observation: Strengths and Weaknesses

- Deep and thick data
- Look behind the scenes and oppose self-portrayal
- Understand local belief systems
- Inquiry social processes and practices
- Easier to understand the subjects‘ world
- Flexibility



- Access
- Double role
- Social competences
- Very demanding (time)
- Possible ethical dilemma
- Bias through observation (»going native«)
- Personal involvement (critical distance)

Erasmus+

AIBA

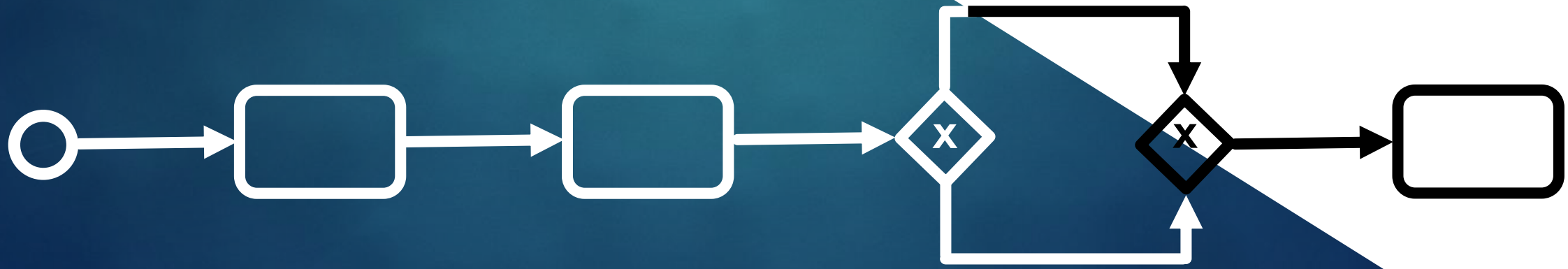
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

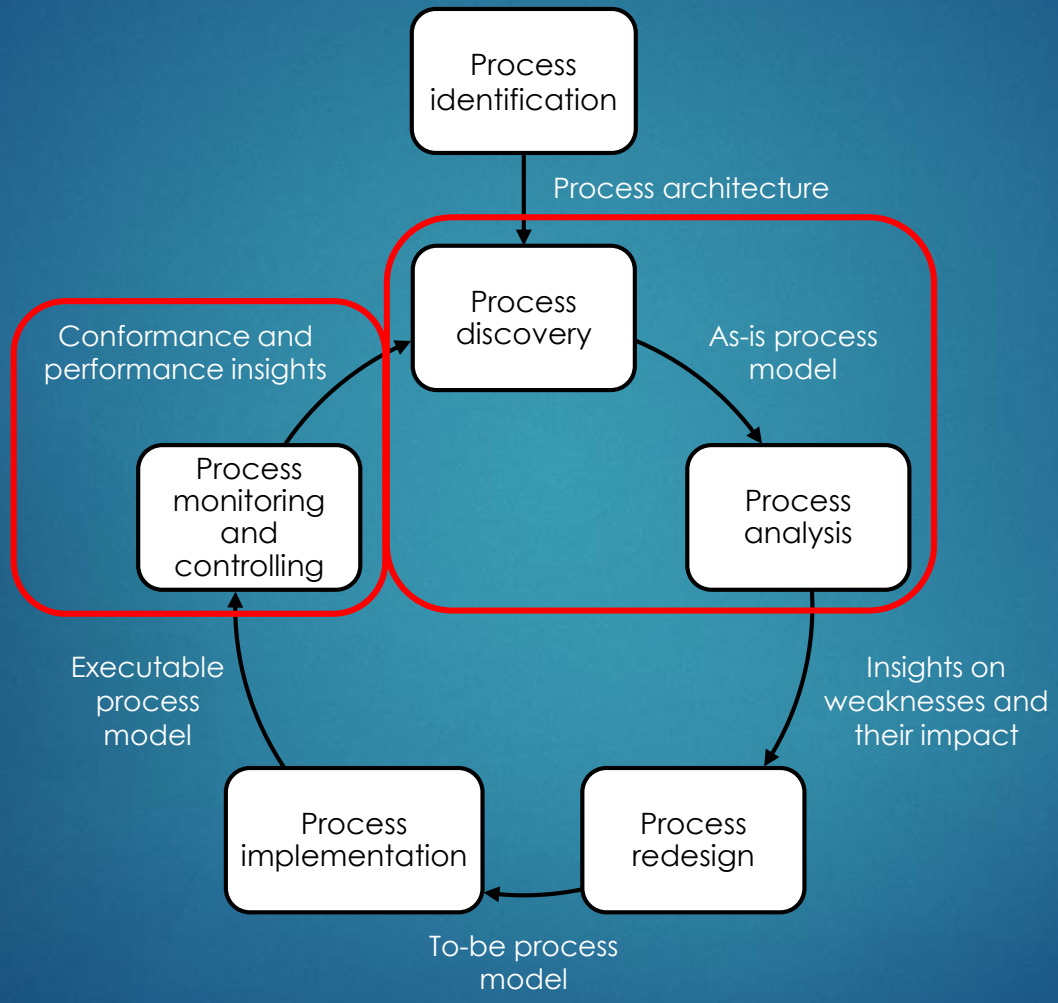
Radboud Universiteit Nijmegen

BPM & OS

PROCESS MINING



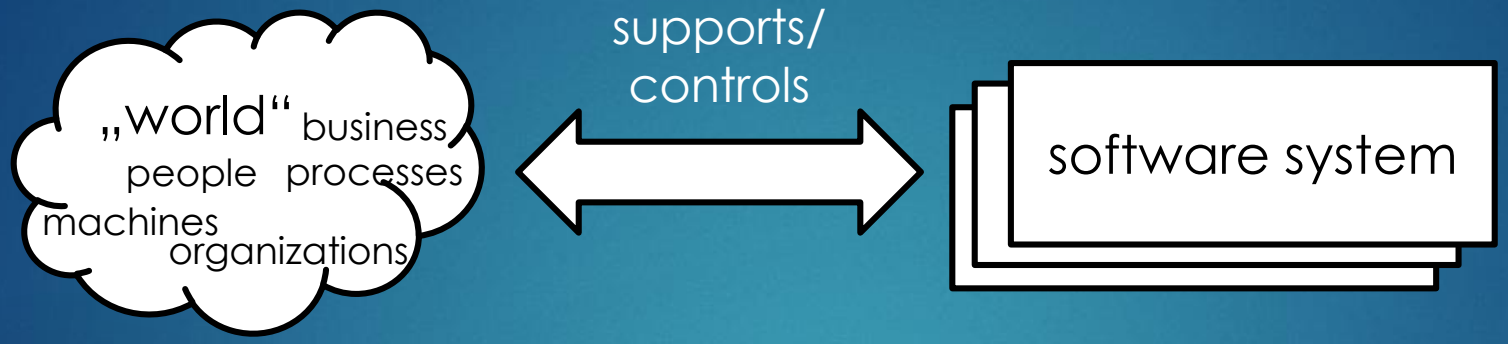
Process Mining in the BPM Lifecycle



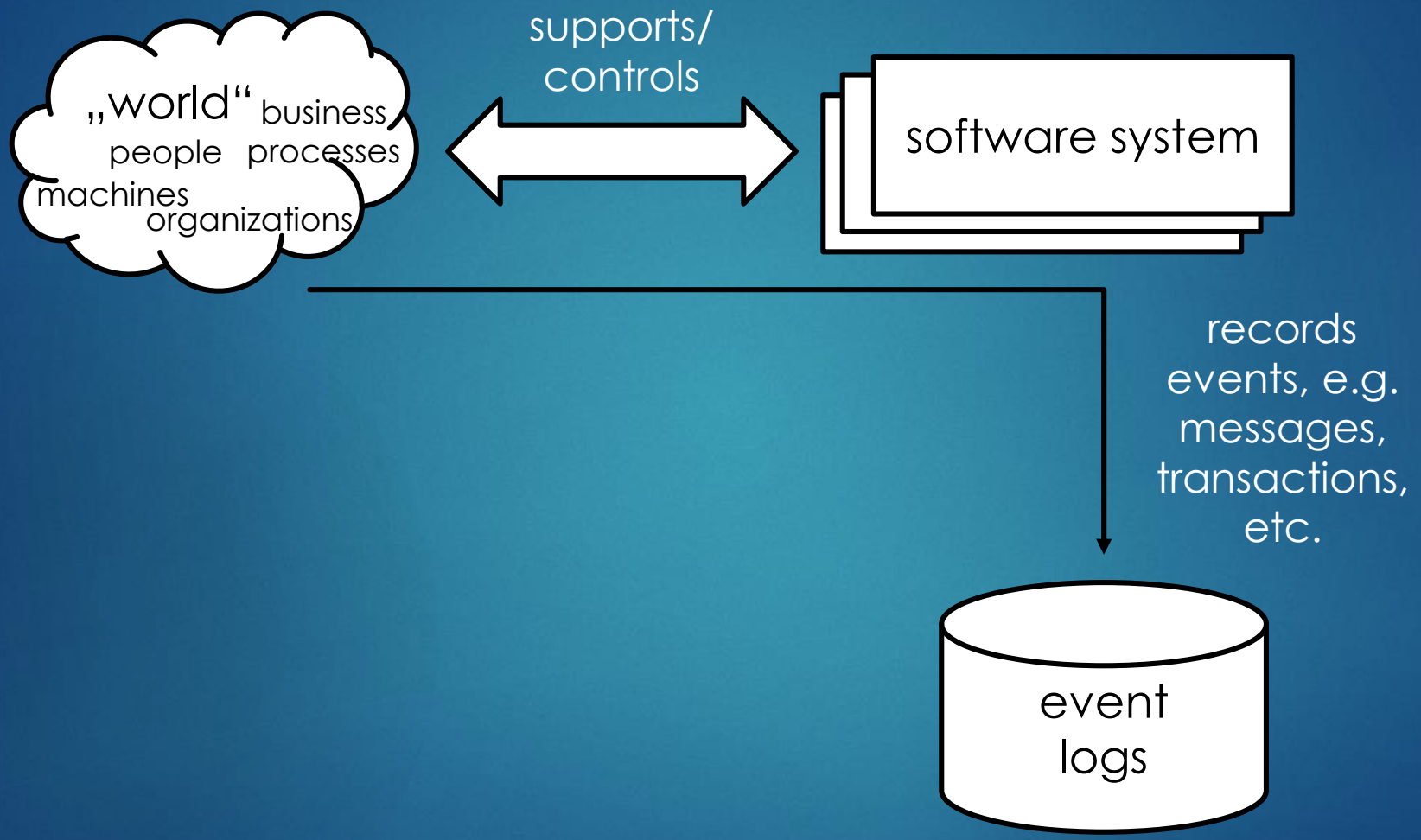
IT is everywhere

- Use of IT generates (trace) data that can be used to understand behavior

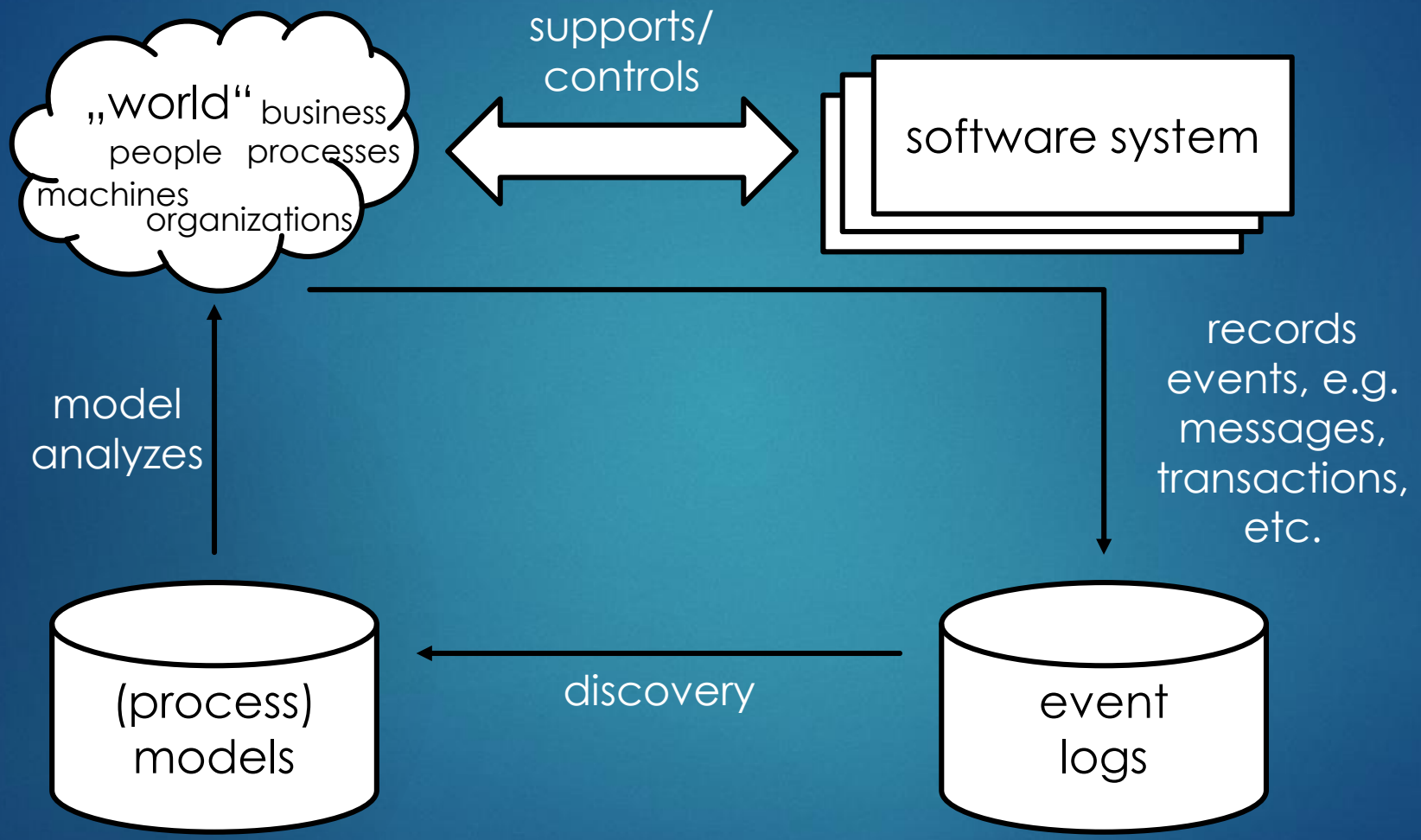
Technologically supported work



Technologically supported work



Technologically supported work

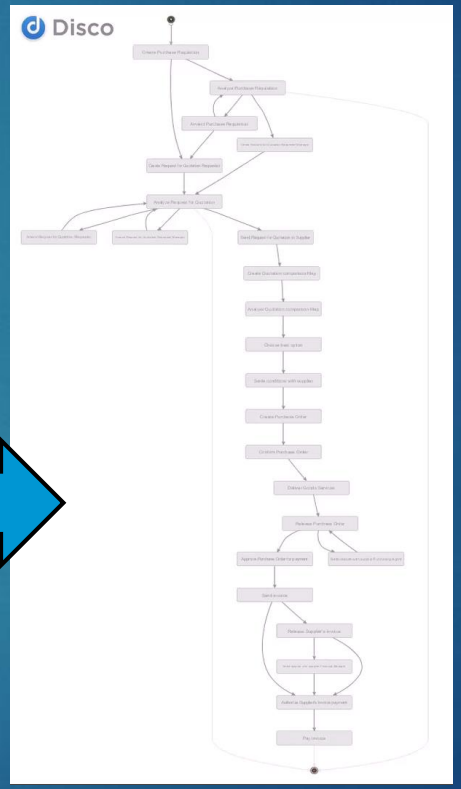


Process Discovery
Starting Point: Event logs

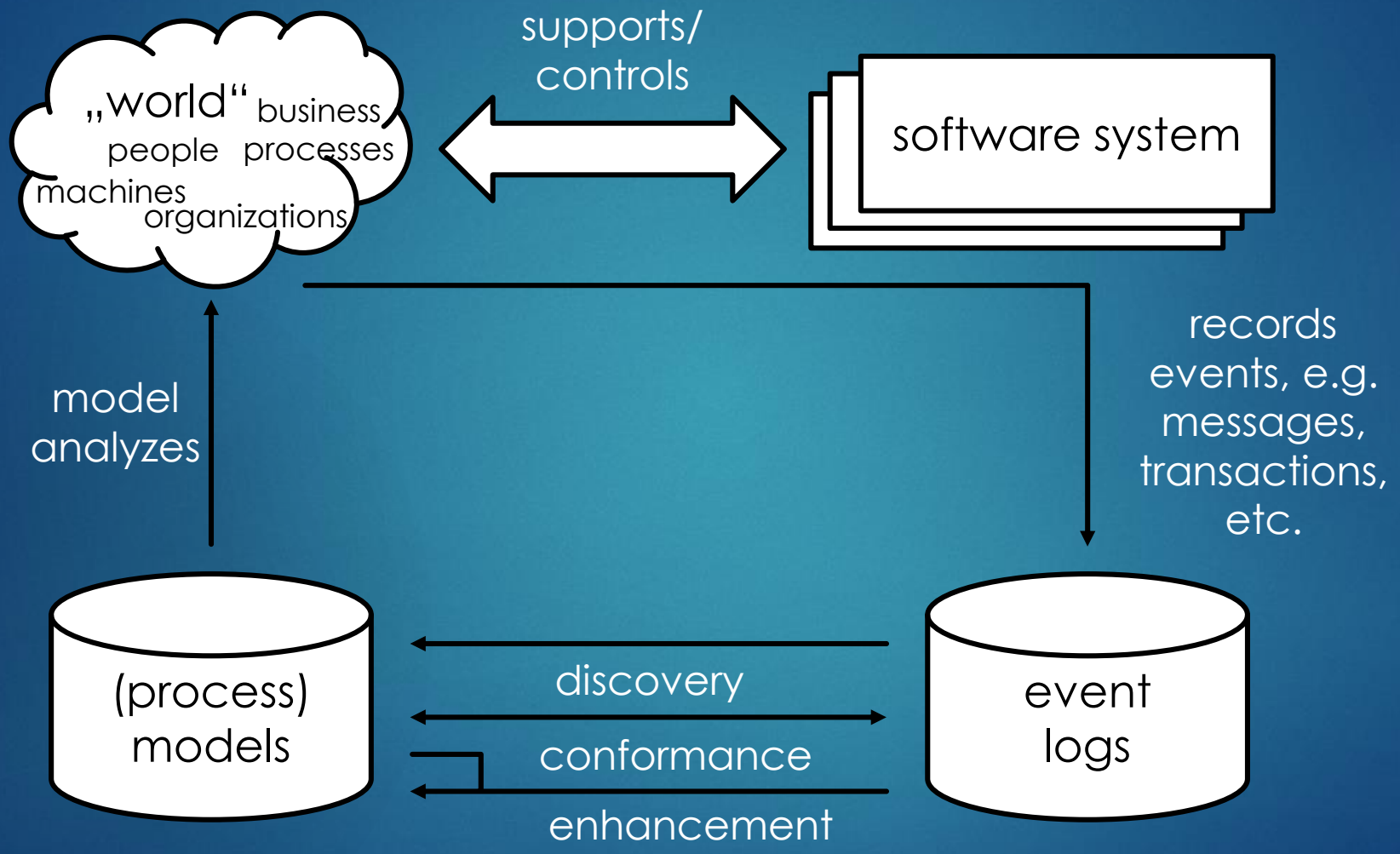
order number	activity	timestamp	user	product	quantity
9901	register order	22-1-2014@09.15	Sara Jones	iPhone5S	1
9902	register order	22-1-2014@09.18	Sara Jones	iPhone5S	2
9903	register order	22-1-2014@09.27	Sara Jones	iPhone4S	1
9901	check stock	22-1-2014@09.49	Pete Scott	iPhone5S	1
9901	ship order	22-1-2014@10.11	Sue Fox	iPhone5S	1
9903	check stock	22-1-2014@10.34	Pete Scott	iPhone4S	1
9901	handle payment	22-1-2014@10.41	Carol Hope	iPhone5S	1
9902	check stock	22-1-2014@10.57	Pete Scott	iPhone5S	2
9902	cancel order	22-1-2014@11.08	Carol Hope	iPhone5S	2
...	...	...	...	...	...

case id | activity name | timestamp | resource | other data

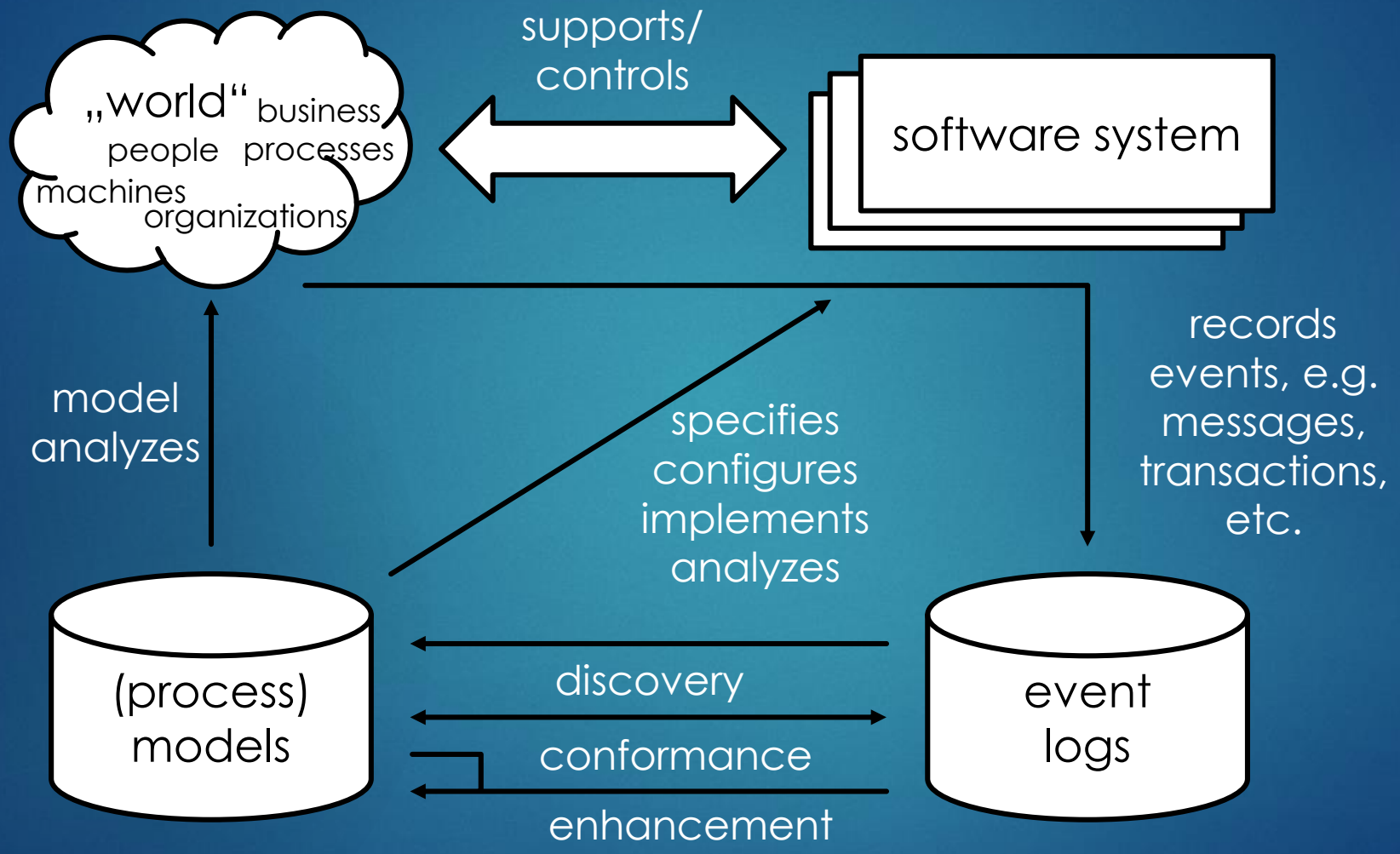
Process Mining



Technologically supported work



Technologically supported work



Hands-on Exercise

- Process overview
- Process discovery
- Zooming in and out of routines
- Conformance checking

Process Mining Tools

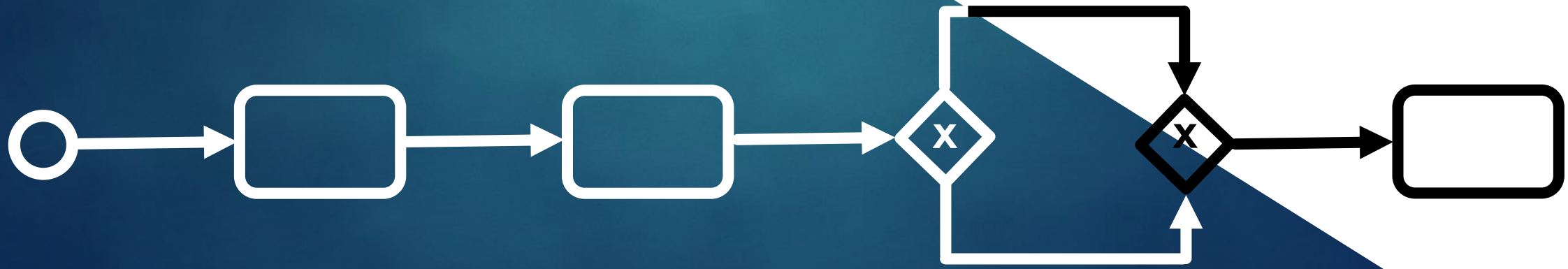
Open-source	Lightweight	Mid-range	Heavyweight
• Apromore • ProM • ThreadNet	• Disco	• Minit • myInvenio • QPR Process Analyzer • Signavio Process Intelligence • StereoLOGIC Discovery Analyst • Lana Labs	• ARIS Process Performance Manager • Celonis Process Mining • Perceptive Process Mining (Lexmark) • Interstage Process Discovery (Fujitsu)

Process Mining Tools

Open-source	Lightweight	Mid-range	Heavyweight
• Apromore • ProM • ThreadNet	• Disco	• Minit • myInvenio • QPR Process Analyzer • Signavio Process Intelligence • StereoLOGIC Discovery Analyst • Lana Labs	• ARIS Process Performance Manager • **Celonis Process Mining** • Perceptive Process Mining (Lexmark) • Interstage Process Discovery (Fujitsu)

BPM & OS

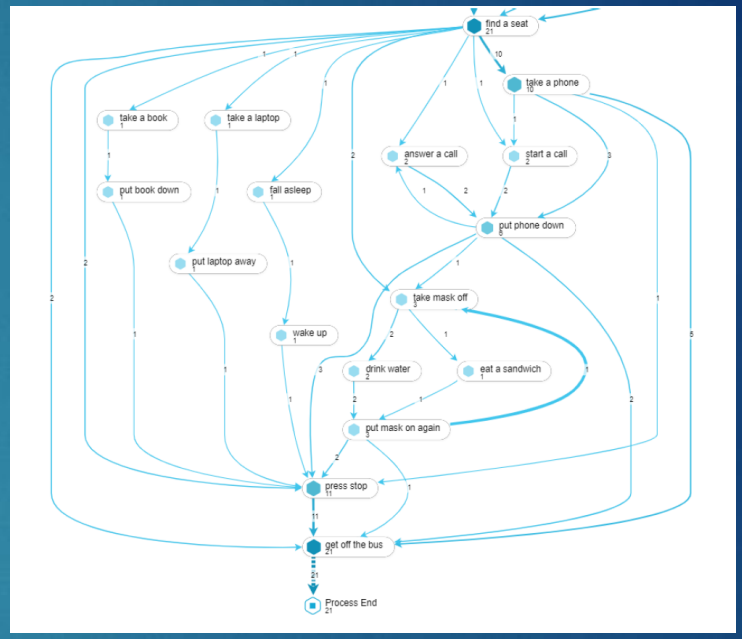
COMBINING ETHNOGRAPHY AND PROCESS MINING



Putting the pieces together…

Observation

Process Mining



Insights into organizational processes

Summary

- Ethnography as a method to investigate social phenomena
- Introduction to process mining
- Presentation of different process mining algorithms
- Sneak-in into one process mining tool

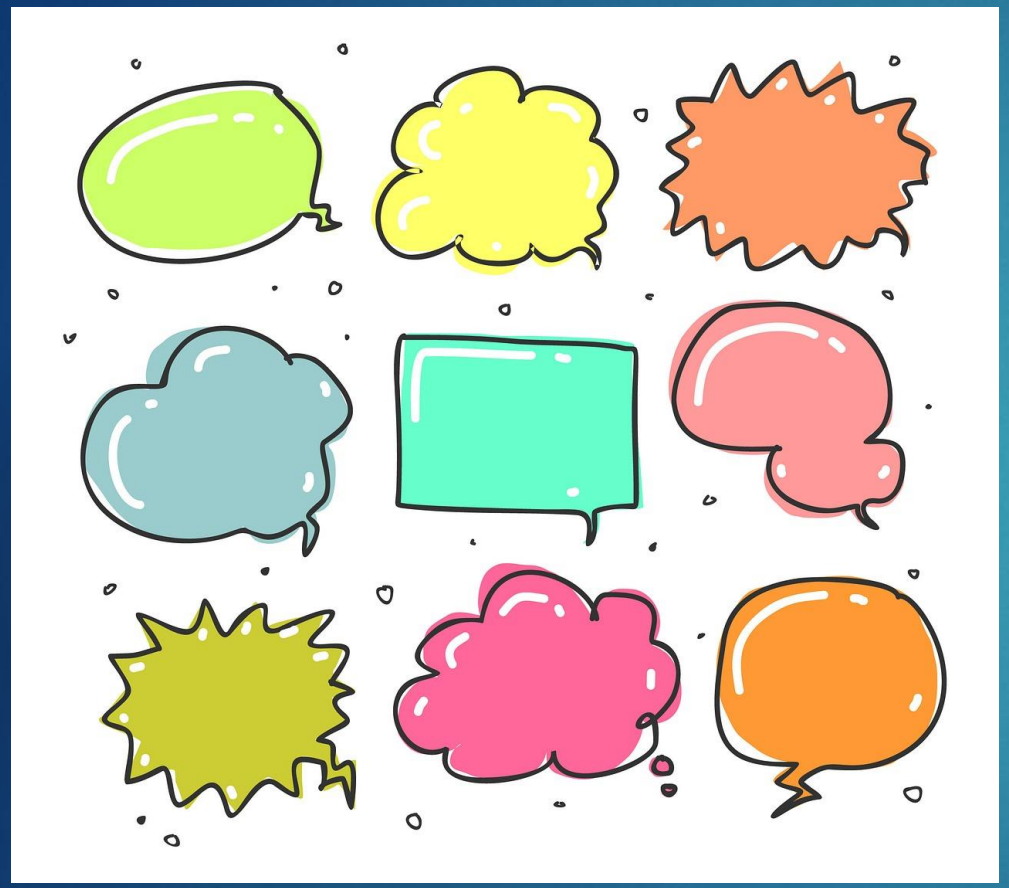
- There are many other useful tools and algorithms

Next week: Project Time

- Time for you to work on your project/ reflection
- Approach me if you have any questions

- **Think about a process you want to investigate and discuss with me!**

Discussion



- Are routines and business processes the same?
- In how far are they different?
- What do you think about the differences between BPM and routine dynamics?

One sentence about this lecture…

- Go to **menti.com** and use the indicated code

- What did you like about the lecture?
- What did you **not** like about the lecture?
- What are questions you still have?
- What caught your interest?
- What would you like to discuss in future sessions?

Erasmus+

AIBA

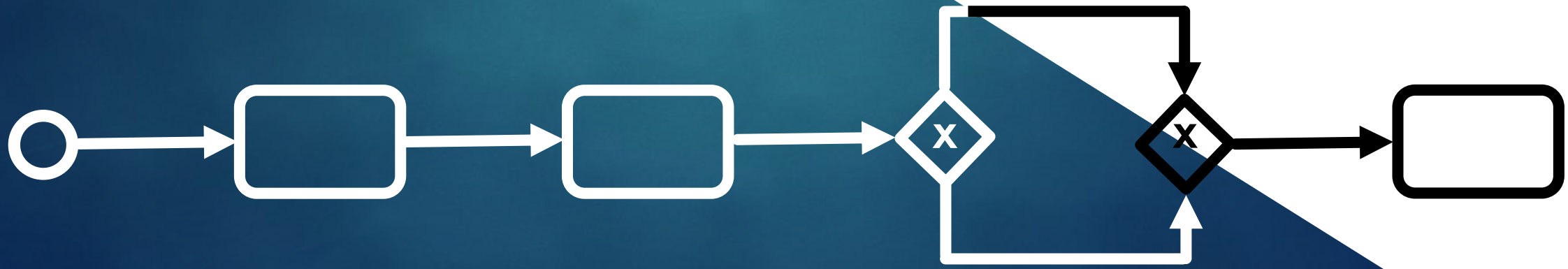
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

PROJECT WORK & ORGANIZATIONAL ROUTINES



Agenda Unit 6 - Organizational Routines

1. Recap
2. Discussion about Projects
3. Organizational Routines
4. Organizational Routines and IT

Erasmus+

AIBA

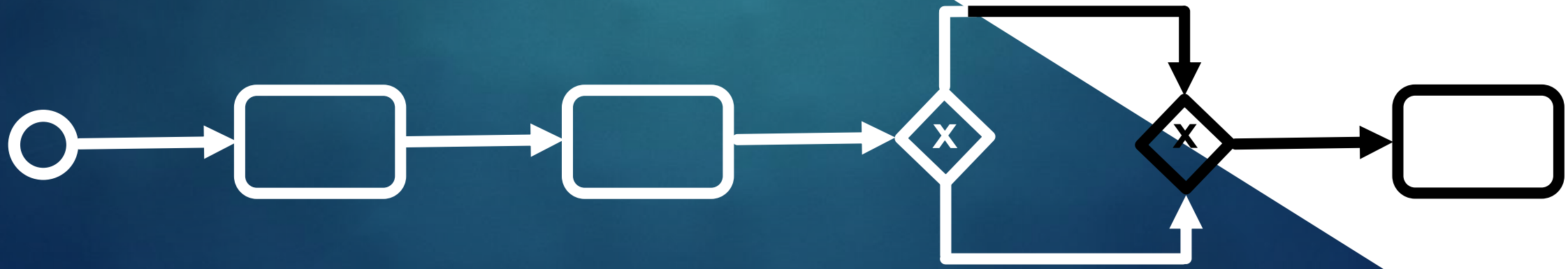
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

RECAP



Let‘s recap

- Go to **menti.com** and use the indicated code
- What did we do last time?

https://www.wu.ac.at/en/students/my-program/bachelors-student-guide/volunteering-support-and-honors-programs/student-counselling

Corona hotline by the city of Vienna: 01 4000 53000

General telephone counseling: 142

Erasmus+

AIBA

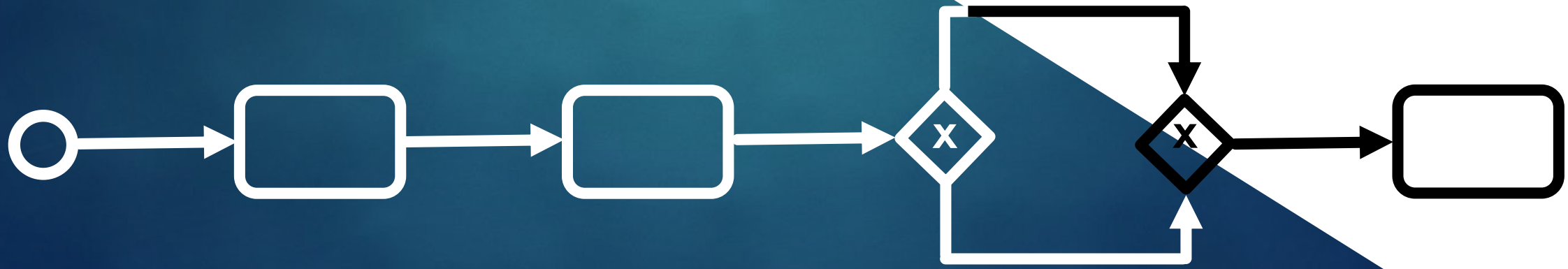
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

PROJECT DISCUSSIONS



Project Discussion

Any questions?

Structure of Project Report

1. Motivation
   - Why this process?
2. Data Collection
   - How did you collect the data?
3. Analysis
   - How do you analyze the data?
   - How many cases are there?
   - What are the activities?
   - **Proceed from general to specific!**
   - **Goal: Understand the process, not necessarily improvement**
4. Findings
   - What are interesting observations?
5. Conclusion
   - Put everything "in a nutshell"

Approximately
7-10 pages

Erasmus+

AIBA

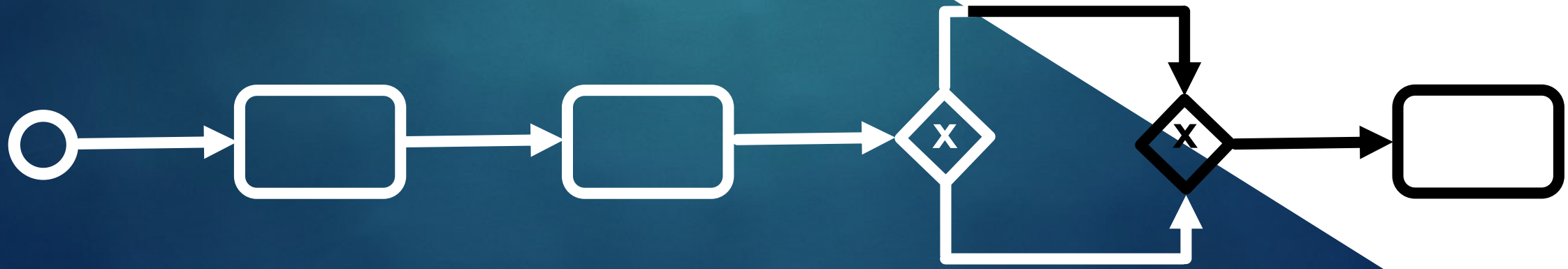
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

RECAP BPM



Recap BPM

- **What have we learned so far?**

- Process Identification
- Process Discovery
- Process Modelling
- Process Mining

Erasmus+

AIBA

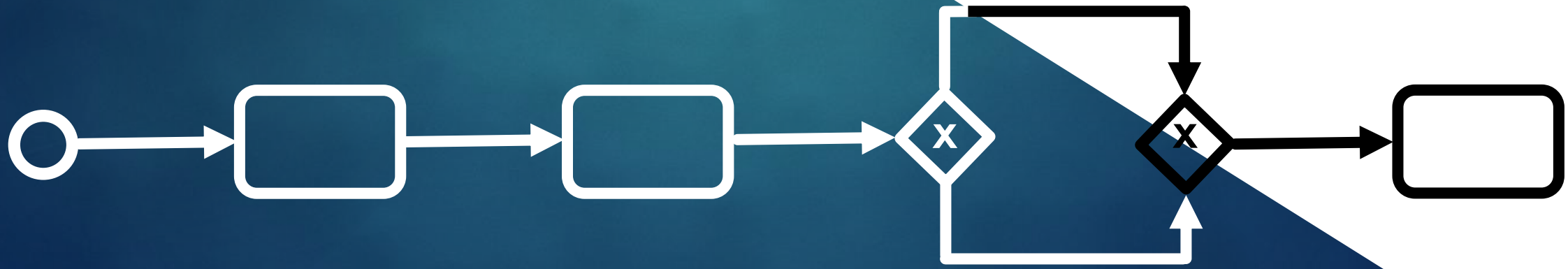
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

ORGANIZATIONAL ROUTINES



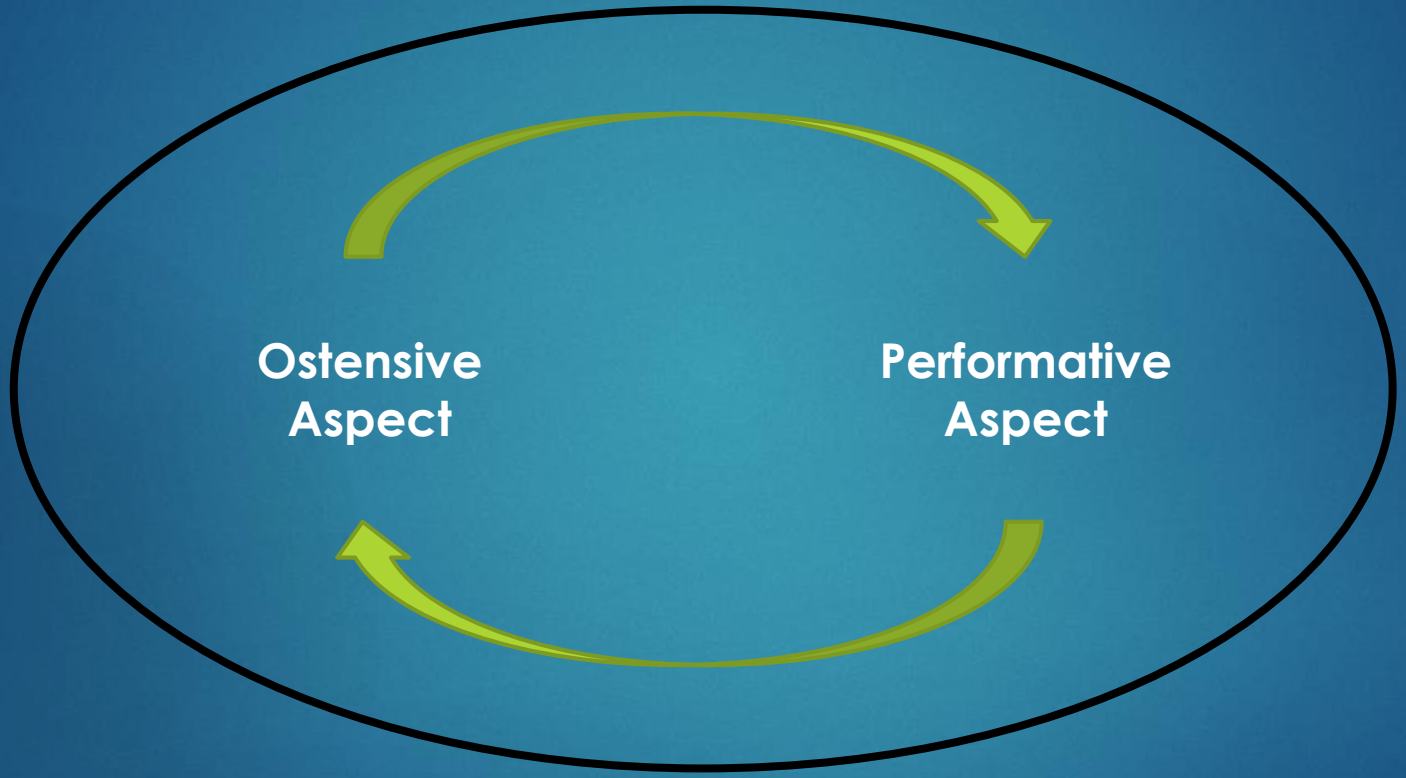
Think in groups…

- What are examples from your experience where actors did not follow the process?
- What are reasons for this?
- How is it recognizable?

(10mins)

Erasmus+
AIBA
UNIVERSITÄT LIECHTENSTEIN
WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS
Radboud Universiteit Nijmegen

Organizational Routines as generative Systems



What are the ostensive and performative?

Performative Aspect

- **Specific actions** that are carried out by **specific actors** at **specific points in time**
- Actions are taken against the background of rules, expectations and assumptions

  → but they are never completely the same (even though it might seem as if)
- Some actions can be habitual but in general, we are always reflective and self-aware (e.g. "Am doing this right?")
- **Improvisational**: there are always new elements in terms of context
- **Context**: e.g. when hiring a person: urgency of hiring, number of people who applied, availability of staff

Erasmus+ AIBA UNIVERSITÄT LIECHTENSTEIN WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS Radboud Universiteit Nijmegen

Ostensive Aspect

- Shapes perception of what a routine is (about)
- Can be implicit or explicit (SOPs, process model)
  - E.g. hiring routine: attracting, screening, choosing applicants

- But: not one ostensive aspect -> each routine has multiple subjective insights and understandings, based on role, tasks, etc.
- An ostensive aspect does not include all performances
  - E.g. hiring routine is different for applicant than HR manager
  - The more these views are aligned, the more objective the ostensive aspect is

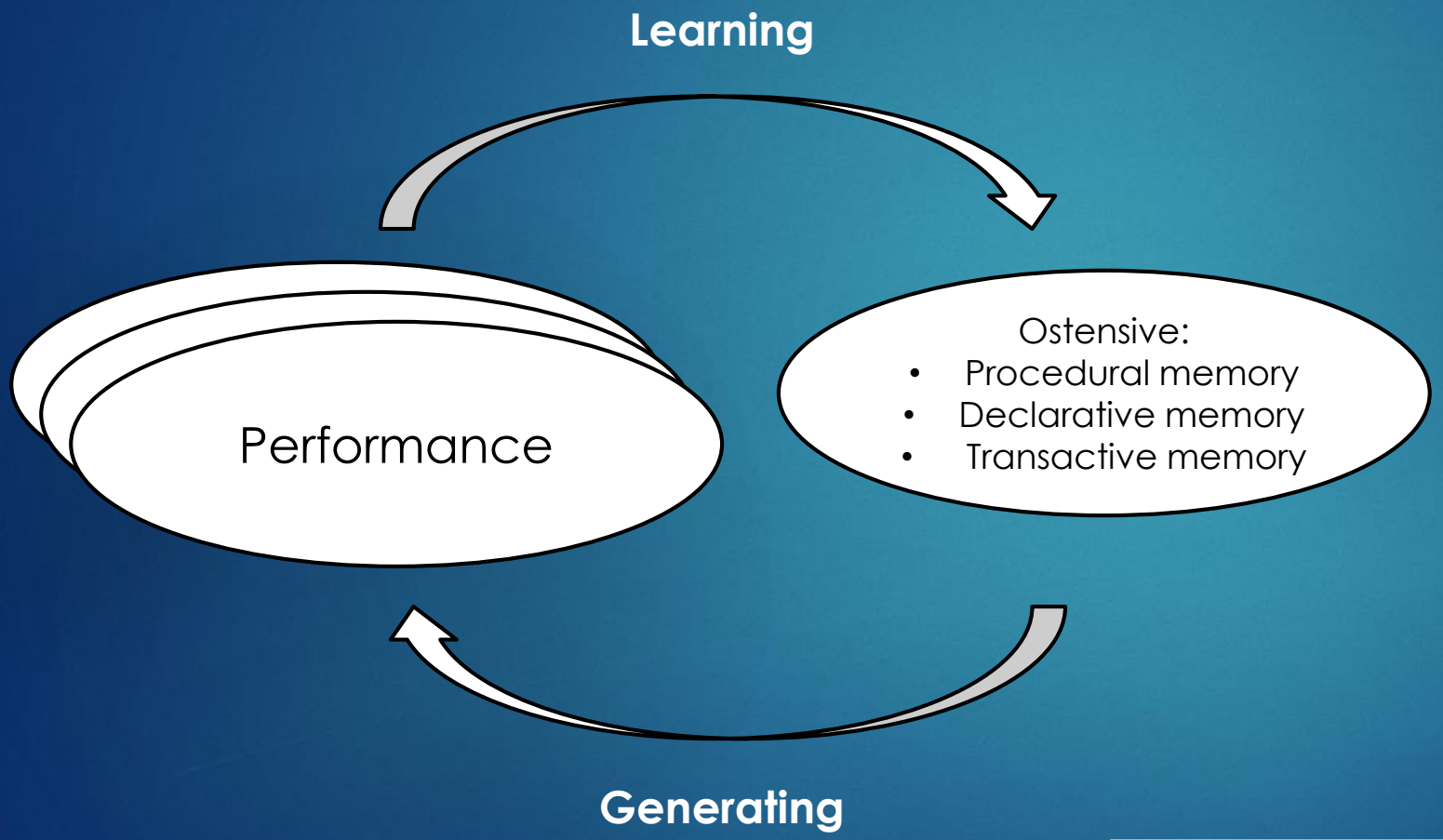
- **What is an example for a routine with diverse ostensive aspects?**

Organizational Routines as generative Systems

Implications of this perspective on routines

- ”Beyond routines as things” -> they are dynamic entities that change over time (generativity)
- Actors have influence and agency -> routines are **effortful accomplishments**
- **Stable and unstable** at the same time -> “The Paradox of the (N)ever changing world” (recognisability)

Routines as generative mechanisms



- Routine enactment draws on different kinds of knowledge/memory (Miller et al. 2012)
- Declarative memory: Explicit knowledge about requirements, procedures, etc.; "knowing THAT"
- Procedural knowledge: Implicit skill-related knowledge; "knowing HOW"
- Transactive memory: Knowledge about knowledge of others; "knowing WHO"

Mechanisms for change

- Routine enactment entails mechanisms for action/non-action patterns; they explain how change occurs over time (Pentland et al., 2012)

Selection: Actors enact specific patterns of actions
Variation: Actors change the sequence of patterns of actions
Retention: Actors retain specific patterns of actions

- Examples?

- Limitations to these patterns?

Business Processes versus Routines: Assumptions and premises (adopted from Beverungen 2013)

	Business Processes	Organizational Routines
Recurrence	Prerequisite for design and implementation	Recurrent performance leads to emergence of routine
Collective	Involve diverse organizational units	Involve multiple actors with dispersed knowledge
Change	As a result of process redesign/re-engineering	Endogenous dynamics lead to change in routine
Context-dependency	Reference models need to be adjusted	Sensitive to and deeply embedded in organizational context
Coordination	Ensure coordination in end-to-end fashion	Provide regularity, unity and systemacity
Intentional design & management	BP result from analysis, design, implementation	Routines emerge with or without intention; hardly be managed
Organizational memory	Codified/explicit knowledge that can be stored as plans, models, SOPs	Explicit and implicit knowledge on activities, people and coordination

Erasmus+

AIBA

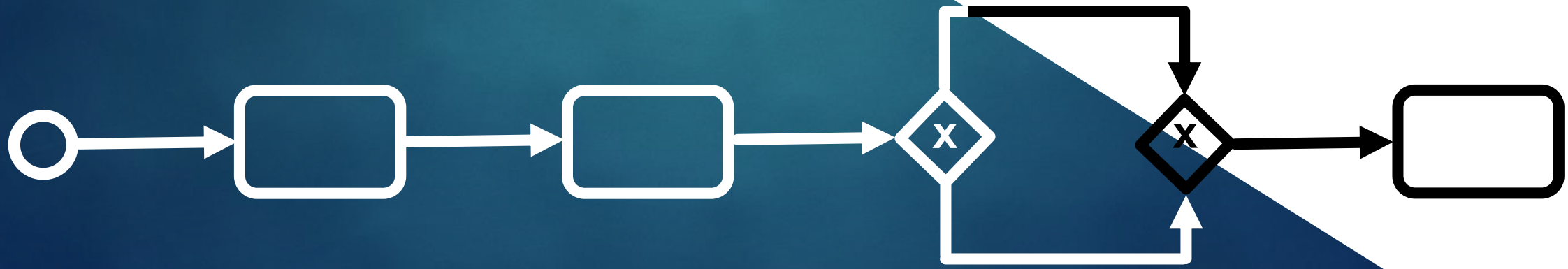
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

ORGANIZATIONAL ROUTINES AND IT



Enterprise-Resource-Planning Systems

- Information Systems are thought to support the organization in planned and desired ways

- Enterprise-Resource-Planning (ERP) systems are one of the most common IS
- ERP systems capture the processes that are needed to run an organization
  - Finance
  - Human resources
  - Production
  - Logistics
  - Etc.

  - There are various companies that offer ERP systems, the most well-known are SAP and Oracle

Do ERP systems capture core processes of an organization?

How do information systems influence routines? 1/2

What are advantages of ERP systems?

- Successful if aligned with the organization
  - Serves to structure processes
  - Increases transparency
  - Increases knowledge sharing

Why might ERP systems be problematic?

- Problem: best practices encoded into the system do seldom match with existing routines
- Misalignment occurs when system does not fulfill the needs of users, and when users misinterpret the system
- Misalignments can grow and become more persistent over time
- Why do such dynamics occur?
- How do account for these dynamics?

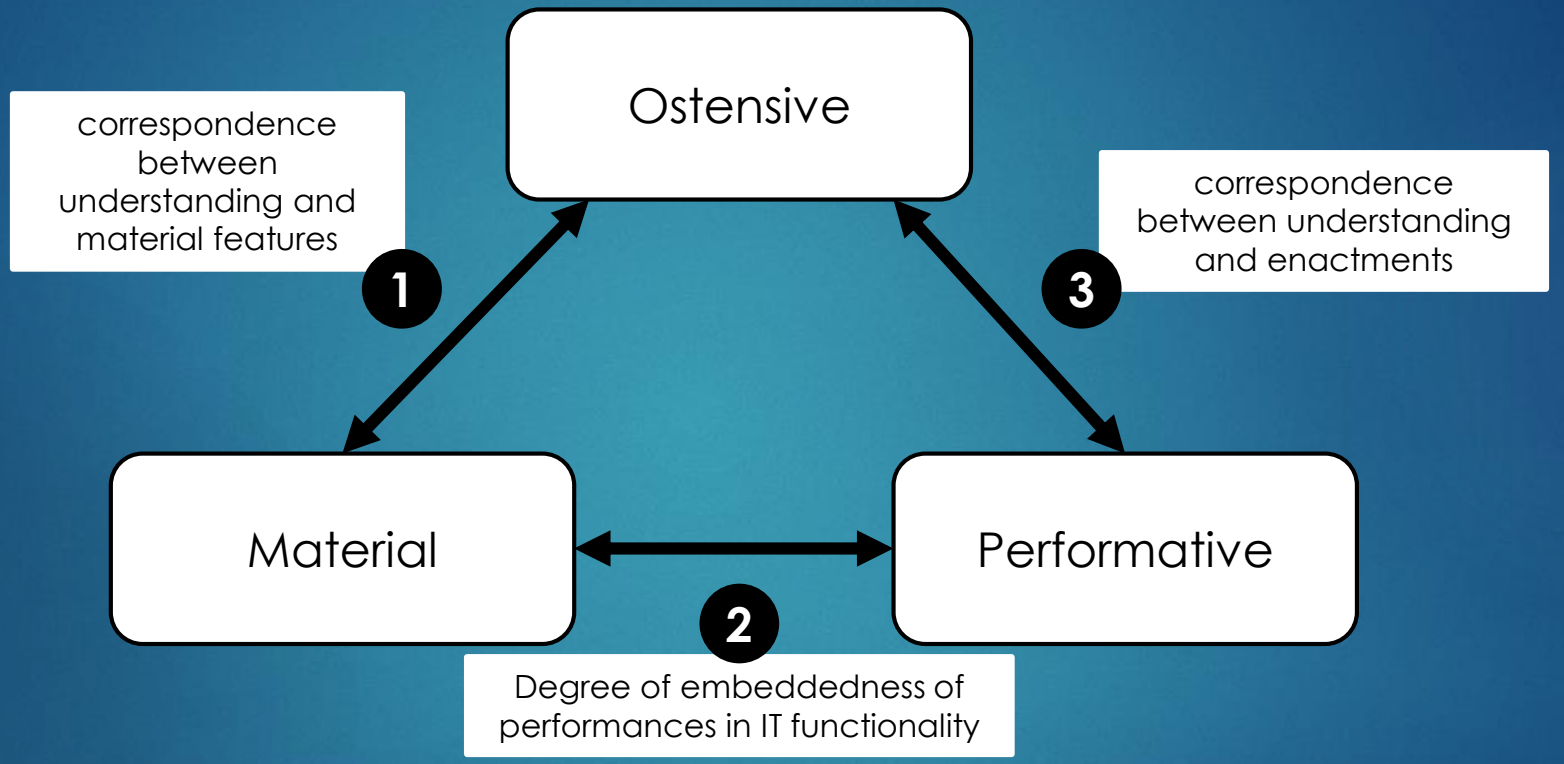
How do information systems influence routines? Problem: designers versus users

- Designers design systems according to their ideas and reasoning how the routine looks like
- Designers also consider guidelines and legal specifications by the organization
- They "inscribe" rules and practices to be taken up by users
- Often systems are designed according to management expectations

- Users are embedded in the organizational environment -> users developed their own understanding of how the routine should look like
- Their understanding might not be in line with the understandings of the designers

Possible consequences?

How do information systems influence routines?



How does misalignment materialize in these three relationships?

How do information systems influence routines? The Case of NASA (Berente et al. 2016)

- Created by the 1958 National Aeronautics and Space Act
- Established 10 separate centers to meet agency missions in a decentralized manner
- Centers had unique competencies, organizational structures, routines, accounting standards, cultures, and technical infrastructures—different financial systems that did not talk to each other following different and conflicting accounting principles
- By the 1970s, the executive branch and the U.S. Congress were pressuring NASA for better transparency and accountability
- Crash of Challenger shuttle in 1986 and Columbia in 2003

→ Columbia accident report emphasized poor inter-center communication and collaboration

→ Legislative initiatives that required NASA to implement a single integrated financial management system

→ Implementation failed twice; paper describes third and successful attempt

How do information systems influence routines? The Case of NASA

- Misalignment between ERP and routines – yet, the organization achieved its goals
- Misalignment as "nonconformance with management expectations of integration and control, but also on misalignment as failure of the ERP system to support local practices" (p. 558)

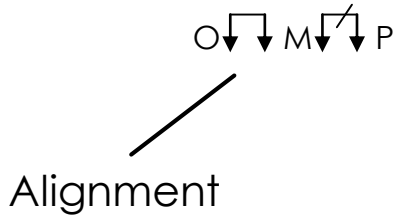
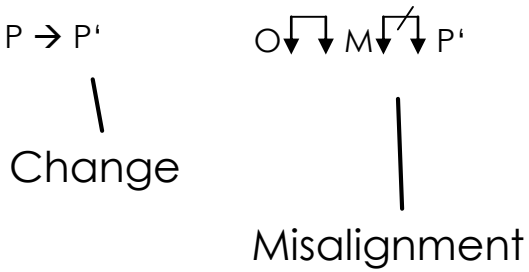
- Interviews with 107 scientists, engineers, project managers and technicians
- Focus on two routines at NASA

Organizational routine	Integration/ control dimension	Related activities
Procurement	Data integration Process integration Bureaucratic control	Procurement header field use Intermediated procurement process Procurement approval process
Project management	Organizational integration Disciplinary control	Project funds allocation Scientist time tracking

Source: Berente et al. 2016

Example Routine: Project Management Disciplinary Control 1/2

Starting Point: Standardized budget data across all centers and projects

Evolution	Misalignment	Description	Illustrative Data
		O M: Project managers were expected to use the system directly for budgeting M P: Project managers used legacy systems for budgeting – Features for financial management, not project management	**Period T1** „Those of us in the project management world realized that this doesn‘t help us at all. It actually makes our job even harder, ok. And I started digging and trying to find out what's going on. Apparently the system was designed to meet the needs of the people in the financial organizations, not the project organizations. The project organizations‘ input never made it into the final product. They had to make a decision between the needs of the projects and the needs of the financial people and they decided to implement the needs of the financial people.“ (Project manager)
		P’: Legacy systems shut down M P’: Features of ERP not adequate for reporting – use alternative means	**Period T2** „They killed the system. They turned the systems off. When the system came live with SAP and even BW (Business Warehouse) wasn‘t live when they cut over, it was SAP or nothing. You had no alternative… It wasn't until out people that had helped develop the canned reports for the old systems got indoctrinated into the new systems and BW and the capability that BW brought with it…They pulled the rug out from everybody and nobody felt comfortable.“ (Project manager)

Example Routine: Project Management Disciplinary Control 2/2

Evolution	Misalignment	Description	Illustrative Data
M → M‘	O M‘ P‘	M’: Business Warehouse implemented for project reporting P’: Business Warehouse still did not meet needs of project managers – using “satellite” databases	**Period T3** „The BW is basically pulled out of this data warehouse, and then these people out in the field use the queries against the BW. We never had that capability before, and so that really did change a lot. And we certainly haven't solved – haven't completely transitioned… the way the funds control works now, has caused people to feel like they need to have satellite system to manage that process.“ (Implementation manager)
O → O‘	O‘ M‘ P	O’: Budgeting from the view of implementation team now includes a combination of Business Warehouse and offline database for budgeting	**Period T4** „We have the data downloaded by a couple of guys. They download it into Access and it‘s on a financial website and this way it’s available for people here at the center…It does need a little bit of cleaning up once it’s out. Ours doesn't look like the BW reports straight out of BW…So for the folks around here, we have the data updated. As soon as it closes, they run their standard queries. They have everything all set up in bookmarks and they hit right away… We have it downloaded not only to the website but we have spreadsheets it gets downloaded into that generate a lot of our standard monthly reports.“ (Administrative project support)

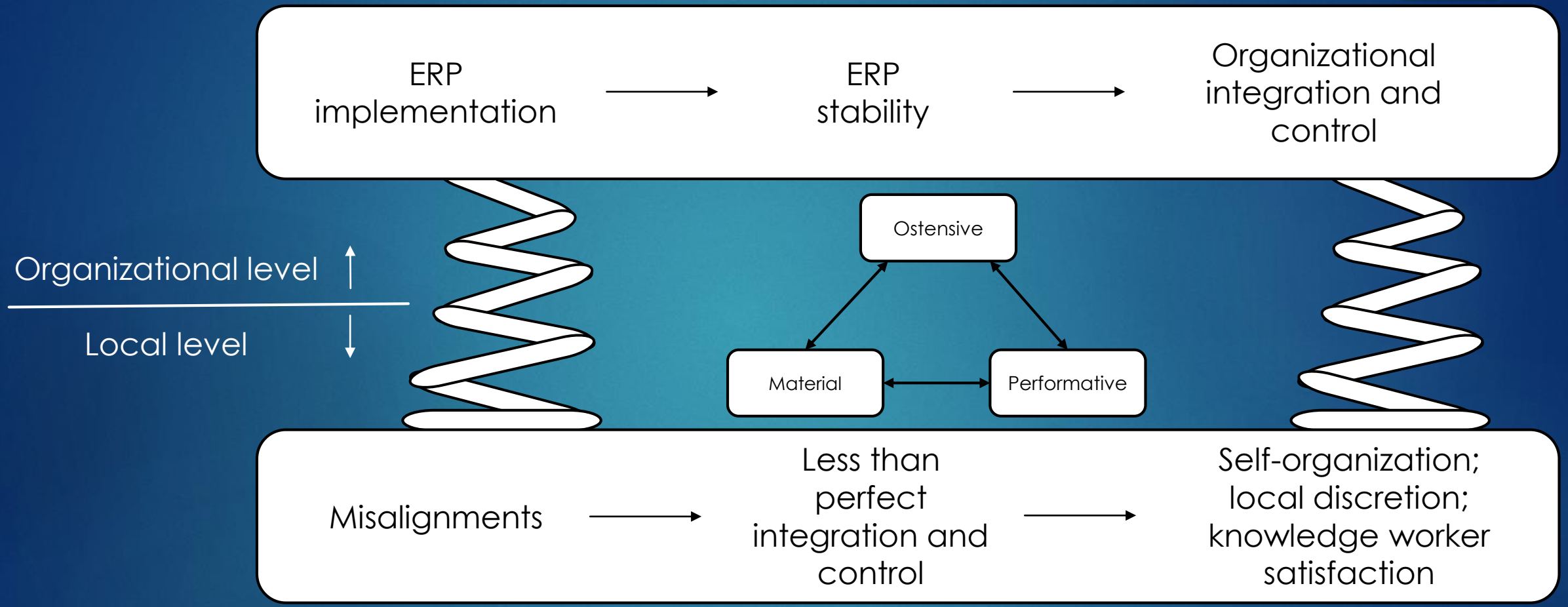
Findings

- Conventional understandings of ERP implementation suggest that misalignments must be eliminated before implementation can be successful

- **Alternative**: Routines as "shock absorbers"
  - Routines mitigate the tension between everyday work activities and prescribed functionalities in the ERP system
  - Adjustments to different aspects of the routine (ostensive, performative, material)

- Key mechanism: "negotiated order" → people make sense of the situation, talk with each other and develop situated local practices
- Organizational control can exist simultaneously with local autonomy → key for knowledge-intensive organizations

Routines as shock absorbers



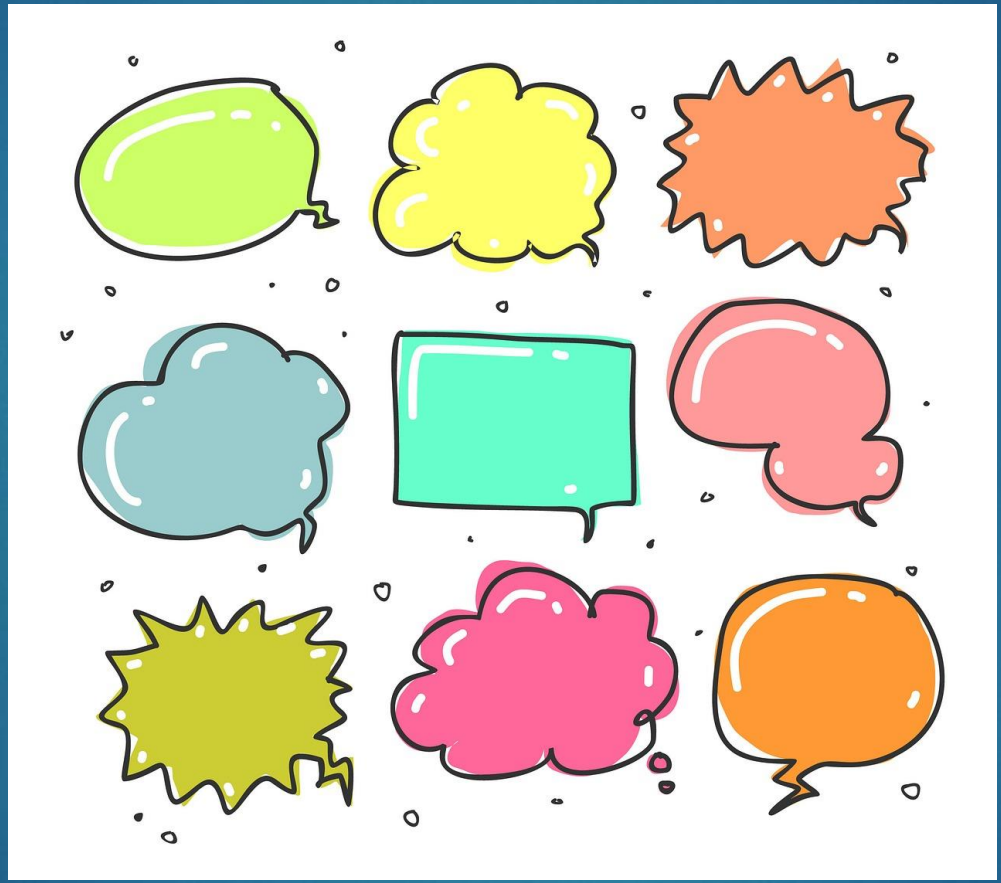
Over time, continued adjustments in routines can produce a negotiated stability acceptable to all parties, but this stability continues to change and adapt

Summary

- Organizational routines are generative and dynamic systems
  - Ostensive Aspect
  - Performative Aspect

- IT captures and influences organizational routines
- Routines can act as shock absorbers when IT does not afford required functionality

Discussion



References

- Berente, N., Lyytinen, K., Yoo, Y., & King, J. L. (2016). Routines as shock absorbers during organizational transformation: Integration, control, and NASA's enterprise information system. *Organization Science*, *27*(3), 551-572.
- Miller, K. D., Pentland, B. T., & Choi, S. (2012). Dynamics of performing and remembering organizational routines. *Journal of Management Studies*, *49*(8), 1536-1558.

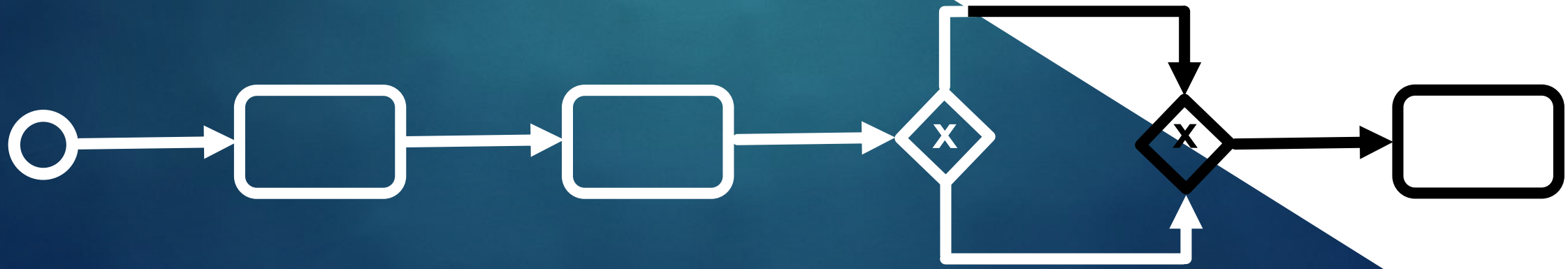
One sentence about this lecture…

- Go to **menti.com** and use the indicated code

- What did you like about the lecture?
- What did you **not** like about the lecture?
- What are questions you still have?
- What caught your interest?
- What would you like to discuss in future sessions?

BPM & OP

ORGANIZATIONAL ROUTINES AND IT & PHYSICAL WORK



Physical work and IT

- **How is the use of IT different in physical-intensive work environments?**

Erasmus+

AIBA

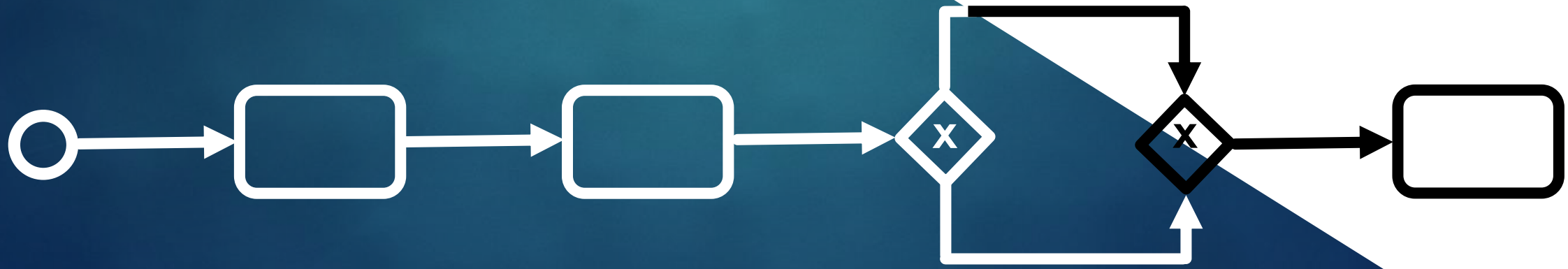
UNIVERSITÄT LIECHTENSTEIN

WU WIRTSCHAFTS UNIVERSITÄT WIEN VIENNA UNIVERSITY OF ECONOMICS AND BUSINESS

Radboud Universiteit Nijmegen

BPM & OP

THE BIG PICTURE



Exercise – 15 mins

- Discuss in your team about the overall content of the lecture
  - What have we learned?
  - How do the pieces fit together?
  - How do you think this will help you in the future?

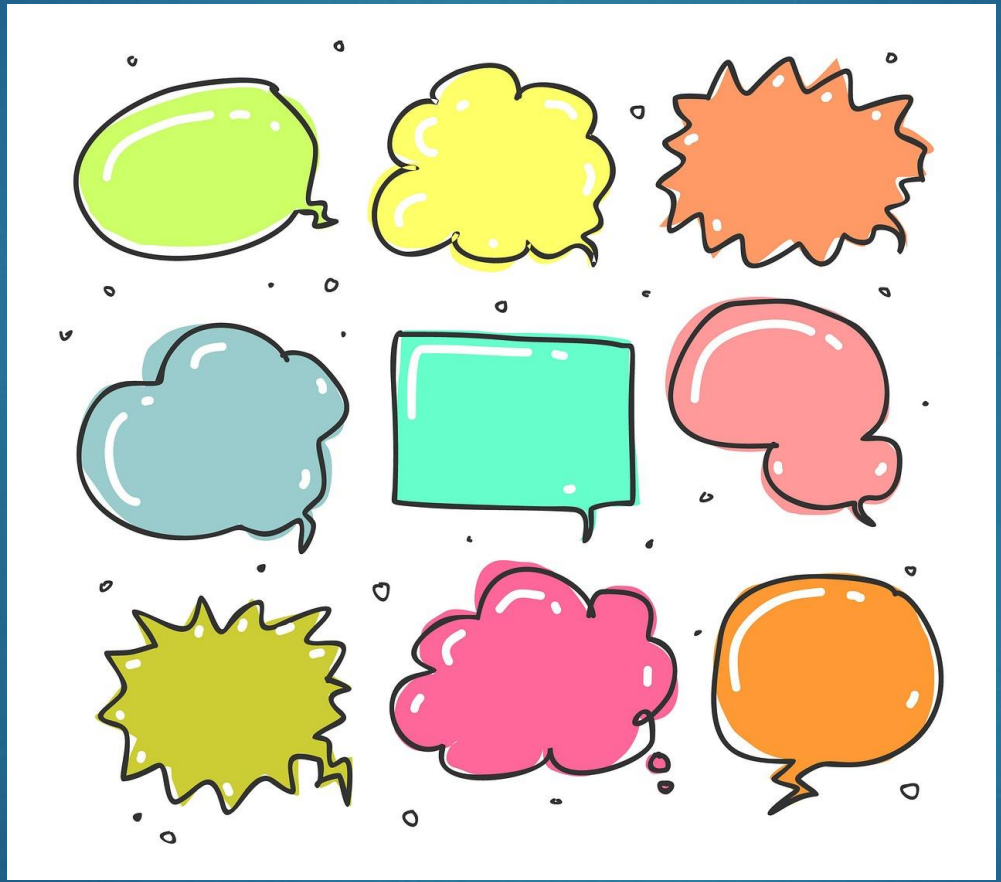
- Share your impressions with the whole group by means of PowerPoint slide(s), a mind map, or other visual means

Project Time

- Time for you to work on your project/ reflection
- Approach me if you have any questions

- **Think about a process you want to investigate and discuss with me!**

Discussion



One sentence about this lecture…

- Go to **menti.com** and use the indicated code

- What did you like about the lecture?
- What did you **not** like about the lecture?
- What are questions you still have?
- What caught your interest?
- What would you like to discuss in future sessions?