

Business Process Management

Lecture 3 Essential Process Modeling I

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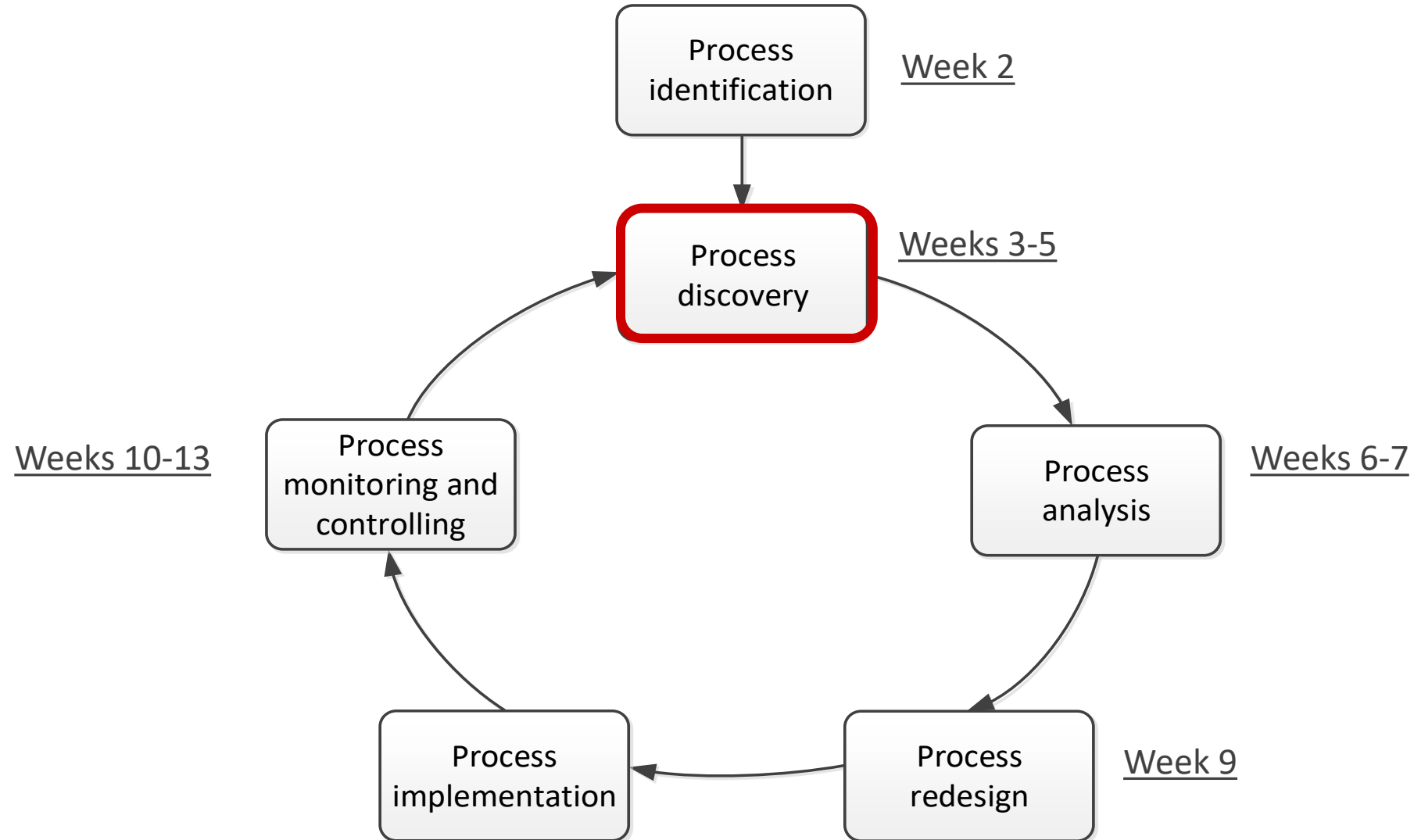
Seoul National University of Science and Technology



Contents

- Purpose of Process Modeling
- Essential Business Process Modeling with BPMN
 - Control flow & Functional perspective

Course structure



Why process modeling?

“It’s like turning a lot of light bulbs on in the minds of managers”

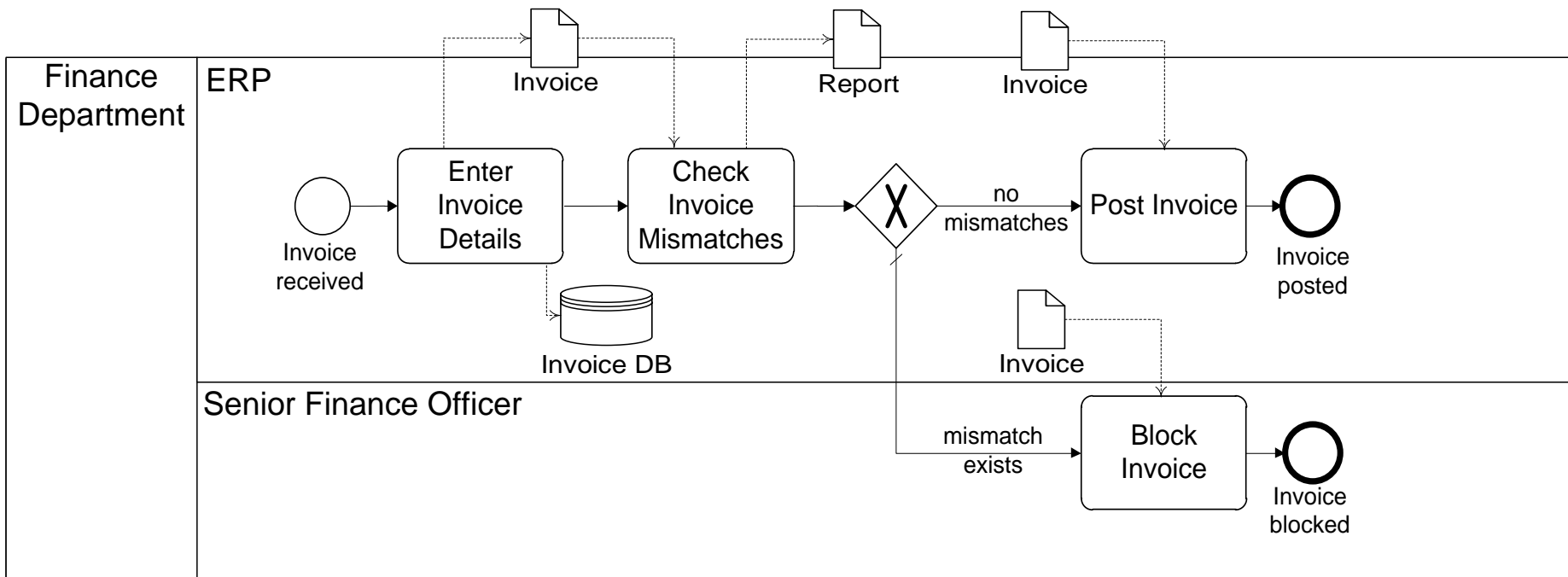
Process owner
Defense Housing Authority
Canberra, Australia



Transparency

Process models – conveying transparency

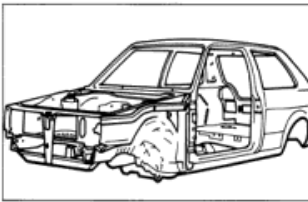
1. What we need to do and when – *Control flow & Functional*
2. What we need to work on – *Object/Data, Artifacts (physical & electronic)*
3. Who does the work – *Resources / Organizational (human & systems)*



Mapping, Abstraction, and Purpose of a Model



Models are **mappings of a real-world phenomenon**, developed for the purpose of **reducing overall complexity**.



Models **abstract from certain details** and **document only relevant aspects** of the real world

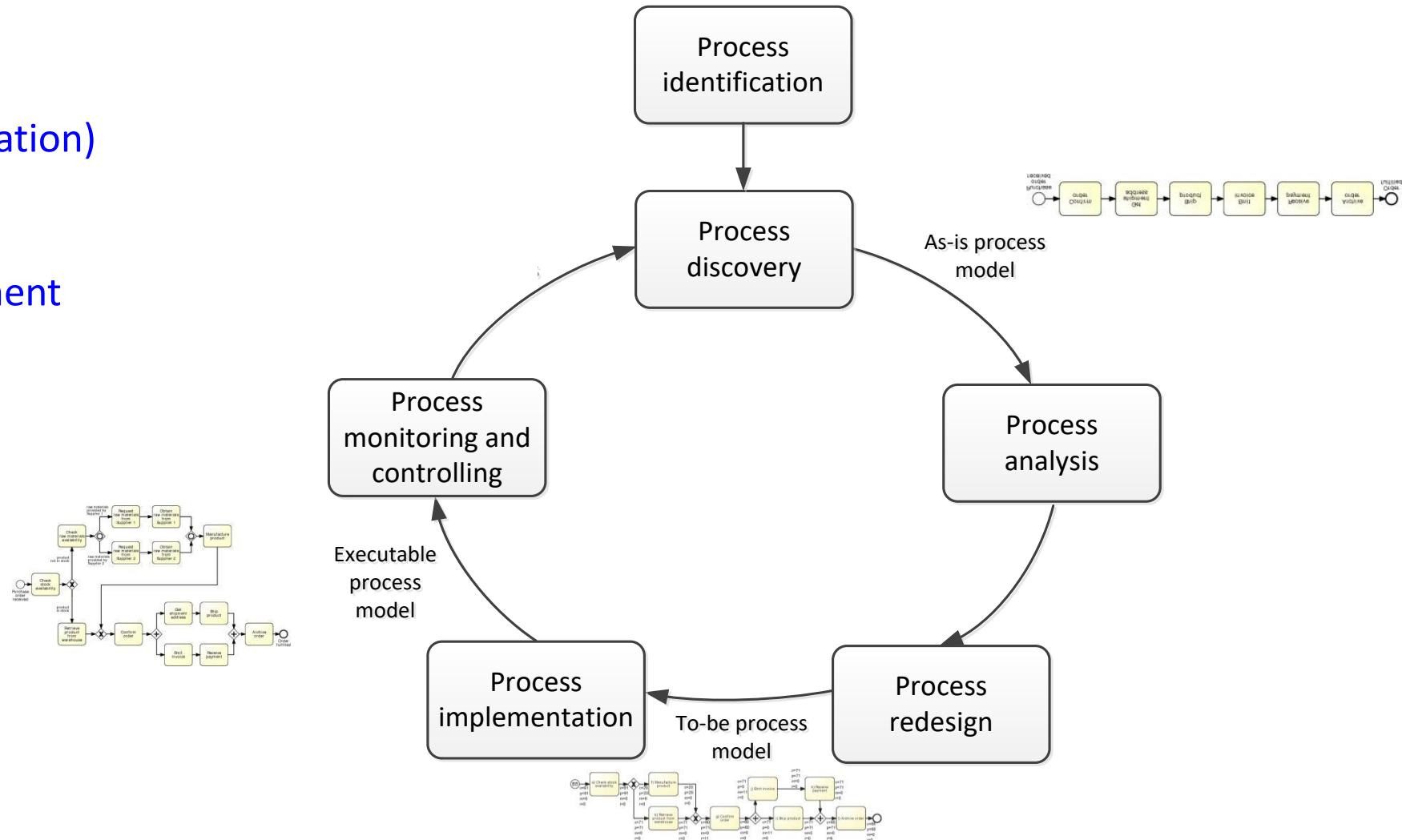


Models are being developed:

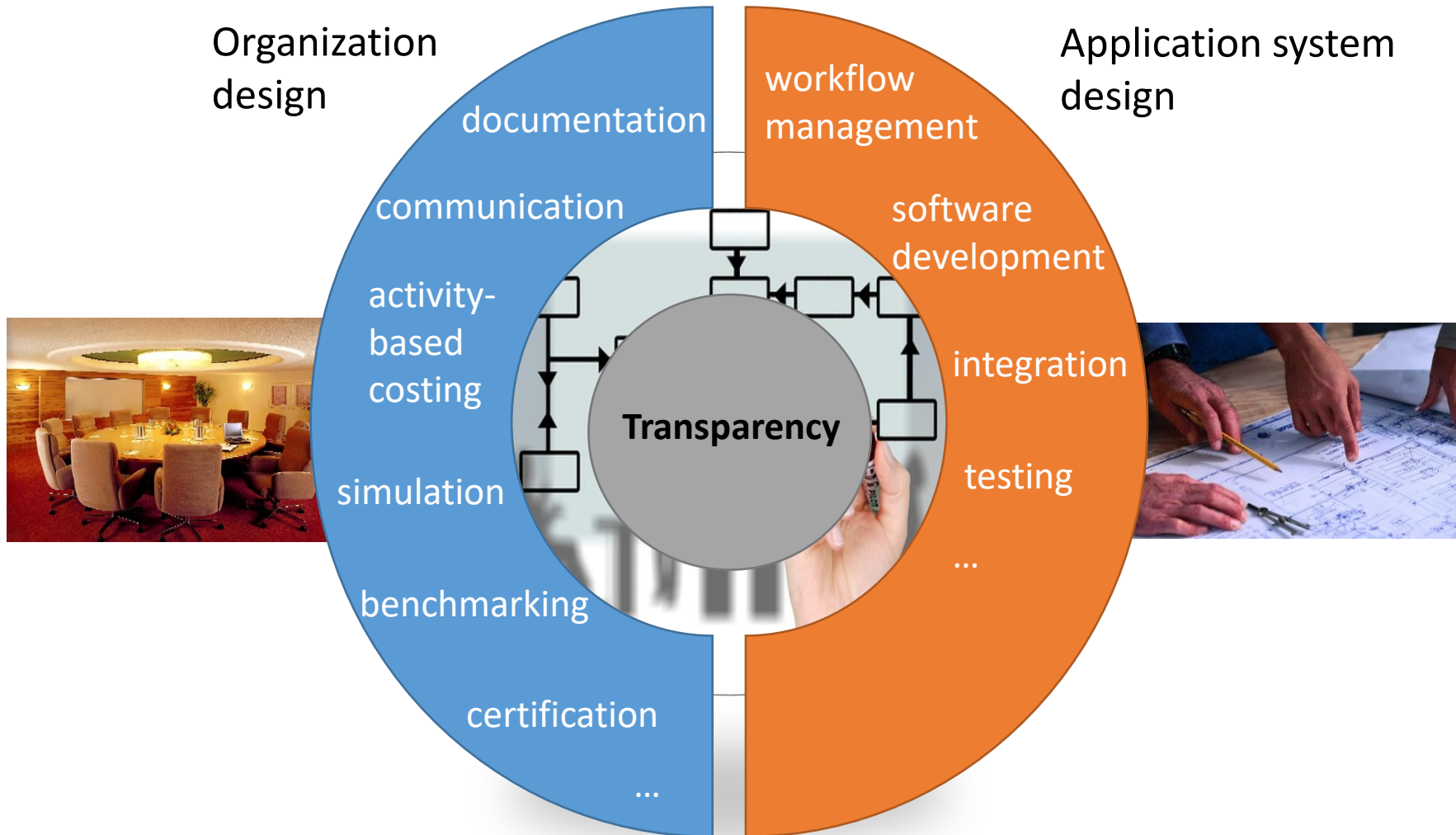
1. in a specific **modelling subject**
2. for a specific **target audience**
3. with a specific **modelling purpose** in mind

Purposes of Process Modeling

- Communication
- Documentation
- Analysis (e.g. simulation)
- Benchmarking
- Certification
- Software development
- Integration
- Testing



Purposes of Process Modeling



Different stakeholders have different interests...

Business stakeholders

- Process innovation, operational excellence
- KPIs, customer touch-points, issues, opportunities, risks
- Balanced Scorecard, Activity-based costing
- Animation, simulation, scenario analysis, easy communication...



IT stakeholders

- Process-Aware Information Systems
- Process automation
- Expressive, executable, standardized models
- Data types, conditions, data mappings, faults handling...



Business Process Model and Notation (BPMN)

- OMG standard
- Suitable for capturing models for process discovery, analysis, and implementation
- Supported by numerous tools, incl.
 - Apromore
 - Bizagi Process Modeler (free)
 - Signavio (academic version: academic.signavio.com)

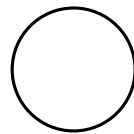


BPMN from 10,000 miles...

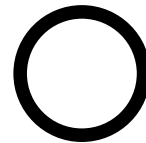
A BPMN process model is a graph consisting of four types of **core elements**:



activity

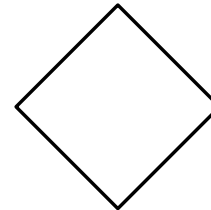


start

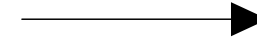


end

event



gateway



sequence
flow

Let's start modeling

Order-to-cash

An order-to-cash process is triggered by the receipt of a purchase order from a customer. Upon receipt, the purchase order has to be checked against the stock to determine if the requested item(s) are available. Depending on stock availability the purchase order may be confirmed or rejected.

If the purchase order is confirmed, an invoice is emitted and the goods requested are shipped. The process completes by archiving the order.

Let's start modeling – break it down

Order-to-cash

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- Upon receipt, the purchase order has to be checked against the stock to determine if the the requested item(s) are available.
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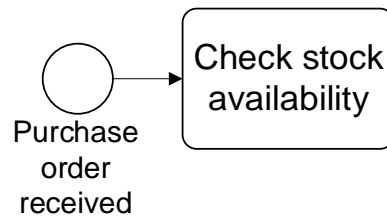
Let's start modeling – break it down

Order-to-cash

- **An order-to-cash process is triggered by the receipt of a purchase order from a customer.**
- **Upon receipt, the purchase order has to be checked against the stock to determine if the the requested item(s) are available.**

BPMN Model

Order-to-cash



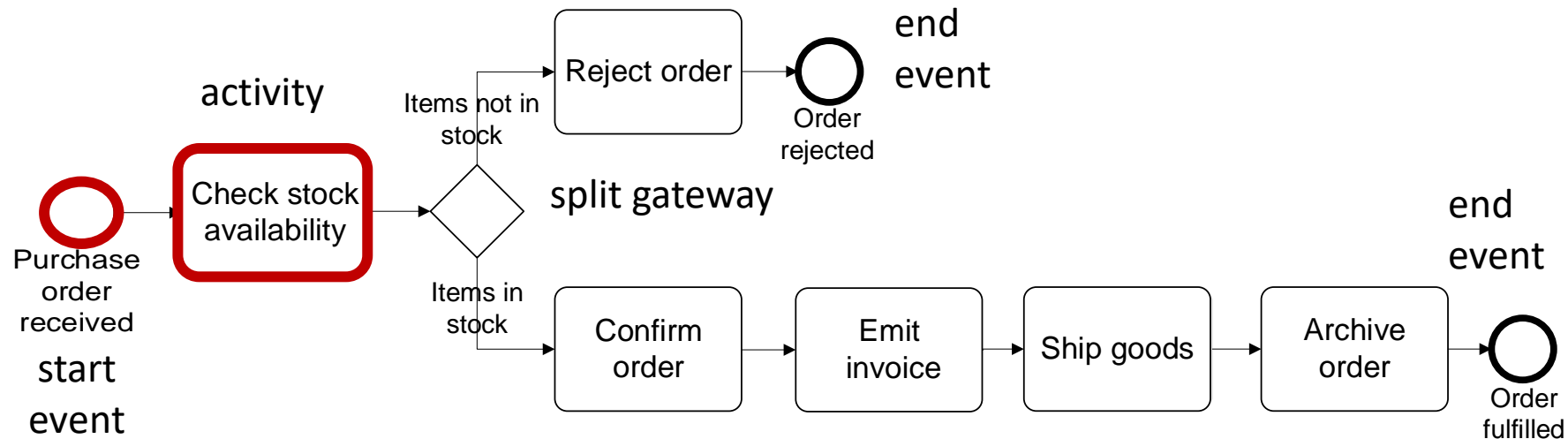
Let's start modeling – break it down

Order-to-cash

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BPMN Model

Order-to-cash



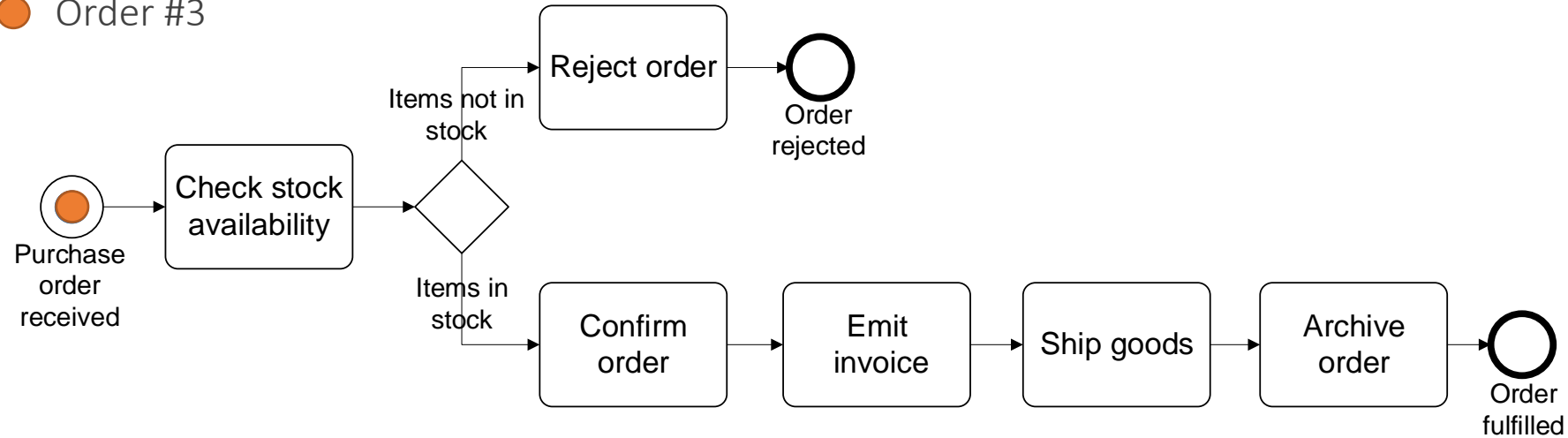
Naming conventions

- Event: noun + past-participle verb (e.g. insurance claim lodged)
- Activity: verb + noun (e.g. assess credit risk)

Execution of a process model

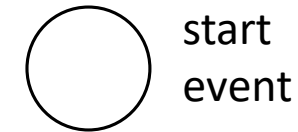
The “token game”

- Order #1
- Order #2
- Order #3



A little bit more on events...

A *start event* triggers a new process instance by generating a token that traverses the sequence flow (“tokens source”)

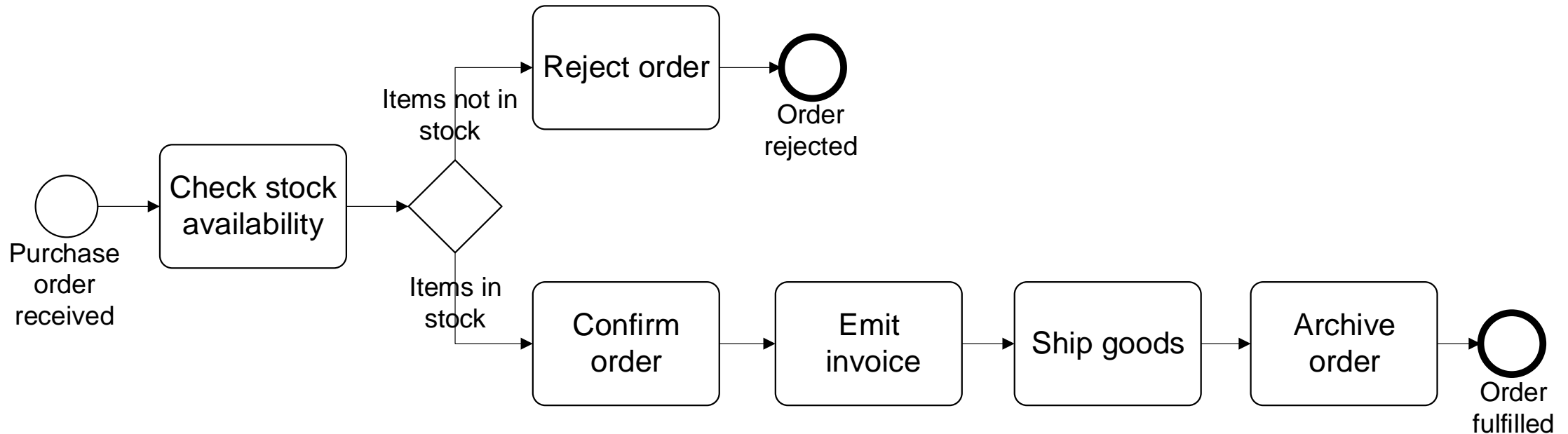


An *end event* signals that a process instance has completed with a given outcome by consuming a token (“tokens sink”)



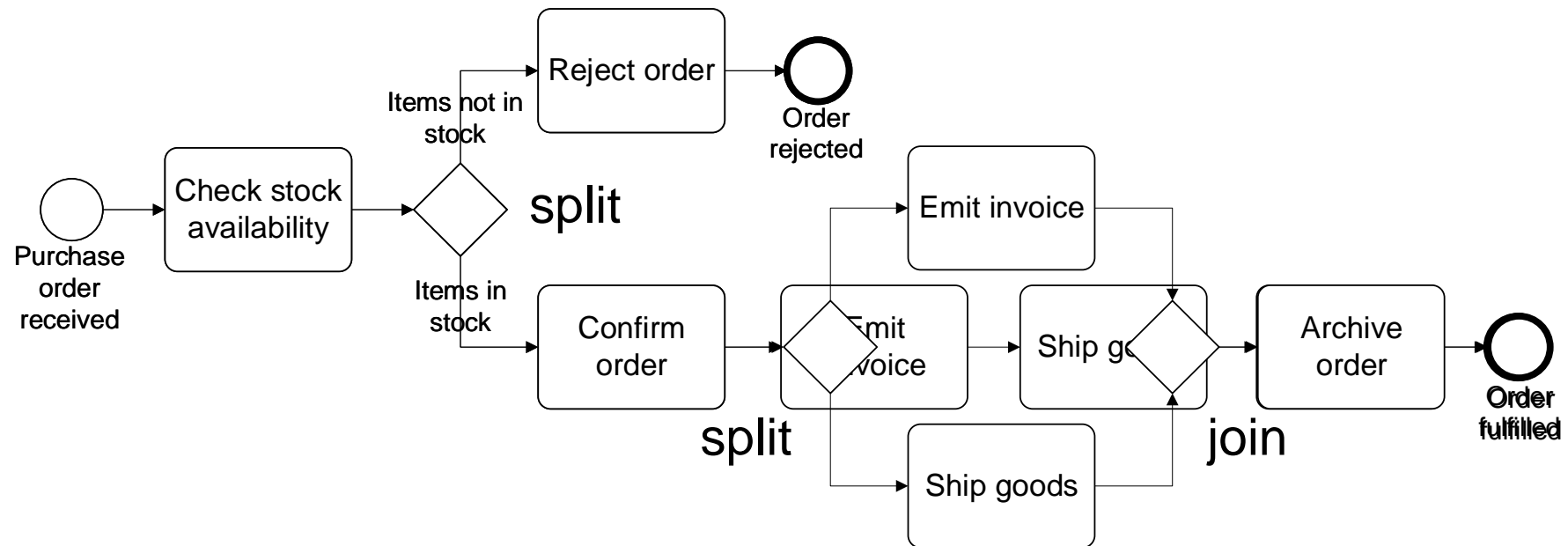
Order-to-cash example revisited...

[...] If the purchase order is confirmed, **an invoice is emitted and the goods requested are shipped (in any order)**. The process completes by archiving the order. [...]

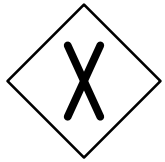


First try

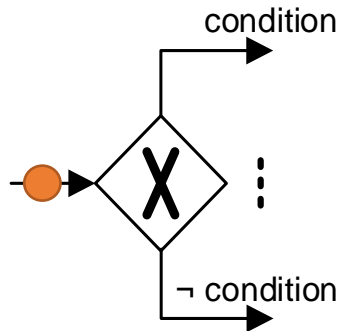
Order-to-cash



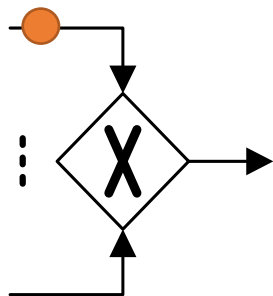
A little more on gateways: XOR Gateway



An *XOR Gateway* captures decision points (XOR-split) and points where alternative flows are merged (XOR-join)



XOR-split → takes **one** outgoing branch



XOR-join → proceeds when **one** incoming branch has completed

Example: XOR Gateway

Example 3.2. Let us consider the following invoice checking process.

As soon as an invoice is received from a customer, it needs to be checked for mismatches. The check may result in any of the following three options:

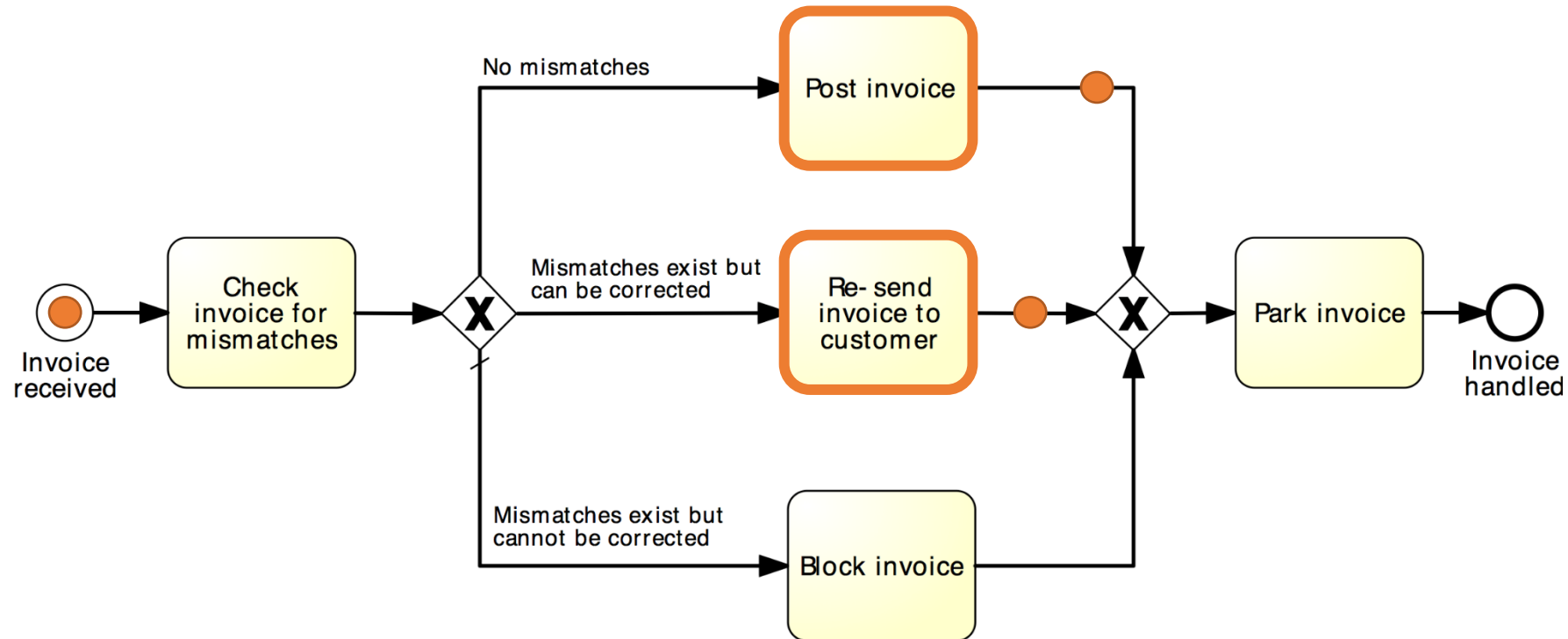
- (i) there are no mismatches, in which case the invoice is posted;*
- (ii) there are mismatches but these can be corrected, in which case the invoice is resent to the customer; and*
- (iii) there are mismatches but these cannot be corrected, in which case the invoice is blocked.*

Once one of these three activities is performed the invoice is parked and the process completes.



Example: XOR Gateway

Invoice checking process

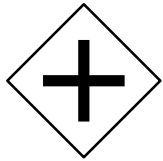


Exercise 3.1

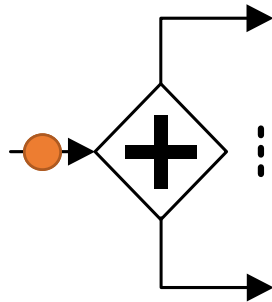
Model the following fragment of a business process for assessing loan applications (loan origination process).

Once a loan application has been approved by the loan provider, an acceptance pack is prepared and sent to the customer. The acceptance pack includes a repayment schedule which the customer needs to agree upon by sending the signed documents back to the loan provider. The latter then verifies the repayment agreement: if the applicant disagreed with the repayment schedule, the loan provider cancels the application; if the applicant agreed, the loan provider approves the application. In either case, the process completes with the loan provider notifying the applicant of the application status.

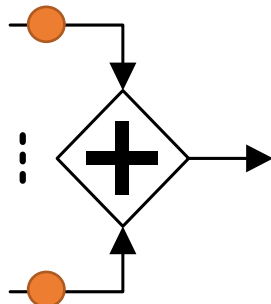
A little more on gateways: AND Gateway



An *AND Gateway* provides a mechanism to create and synchronize “parallel” flows.



AND-split → takes **all** outgoing branches



AND-join → proceeds when **all** incoming branches have completed

Example:AND Gateway

Example 3.3. Let us consider the security check at an airport.

Once the boarding pass has been received, passengers proceed to the security check.

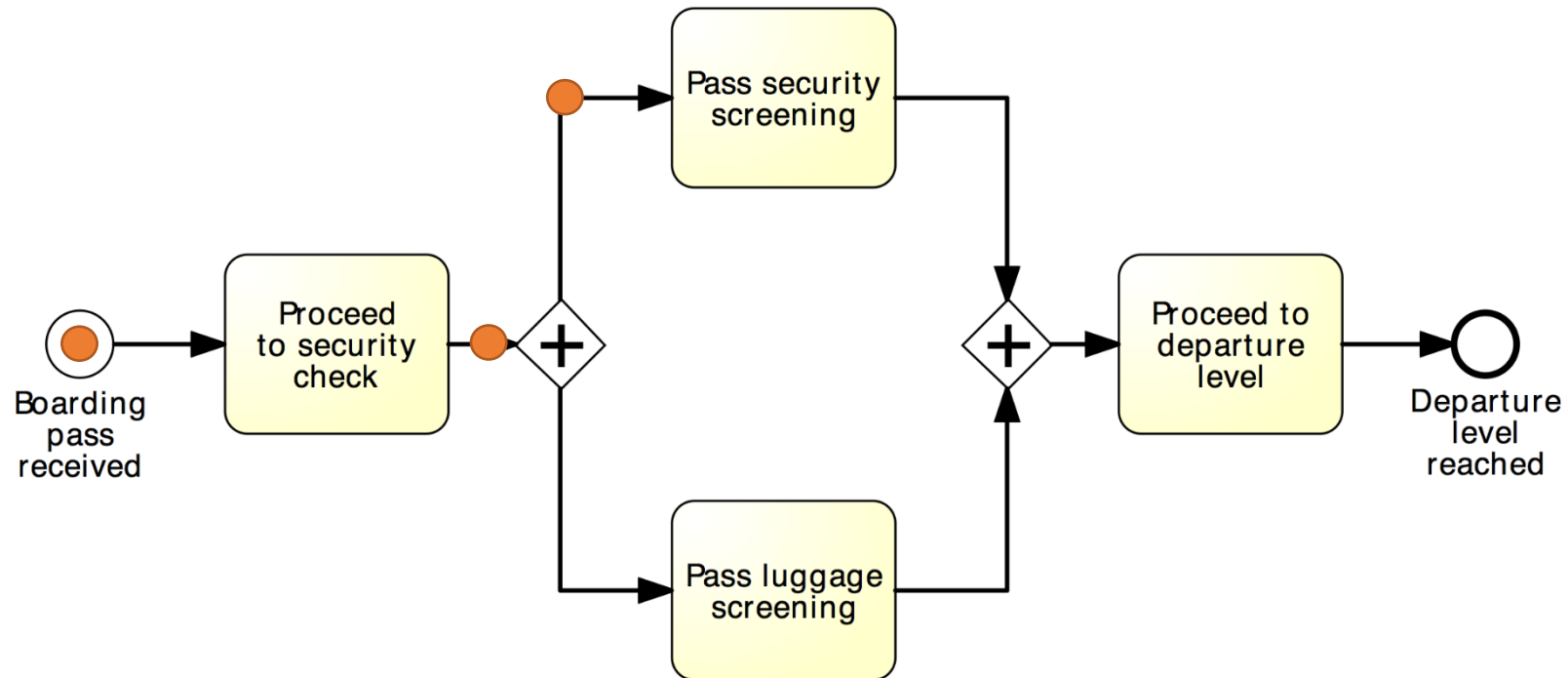
Here they need to pass the personal security screening and the luggage screening.

Afterwards, they can proceed to the departure level.



Example: AND Gateway

Airport security check

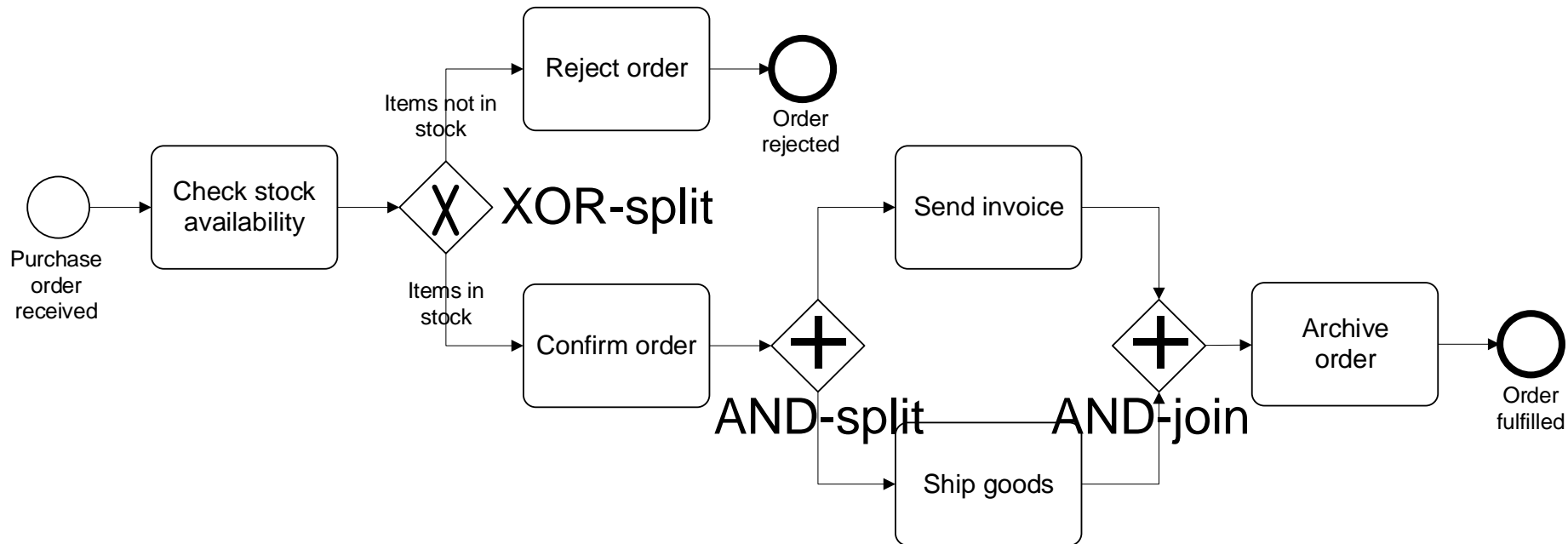


Exercise 3.2

Model the following fragment of a business process for assessing loan applications.

A loan application is approved if it passes two checks: i) the applicant's loan risk assessment, done automatically by a system, and ii) the appraisal of the property for which the loan has been asked, carried out by a property appraiser. The risk assessment requires a credit history check on the applicant, which is performed by a financial officer. Once both the loan risk assessment and the property appraisal have been performed, a loan officer can assess the applicant's eligibility. If the applicant is not eligible, the application is rejected, otherwise the acceptance pack is prepared and sent to the applicant.

Revised order-to-cash process model



Between XOR and AND

Example 3.5. Consider the following 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:

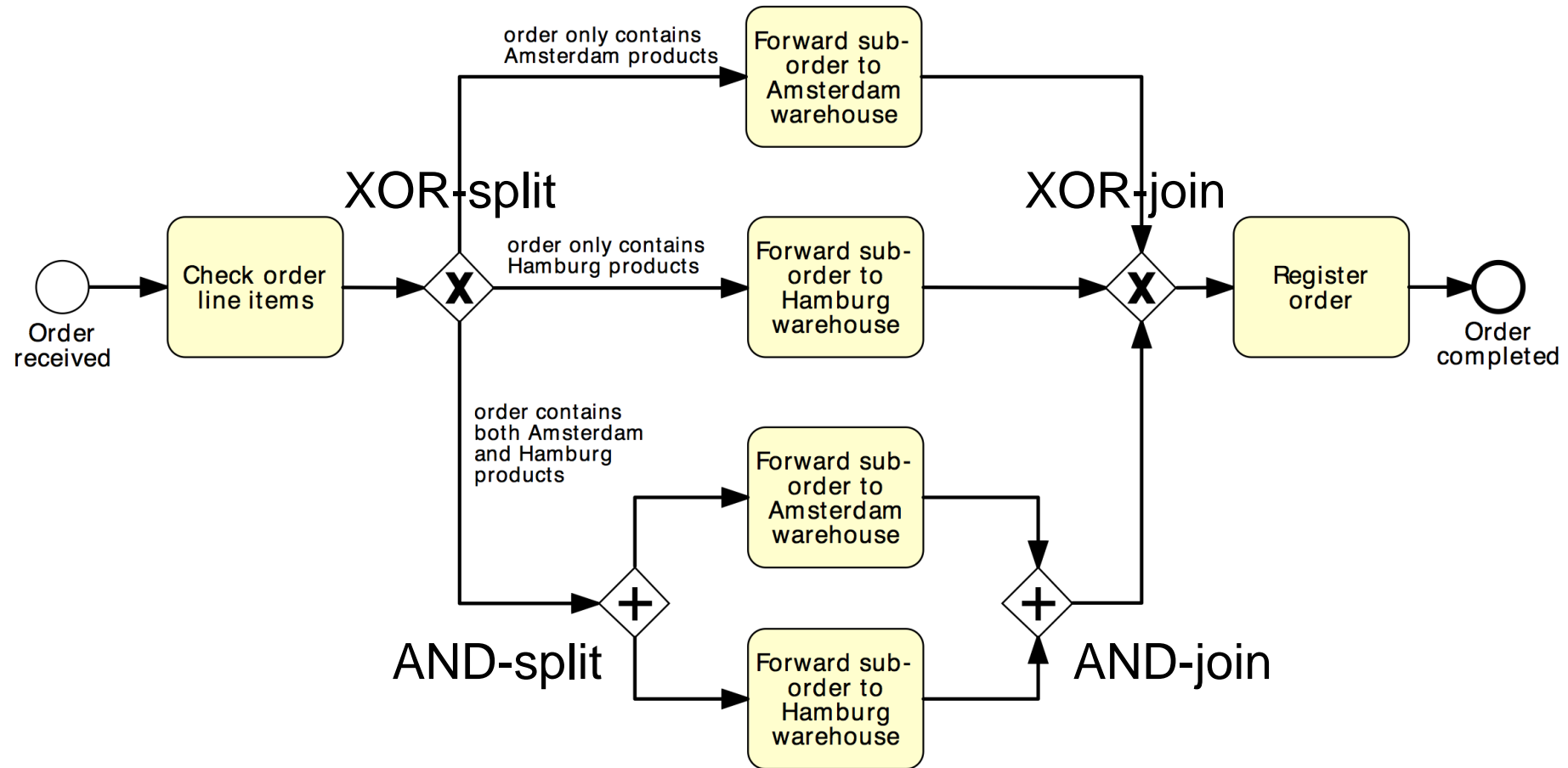
- If some of the relevant products are maintained in Amsterdam, a sub-order is sent there;*
- likewise, if some relevant products are maintained in Hamburg, a sub-order is sent there.*

Afterwards, the order is registered, and the process completes.



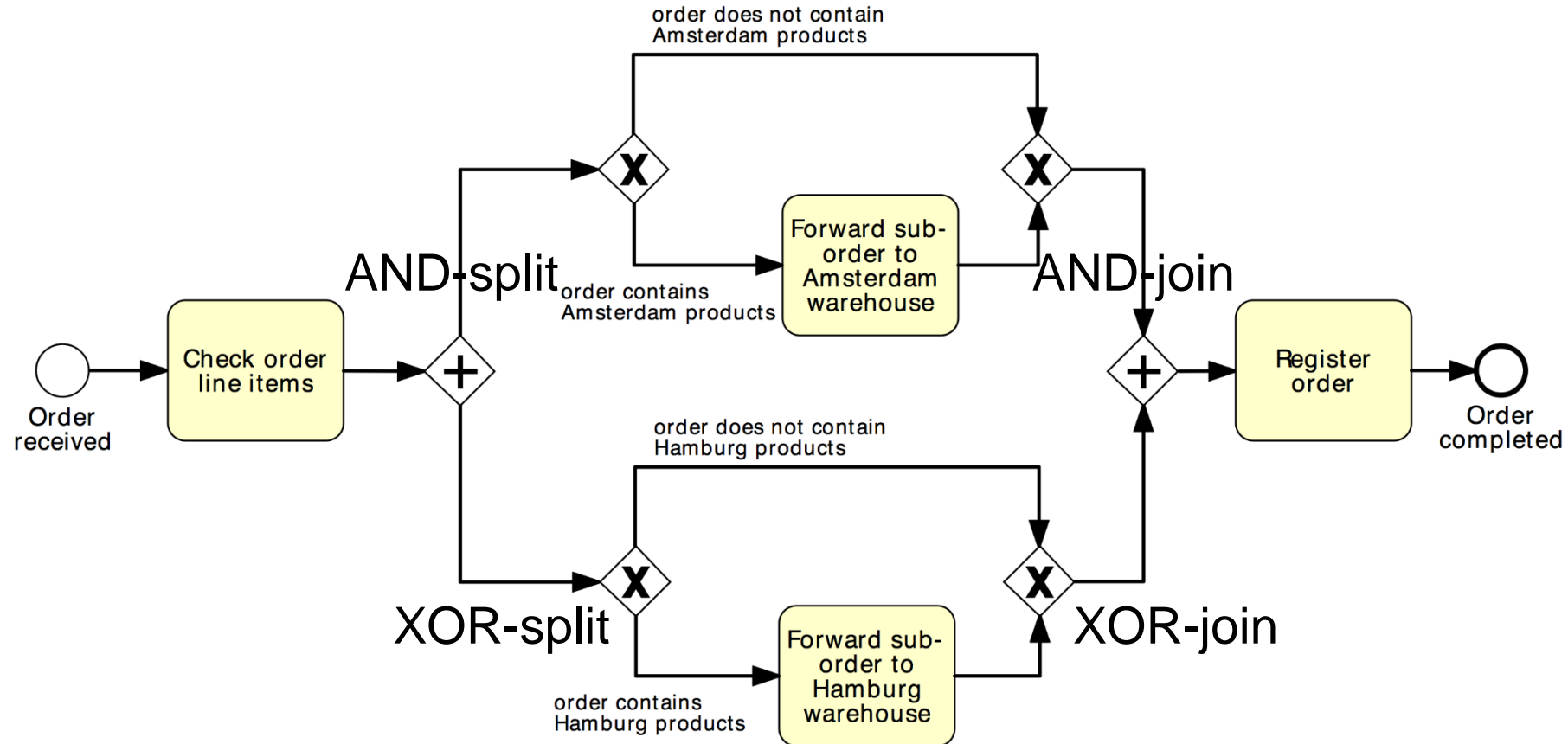
Solution I

Order distribution process

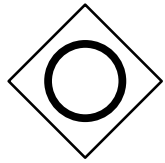


Solution 2

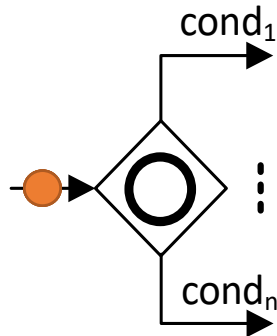
Order distribution process



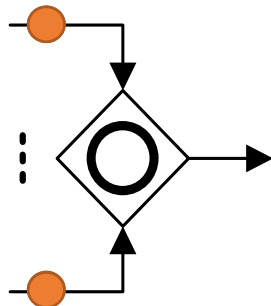
OR Gateway



An *OR Gateway* provides a mechanism to create and synchronize n out of m parallel flows.



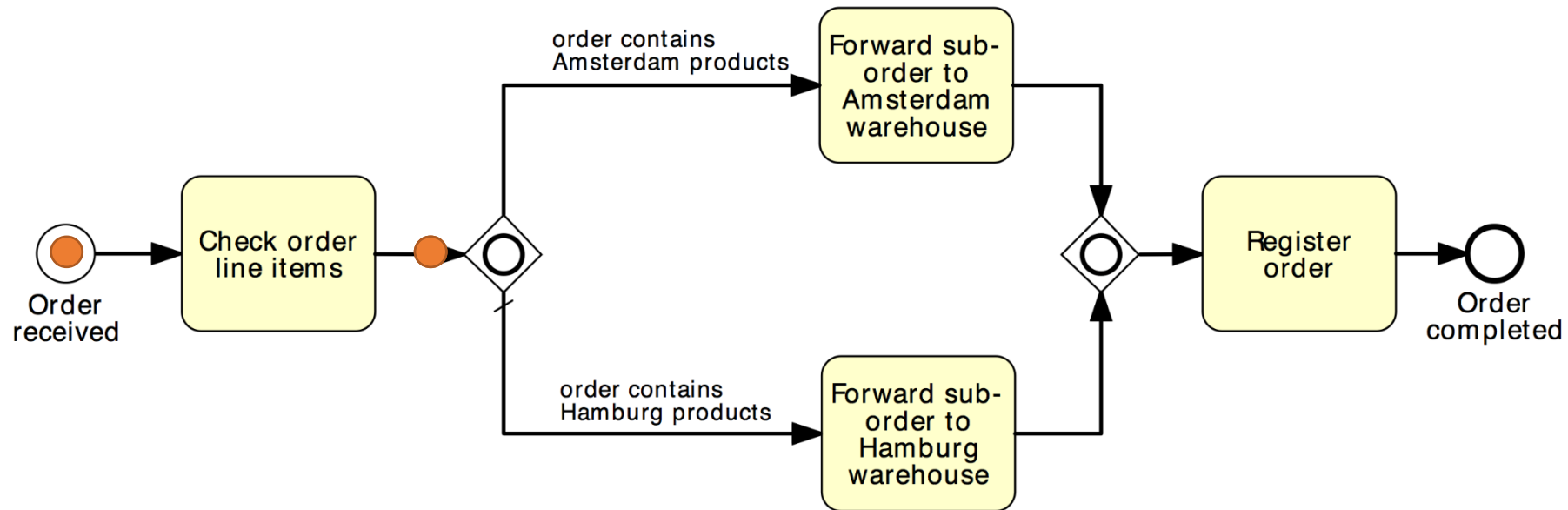
OR-split → takes one or more branches depending on conditions



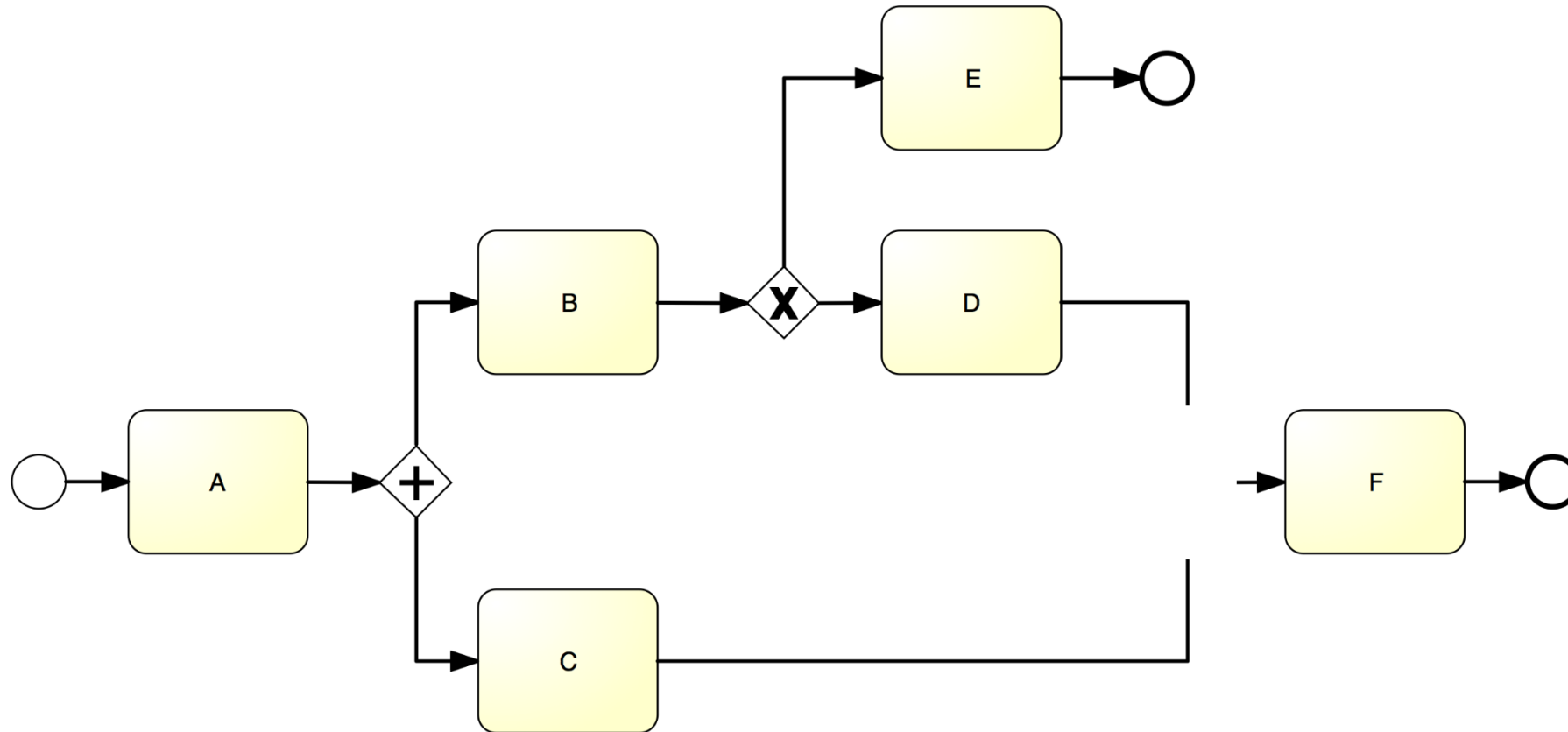
OR-join → proceeds when all **active** incoming branches have completed

Solution using OR Gateway

Order distribution process



What join type do we need here?

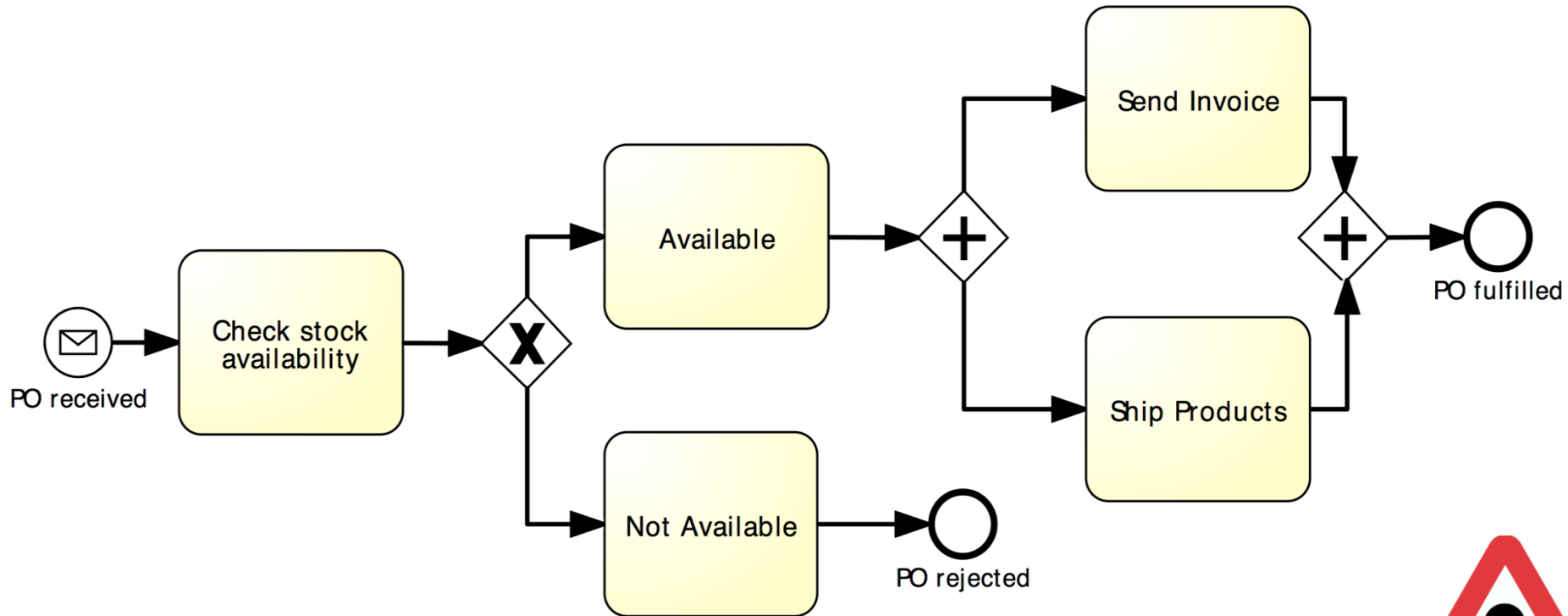


Exercise 3.3

Model the following fragment of a business process for assessing loan applications.

A loan application may be coupled with a home insurance which is offered at discounted prices. The applicants may express their interest in a home insurance plan at the time of submitting their loan application to the loan provider. Based on this information, if the loan application is approved, the loan provider may either only send an acceptance pack to the applicant, or also send a home insurance quote. The process then continues with the verification of the repayment agreement.

Beware: Beginner's Mistake...

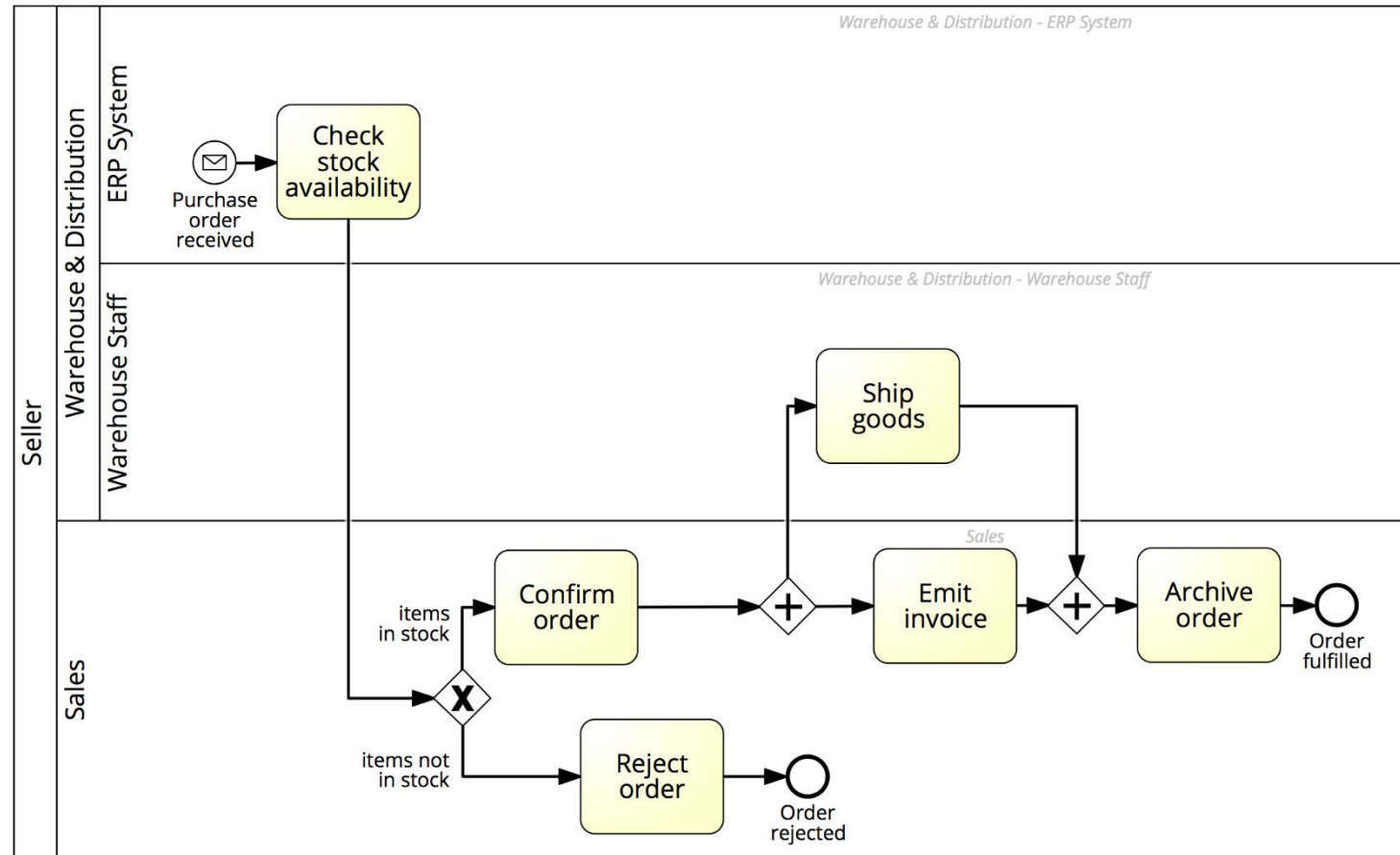


Recap

1. BPMN activities capture units of work in a process
2. Events define the start and end of a process, and signal something that happens during the execution of it
3. Gateways model exclusive and inclusive decisions, merges, parallelism and synchronization, and repetition
4. A process model depicts all the possible ways a given business process can be executed, while a process instance captures one specific process execution out of all possible ones

Next Week

Data/Object Perspective & Organizational Perspective



Acknowledgements

- Most of the content notes for this lecture feature content borrowed with or without modification from the following sources:
 - “Source: M. Dumas, M. La Rosa, J. Mendling and H. Reijers, *Fundamentals of Business Process Management*, 2nd edition, Springer, 2018”.