ICT393
Advanced Business Analysis and Design

Topic 6
Process Discovery

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Readings and Resources

- Dumas, M. La Rosa, M., Mendling, J. and Reijers. H. A. (2013 or 2018) *Fundamentals of Business Process Management*, Springer. Chapter 5.

Learning Objectives

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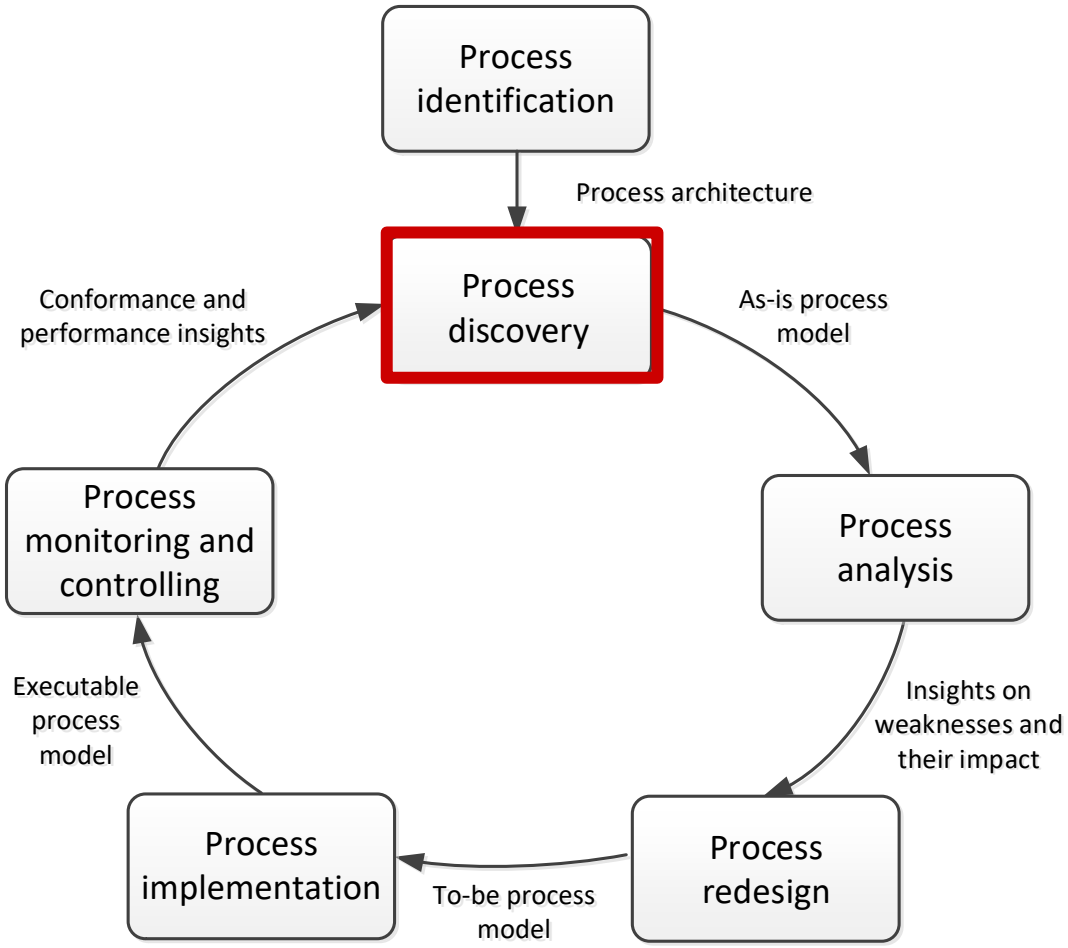
After completing this topic you should be able to:

- Collect the information needed to model business processes accurately
- Construct a process model based on collected information about the process
- Discuss the quality criteria that should be checked before a model can be accepted as an authoritative representation of a business process

REMINDER - BPM Lifecycle



Process discovery is the act of gathering information about an existing process and using it to create an As-Is process model

Main Tasks in Process Discovery

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Four main tasks:

- **Assemble a team** that will be responsible for working on the process discovery
- **Gather information:** build an understanding of the process. Different discovery methods are available
- **Conduct the modeling:** do the actual modeling
- **Assure model quality:** guarantee that the resulting model meets quality criteria

done together

Who is Involved?

Business analysts
/ process analysts

Domain experts

Questions:

- **Why are both roles needed?**
- **What skills do the 2 roles need?**

Example – Seek.com.au advertisement

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Business Systems and Process Analyst - Health Services

17h ago

Quinn Allan

Melbourne > CBD & Inner Suburbs

Information & Communication Technology > Business/Systems Analysts

- Work for a not for profit that helps people to overcome their immediate crises
- Help shape the "to be" processes on a large transformation programs
- Salary package up to $15,900 per year for being a not for profit employee

A well known not for profit that supports vulnerable Victorians requires a Business Systems and Process Analyst to work on its transformation program.

Challenges of Process Discovery

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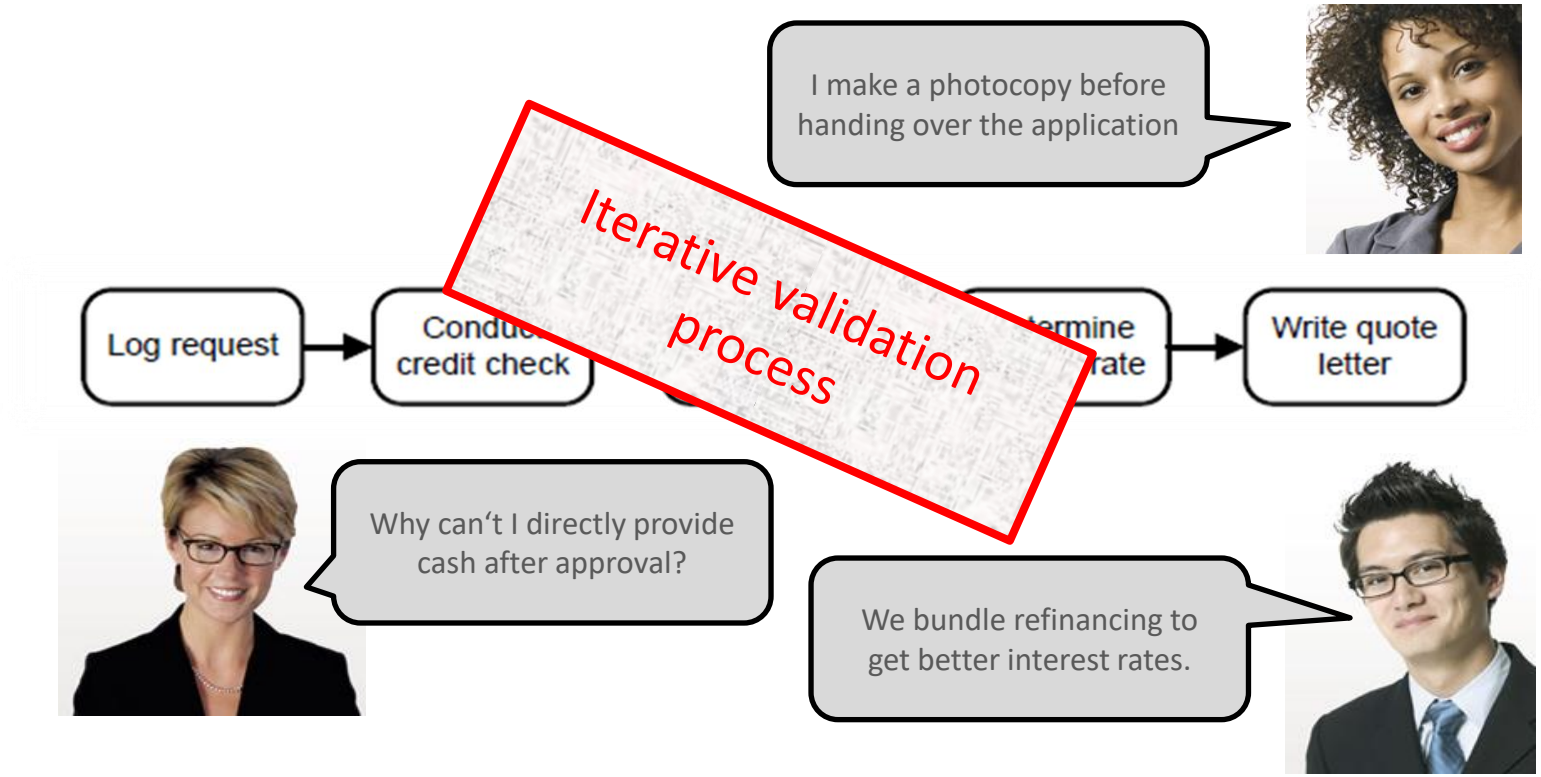
1. Need to deal with **fragmented process knowledge** - normally requires several iterations
2. Need to **abstract from individual cases** to create model that covers all cases
3. Need to deal with **lack of modelling experience of domain experts**

Challenge 1 - Fragmented process knowledge



Challenge 2 - Domain experts think on instance level

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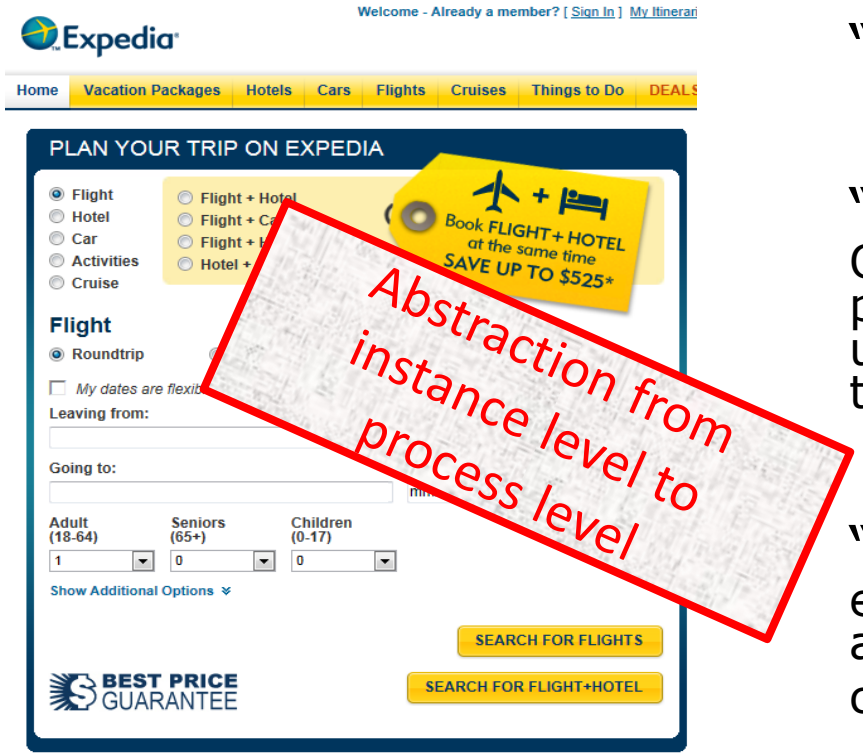

"Every trip is different"

"You cannot really compare. Our customers go to different places in different seasons using different modes of transportation"

"We can never do anything exactly in the same way. There are so many special conditions"

Challenge 3 – Domain experts lack process modelling knowledge

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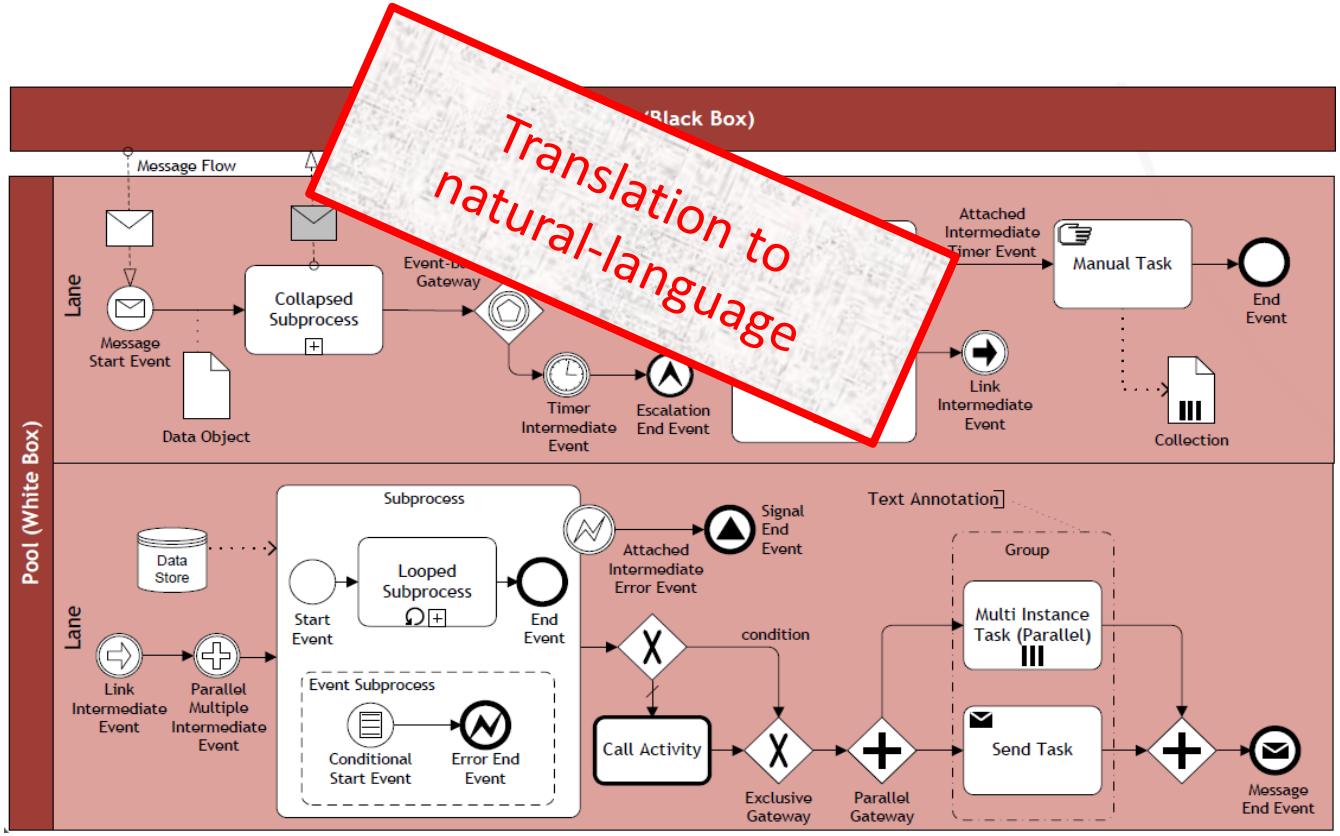
"Does this diagram correctly show your process?"



Process Discovery Methods

1. **Evidence-based**
   - Document analysis
   - Observation
   - Automated process discovery
2. **Interview-based**
3. **Workshop-based**

Can use one or more of these

1. Evidence-based – document analysis

Documents point to existing roles, activities and business objects – e.g.:

- Process descriptions
- Internal policies
- Organisation charts
- Employment plans
- Quality certificate reports
- Glossaries and handbooks
- Forms
- Work instructions…

Can be used to gather information before approaching domain experts

1. Evidence-based – observation

- Follow the execution of individual process instances, then abstract from instance to process level:

  Active role: play a specific role, e.g. customer

  Passive role: observe participants and their environment

Question - What issues might there be?

- Trace business objects in the course of their lifecycle

1. Evidence-based – Automated process discovery

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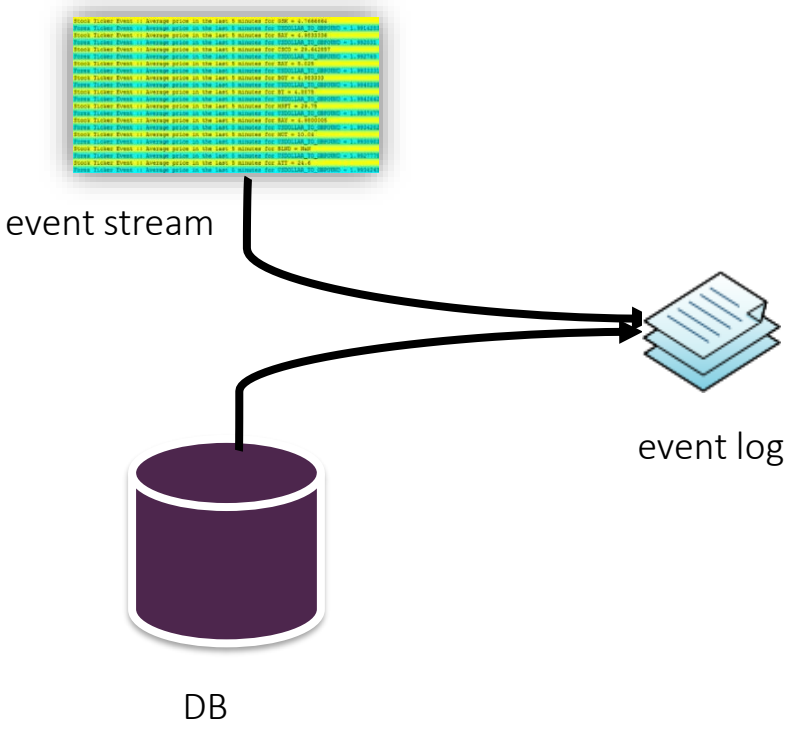
Event logs hold process execution data and are stored by many common systems

Automated process discovery analyses these event logs to extract a model of the process even if it is hardcoded in the system



Automated process discovery (ctd)

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Event logs also may contain additional useful information:

- Activity, resource, cost
- Case attributes (e.g. customer reference, type of case…)

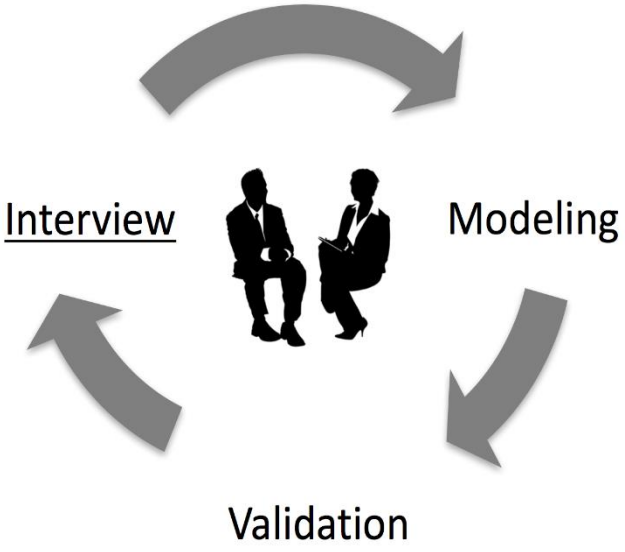
case id	event id	properties				
		timestamp	activity	resource	cost	…
1	35654423	30-12-2010:11.02	register request	Pete	50	…
	35654424	31-12-2010:10.06	examine thoroughly	Sue	400	…
	35654425	05-01-2011:15.12	check ticket	Mike	100	…
	35654426	06-01-2011:11.18	decide	Sara	200	…
	35654427	07-01-2011:14.24	reject request	Pete	200	…
2	35654483	30-12-2010:11.32	register request	Mike	50	…
	35654485	30-12-2010:12.12	check ticket	Mike	100	…
	35654487	30-12-2010:14.16	examine casually	Pete	400	…
	35654488	05-01-2011:11.22	decide	Sara	200	…
	35654489	08-01-2011:12.05	pay compensation	Ellen	200	…

2. Interview-based discovery

Tends to be iterative with multiple domain experts interviewed as tend to obtain fragmented information from individuals

Approaches:

- forward (start with triggers) vs backward (start with outcomes)
- structured vs unstructured – need a balance



3. Workshop-based discovery

- Gather all key stakeholders together
- Participants interact to create shared understanding (usually over several sessions)
- Typically one process analyst (facilitator), multiple domain experts, process owner may also attend
- Maybe software-supported – model is created during the workshop then used as a reference point for discussions

Questions

Discovery approaches have different strengths and weaknesses relating to:

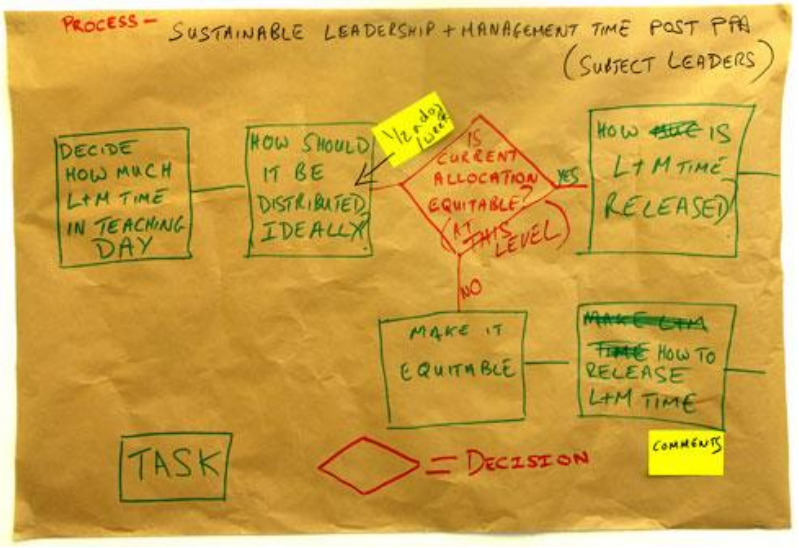
- Objectivity
- Richness
- Time consumption

Which provide the greatest objectivity?

Which provide the richest data?

Suggested Method to Conduct Modelling

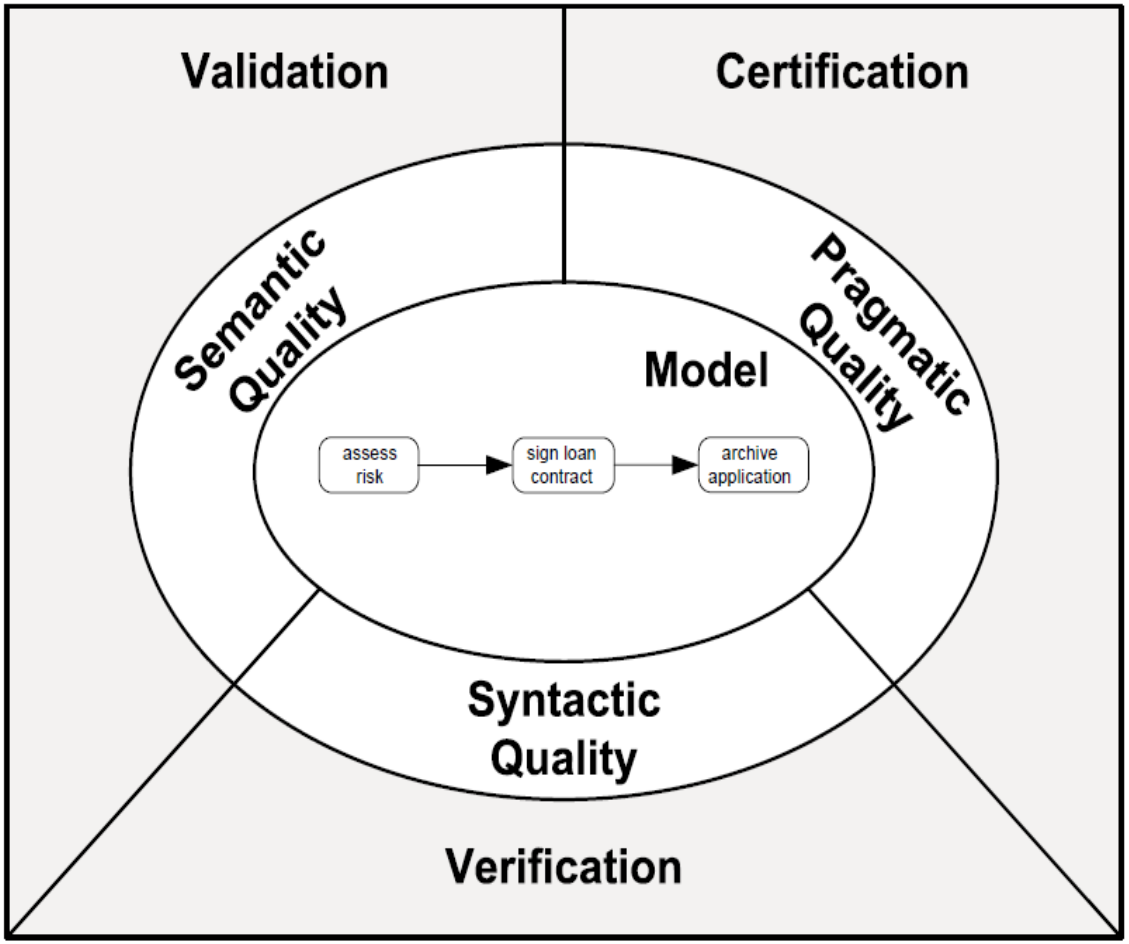
1. Identify the process boundaries
2. Identify activities and events
3. Identify resources and their handovers
4. Identify the control flow
5. Identify additional elements such as:
   - data objects
   - different types of events
   - exception handling…



What information can help identify the boundaries of a process?

Process Model Quality Assurance

- Validity
- Completeness



- Understandibility
- Maintainability
- Learning

- Structural correctness
- Behavioural correctness

Semantic quality: validation

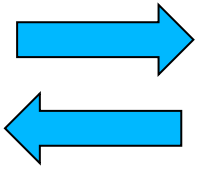
Semantic quality relates to the adherence of a process model to its real-world process

Validation is the activity of checking the semantic quality of a model by comparing it with its real-world business process

A model is of high semantic quality if it is semantically correct:

- Valid (all *model* instances are correct and relevant) +
- Complete (all possible *process* instances are covered)

Domain Expert



Process Analyst

Syntactic quality: Verification

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Syntactic quality relates to the conformance of a process model to the syntactic rules of the modelling language used

Two types of syntactic rules: structural rules and behavioural rules

A model is of high syntactic quality if it is syntactically correct:

- Structurally correct +
- Behaviorally correct

Structural correctness

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A model is structurally correct if it satisfies both element level and model-level rules:

1. **Element-level rules include:**
   - activities must have at least one incoming and one outgoing sequence flow
   - start events must not have incoming sequence flows
   - end events must not have outgoing sequence flows
   - gateways must have exactly one incoming and at least two outgoing flows (splits) or at least two incoming and exactly one outgoing flows (joins)
   - sequence versus message flow rules from Topic 5 must be followed

Structural correctness (ctd)

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2. **Model-level rule:** all activities, gateways, sequence flows and events must be on a path from a start to an end event
   - no dangling sequence flows or disconnected activities
   - implies that a model should have at least one start and one end event

Question

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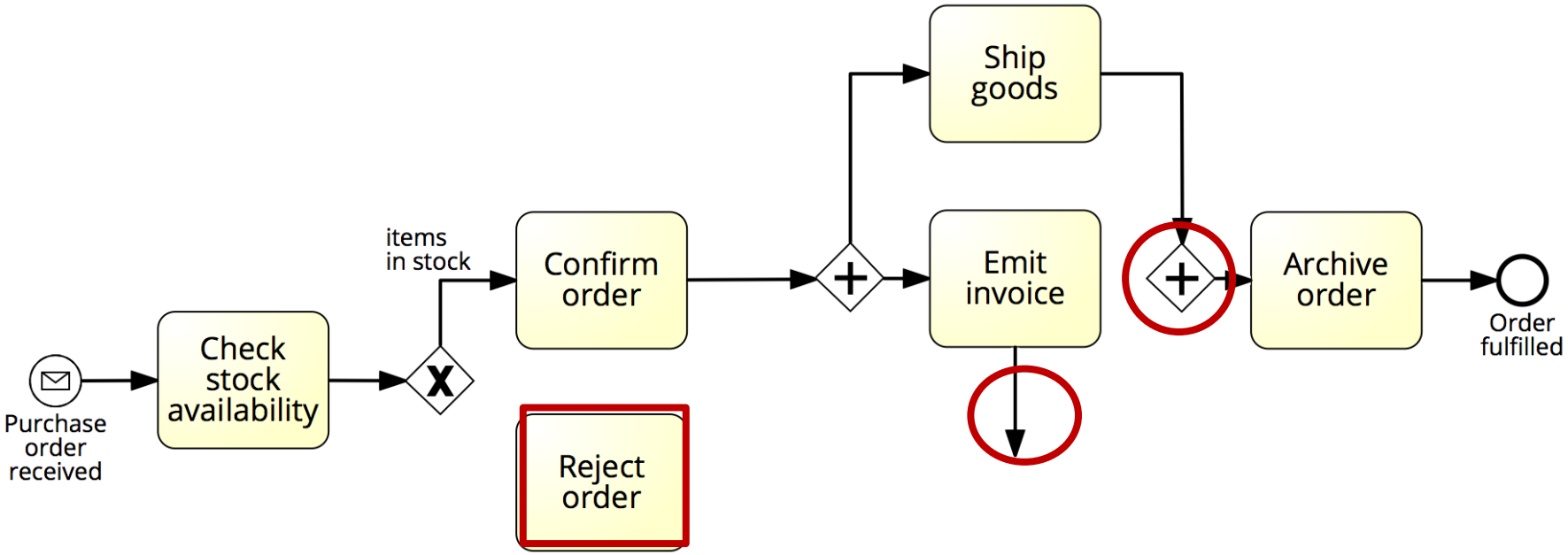
Is this model structurally correct?



Behavioural correctness (aka "soundness")

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A model is sound if it satisfies the following behavioural rules:

1. **option to complete**: any running process instance must eventually complete
2. **proper completion**: at the moment of completion, each token of the process instance should be in an end event
3. **no dead activities**: any activity can be executed in at least one process instance

Question

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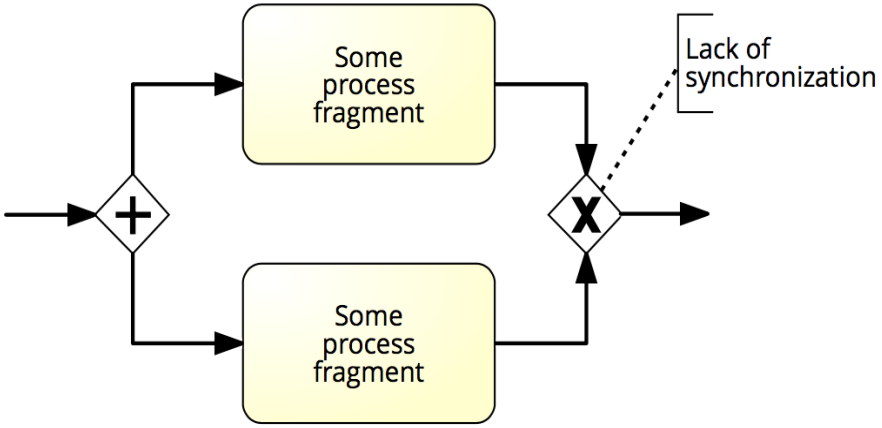
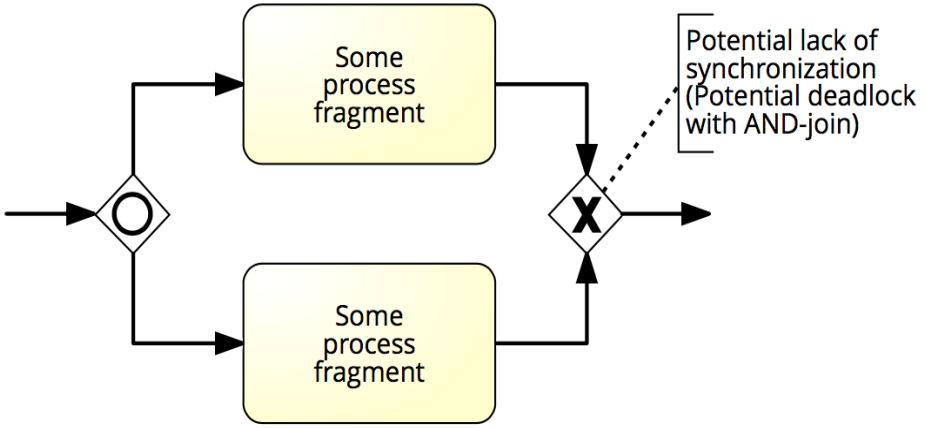
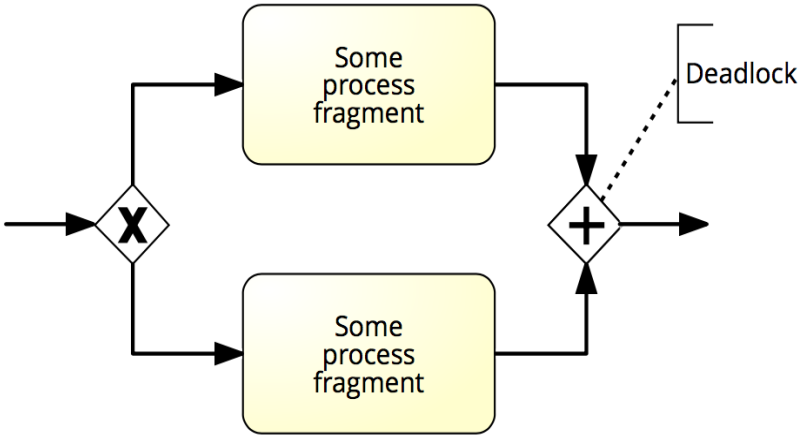
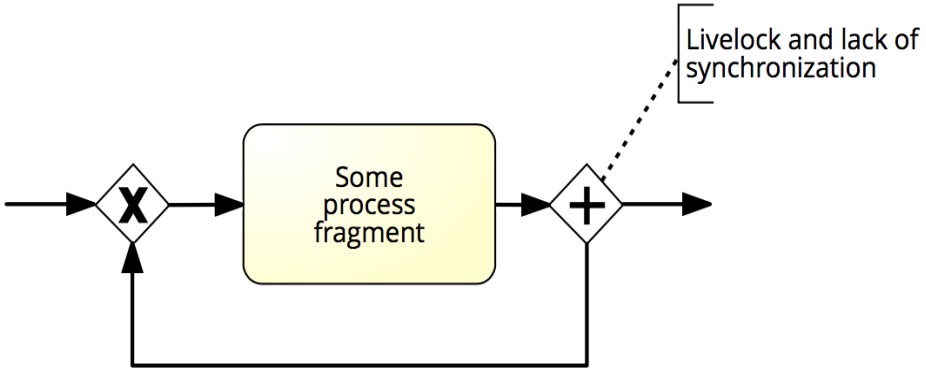
What is going wrong in each of these?









Pragmatic Quality: Certification

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Pragmatic quality relates to the usability of a process model

Challenge = anticipate the particular usage of the model

Usability:

- Understandability: how easy it is to read and comprehend the model
- Maintainability: how easy it is to apply changes
- Learning: how well a model reveals how its corresponding process works in reality

Model characteristics that influence usability include size, structural complexity and layout

Pragmatic quality example

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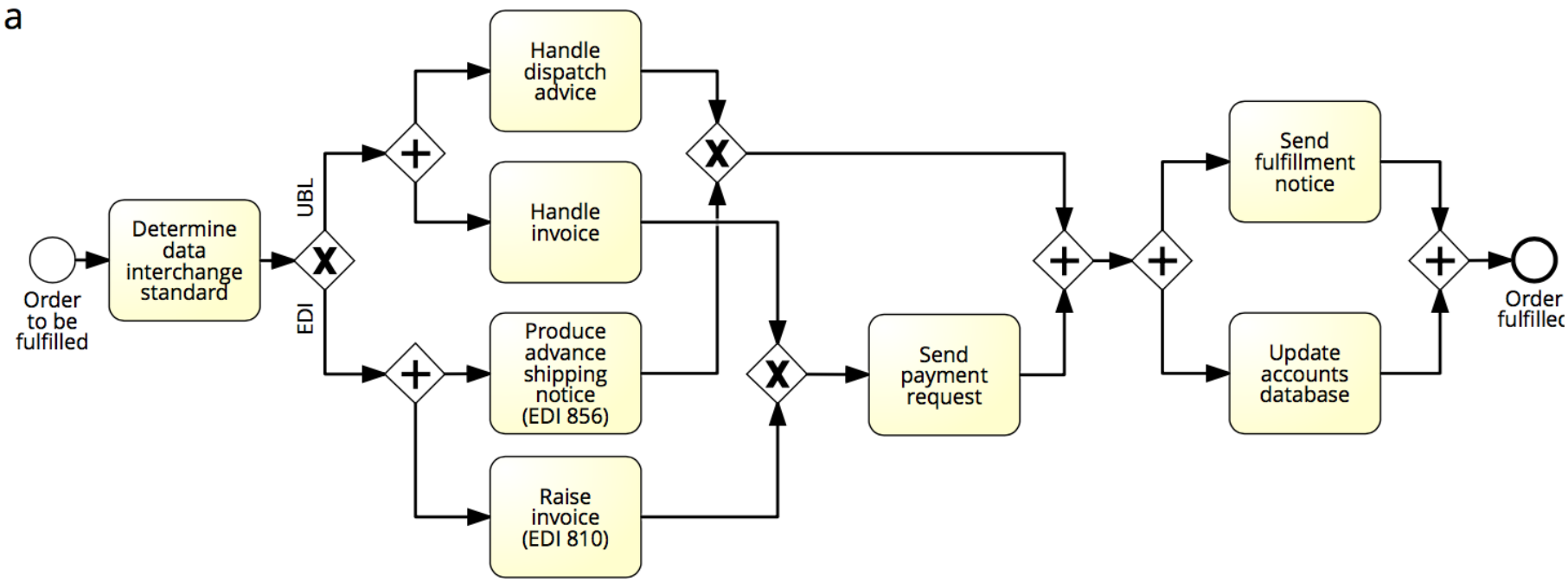
How usable is this?



Pragmatic quality example

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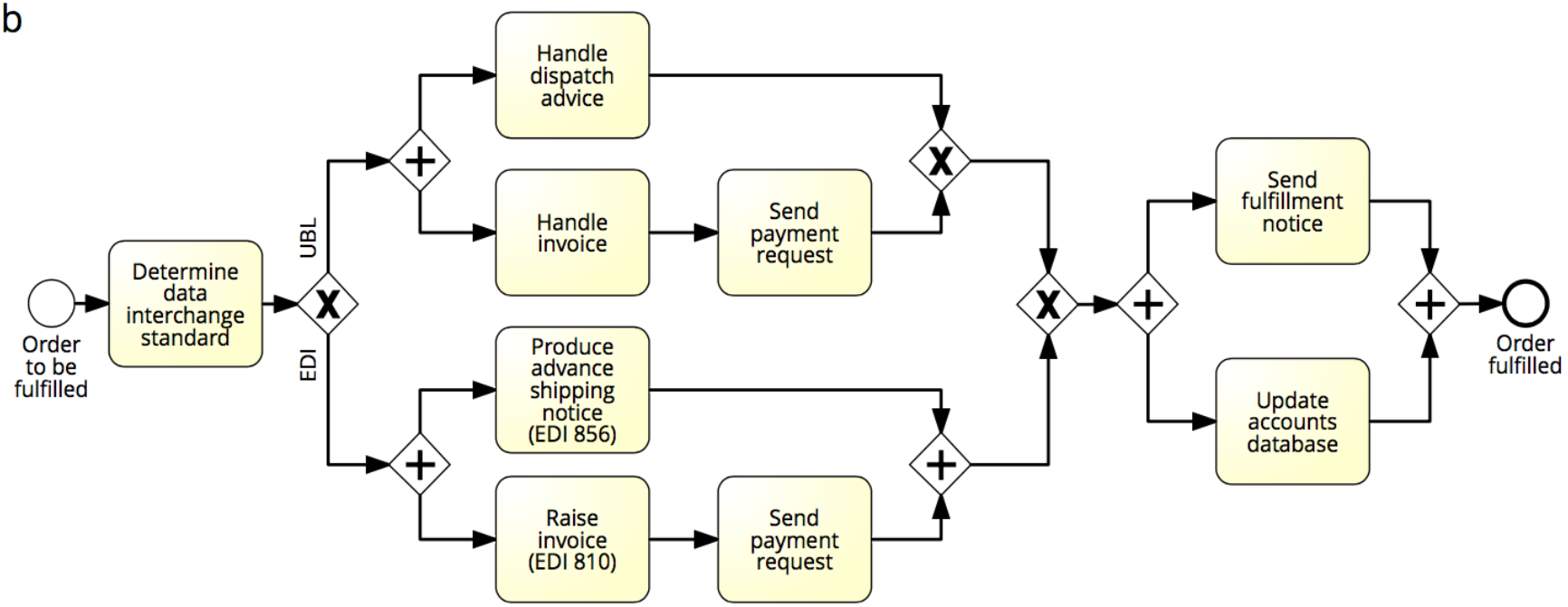
Is this better? Block-structuring a model helps

b



Common modelling guidelines and conventions

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Labeling

1. Activities as verb + noun
2. Events as noun + past-tense verb
3. Conditions on outgoing flows of XOR-splits

Layout

1. From top-left to bottom-right
2. Use no crossing of sequence flows where possible
3. Decompose if more than 30 elements

Have You Achieved the Learning Objectives?

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When you have achieved the learning objectives for this topic you should be able to answer the following questions:

- How would you collect the information needed to model business processes accurately?
- Can you construct a process model based on information collected about the process?
- What are the quality criteria that should be checked before a model can be accepted as an authoritative representation of a business process?