Business Process Management

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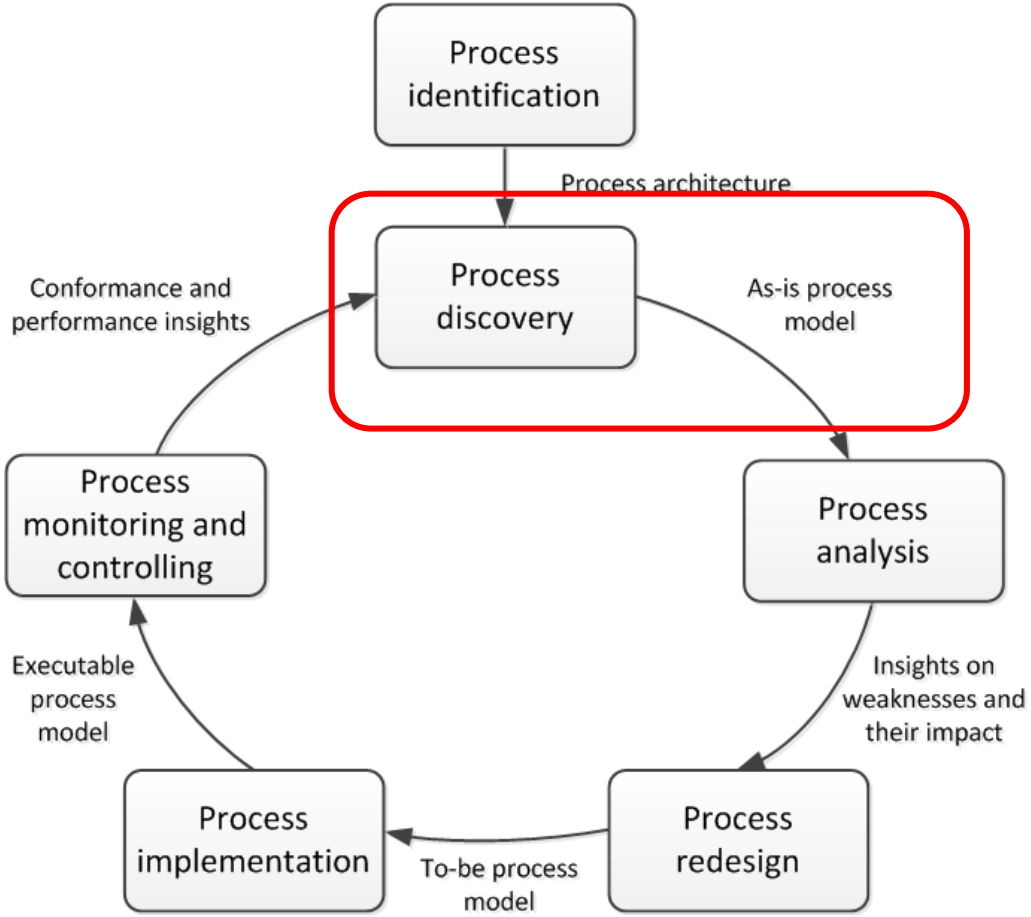
Block 4: Process Discovery

Adapted from the slides for the book :
Dumas, La Rosa, Mendling & Reijers: Fundamentals of Business Process Management, Springer 2013

http://fundamentals-of-bpm.org/wp-content/uploads/2013/02/ProSA-4-Discovery.pptx

BPM Lifecycle



Process Discovery

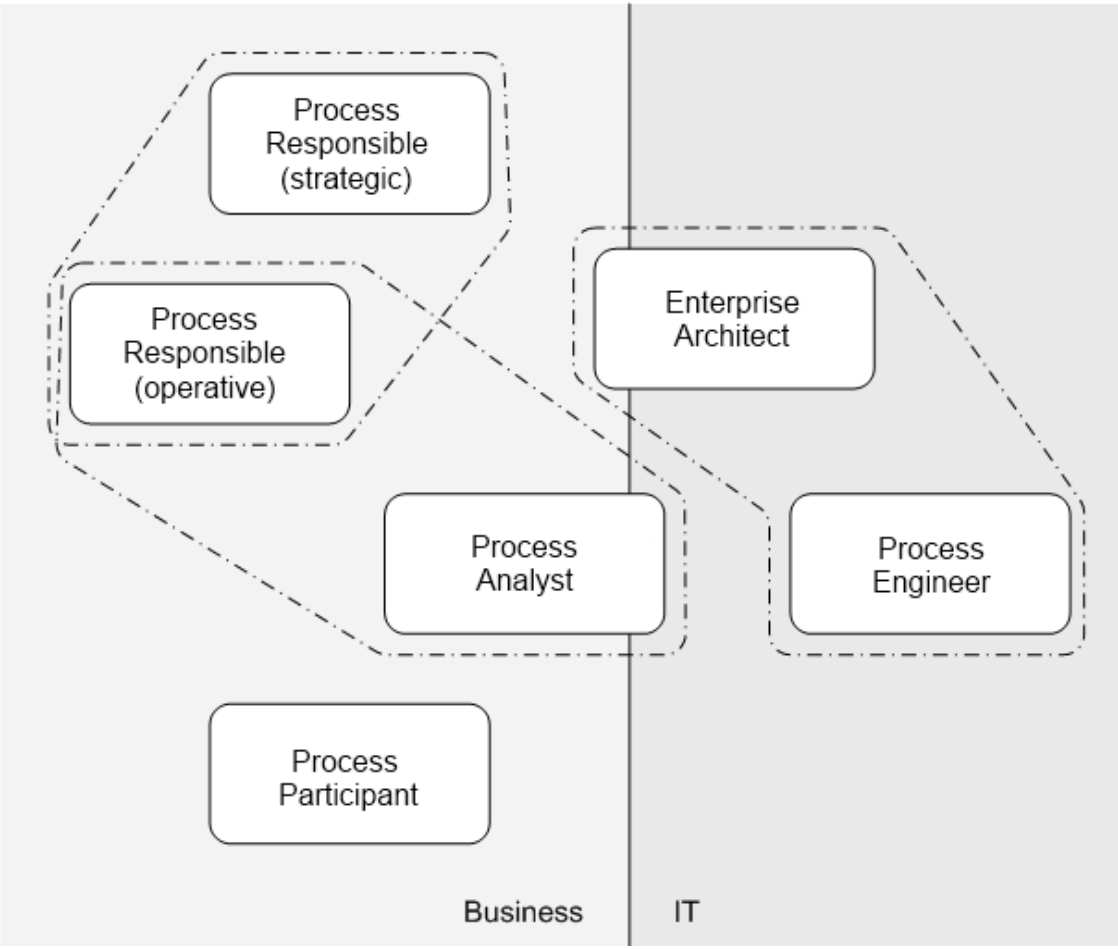
1. Defining the setting: Assemble a team in a company that will be responsible for working on the process.
2. Gathering information: Build an understanding of the process. Use different discovery methods to acquire information on a process.
3. Conducting the modeling task: Organise the creation of the process model. The modeling 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. Aimed at establishing trust in the process model.

Who is involved?

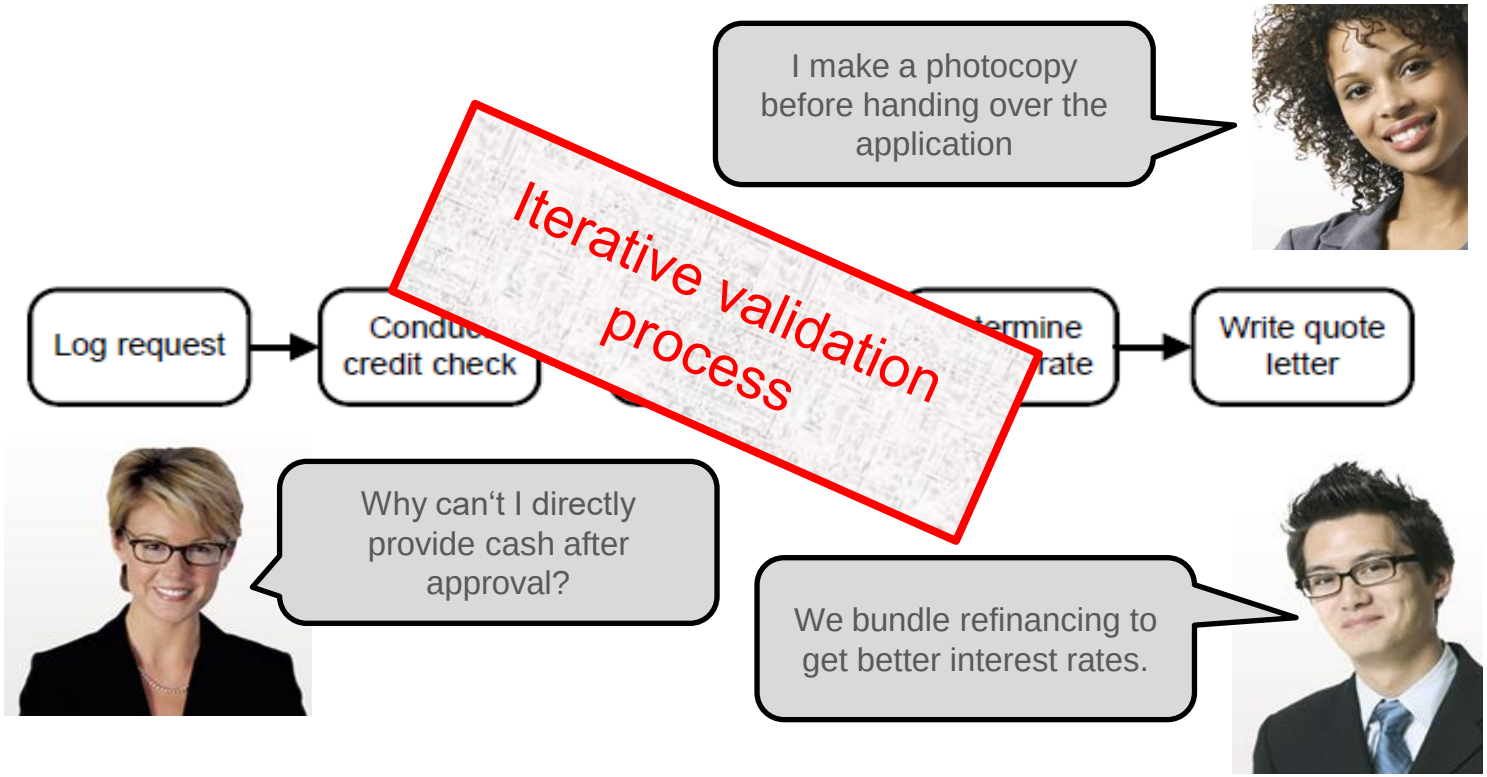
Domain Expert

Process Analyst

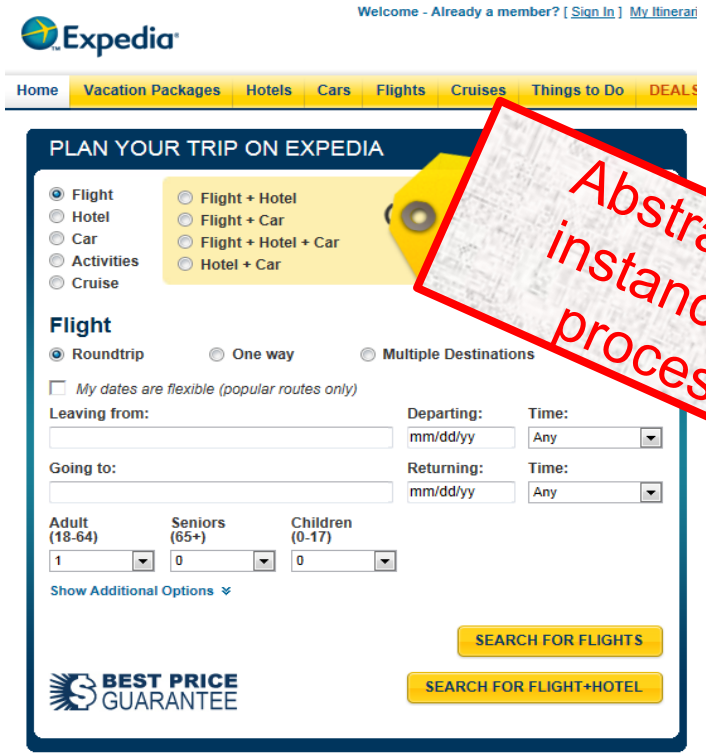
Stakeholders in Detail



Challenge 1: Fragmented process knowledge



Challenge 2: Domain experts think on instance level



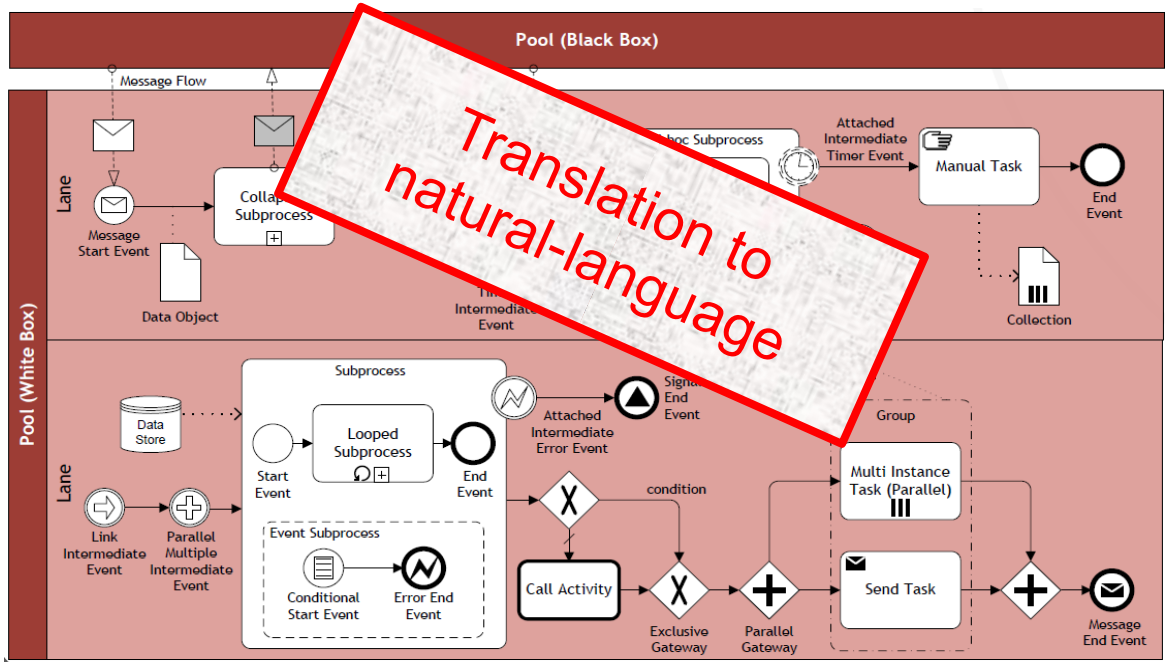
"Every trip is different"

"You cannot really compare. Our
mers go to different places in
asons using different
ransportation"

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

Challenge 3: Knowledge of process modeling is uncommon

"Does this diagram correctly show your process?"



Expertise of Process Analysts

Problem understanding
- Episodic knowledge available to get to root of problem
- Knowledge organisation helps to structure problem

Problem solving
- Trigger identification (problem-related cues)
- Hypothesis management (formulation and testing of hypotheses)
- Goal setting (what needs to be achieved next)
- Top-down strategy driven by analysis goals

Modelling skills
- Well-structured and laid out
- Systematically labelled
- Explicit start and end points of a process
- Appropriate granularity and decomposition

Process discovery methods

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

Choose one or more on the basis of context and budget

Document Analysis

Documents point to existing roles, activities and business objects:

- Process descriptions (ideal scenario)
- Internal policies
- Organization charts
- Employment plans
- Quality certificate reports
- Glossaries and handbooks
- Forms
- Work instructions…

Could be used to gather information before approaching domain experts.

Potential issues:

- May not be process-oriented and trustworthy
- May require abstraction or refinement

Observation

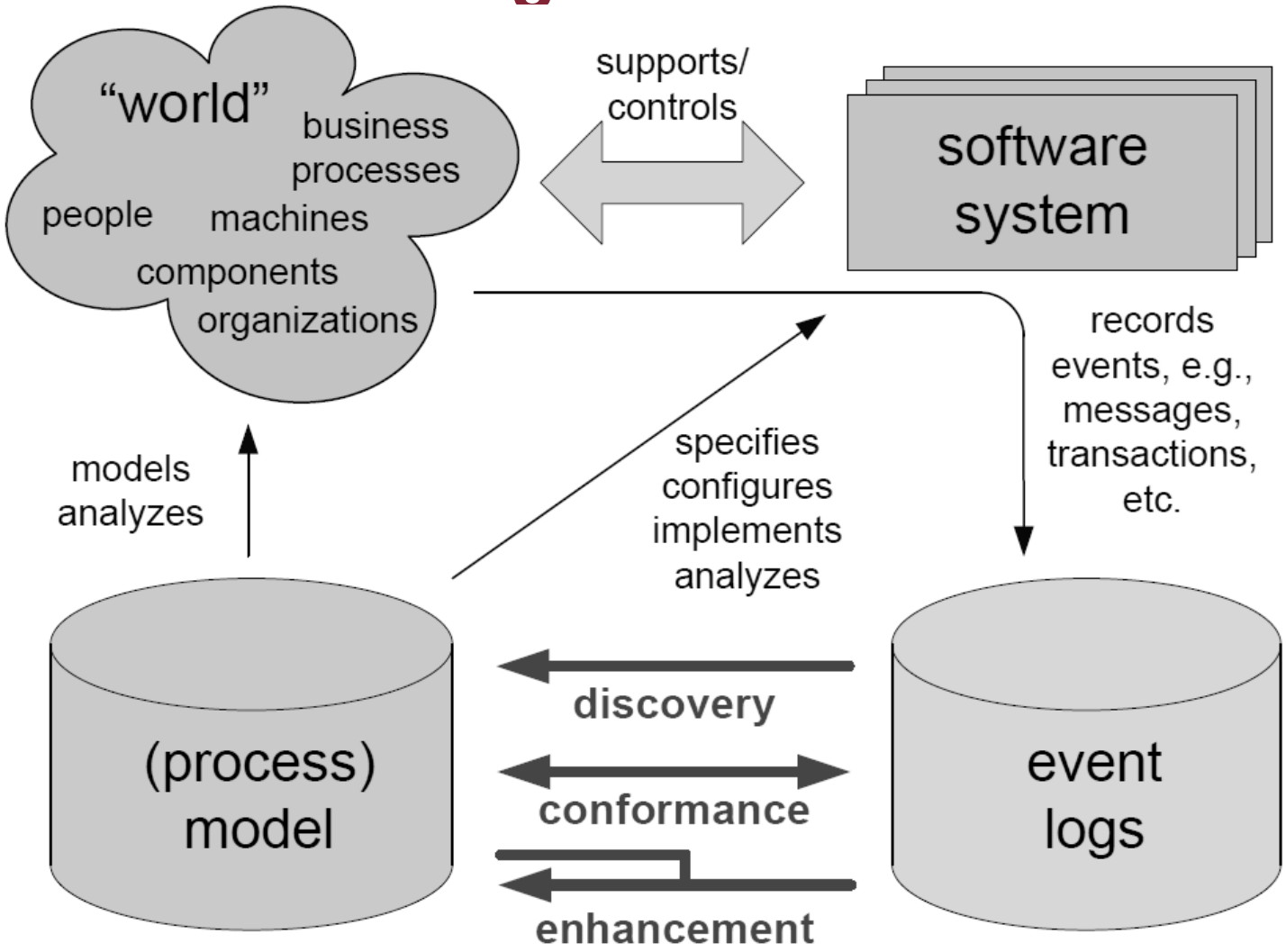
- Follow directly the execution of individual process instances, then abstract from instance to process level:
  - **Active role**: play a specific role, e.g. customer
  - **Passive role**: observe participants and their environment

- Trace business objects in the course of their lifecycle

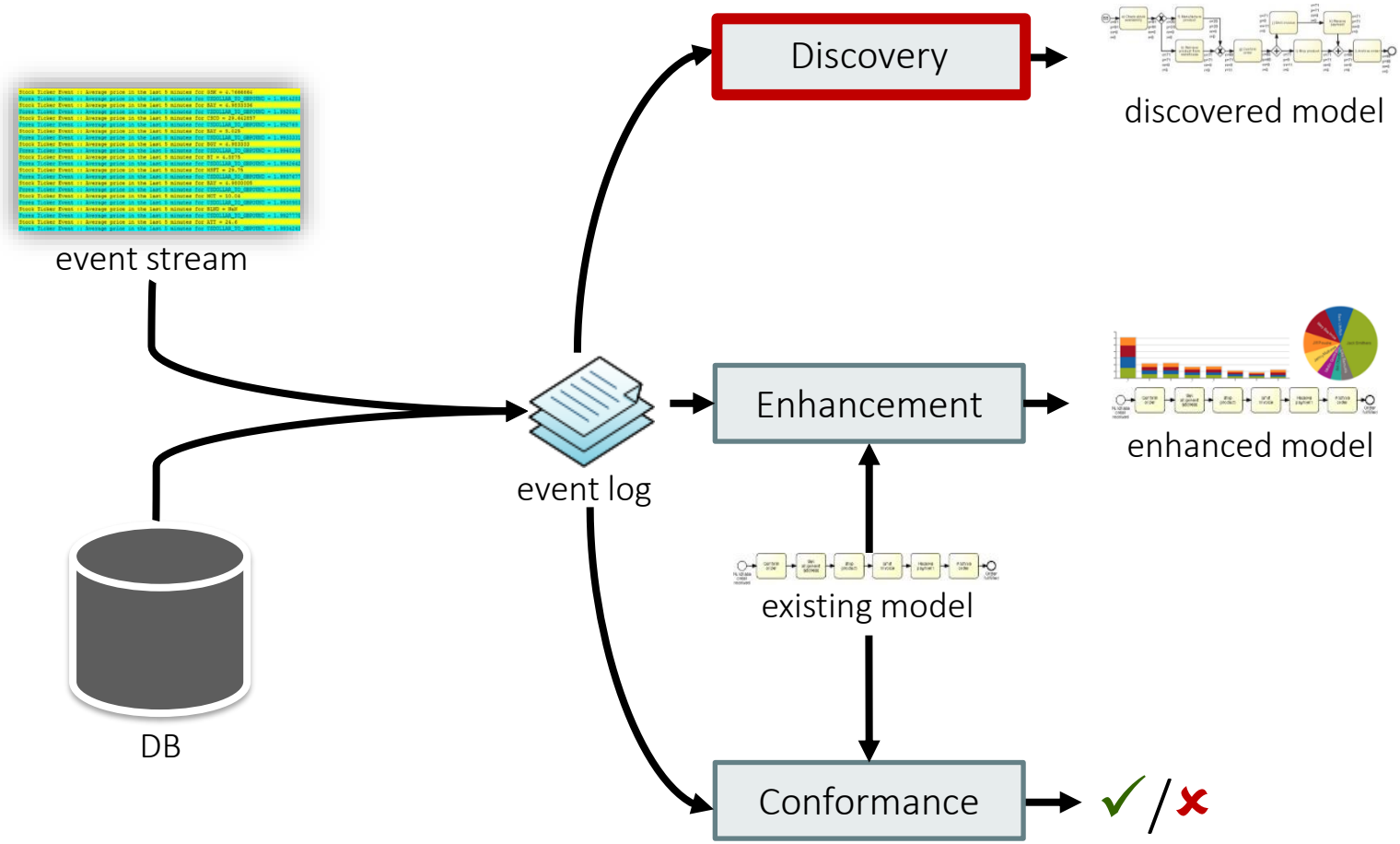
Potential issues:

- Active role: no big picture
- Passive role: participants' bias

Process Mining



Automated process discovery and Process mining

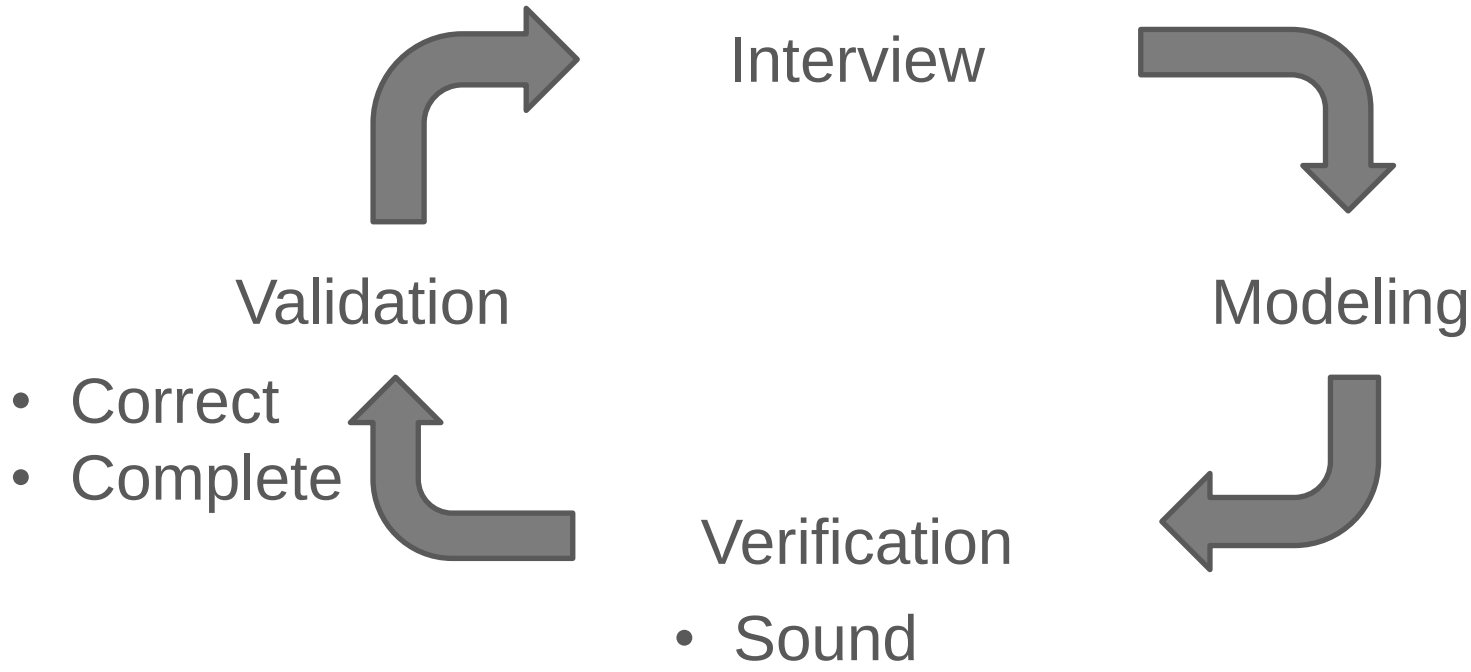


Automated discovery: Minimum data requirements

- Activity name and timestamp
- Reference to case id

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	...

Interviews



- Structured vs. unstructured interviews
- Assumption: analyst and stakeholder share terminology
- Then, questions target at identifying deviations from standard processing

Workshops

- Gather all key stakeholders together
- One process analyst, multiple domain experts
- 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
- Alternative: brown-paper workshops

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

Effort of Process Discovery

Consider that the order process of your favorite online book retailer has ten major activities that are conducted by different persons. How much time do you need approximately for creating a process model that is validated and approved by the process owner? Make appropriate assumptions.

Process Discovery Effort

This process contains ten major activities that are executed by different persons. We can assume that there will be a kickoff meeting with the process owner and some important domain experts on day one. One day might be required to study available documentation. An interview with one domain expert can take from two to three hours, such that we would be able to meet two persons per day and document the interview results at nighttime. Let us assume that we meet some persons only once while we seek feedback from important domain experts in two additional interviews. Then, there would be a final approval from the process owner. This adds up to one day for the kickoff, one for document study, five days for the first iteration interviews, and further five days if we assume that we meet five experts three times. Then, we need one day for preparing the meeting for final approval with the process owner, which would be on the following day. If there are no delays and scheduling problems, this yields 2 + 5 + 5 + 2 = 14 workdays as a minimum.

Any Difference in Discovery?

- Consider the following two companies.
- Company A is young, founded three years ago, and has grown rapidly to a current toll of one hundred employees.
- Company B is owned by the state and operates in a domain with extensive health and security regulations.
- How might these different characteristics influence a workshop-based discovery approach?

Discovery and Culture

Before starting with process discovery, it is important to understand the culture and the sentiment of an organization.

There are companies that preach and practice an open culture in which all employees are encouraged to utter their ideas and their criticism. Such organizations can benefit a lot from workshops as participants are likely to present their ideas freely.

In strictly hierarchical organizations, it is necessary to take special care that every participant gets an equal share of parole in a workshop and that ideas and critique are not held back.

It might be the case that the young dynamic company has a more open culture than the company with extensive health and security regulations. This has to be taken into account when organizing a workshop.

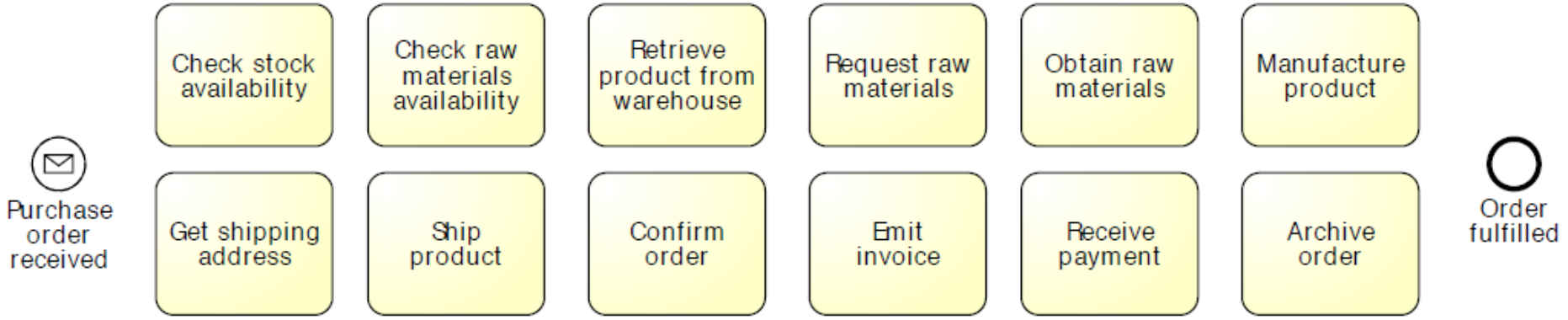
Organizing the Gathered Material

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.

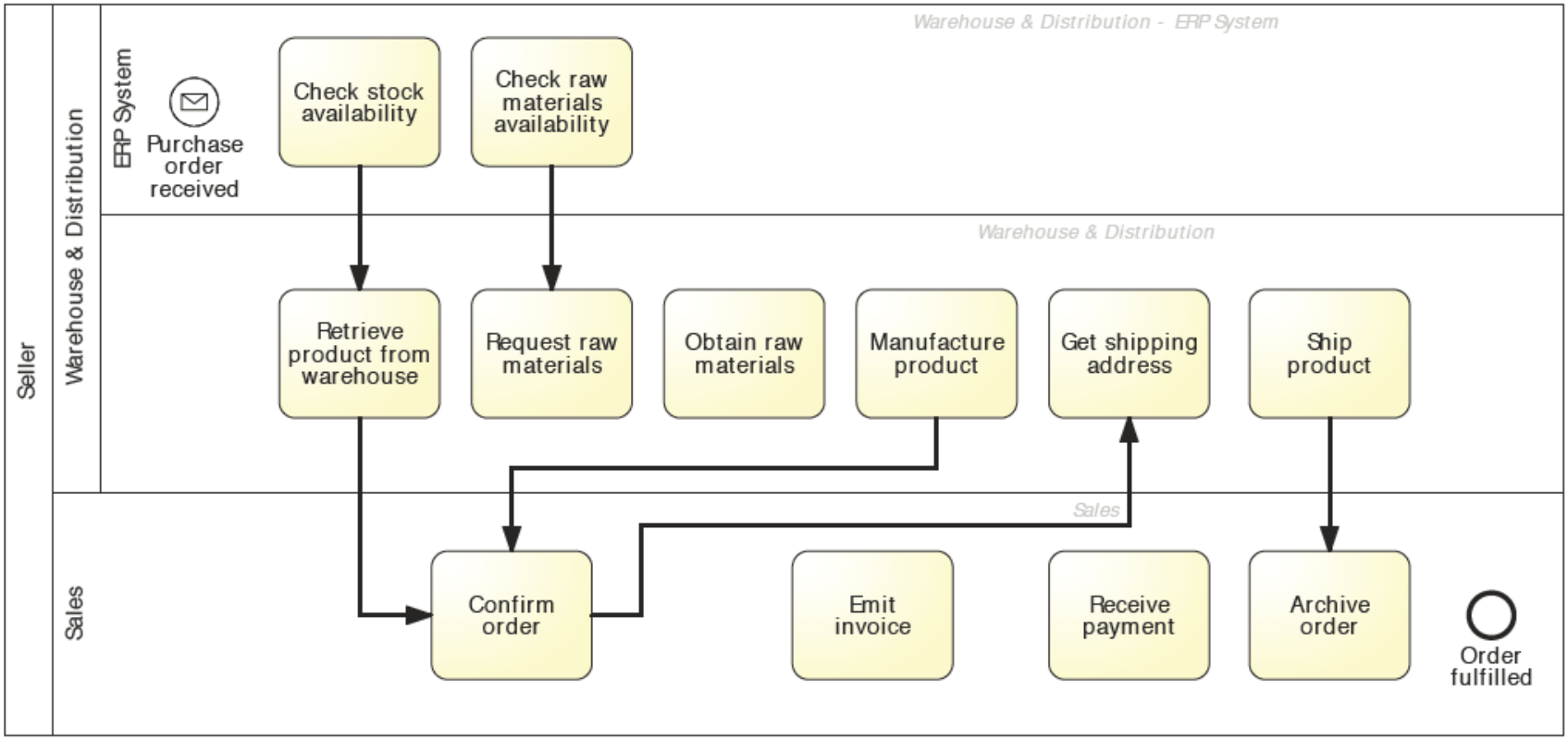
Process Boundaries

- Under which condition does the process start?
- With which result does it end?
- Which perspective do you assume?
- What artifacts are required as input and output to the process?

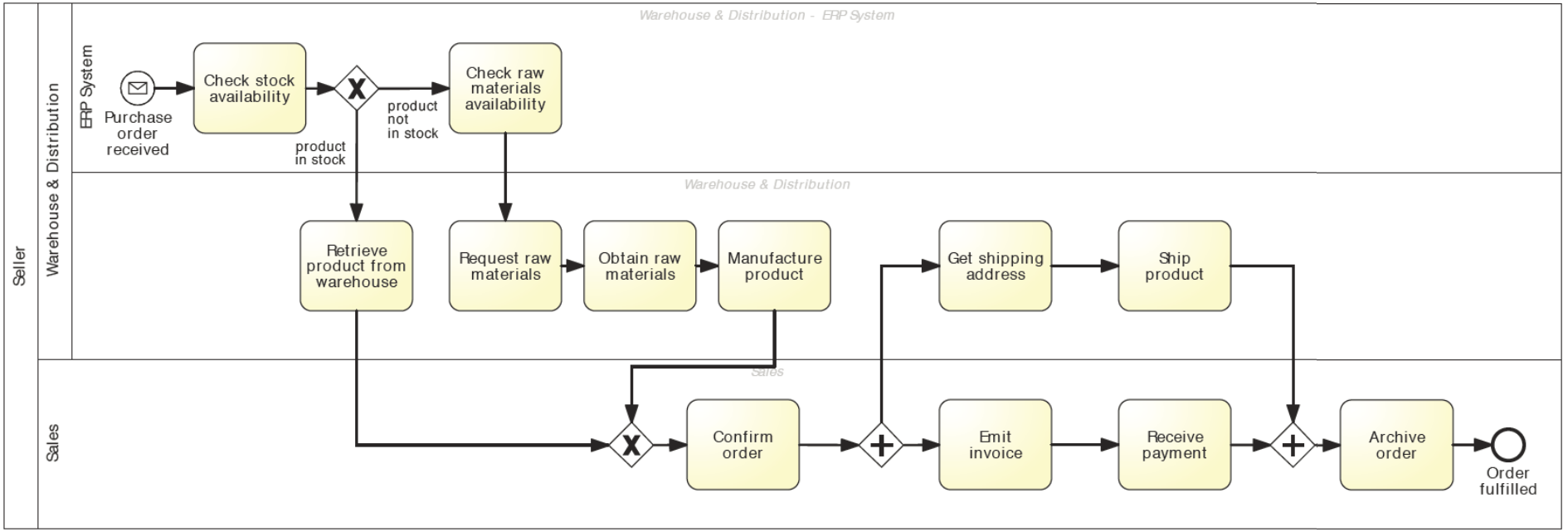
Identify Activities and Events



Identify Resources and Handovers



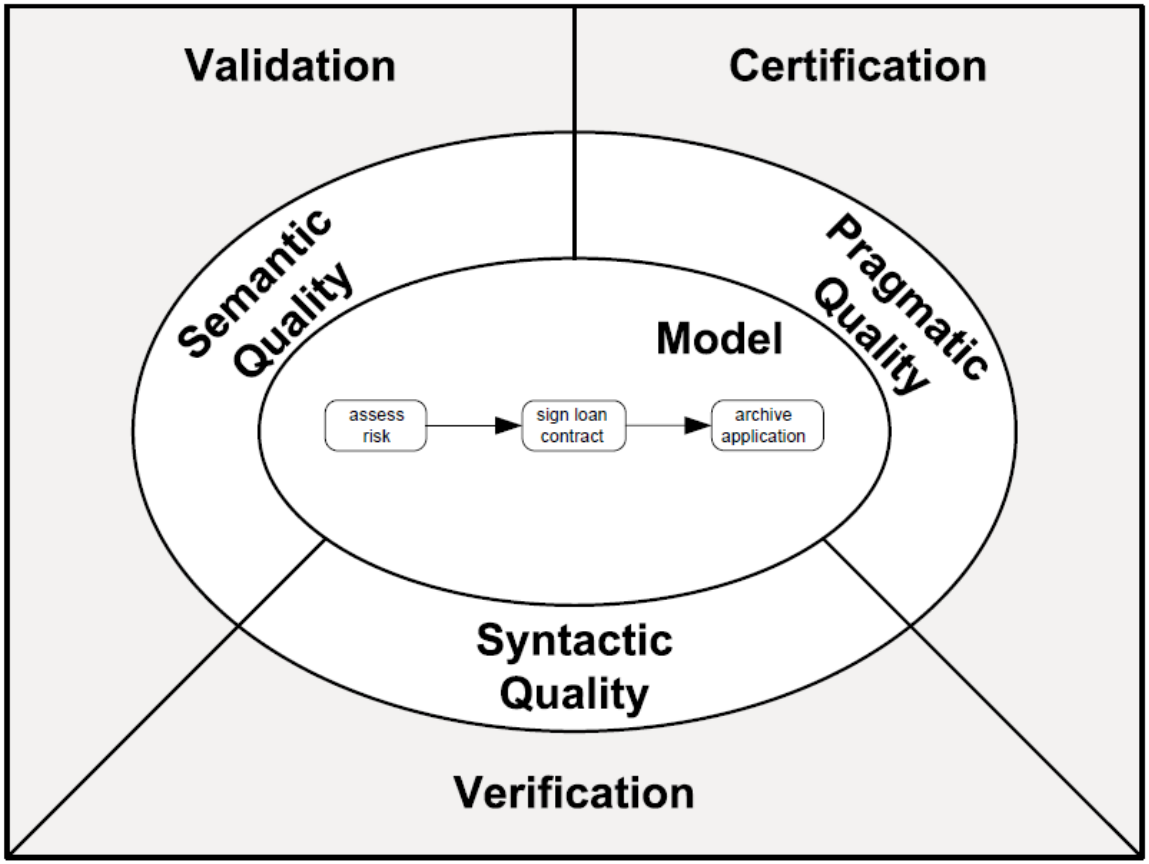
Identify Control Flow



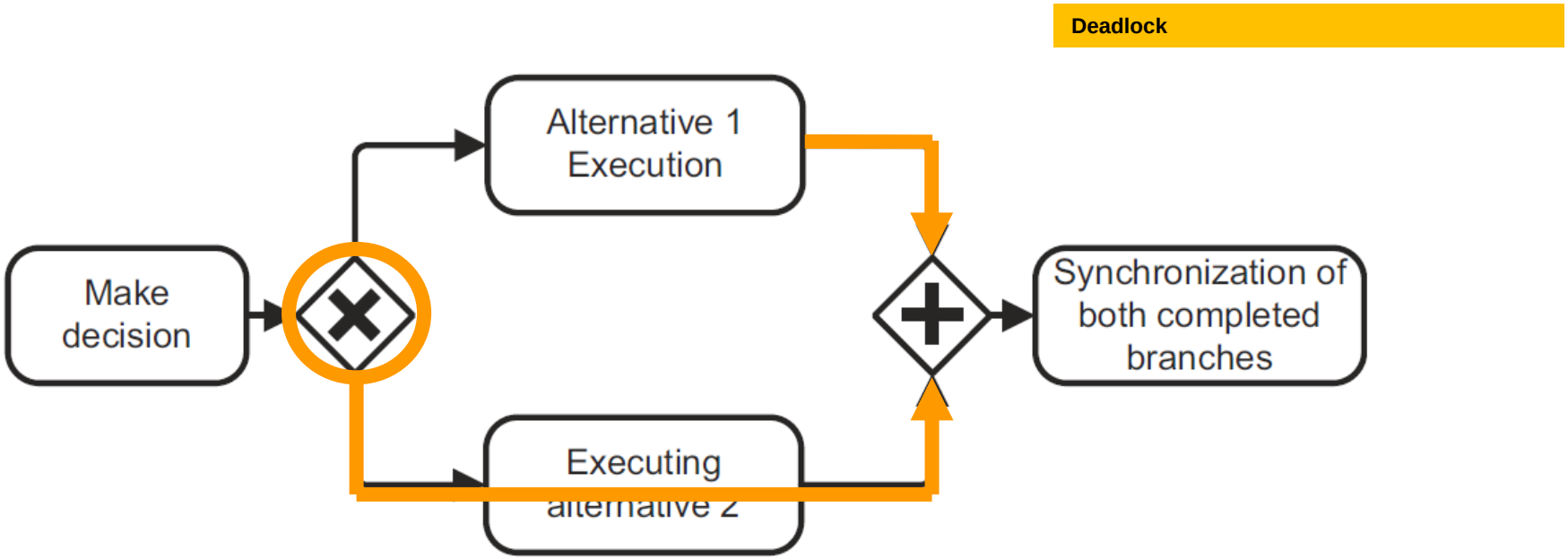
Your modeling project

- For your modeling project, capture
  - Control flow
    - Activities
    - Gateways
    - Conditions
    - Events
  - Resources
  - Describe the process in such a way that it can be used to trace in which state an instance of it is and who is conducting which steps of processing.

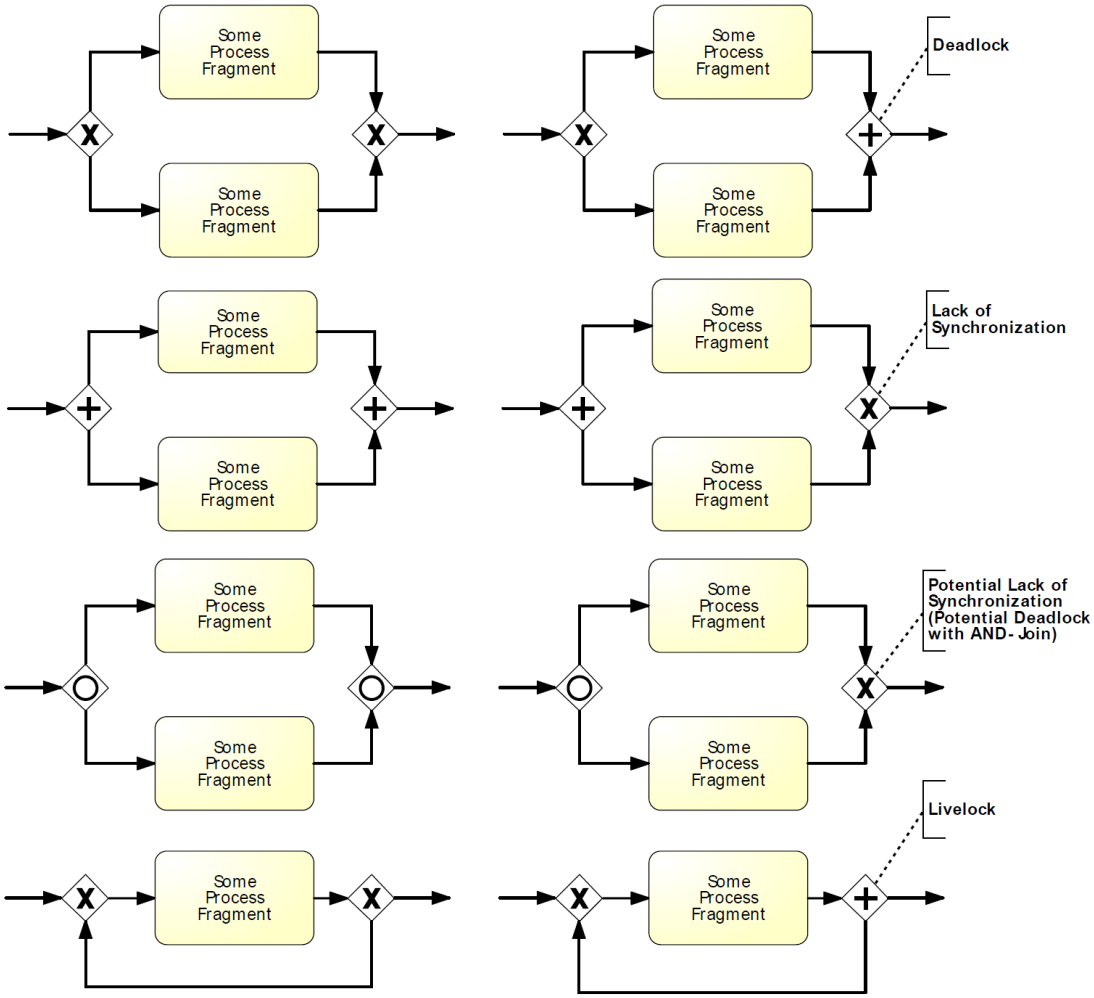
Quality Assurance



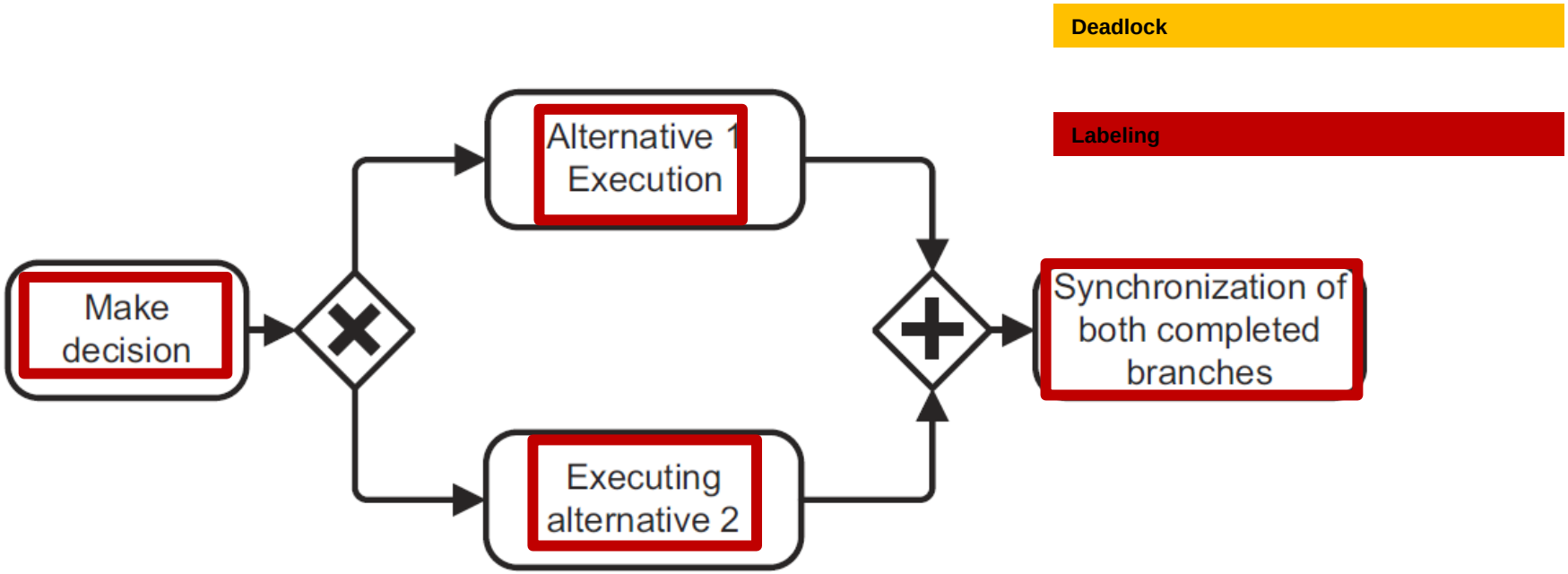
Is this process model of good quality?



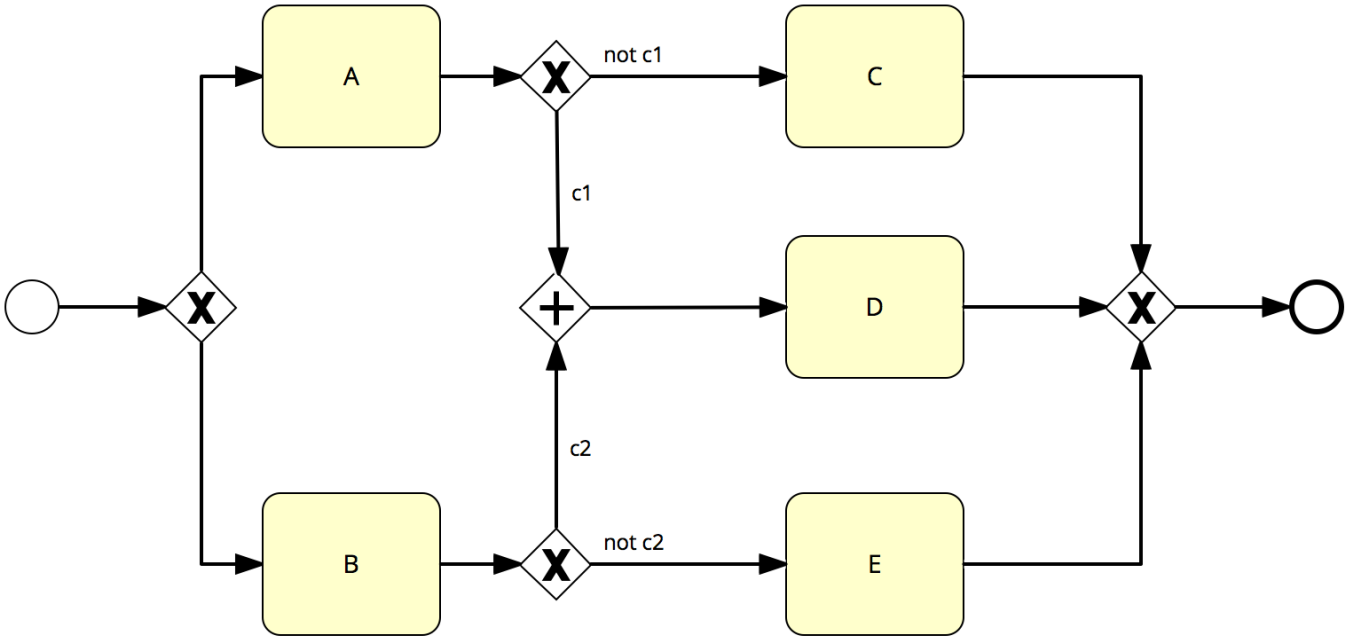
Syntactic Quality: Verification



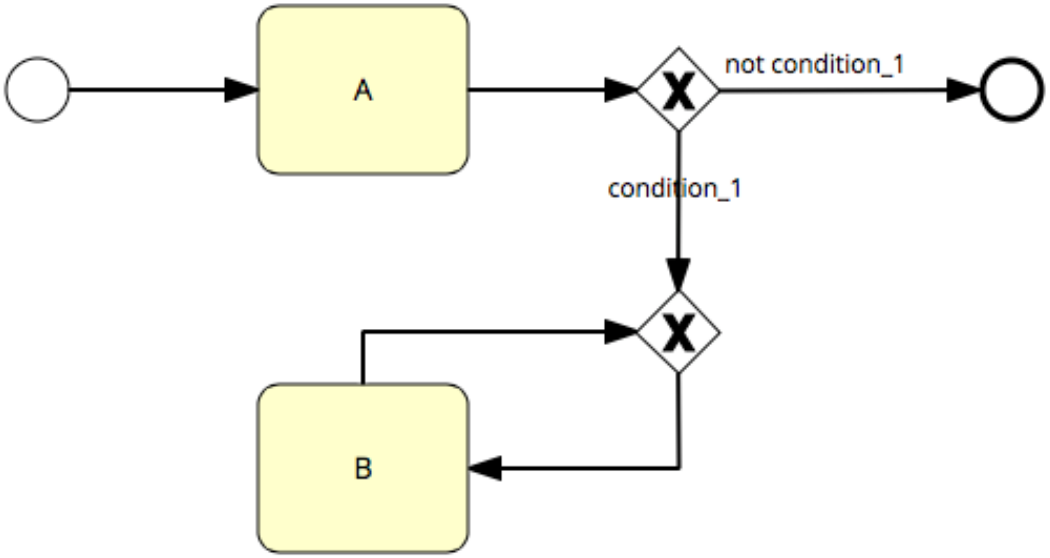
Is this process model of good quality?



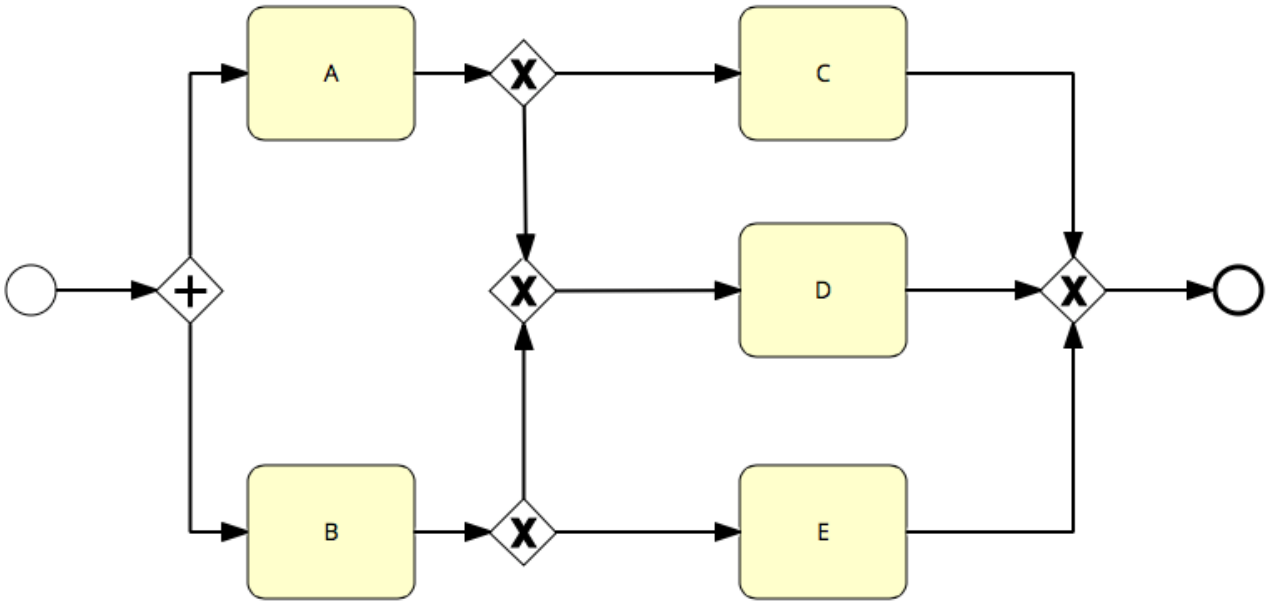
Example: no option to complete



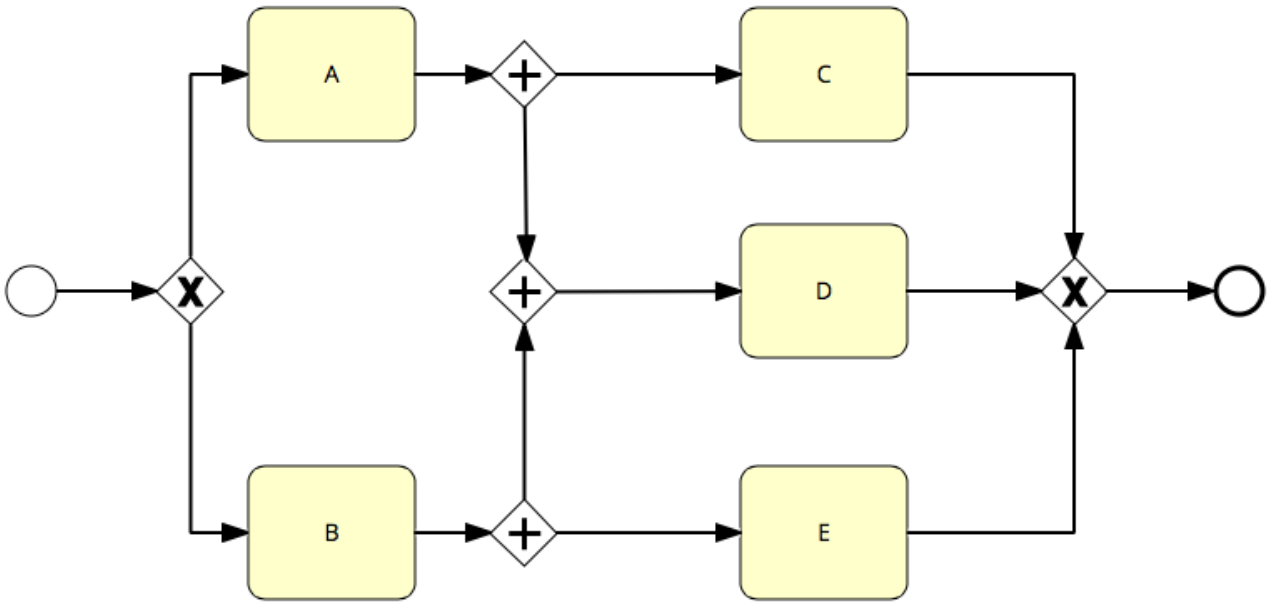
Example: livelock (no option to complete)



Example: no proper completion



Example: dead activity

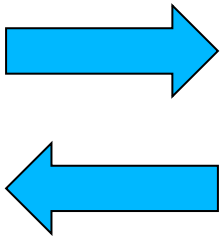


Formulate Labels Adequately

- Activities as Verb-Object
- Events as Object-Passive-Participle
- Conditions with reference to Object

Semantic Quality: Validation

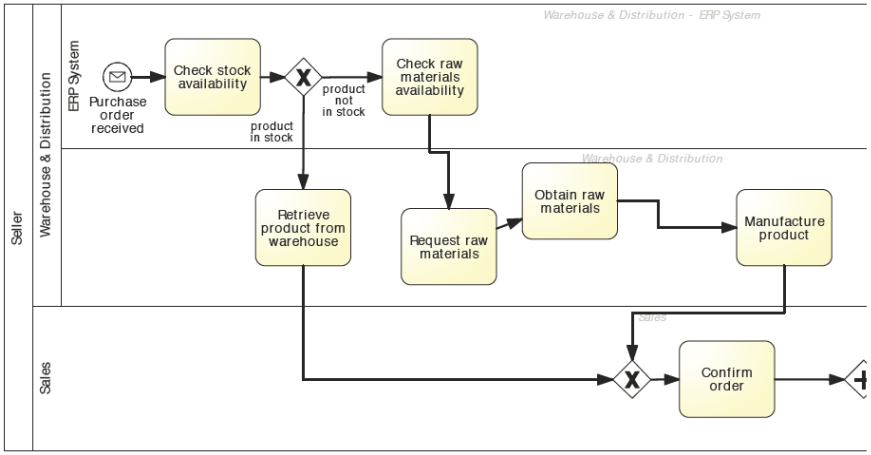
- Correctness and
- Completeness



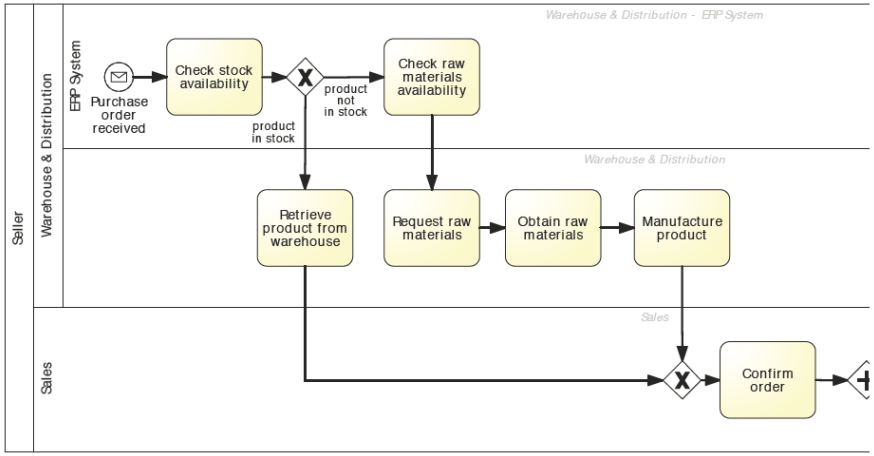
Domain Expert

Process Analyst

Pragmatic Quality: Layout



Models must look nice



Seven Process Modeling Guidelines (7PMG)

G1 Use as few elements in the model as possible

G2 Minimize the routing paths per element

G3 Use one start and one end event

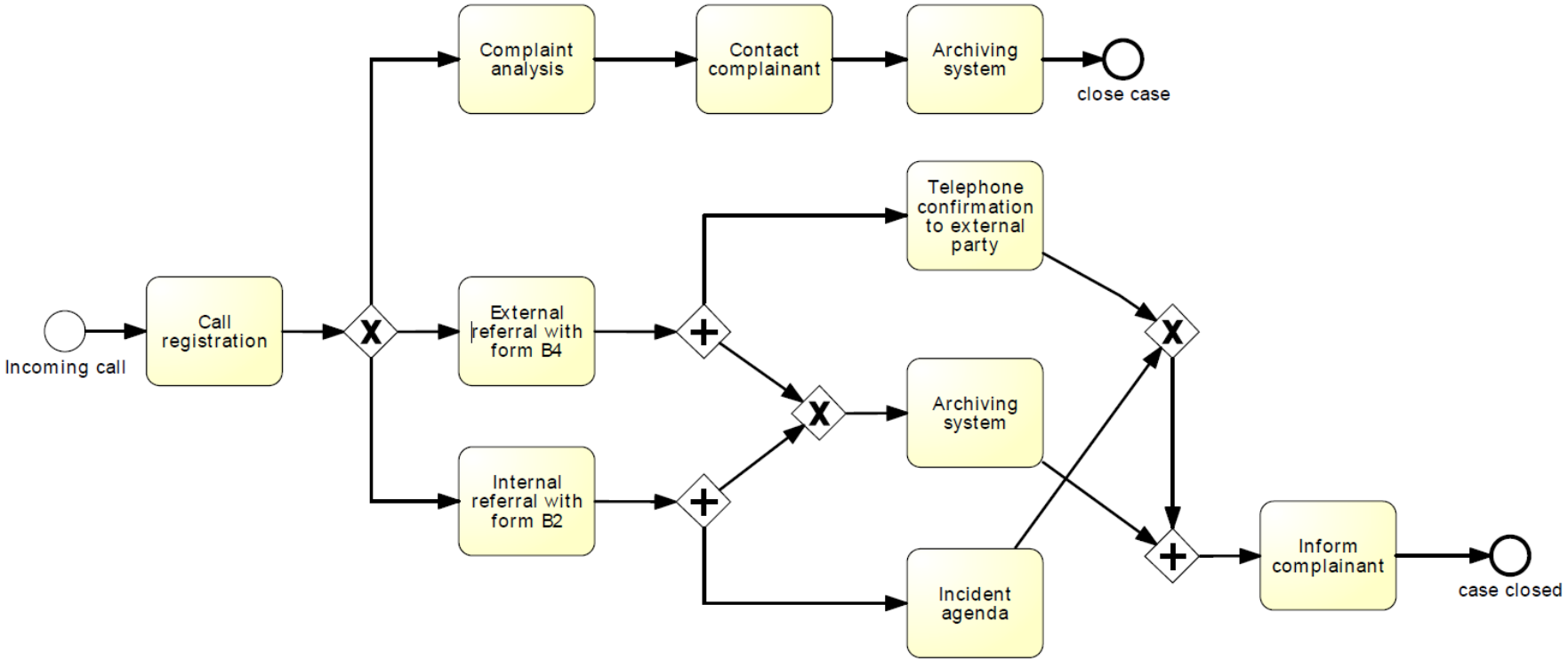
G4 Model as structured as possible

G5 Avoid OR routing elements

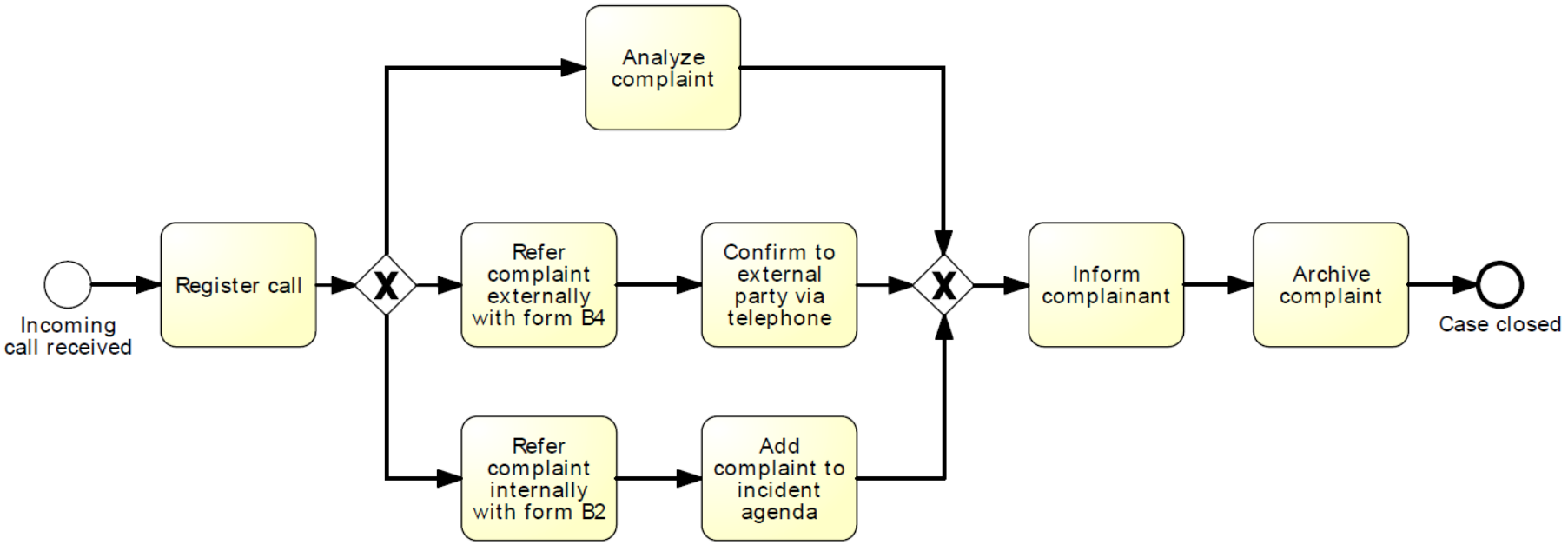
G6 Use verb-object activity labels

G7 Decompose a model with more than 50 elements

Explain which 7PMG guidelines point to potential for improvement. Remodel the process based on your observations.



The reworked process



Recap

1. Structured loops can be modelled with loop activities, but arbitrary cycles cannot
2. Multi-instance activities model activities that need to be executed multiple times without a-priori knowledge of their number
3. Multi-instantiation extends to business objects and resources
4. Intermediate events can either be catching or throwing
5. Message events capture message exchange at the start, during and at the end of a process
6. Timer events capture temporal events (absolute or periodic)

Recap (cont‘ed)

7. Exceptions can be technology or business based, and either internal, external or activity timeouts
8. The simplest way to handle exceptions is via process abortion using terminate events
9. Boundary error events capture internal extensions
10. Boundary message events capture external extensions
11. Boundary timer events capture activity timeouts
12. Signal events broadcast multiple messages and can be used to capture complex exceptions
13. Compensation events are required to revert the effects of completed activities
14. Conditional events are one way of capturing business rules

Summary

- Domain expert and process analyst have different strengths and limitations in process discovery
- There are various discovery methods
- Quality Assurance is important