



Andrii Kopp, Ph.D.



Dmytro Orlovskyi, Ph.D.

“Detection of Mistakes in Business Process Models as a part of Business Analysts E-Training”

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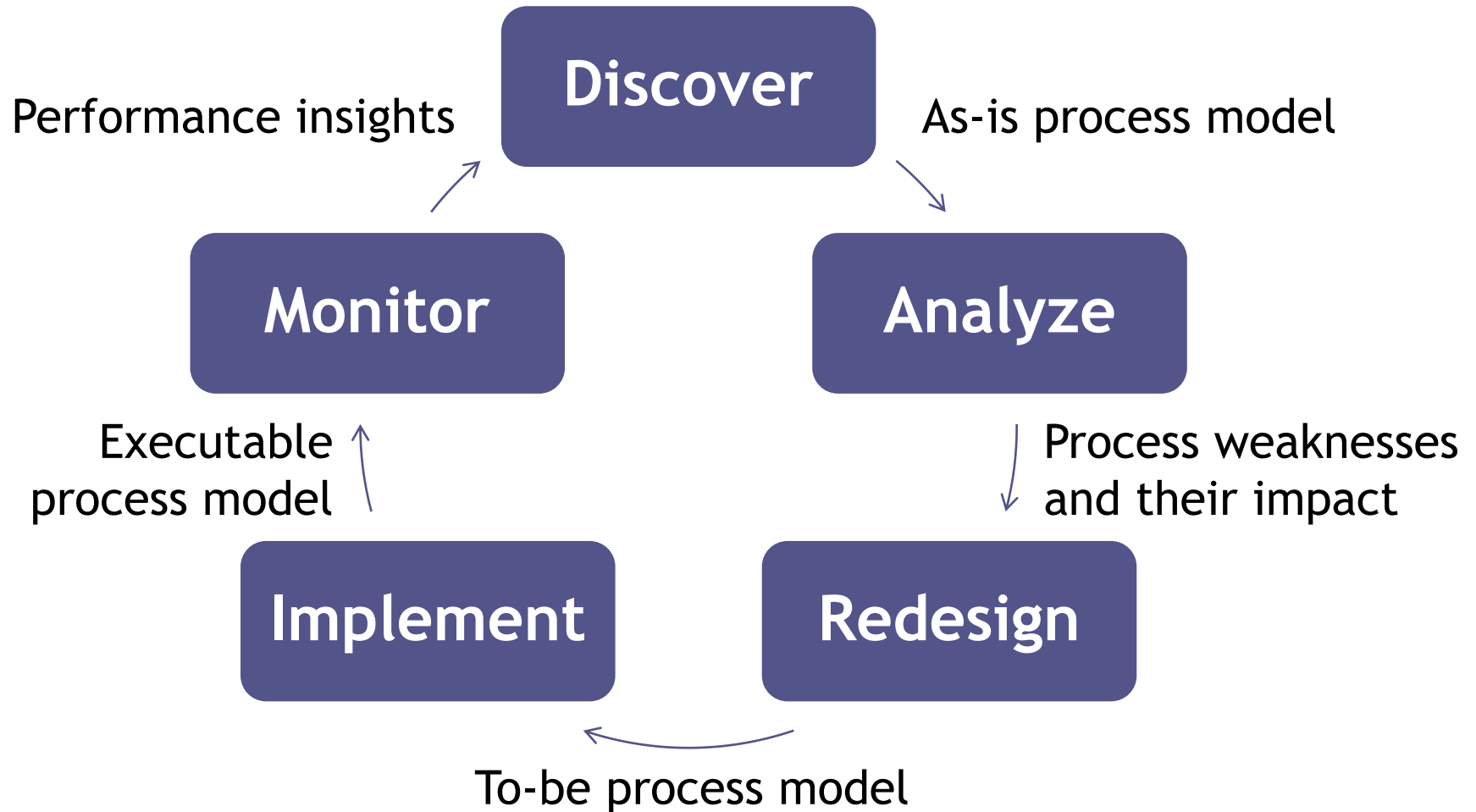


Business Process Management & Modeling

Benefits

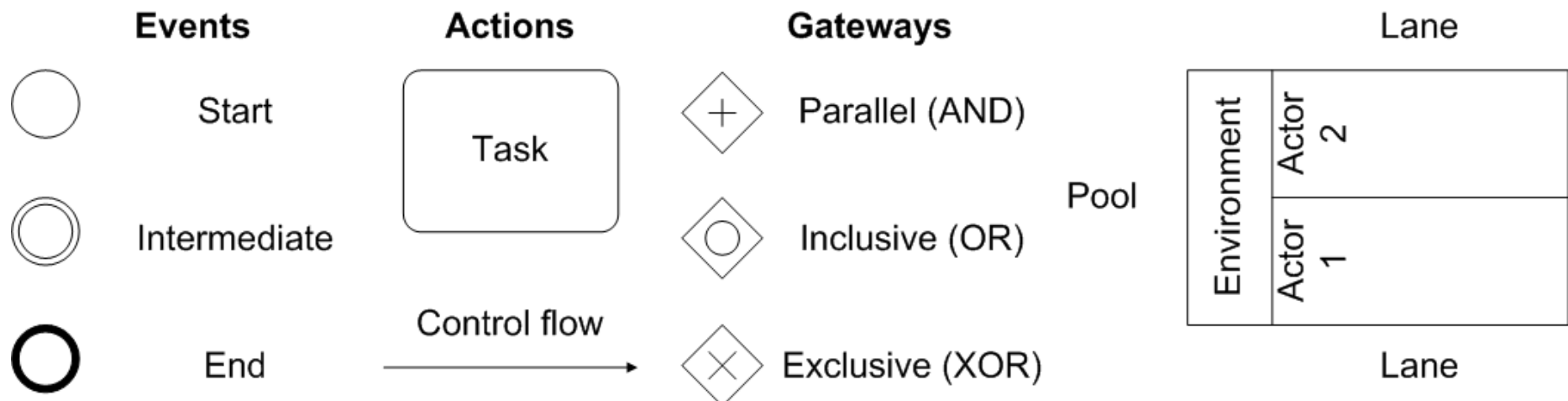
- Business Process Management (BPM) helps to analyze organizational activities to provide quality products and services and to find the ways to improve these activities
- Business Processes are scenarios of **Activities** (or Tasks) driven by **Events** and **Decisions**
- Models are used to describe business processes and help to design and analyze of information systems, and communicate with stakeholders

BPM Lifecycle



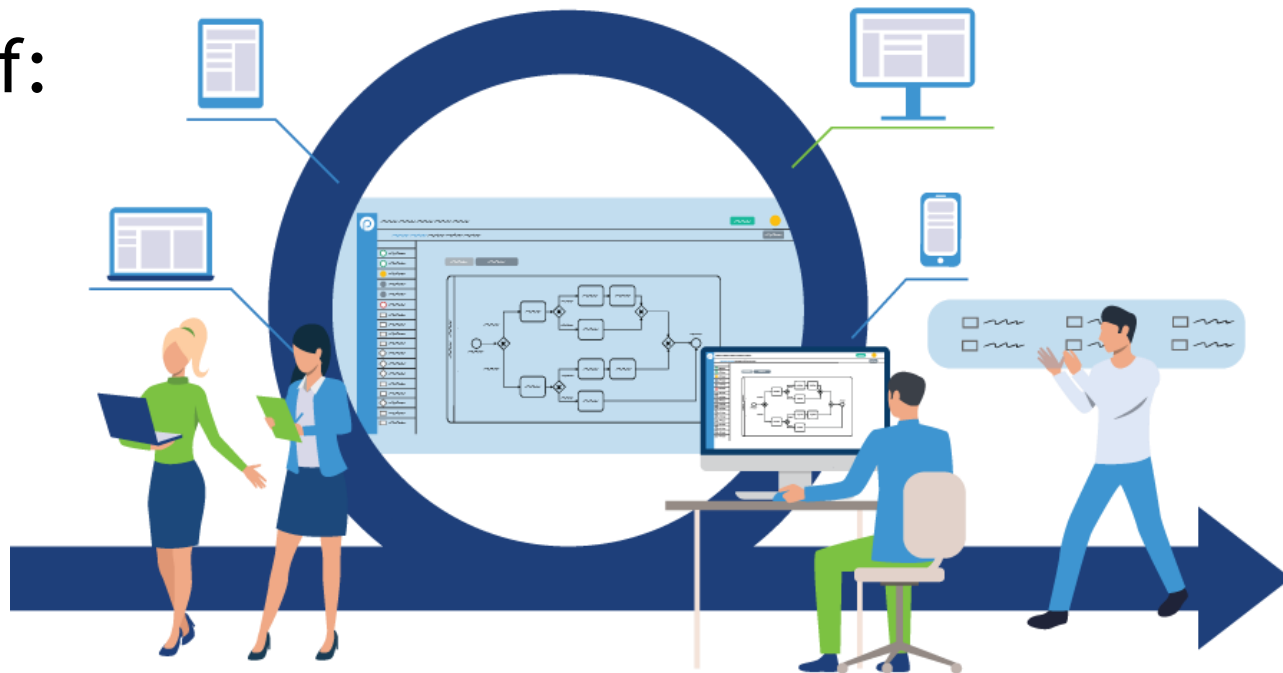
Business Process Model and Notation (BPMN)

- Object Management Group (OMG) standard
- Business-IT alignment and collaboration between stakeholders
- XML-based exchange file format (BPMN 2.0)



Business Process Modeling Mistakes and Bad Practices

- Large model size
- Incorrect usage of:
 - Tasks
 - Events
 - Gateways

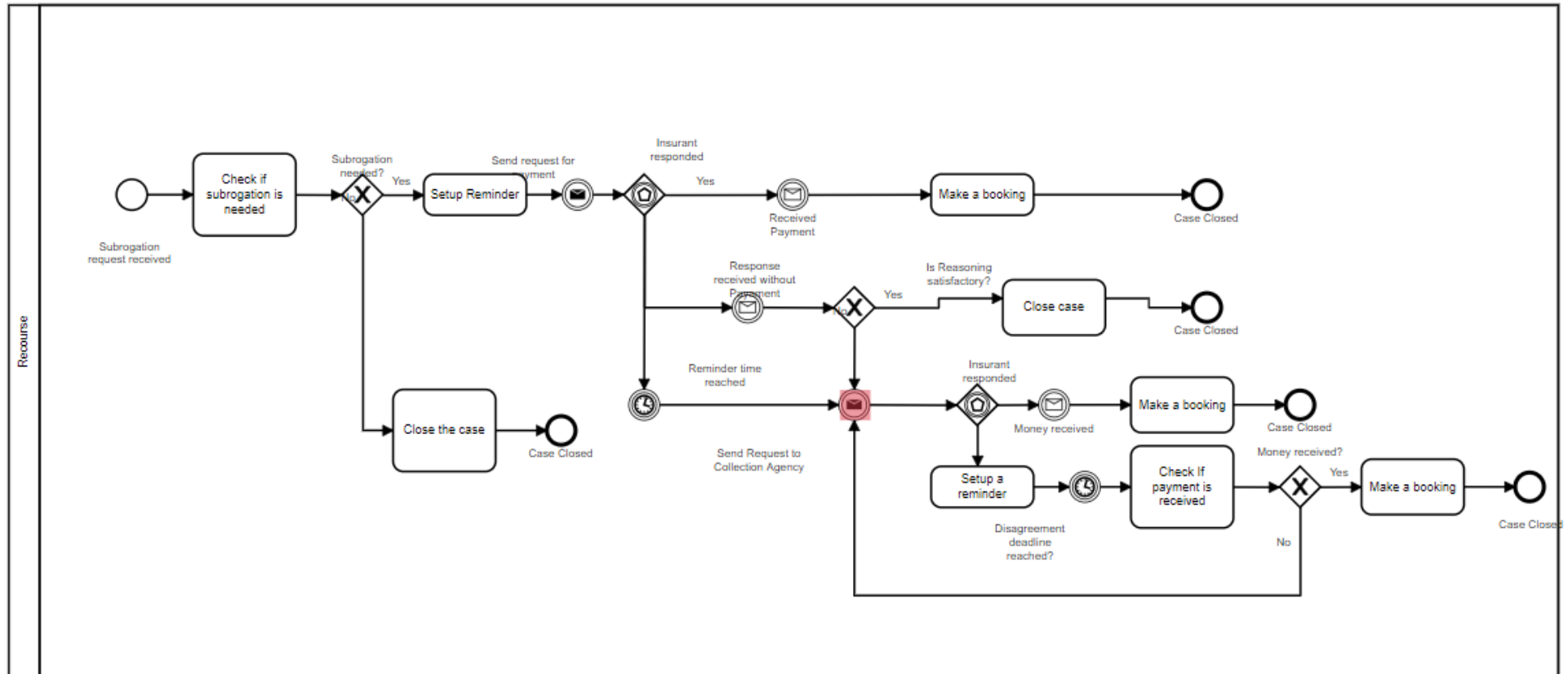


Business Process Modeling Mistakes and Bad Practices: Large Model Size

- There should be up to 8 activities in a business process model
- Larger models should be decomposed using sub-processes



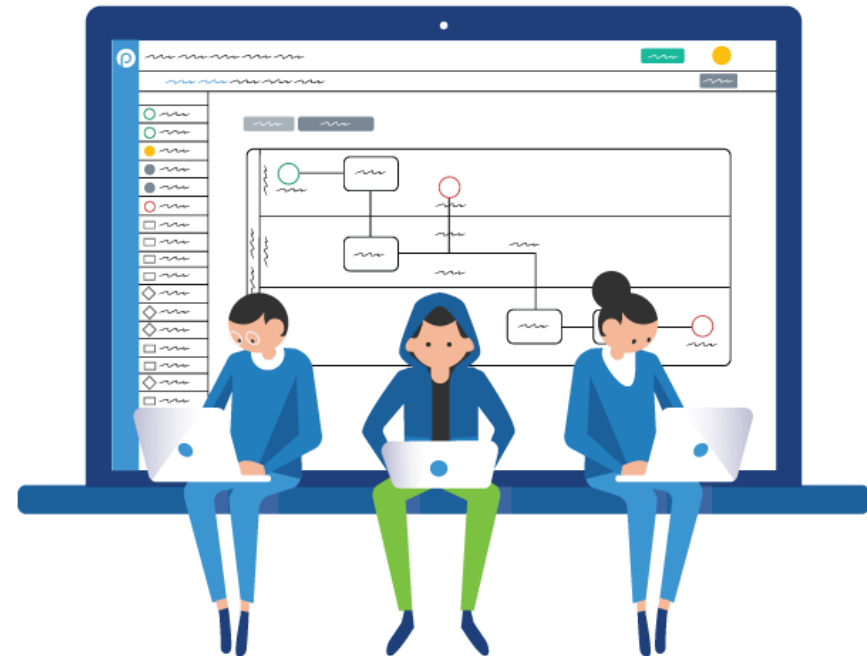
Bad Practices



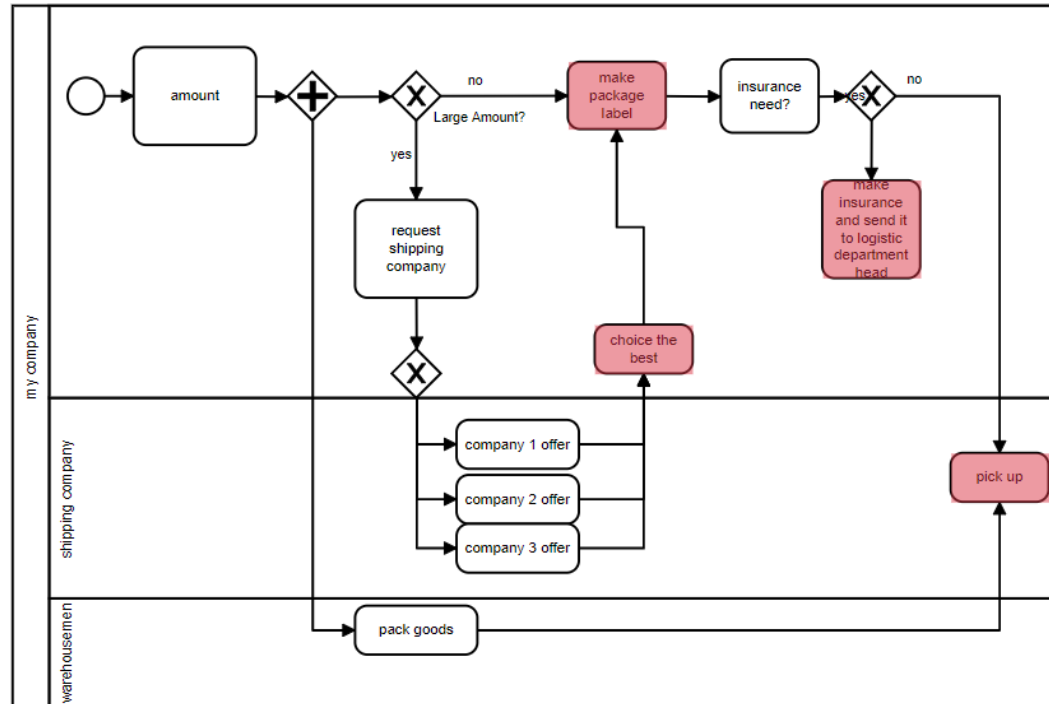
✘ Process is too large: it should be decomposed or split into several processes

Business Process Modeling Mistakes and Bad Practices: Incorrect Tasks Usage

- Tasks should have one incoming and one outgoing sequence flow



Bad Practices



✘ Task "make package label" has several incoming flows (implicit merge/synchronization)

✘ Task "choice the best" has several incoming flows (implicit merge/synchronization)

✘ Task "make insurance and send it to logistic department head" does not have outgoing flows (implicit workflow end)

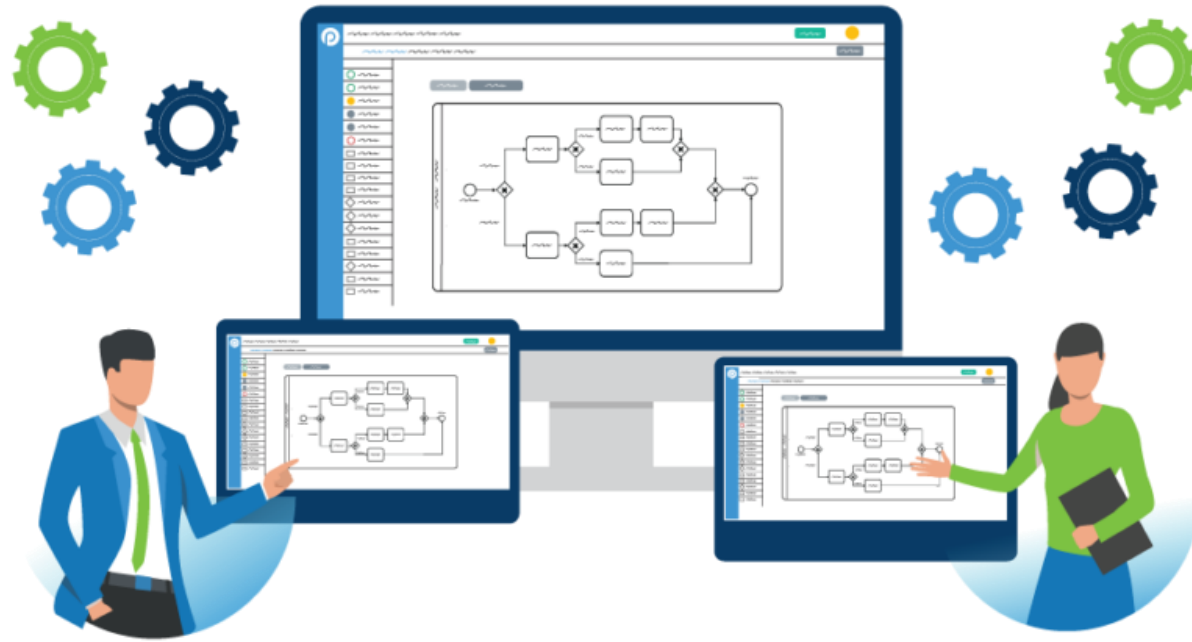
✘ Task "pick up" has several incoming flows (implicit merge/synchronization)

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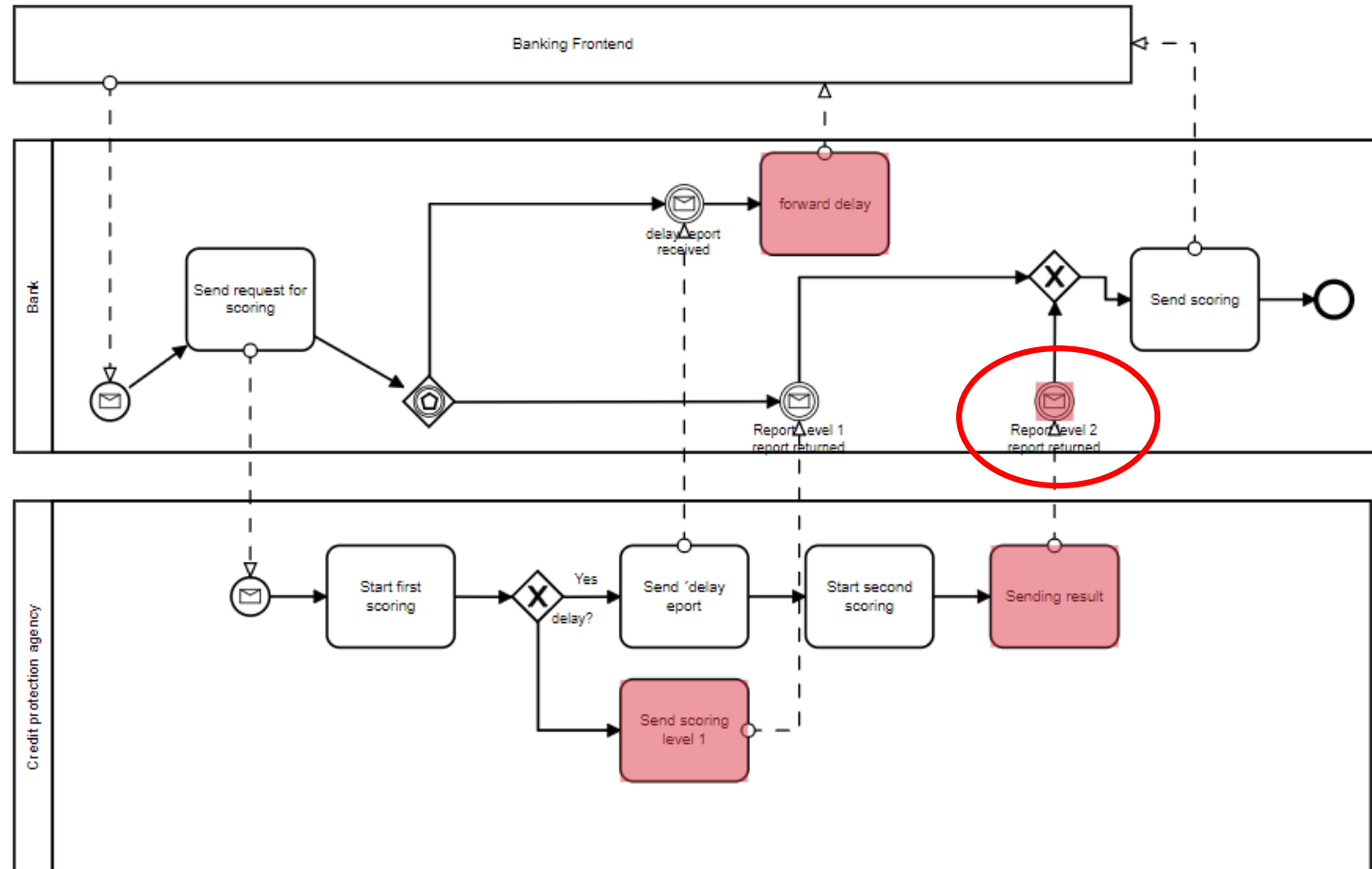
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Business Process Modeling Mistakes and Bad Practices: Incorrect Events Usage

- Start events should have one outgoing sequence flow
- End events should have one incoming sequence flow
- Intermediate events should have one incoming and one outgoing sequence flow



Bad Practices



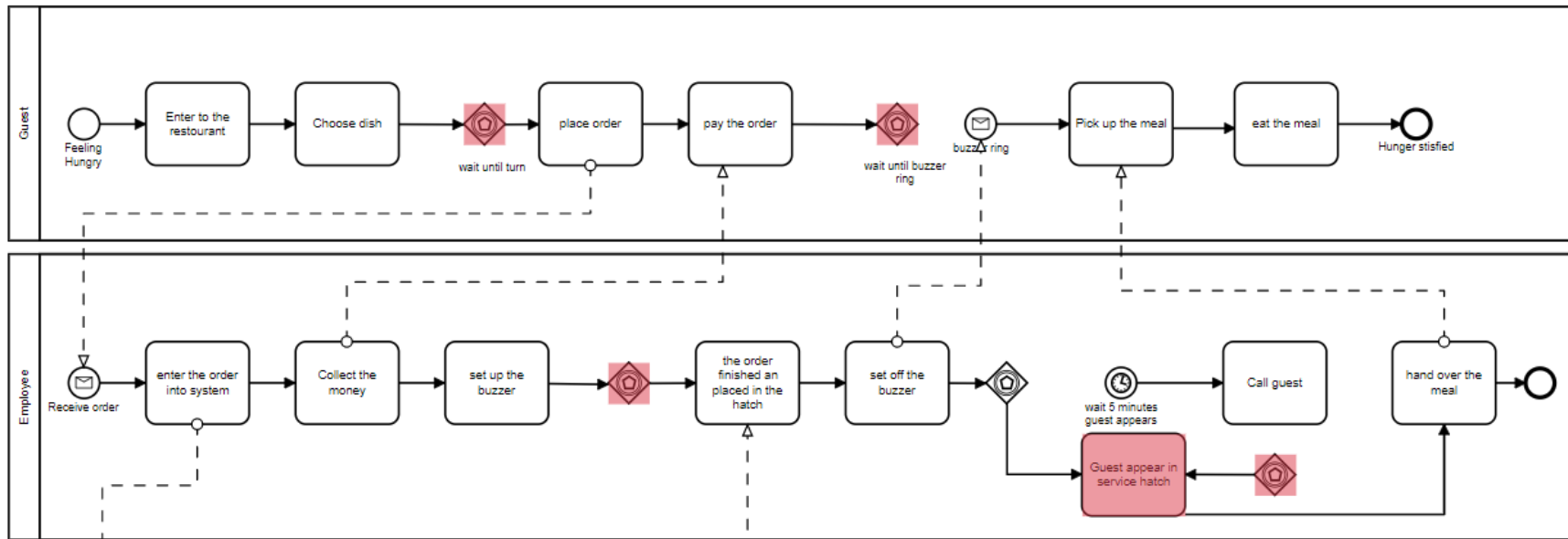
✘ Intermediate event "Report level 2 report returned" does not have incoming flows (implicit workflow start)

Business Process Modeling Mistakes and Bad Practices: Incorrect Gateways Usage

- Gateways should be either splits (one incoming and multiple outgoing sequence flows)
- or joins (multiple incoming and one outgoing sequence flows)



Bad Practices



Process "Guest"

✗ Gateway "wait until buzzer ring" is neither split nor join: it has one incoming and one outgoing flow (redundant gateway)

✗ Gateway "wait until turn" is neither split nor join: it has one incoming and one outgoing flow (redundant gateway)

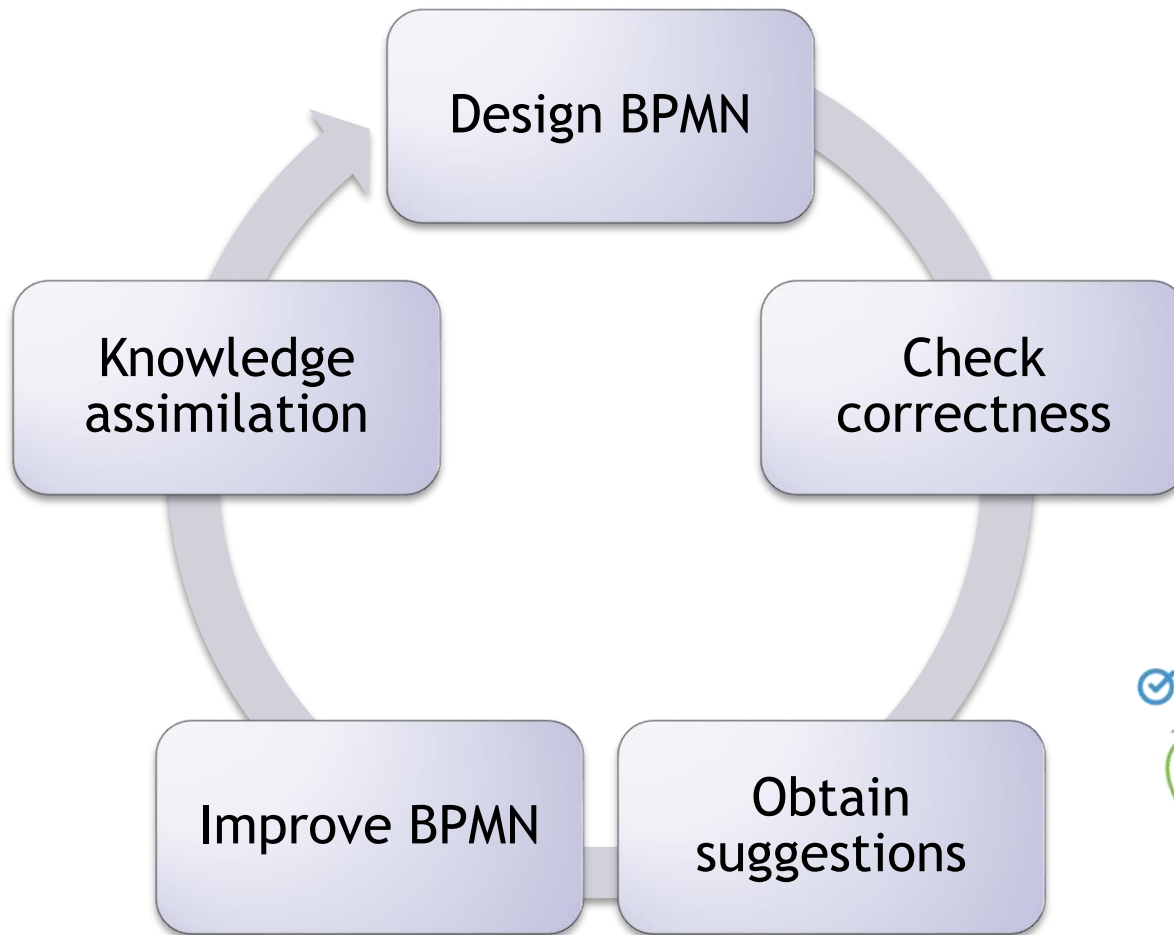
Process "Employee"

✗ Gateway "sid-6B90A114-FD4B-4376-91ED-7B99BD06FEA4" is neither split nor join: it has one incoming and one outgoing flow (redundant gateway)

✗ Task "Guest appear in service hatch" has several incoming flows (implicit merge/synchronization)

✗ Gateway "sid-CF8D0533-9542-4DCA-901D-2723F15E2FD3" does not have incoming flows (implicit workflow start)

Business Process Modeling E-Training Flow



Software Solution - Overview

<https://freebpmnquality.github.io/demo.html>

freebpmnquality Home Website

Drag & drop or click to upload the BPMN 2.0 file

or try to use already uploaded BPMN models from Camunda repository

Recently uploaded BPMN models

- 1 restaurant.bpmn
- 2 credit.bpmn
- 3 recourse.bpmn
- 4 dispatch.bpmn

Dispatch_of_Goods.bpmn

Hover highlighted elements (weak spots) to see tooltips

```

1 <?xml version="1.0" encoding="UTF-8"?><definitions xmlns="http://www.omg.org/spec/BPMN/20100524/MODEL" xmlns:bpmndi="http://www.omg.org/spec/BPMN/20100524/DI" xmlns:signavio="http://www.signavio.com/signavio">
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11 </collaboration>
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```

Process "my company"

- ✘ Task "make package label" has several incoming flows (implicit merge/synchronization)
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Software Solution - Models Uploading

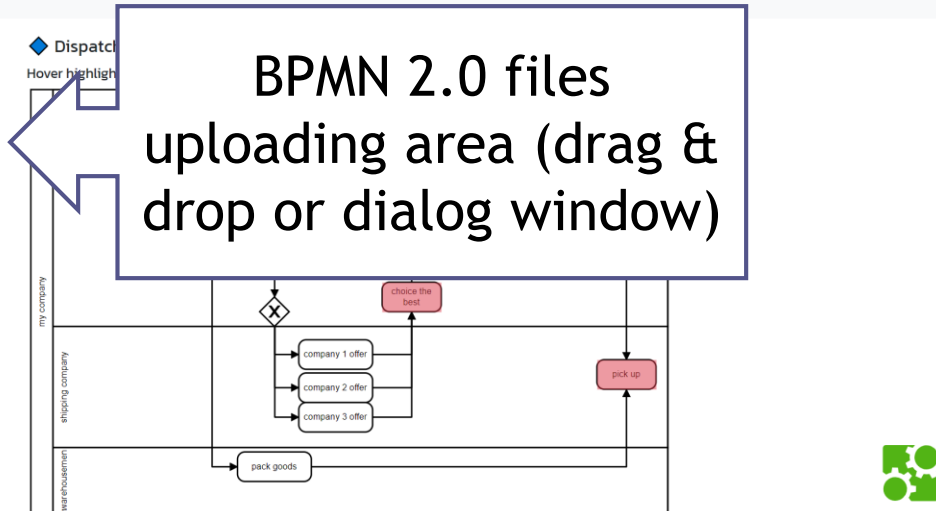
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Software Solution - Backlog

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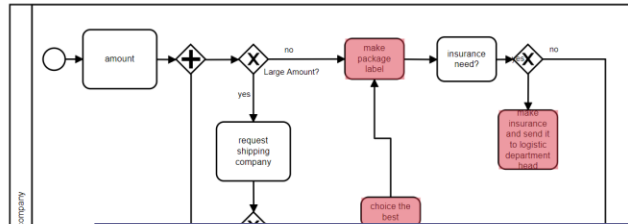
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List of recently uploaded models for fast access

```

1 <?xml
2
3
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Software Solution - Model Displaying

freebpmquality Home Website

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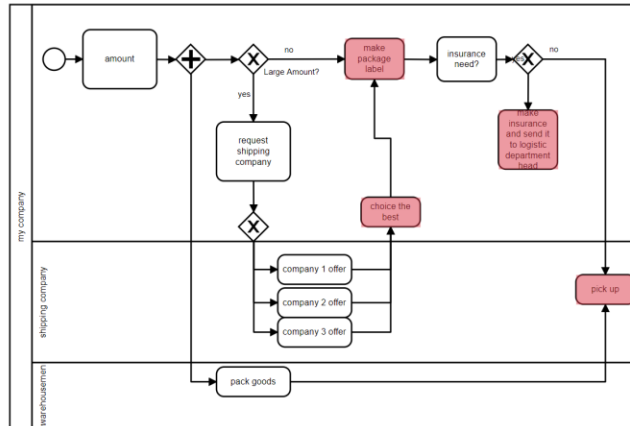


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Visual
representation
of the uploaded
process model



* bpmn.io JavaScript library is used for model displaying

Software Solution - Code Displaying

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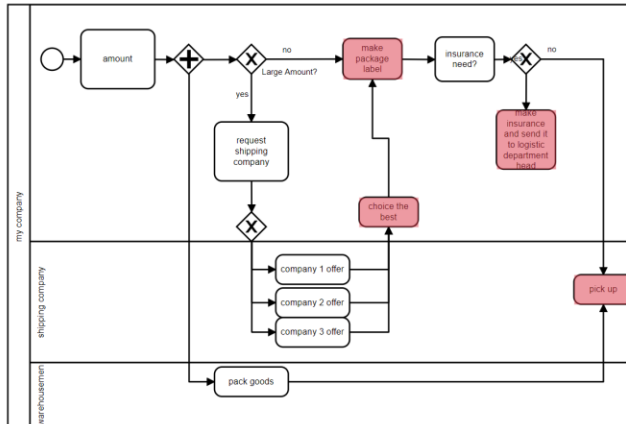
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BPMN 2.0 code of
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Software Solution - Mistakes Detection

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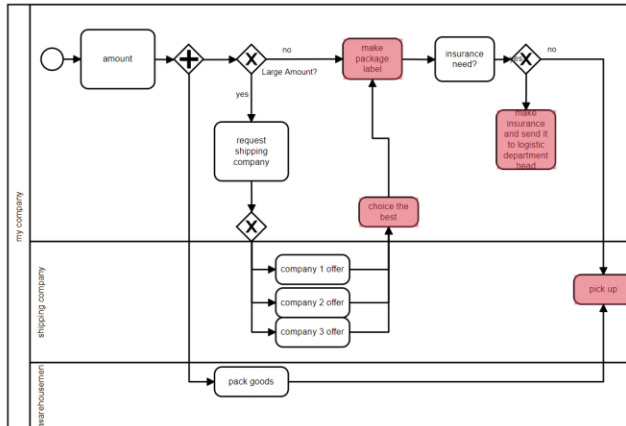
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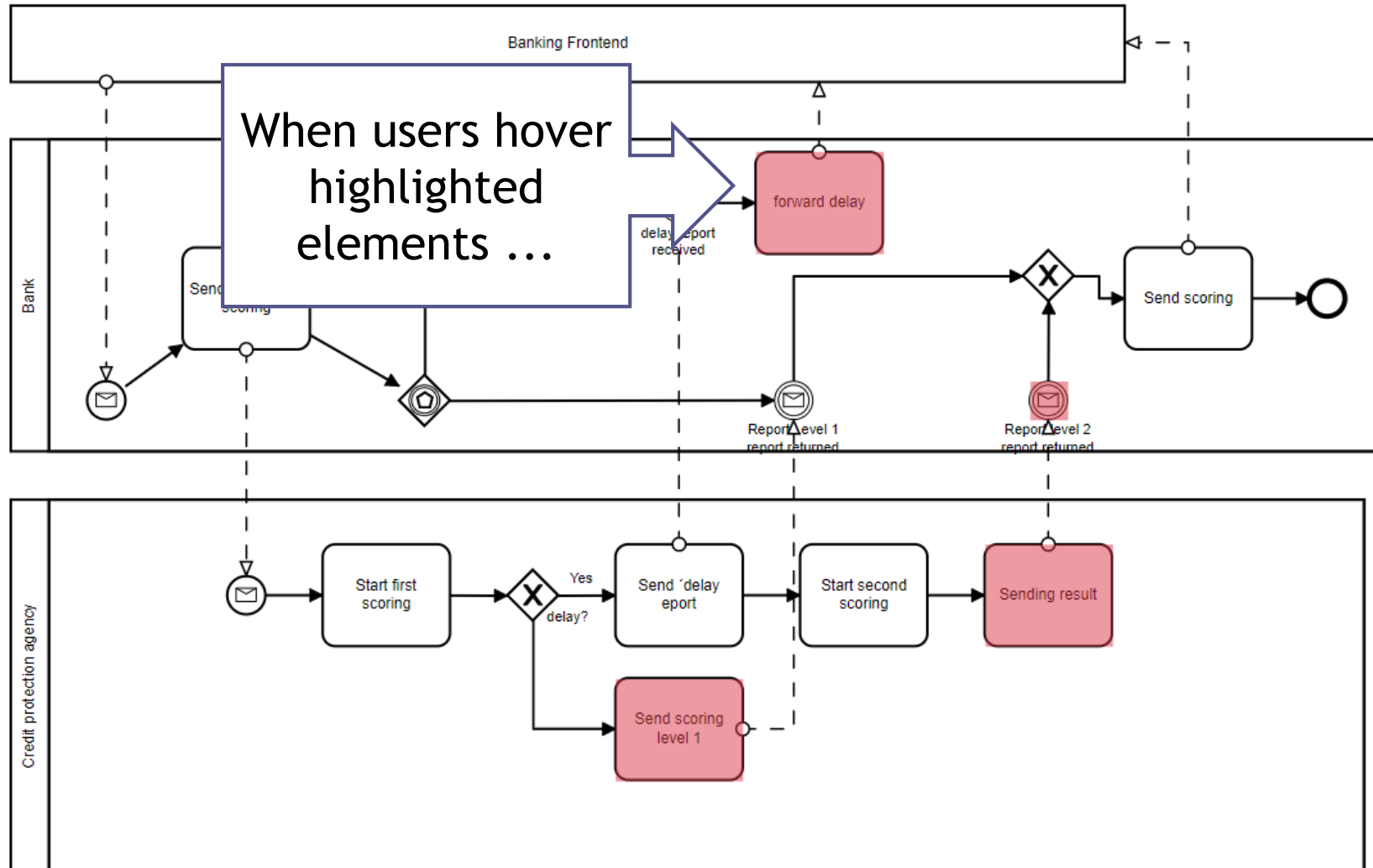
✘ Task "pick up" has several incoming flows (implicit merge/synchronization)

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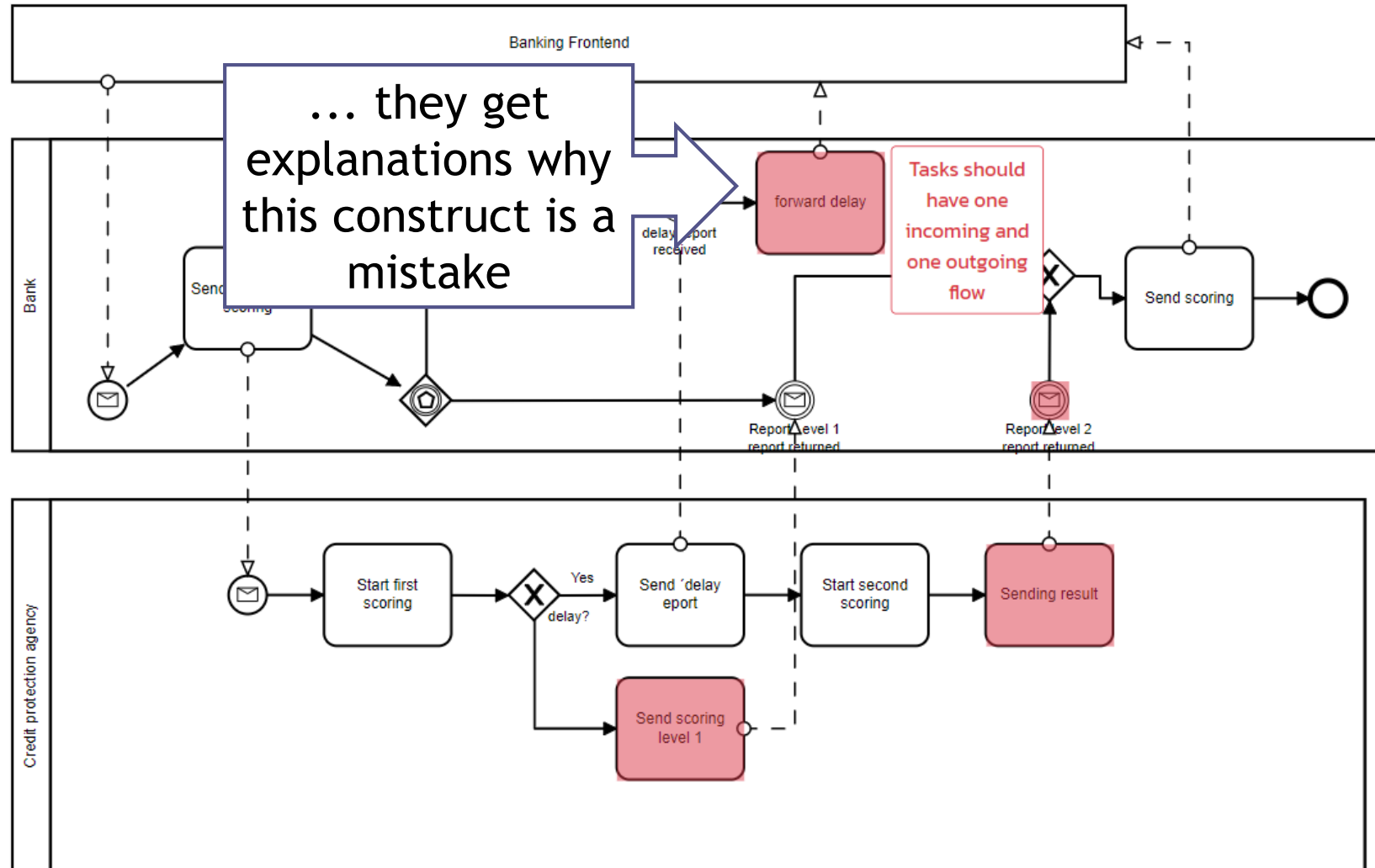
✘ Process is too large: it should be decomposed or split into several processes

Detected
business process
modeling
mistakes

Software Solution - Interaction



Software Solution - Explanations



Software Solution - Suggestions

Process "Bank"

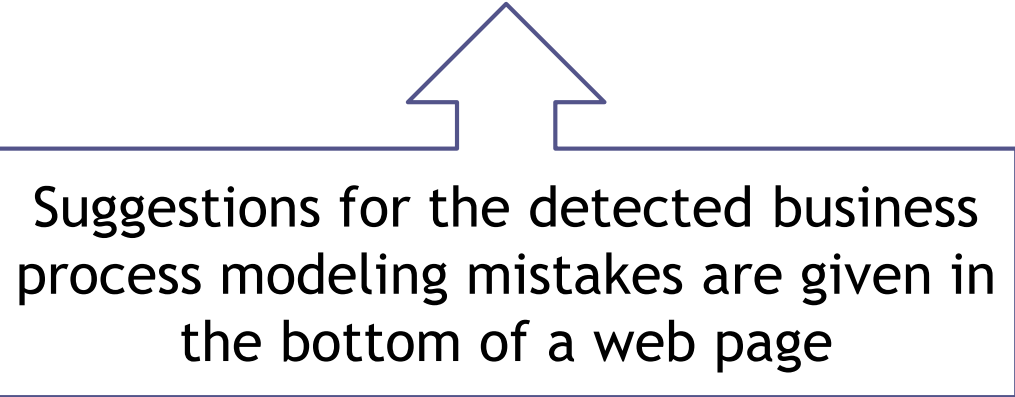
✘ Intermediate event "Report level 2 report returned" does not have incoming flows (implicit workflow start)

✘ Task "forward delay" does not have outgoing flows (implicit workflow end)

Process "Credit protection agency"

✘ Task "Sending result" does not have outgoing flows (implicit workflow end)

✘ Task "Send scoring level 1" does not have outgoing flows (implicit workflow end)



Suggestions for the detected business process modeling mistakes are given in the bottom of a web page

Business Rules to Detect Business Process Modeling Mistakes (1)

- Rule 1. Detection of too complex business process models:

number of activities > 8

- Rule 2. Detection of incorrect tasks:

incoming sequence flows $\neq 1$

AND outgoing sequence flows $\neq 1$

- Rule 3. Detection of incorrect start events:

outgoing sequence flows $\neq 1$

Business Rules to Detect Business Process Modeling Mistakes (2)

- **Rule 4. Detection of incorrect end events:**

`incoming sequence flows \neq 1`

- **Rule 5. Detection of incorrect intermediate events:**

`incoming sequence flows \neq 1`

`AND outgoing sequence flows \neq 1`

- **Rule 6. Detection of incorrect gateways:**

`NOT ((incoming sequence flows = 1`

`AND outgoing sequence flows > 1) OR`

`(incoming sequence flows > 1`

`AND outgoing sequence flows = 1))`

Rough Estimation of Business Process Modeling Mistakes Consequences (1)

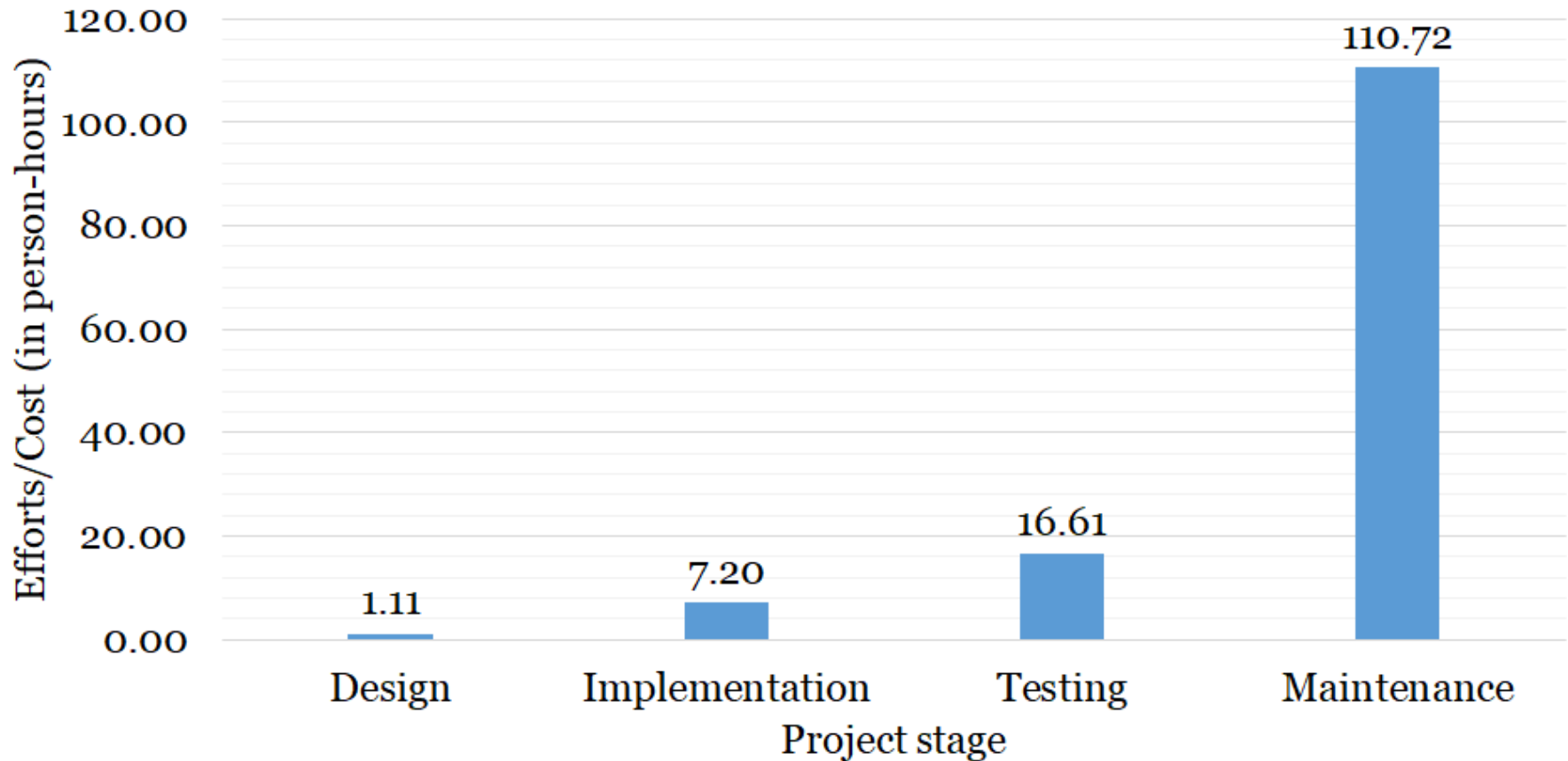
- Using the COCOMO (Constructive Cost Model):

$$\text{Efforts} = 2.4 \times [\text{Number of modeling mistakes}]^{1.05}$$

- And the Bug Fixing Cost Model:

Project stage	Design	Implementation	Testing	Maintenance
Efforts/Cost	1x	6.5x	15x	100x

Rough Estimation of Business Process Modeling Mistakes Consequences (2)



Conclusion

- Detection of mistakes in business process models as a part of business analysts e-training is motivated and explained
- The software tool is presented and the rough estimation of benefits from proper business process modeling is outlined
- Demo of the software tool is accessible by link: <https://freebpmnquality.github.io/demo.html>
- General project's website is accessible by link: <https://freebpmnquality.github.io/>

Thank you for attention!