

Design Time Validation for the Correct Execution of BPMN Collaborations

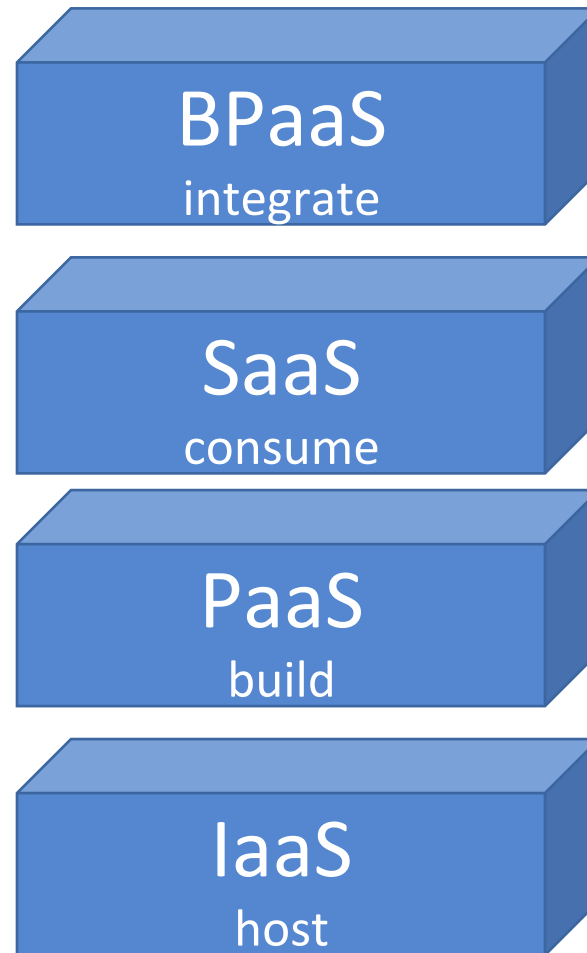
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<http://jns.me/closer2016.pdf>

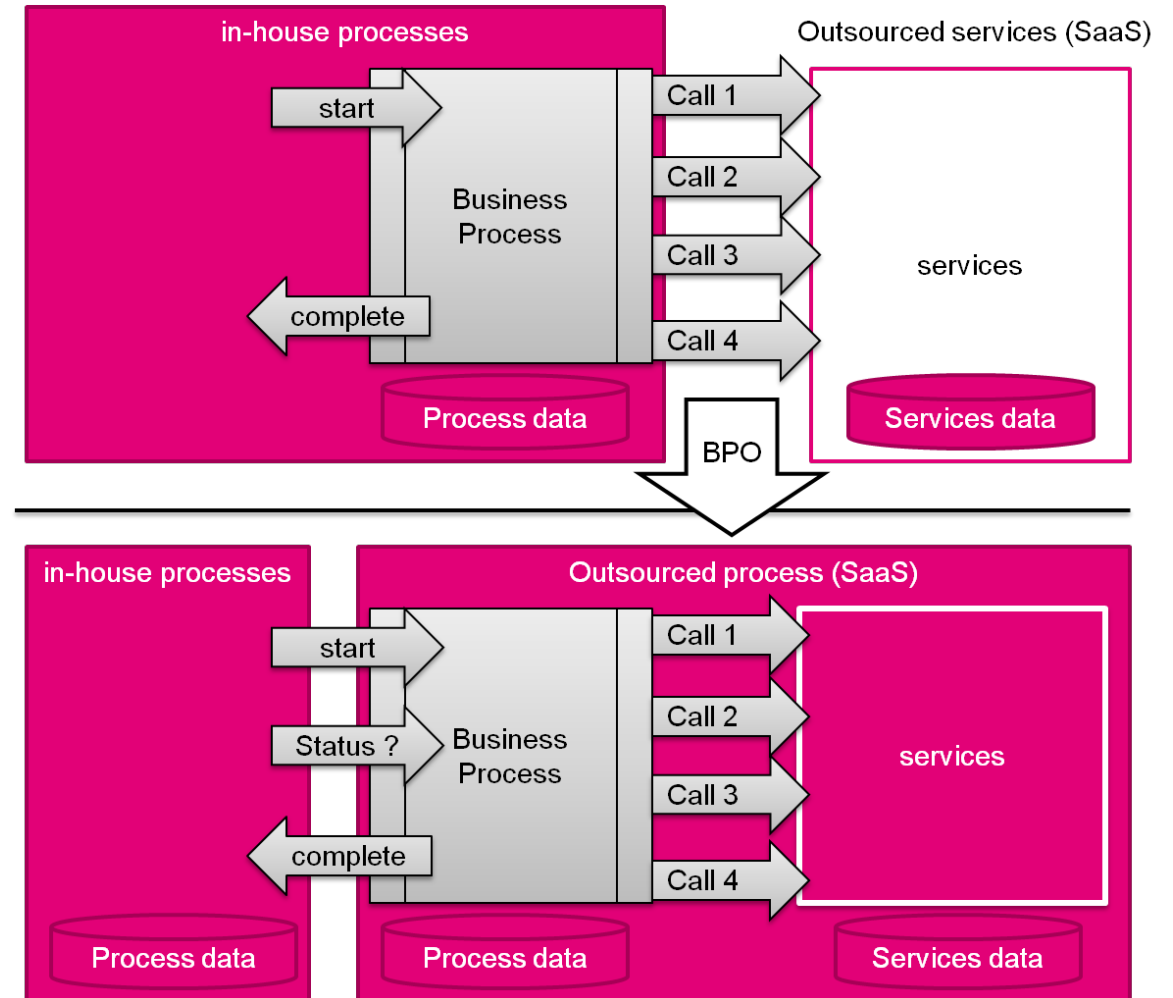
BPaaS (Business Process as a Service)

– a novel cloud paradigm

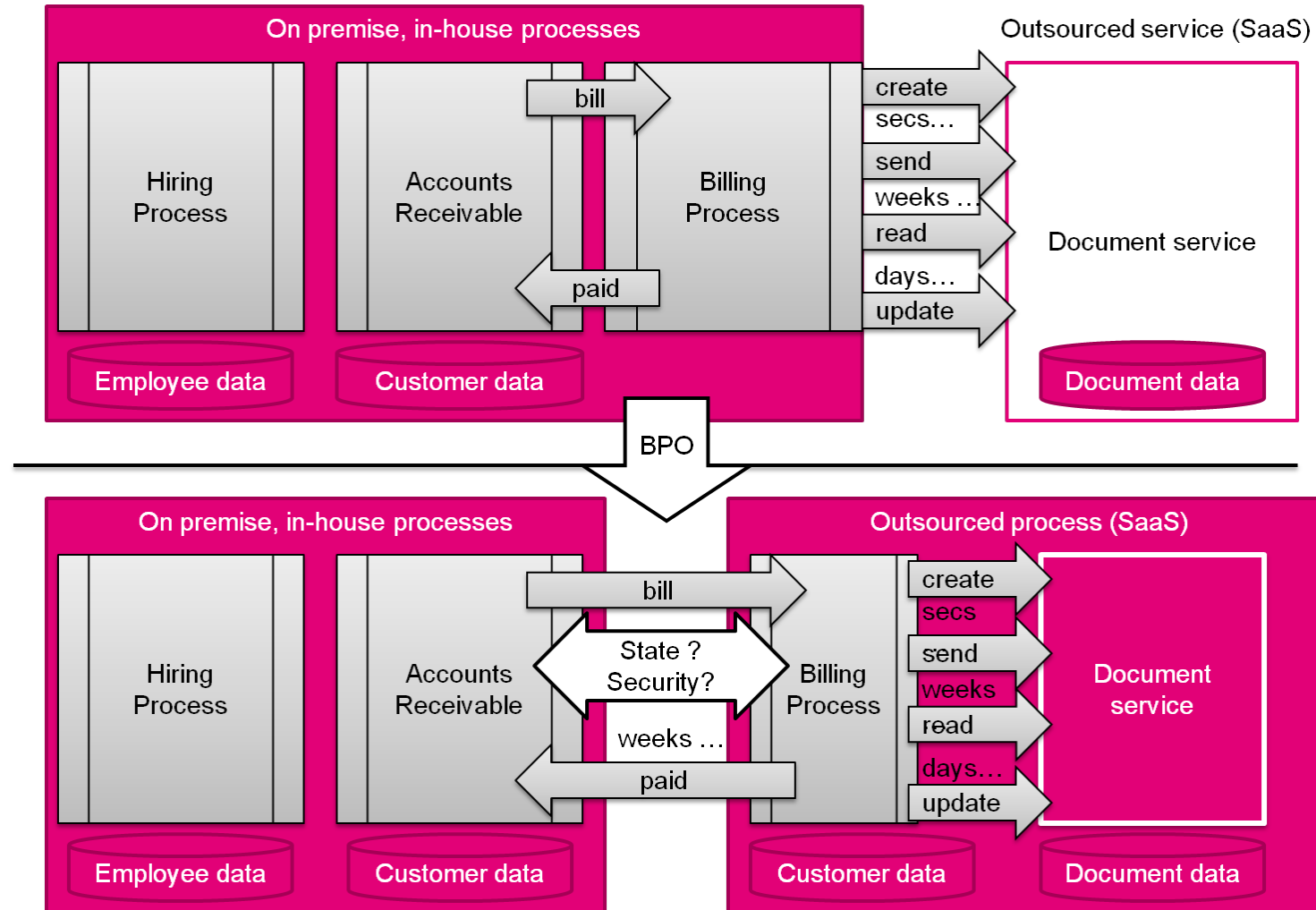


BPaaS – extending SaaS with BPO

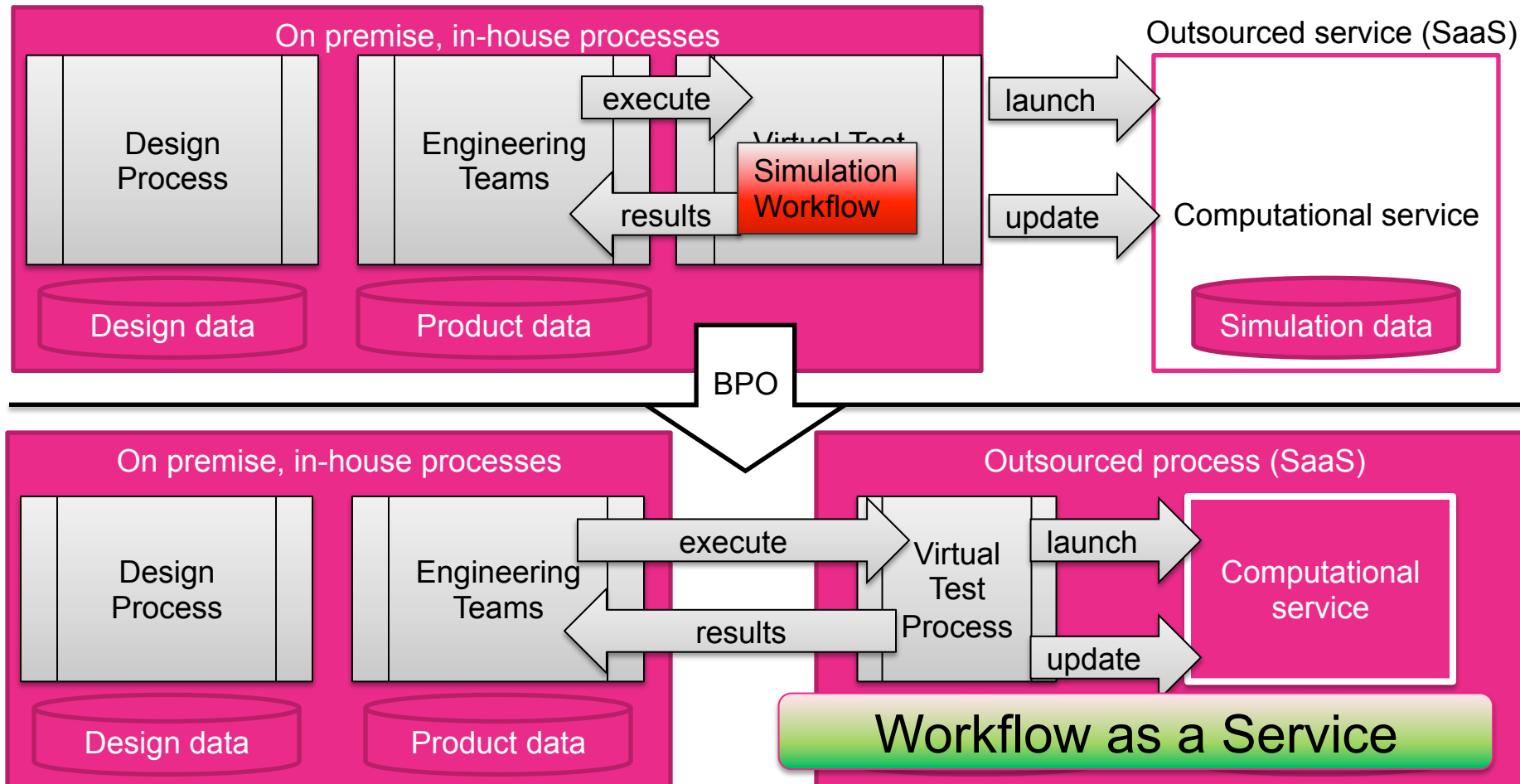
- BPO: Business Process Outsourcing
- Examples of BPO: HR, accounting, billing, customer support, business operations,...



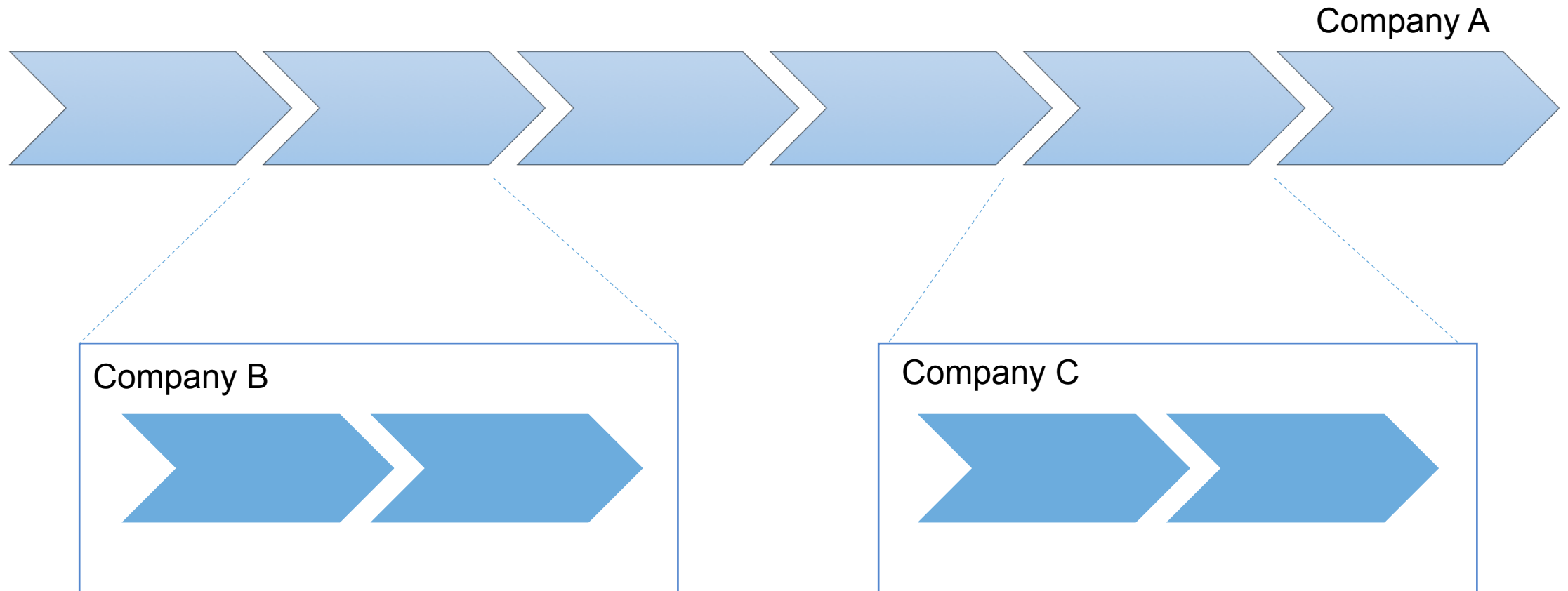
Example: from document management services to billing process as a service



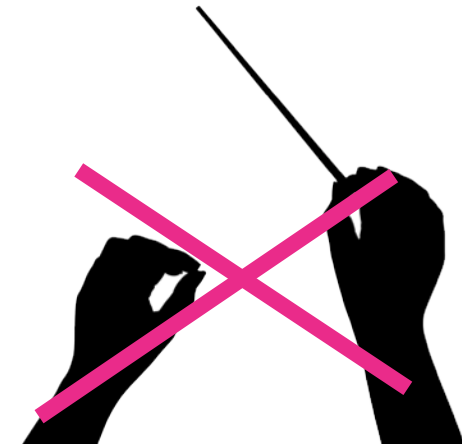
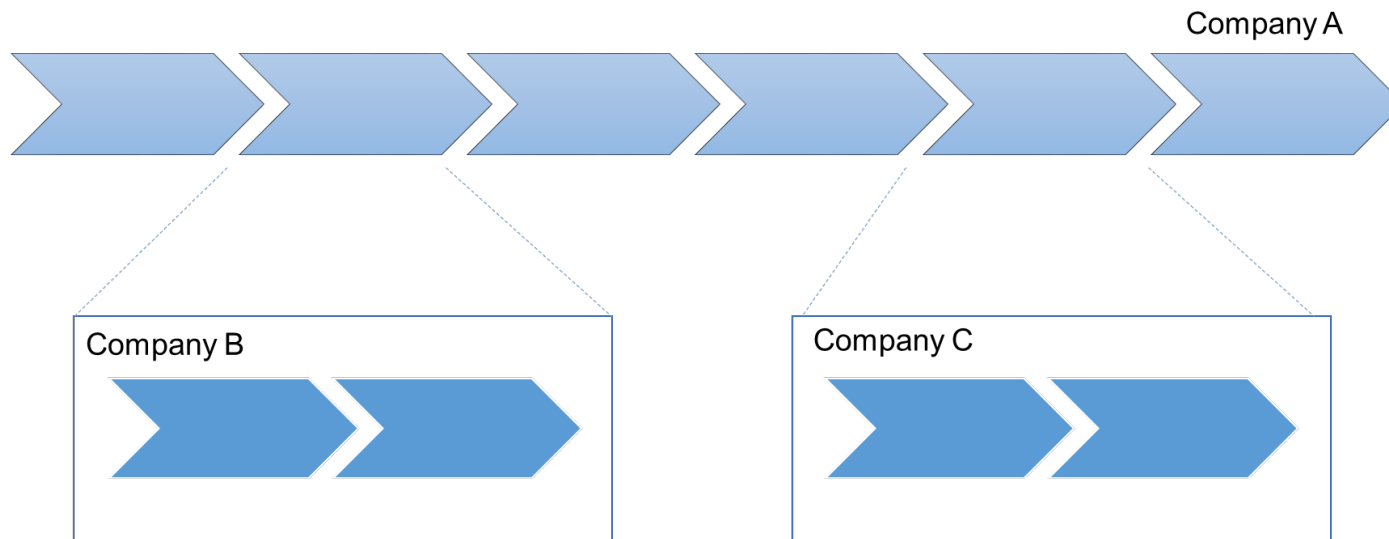
Example: simulation workflow as a service



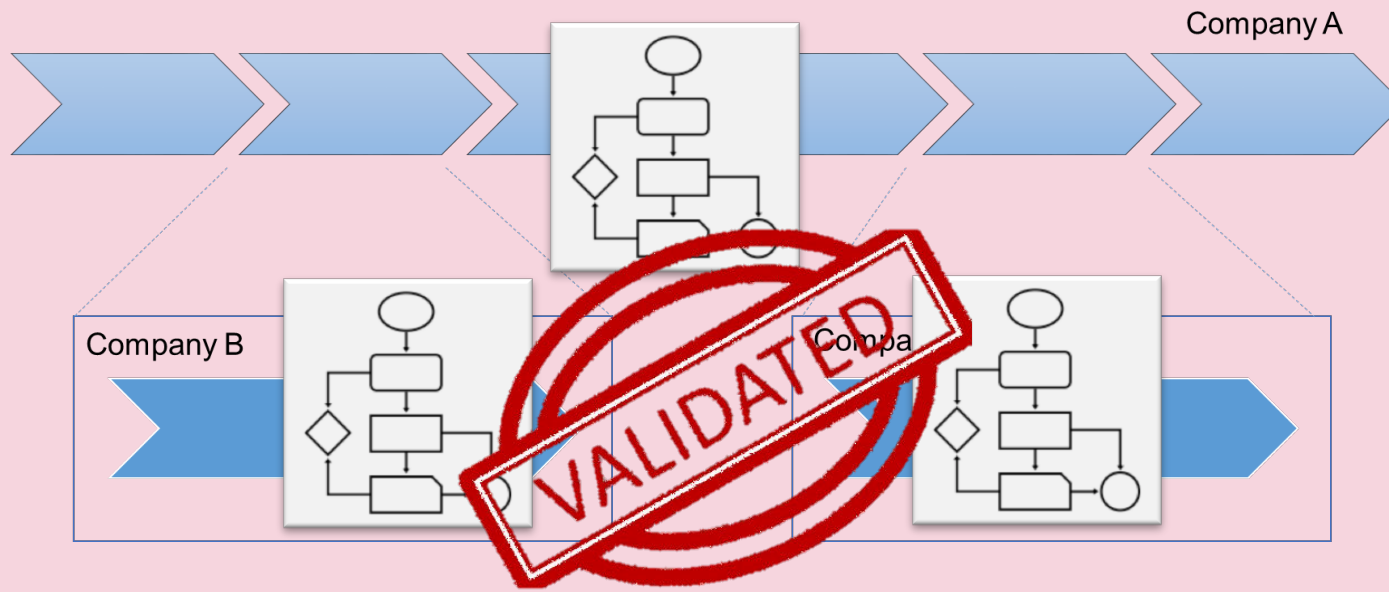
BPO results in decentralized business process flows



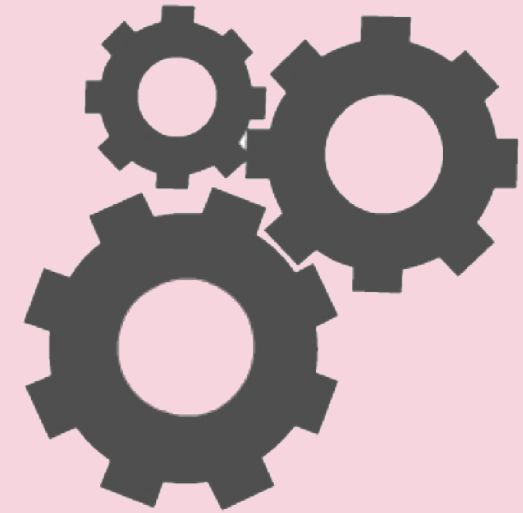
How to ensure correct execution of the different interactions in a decentralized workflow **without central coordinator?**



Validation algorithm will check **at design time** if the execution will be conform the model



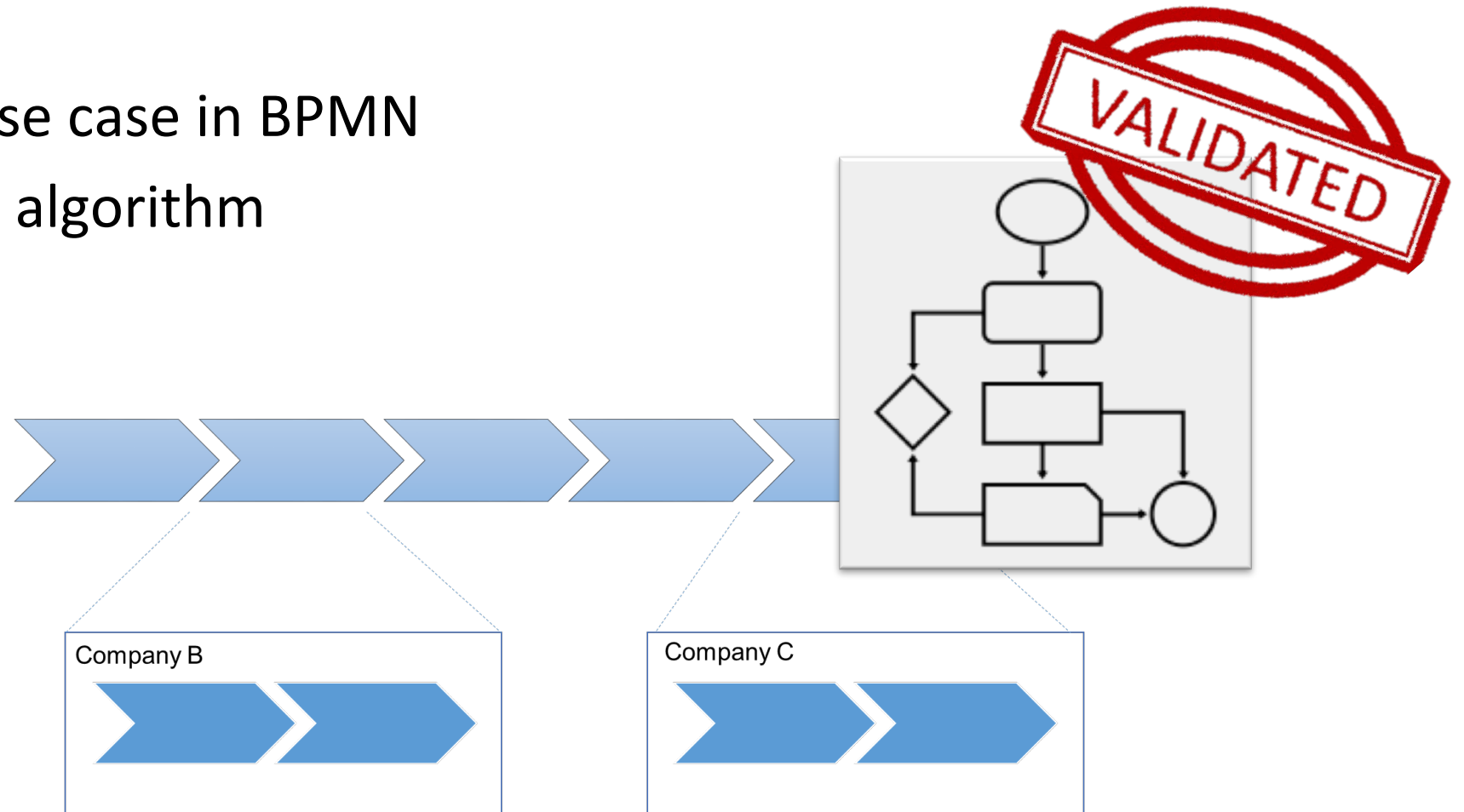
Model



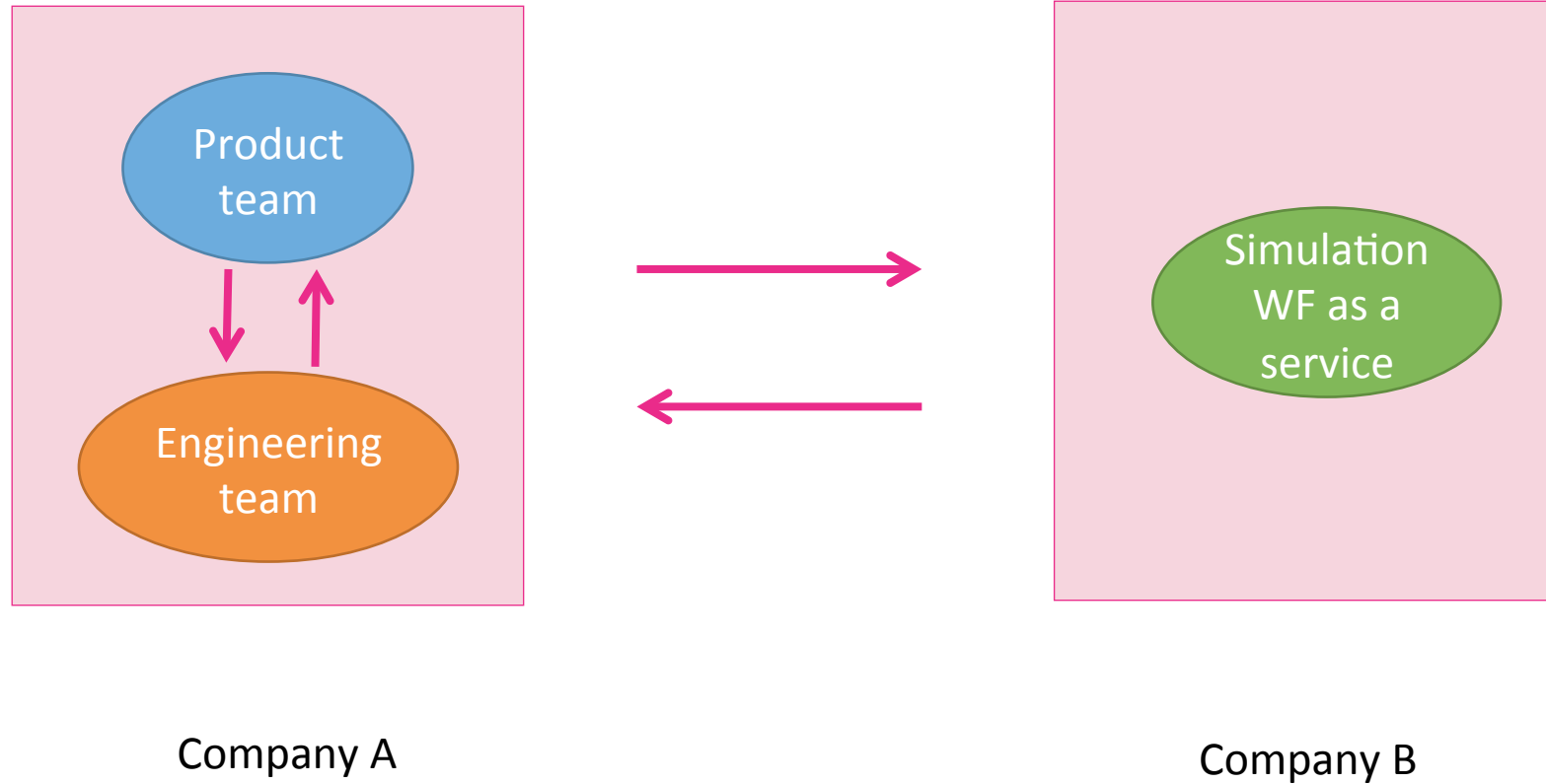
Execution

What comes next?

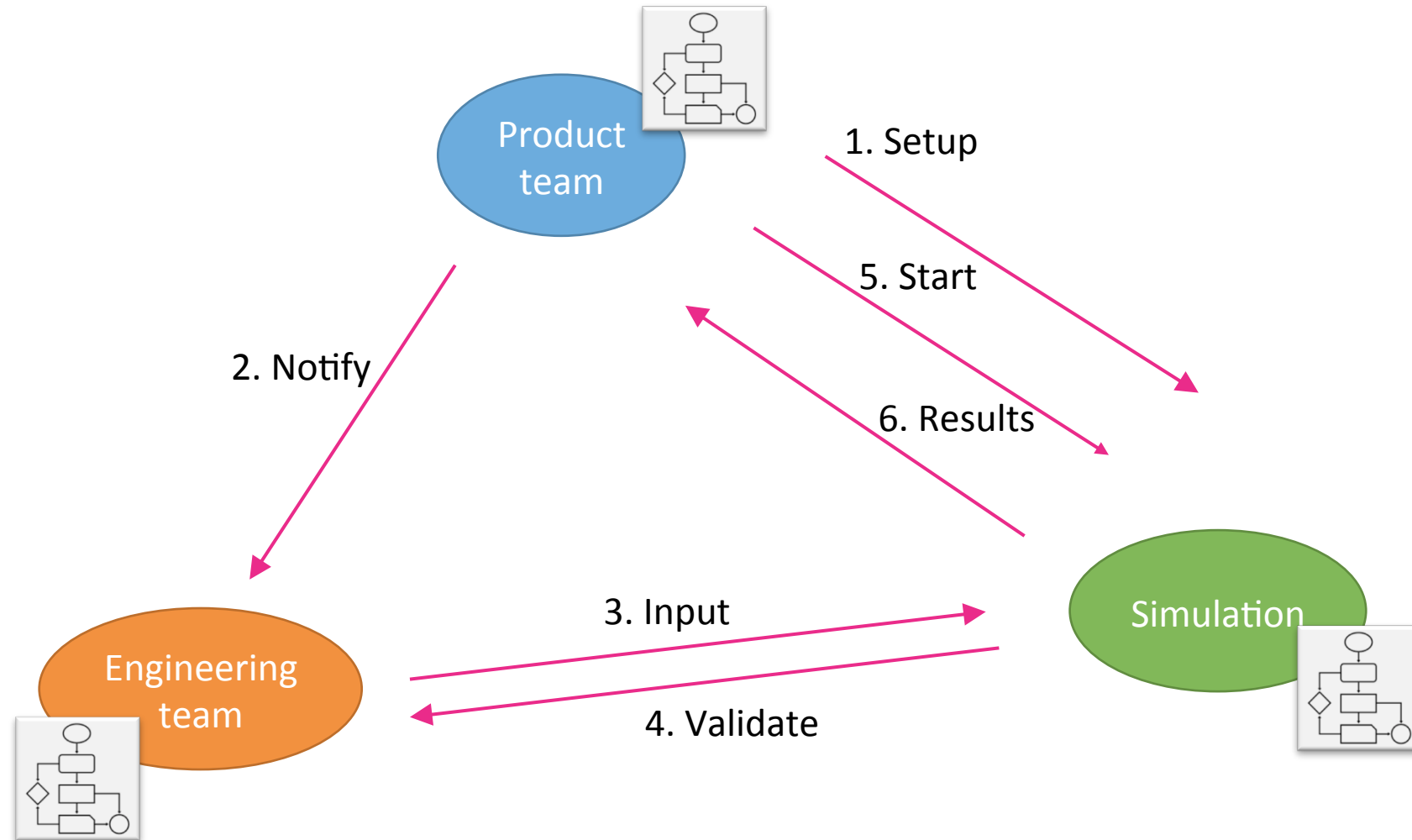
1. Use case
2. Modeling of use case in BPMN
3. The validation algorithm



Use case: simulation



Use case: simulation

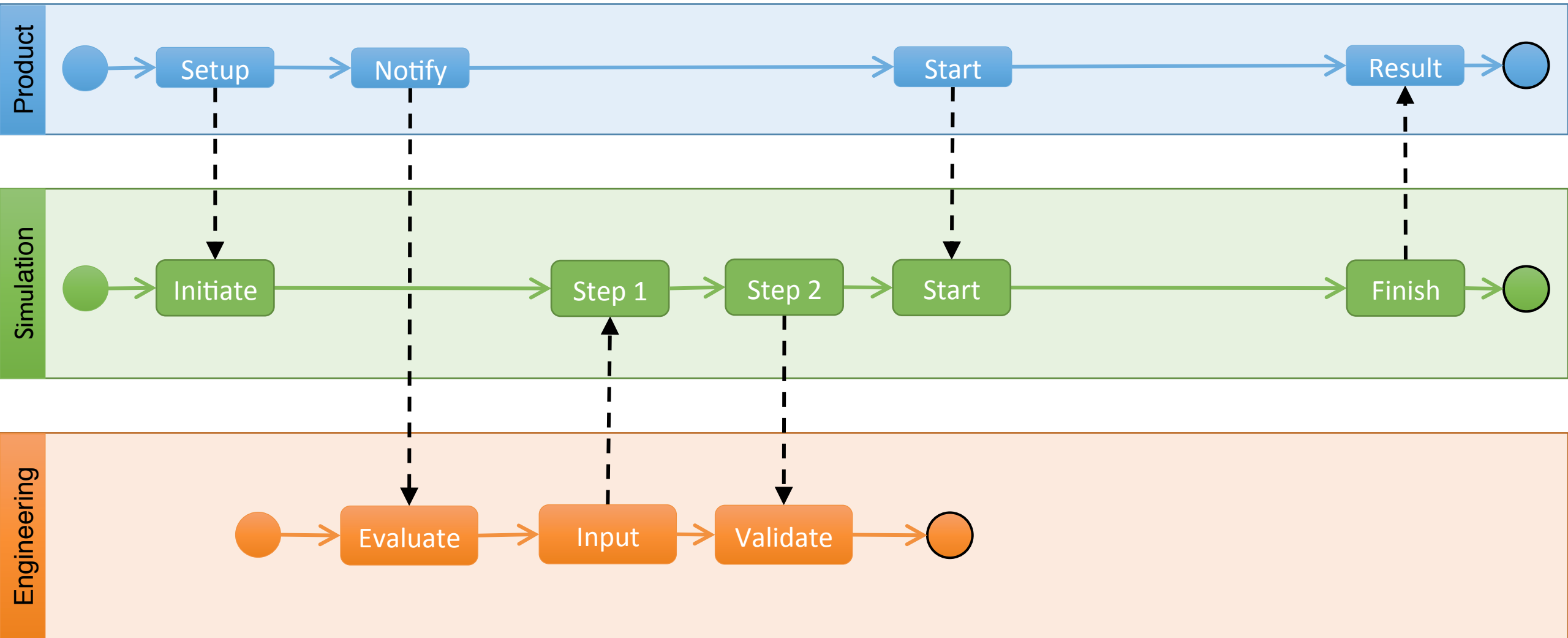


How to model decentralized workflows?

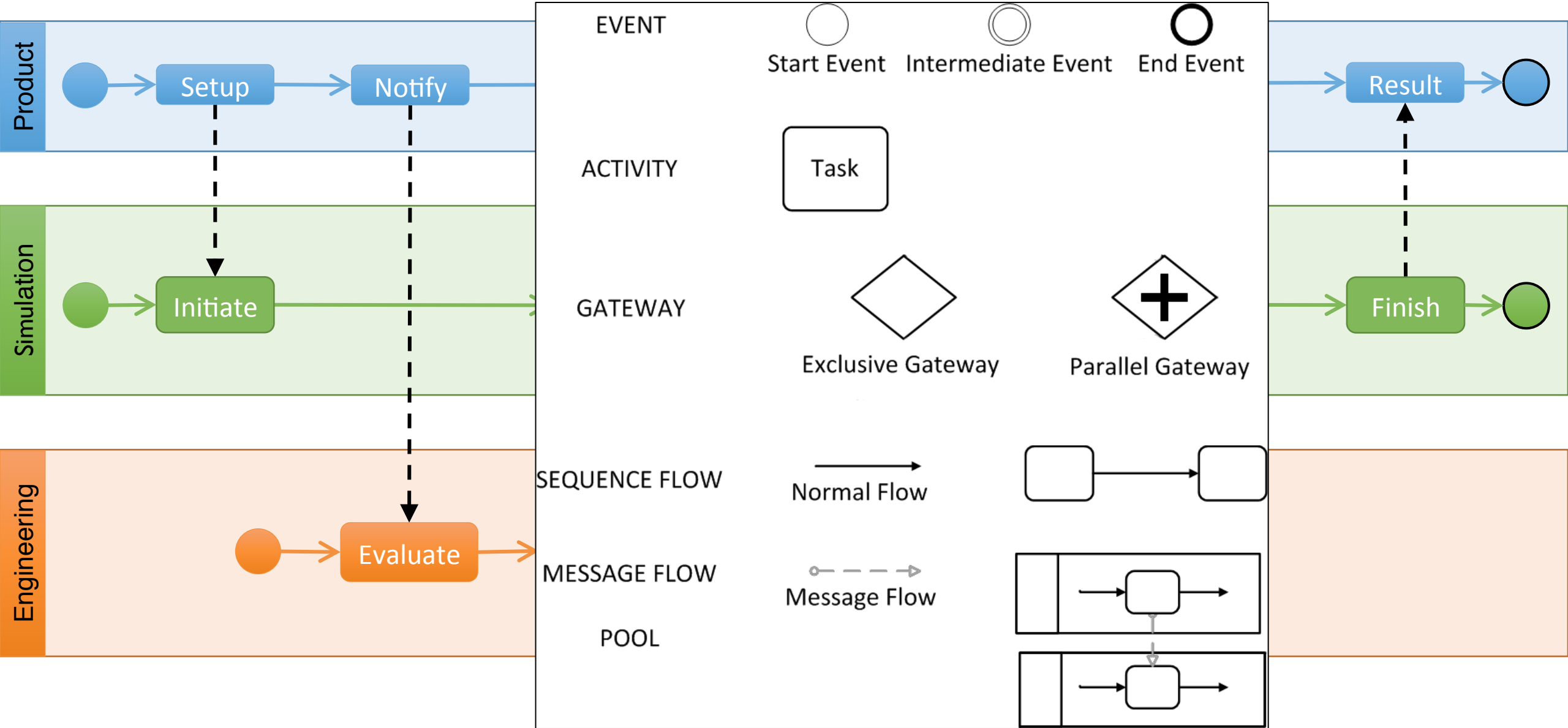
- BPEL (Business Process Execution Language)
- BPMN (Business Process Model and Notation)
- WS-CDL (Web Service Choreography Description Language)
- ...

=> BPMN offers a graphical notation and is a common used standard

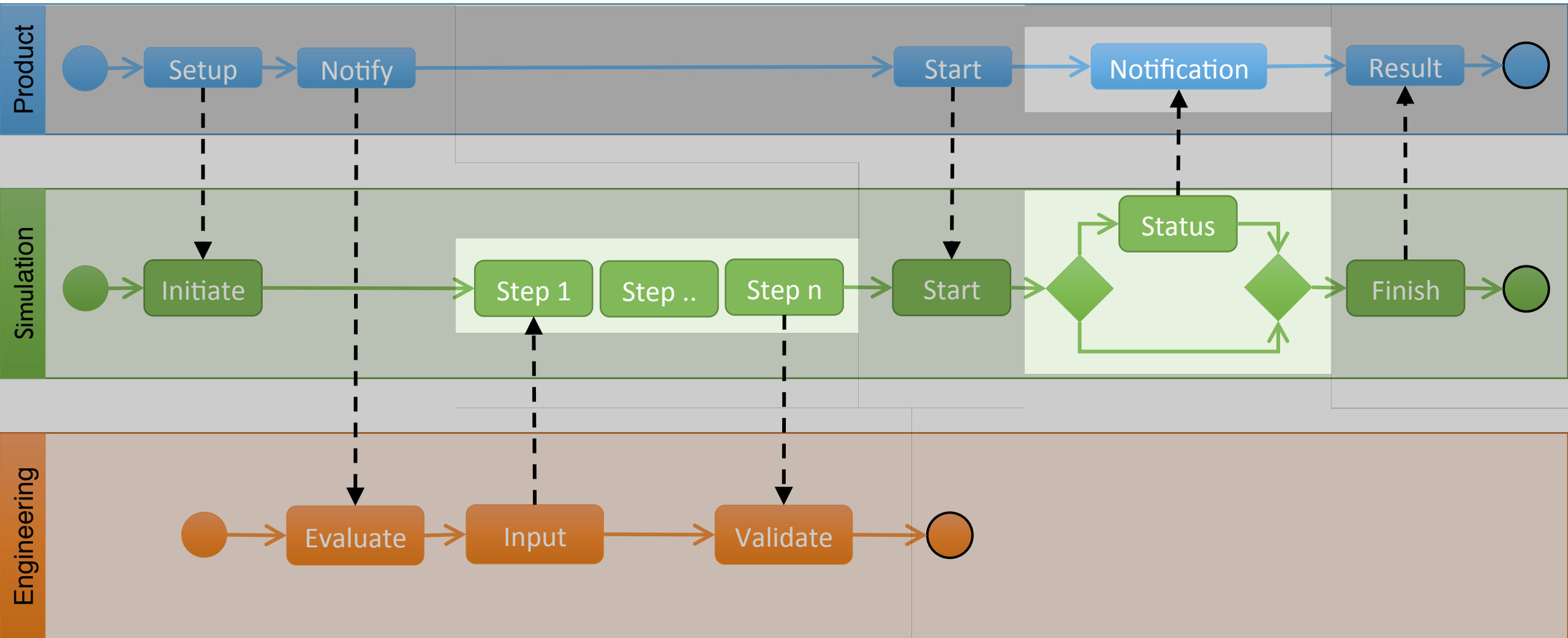
Use case modeled in BPMN



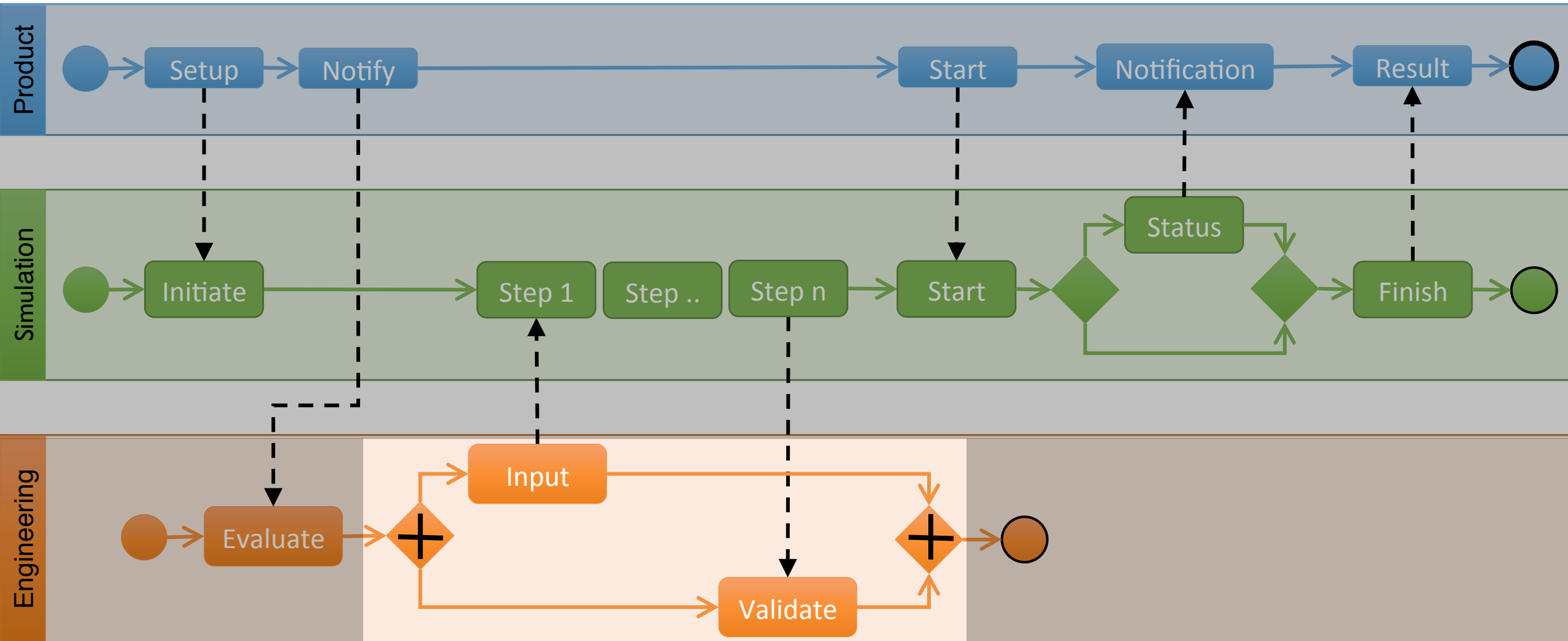
Use case modeled in BPMN



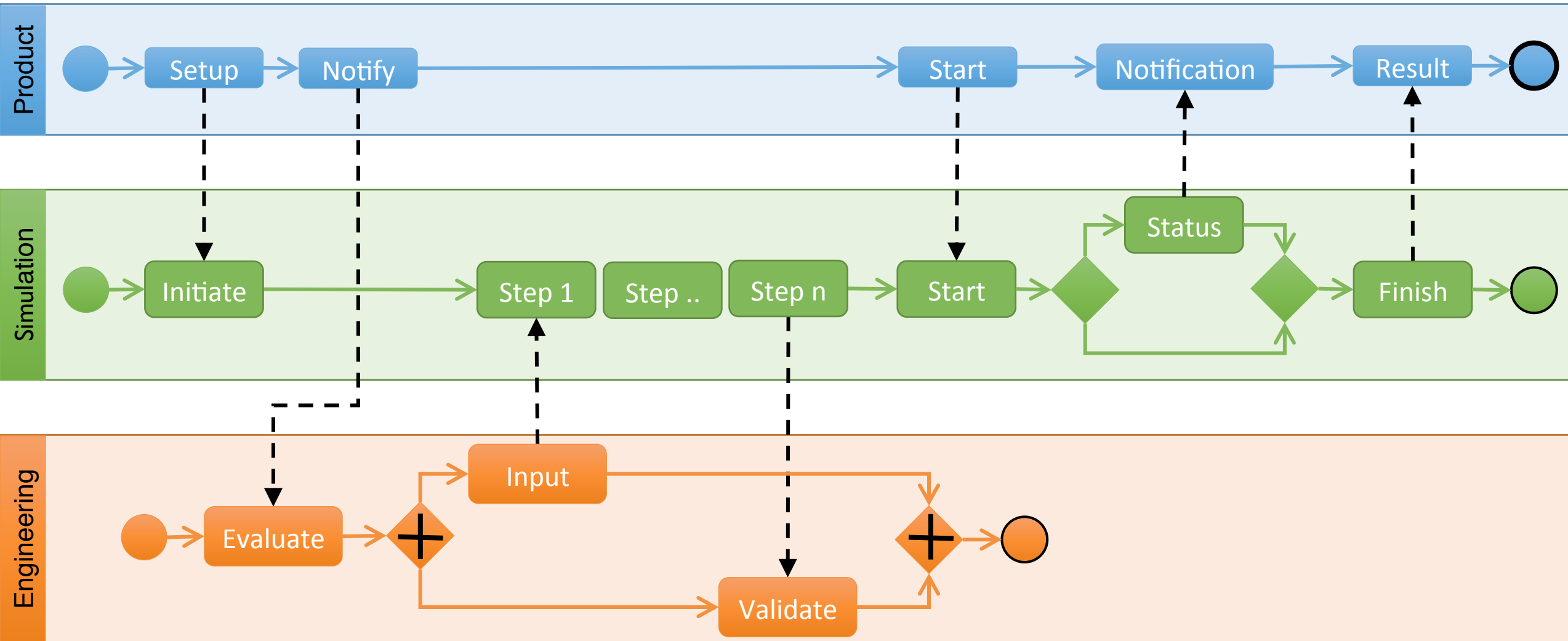
Use case modeled in BPMN



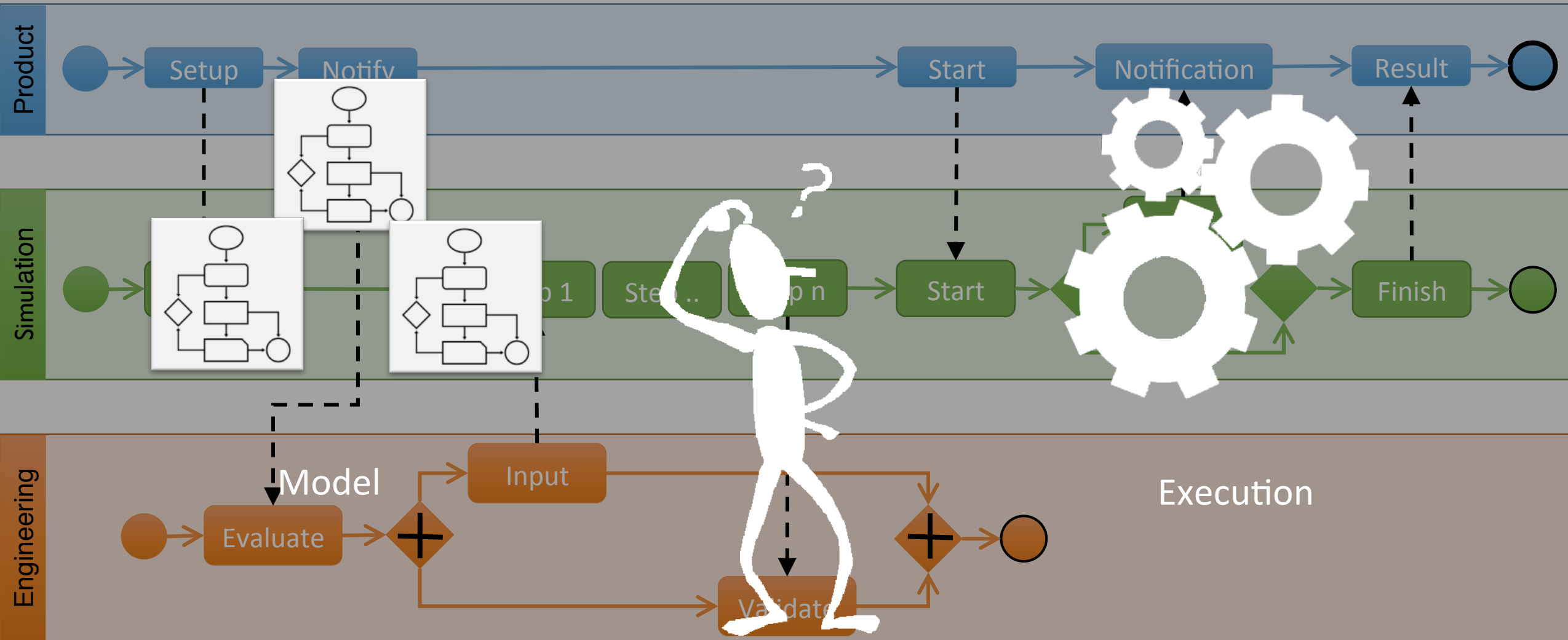
Use case modeled in BPMN



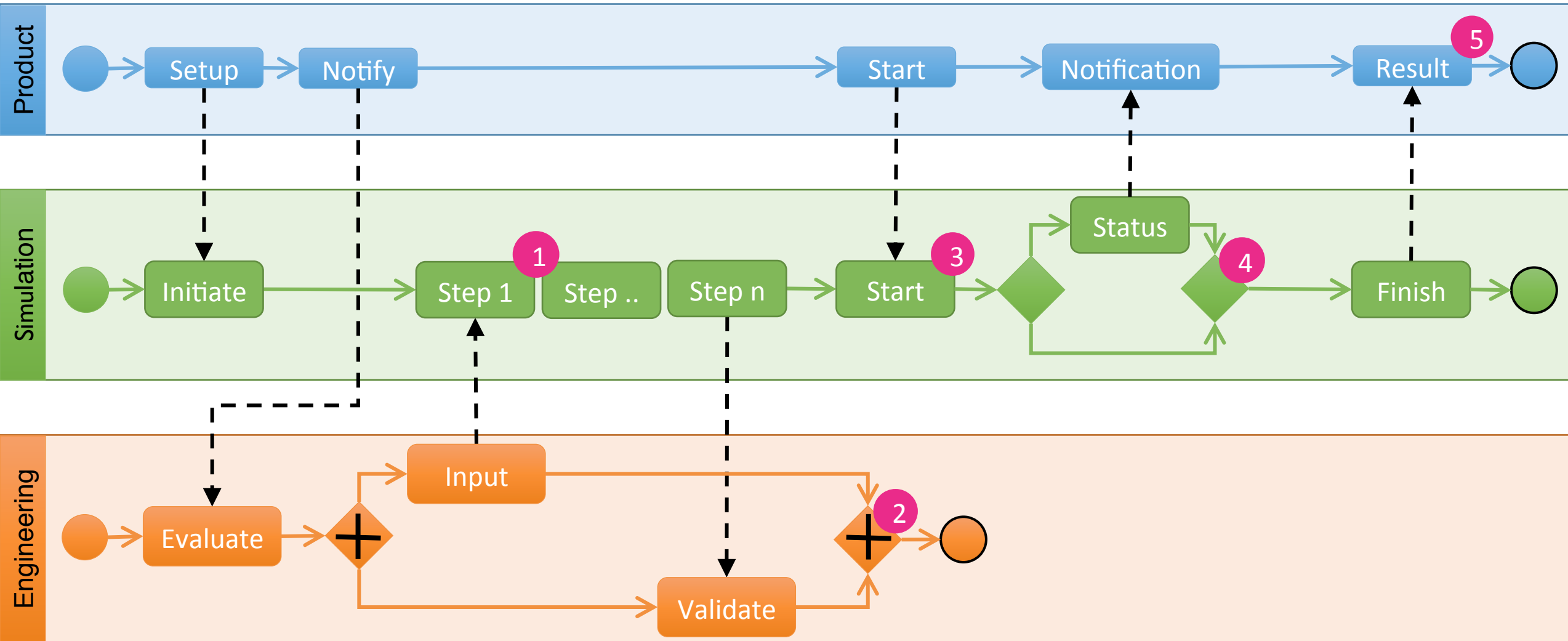
Use case modeled in BPMN



Will the execution be conform the model?



This BPMN model contains 5 ambiguities!



Validation Algorithm

- Algorithm originally used for WS-CDL (Van Seghbroeck, 2011), but adapted for BPMN
- Time Vectors
- Implemented in Eclipse BPMN2 modeler

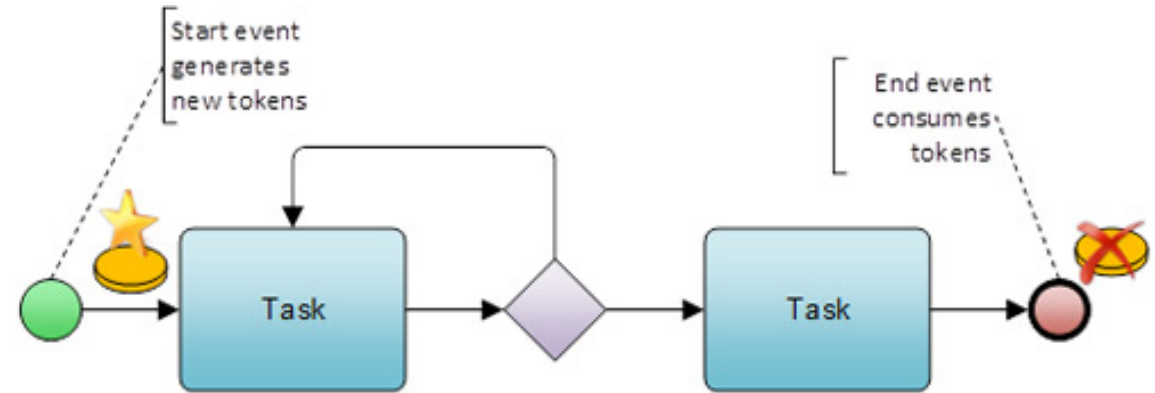


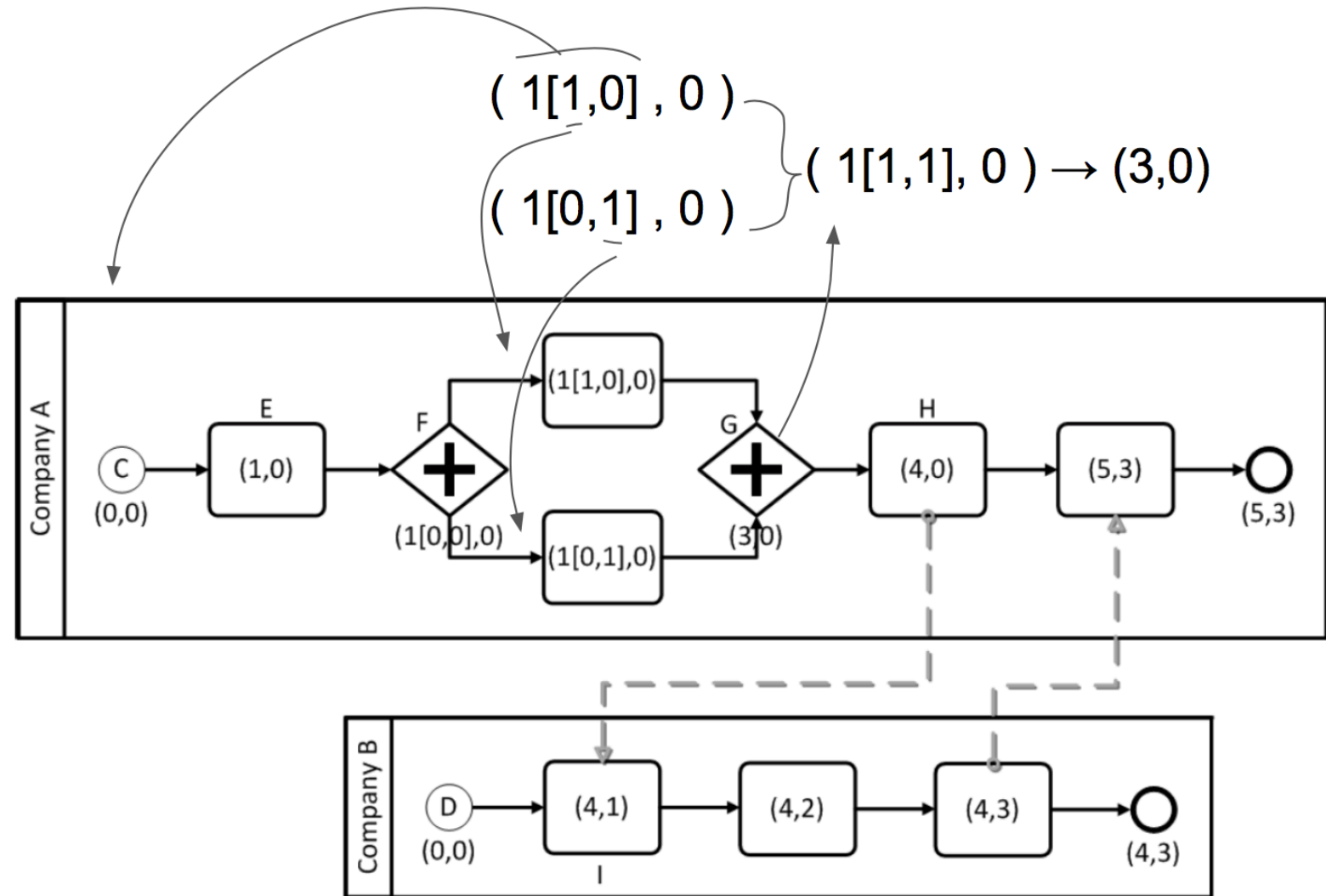
Figure 3: Generation and consumption of tokens

Time Vectors

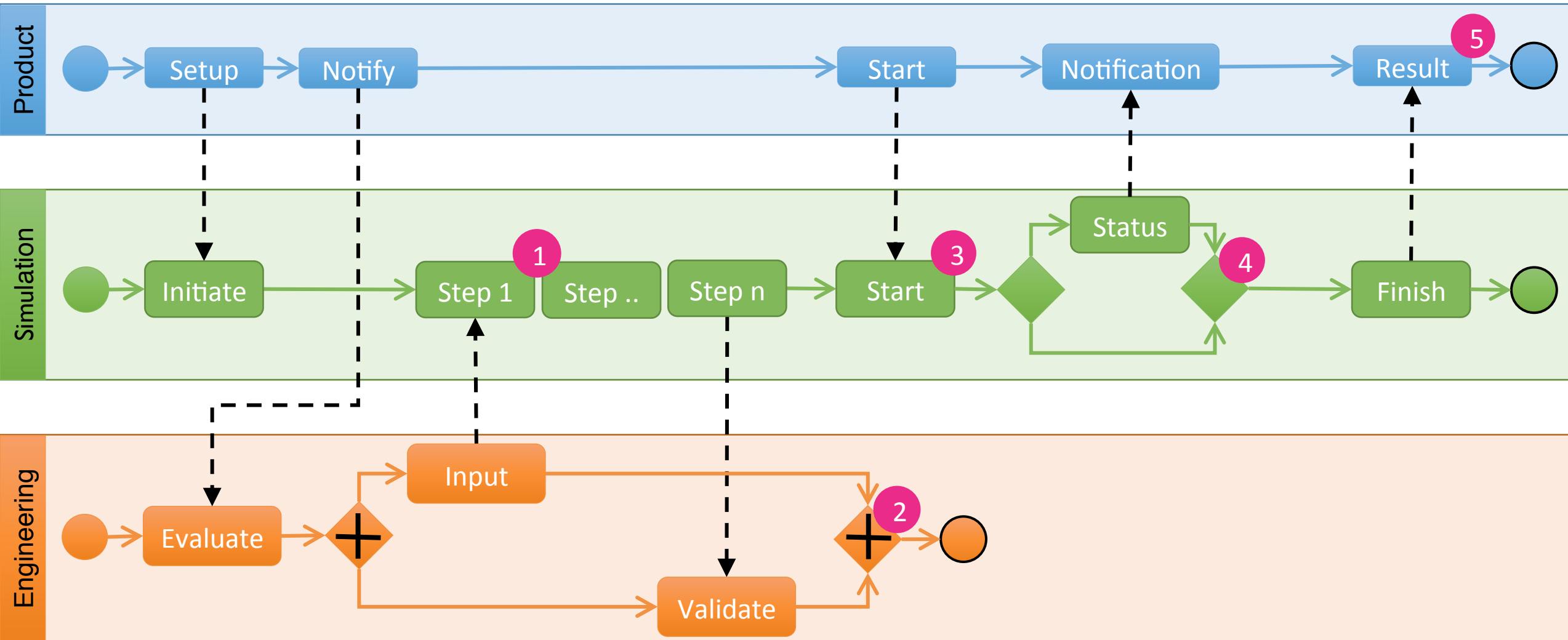
$$x = (t_x, \vec{X})$$

Time Object

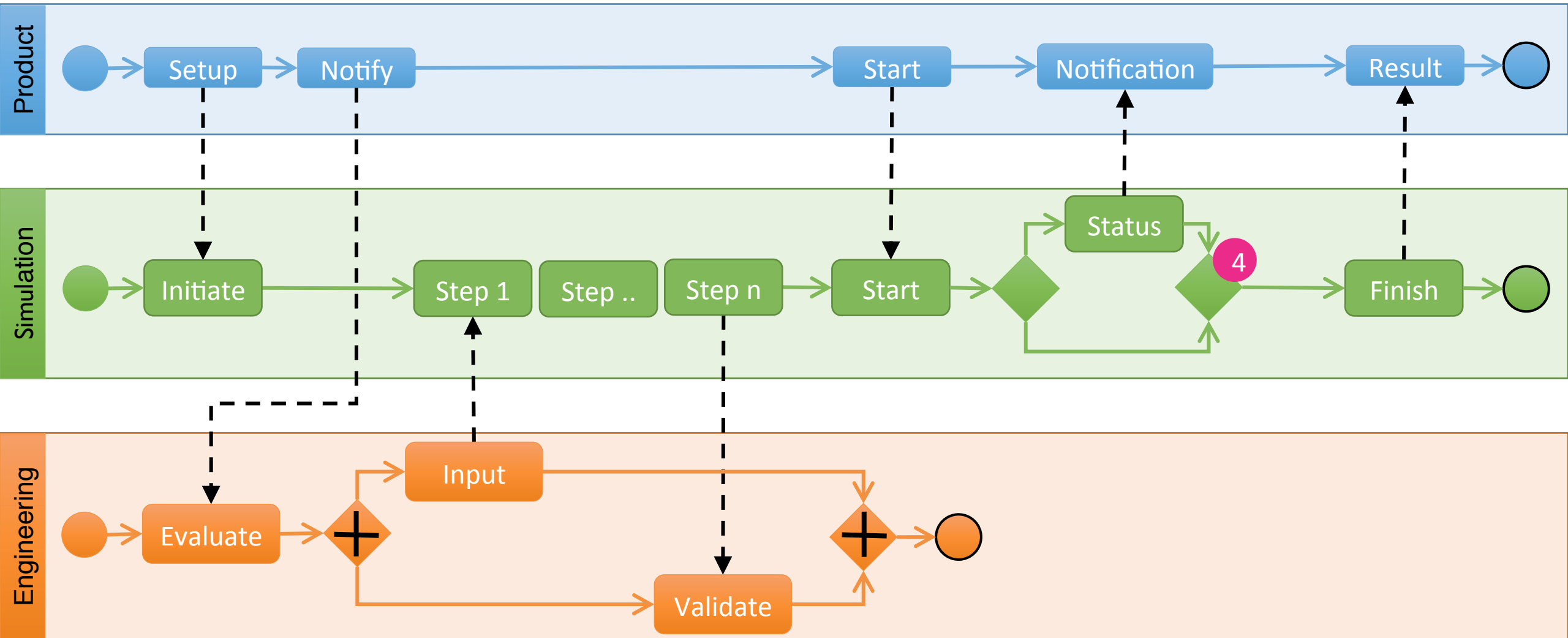
list of Time Objects



How the algorithm works



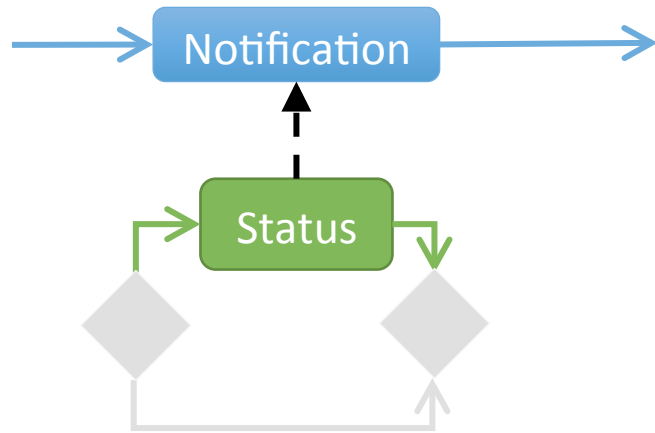
Exception 4



Exception 4

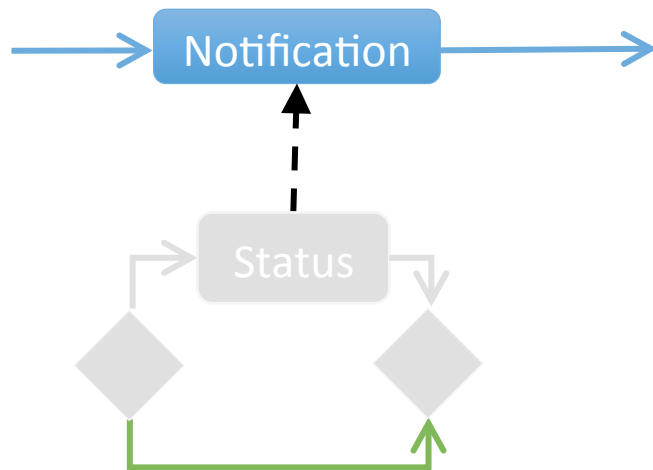
Product

Scenario 1



Simulation

Scenario 2



Engineering

Start

Notification

Result

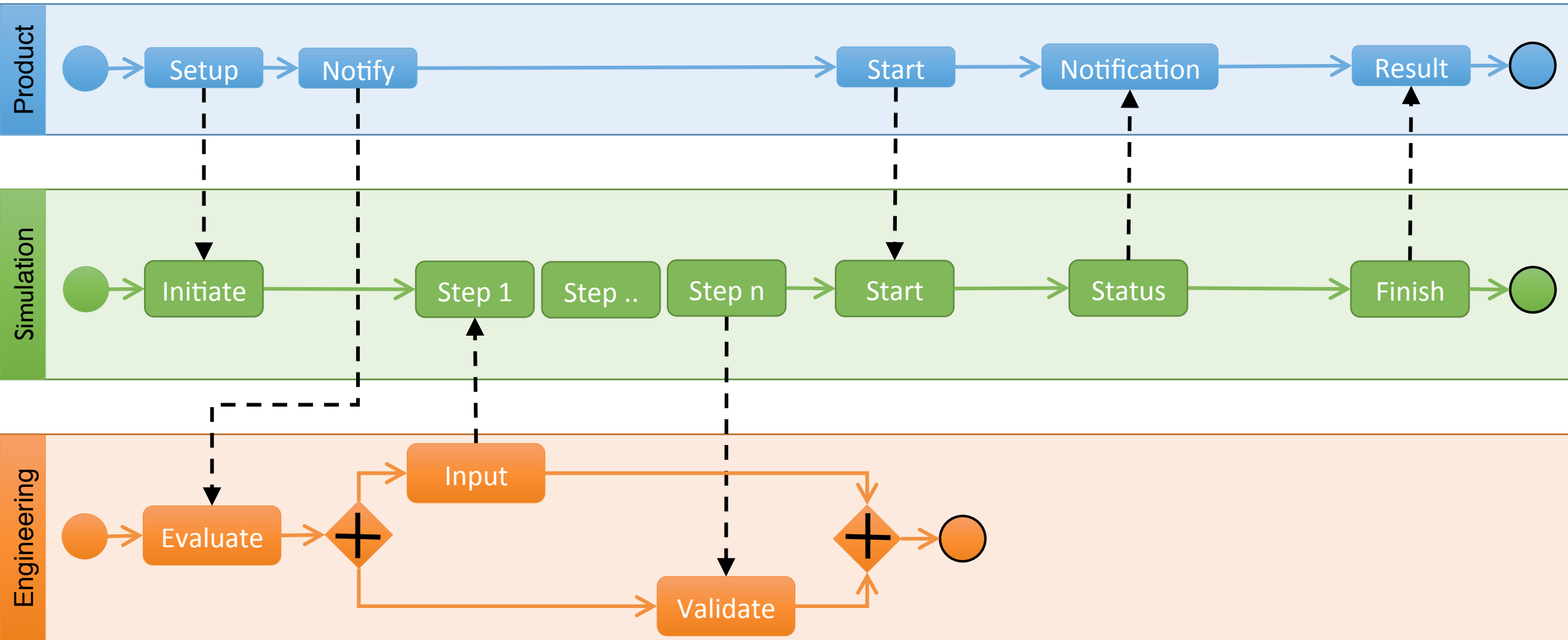
Start

Status

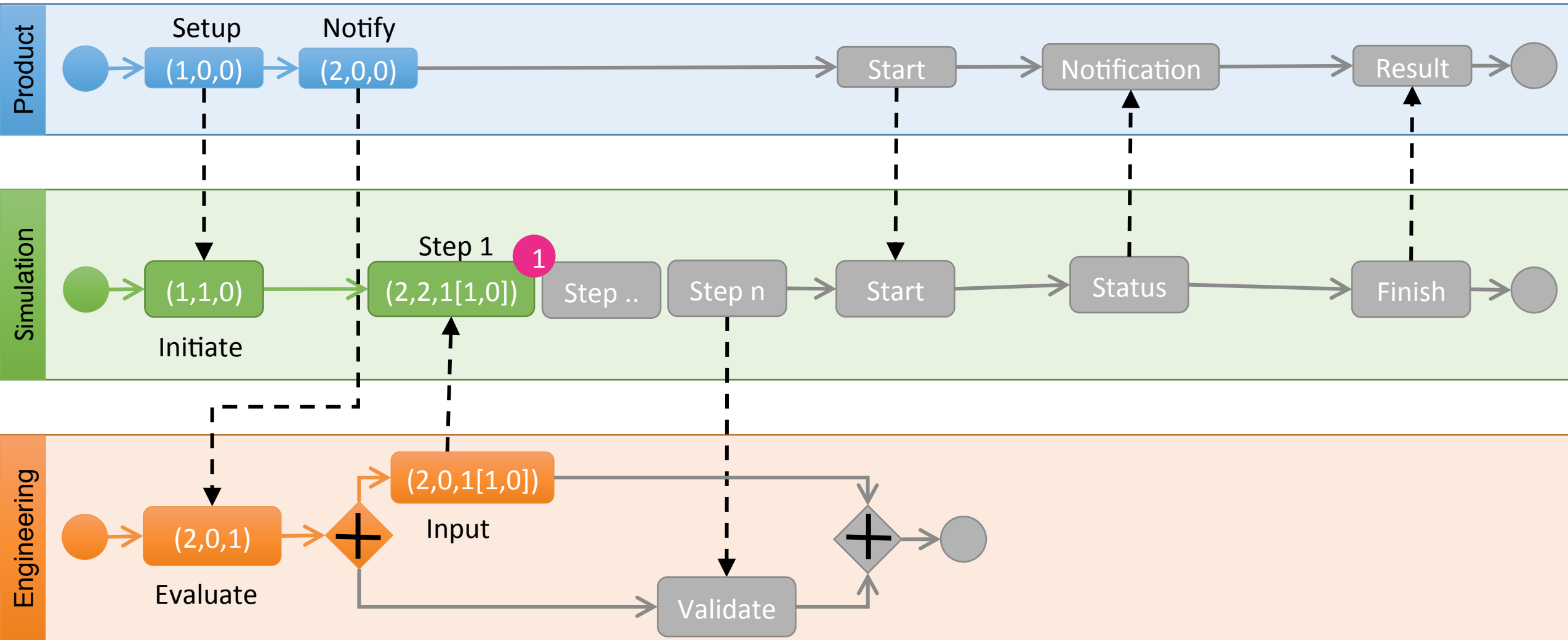
4

Finish

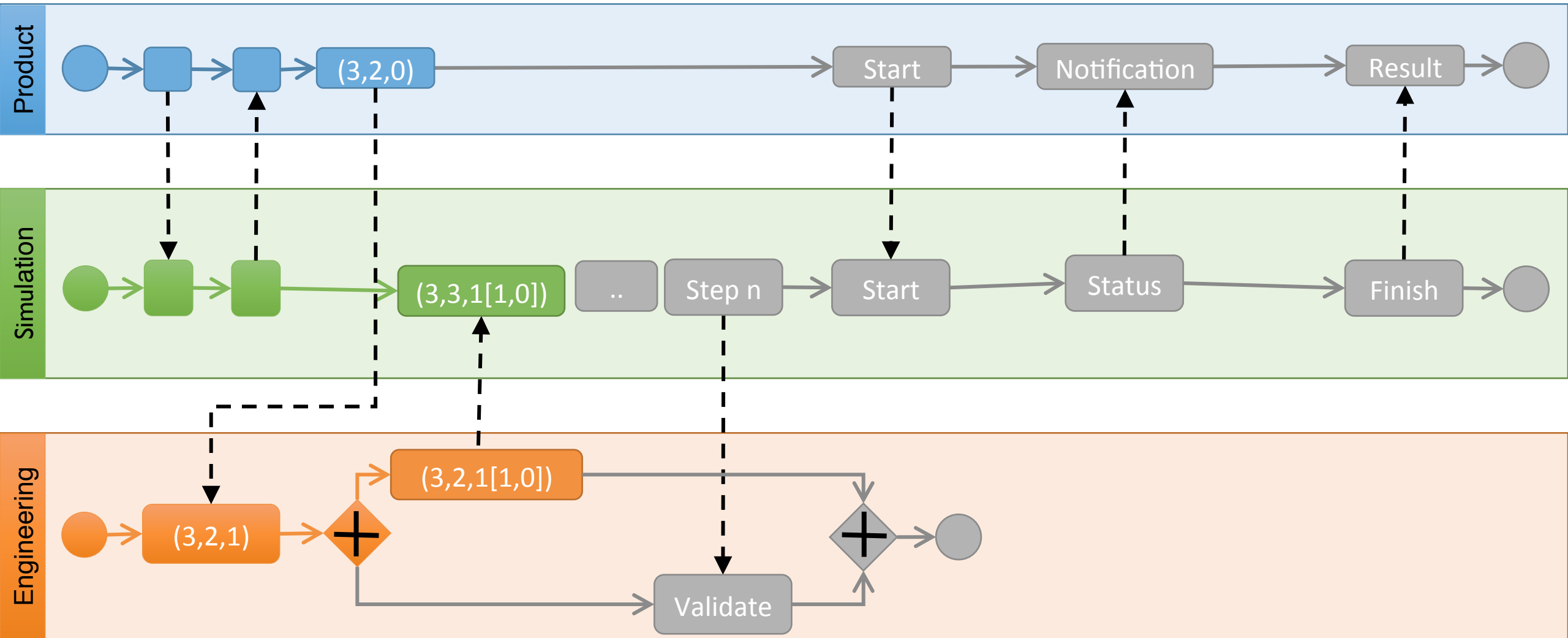
Possible solution for Exception 4



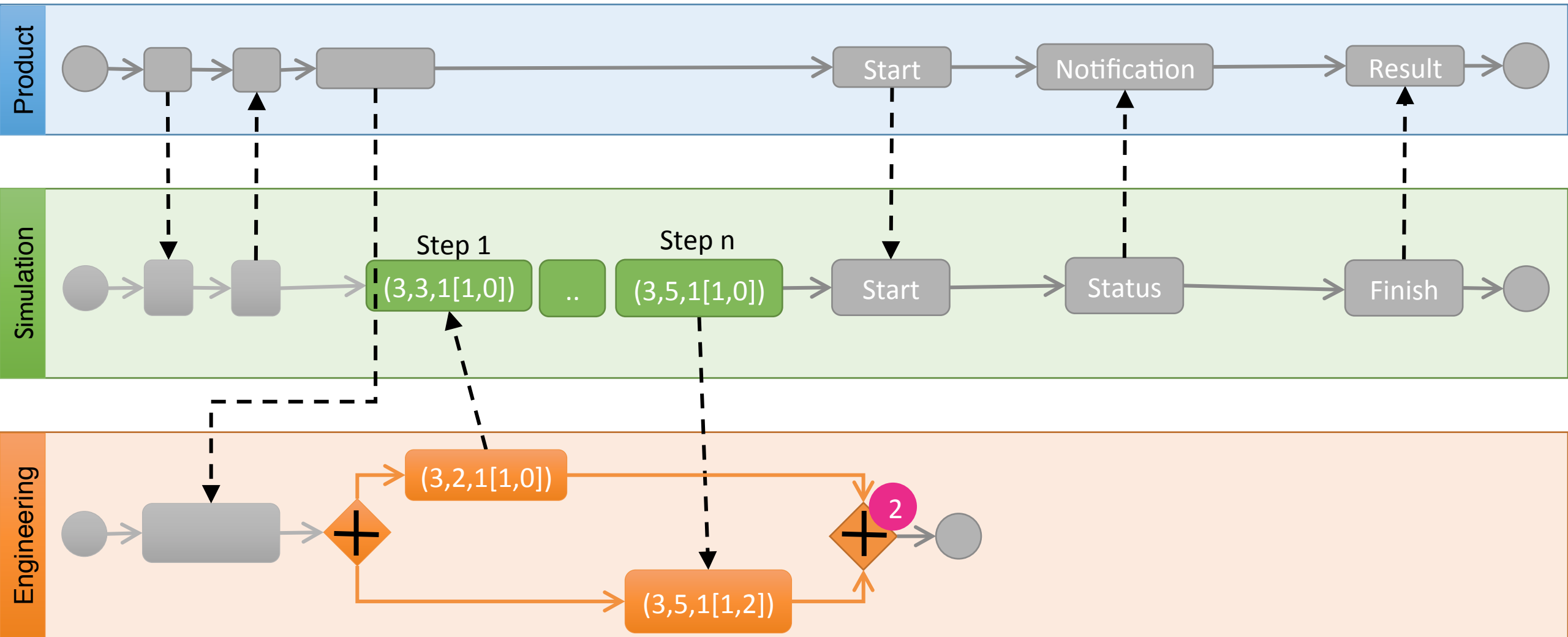
Exception ① : message order



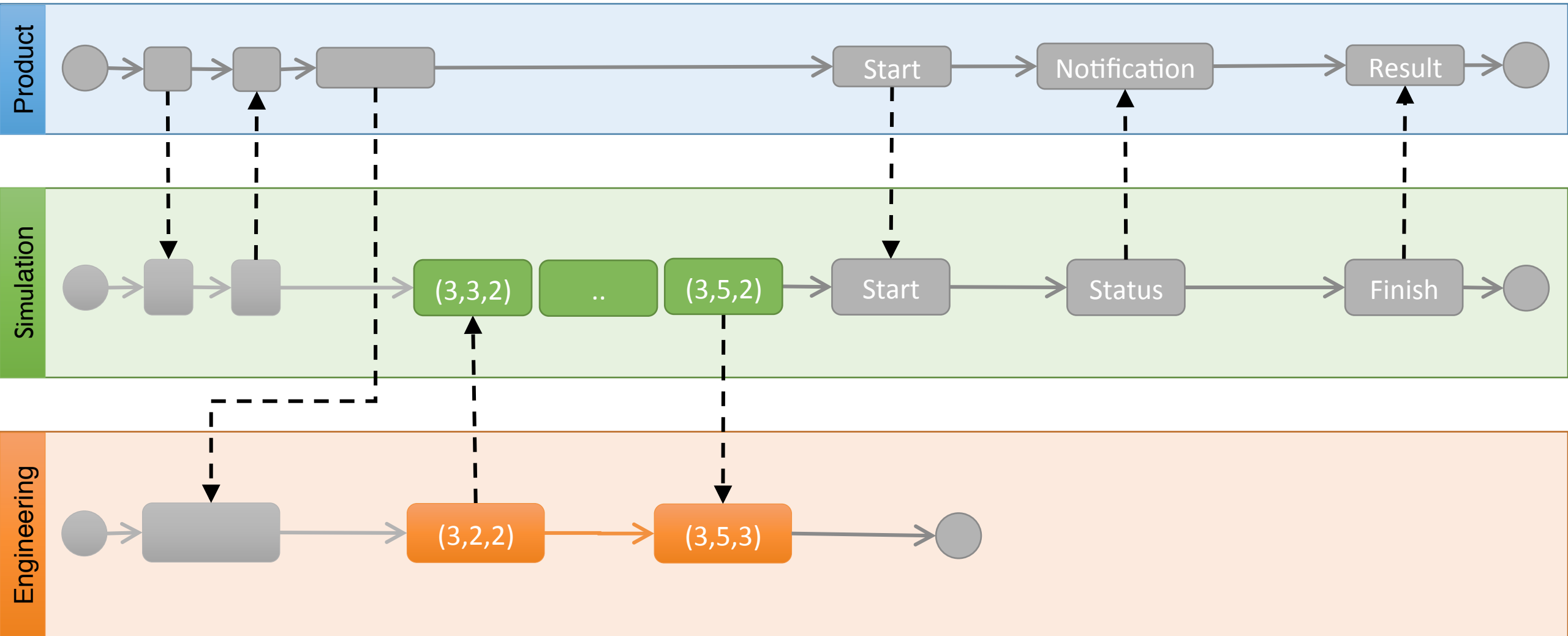
Possible solution for Exception ①



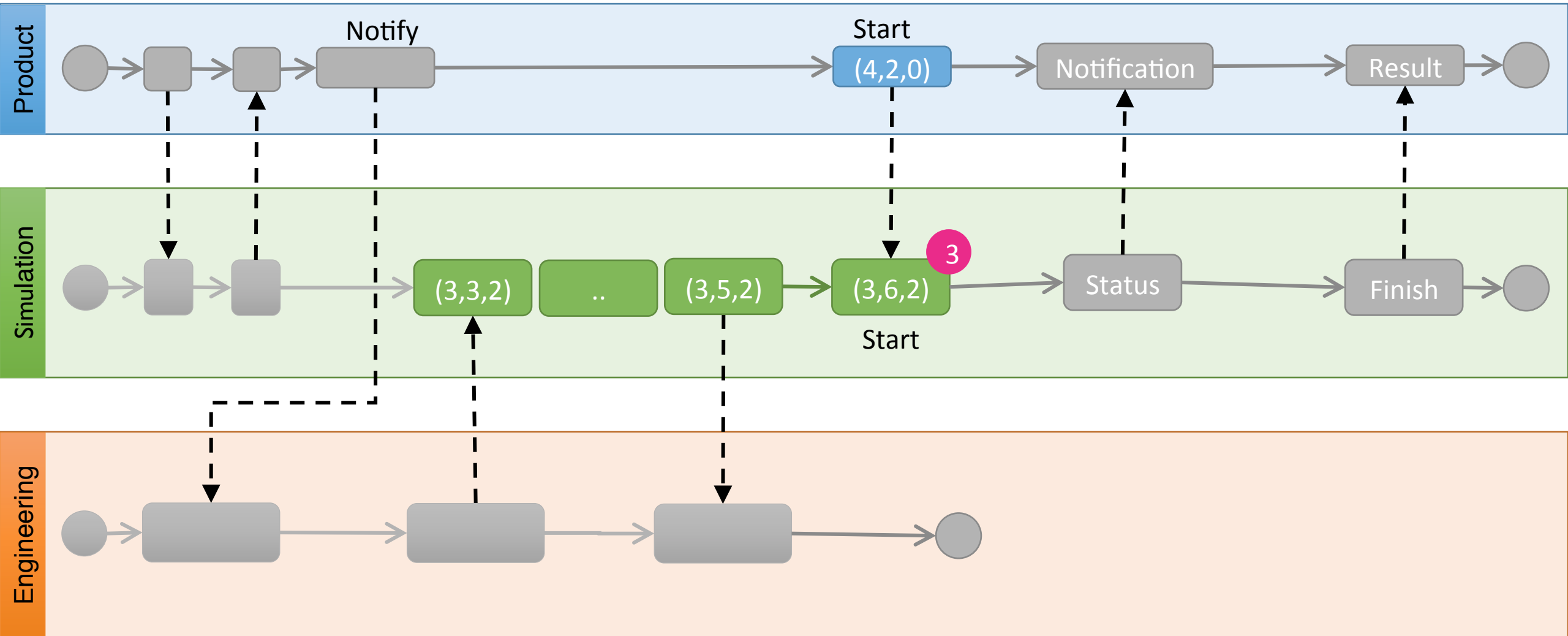
Exception ② : parallel order



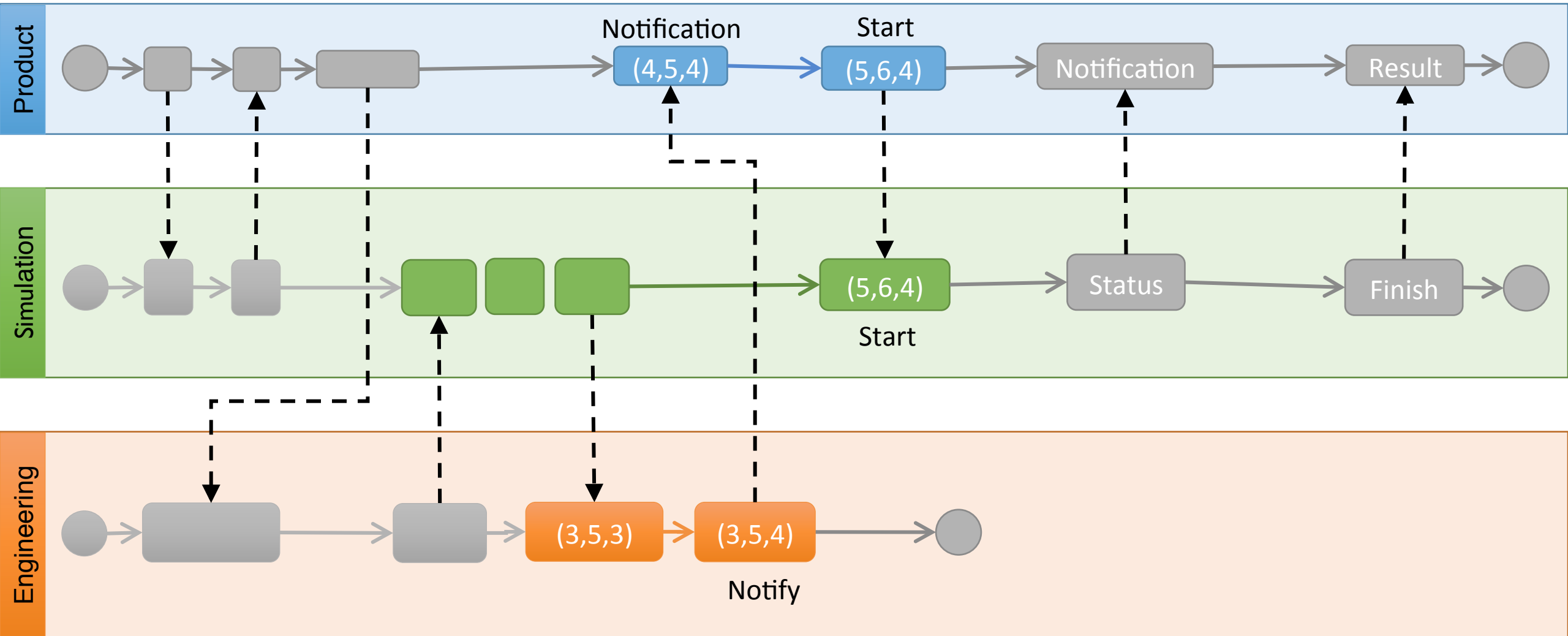
Possible solution for Exception ②



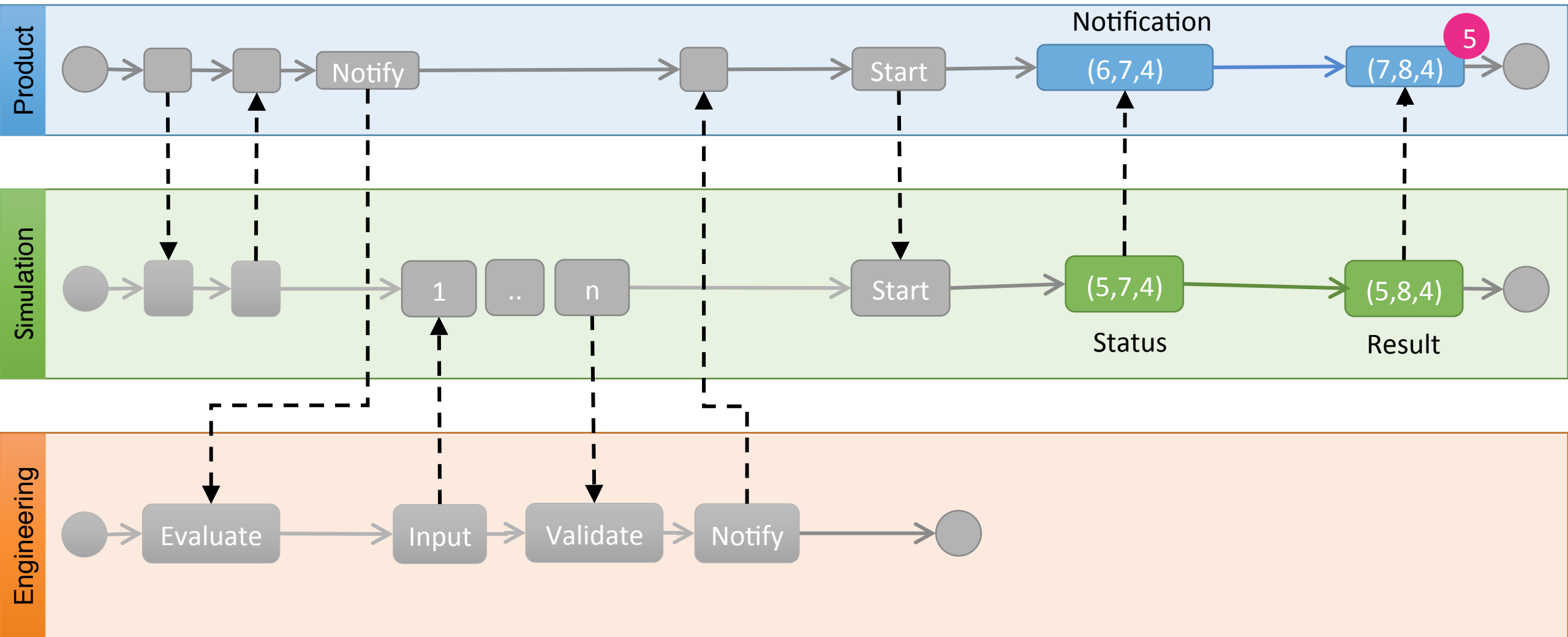
Exception ③ : message order



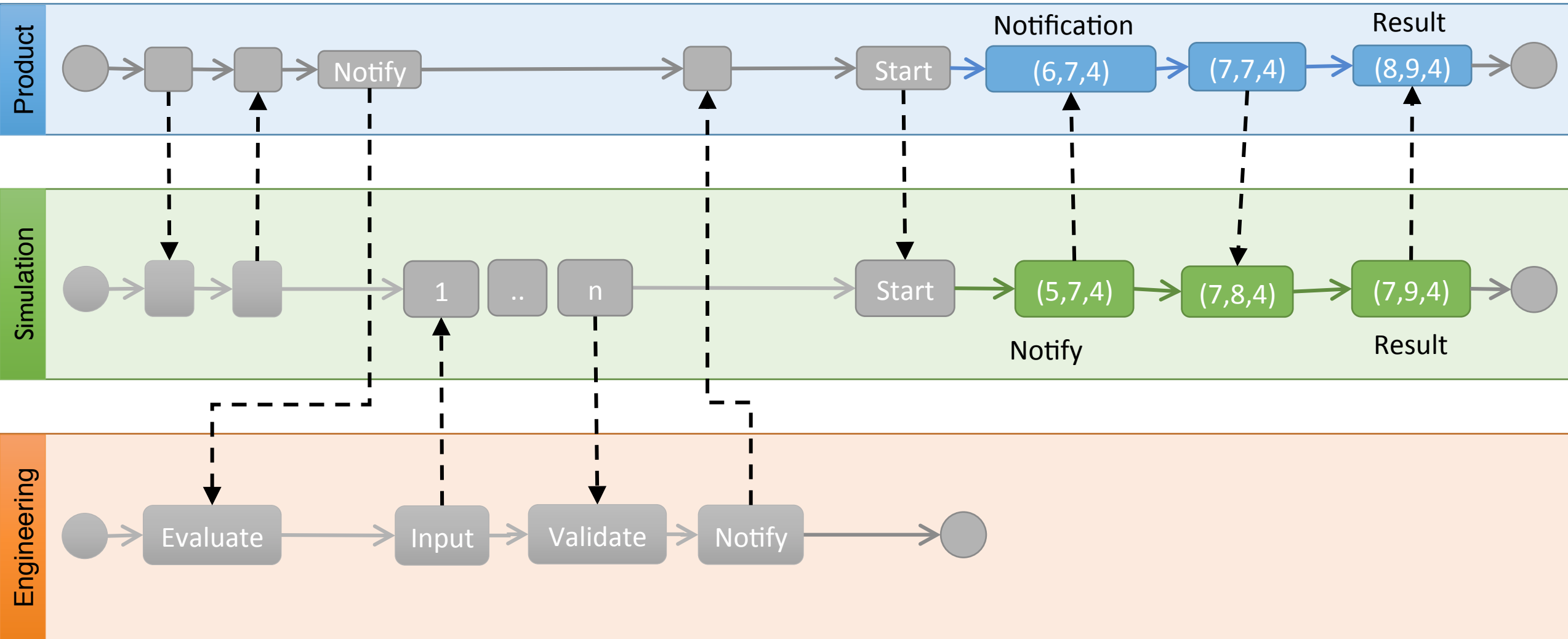
Possible solution for Exception ③



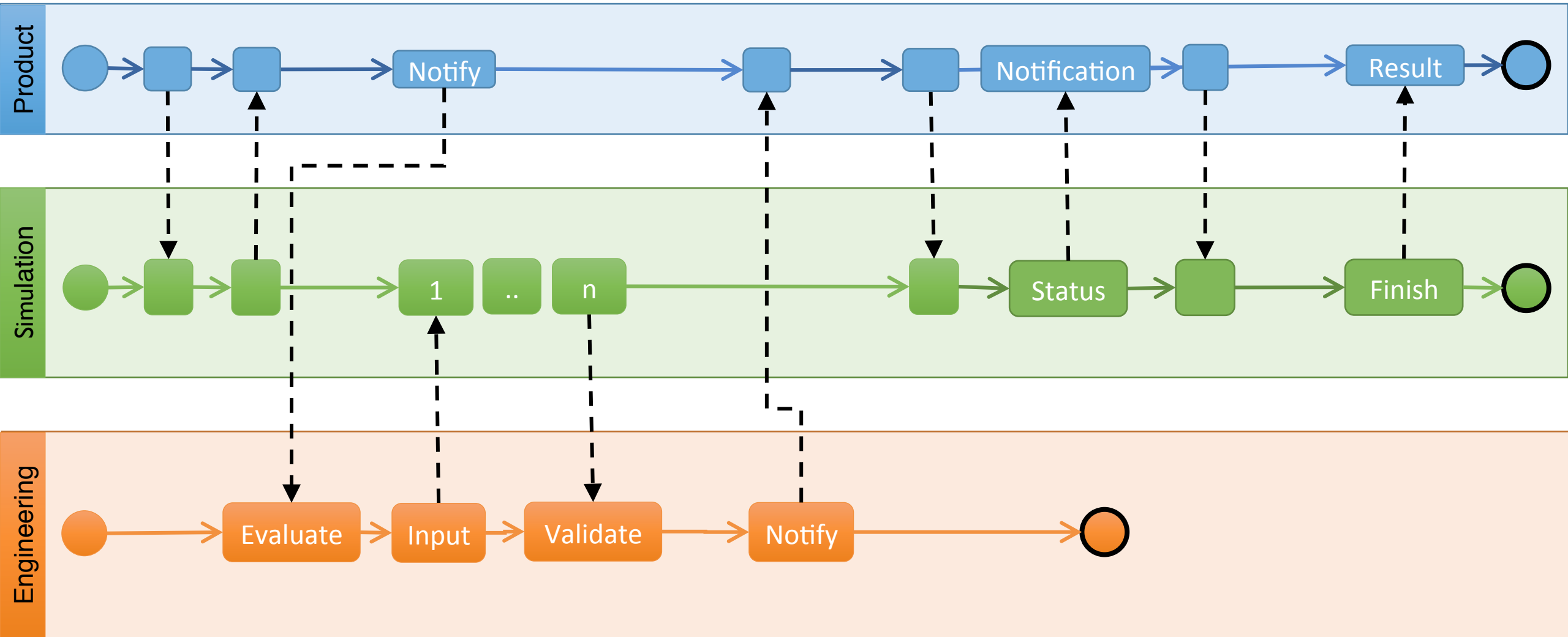
Exception 5



Solution for Exception 5

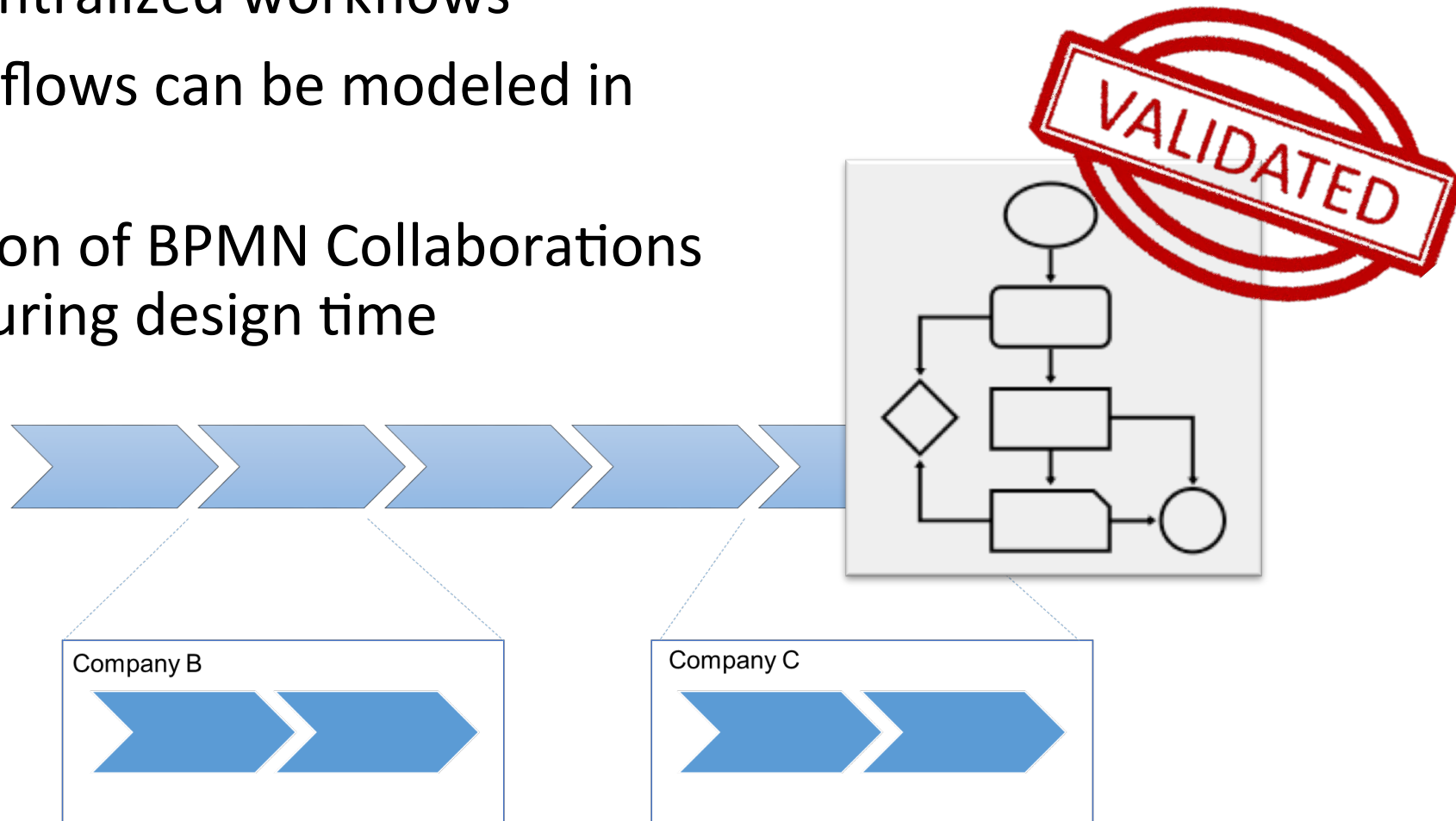


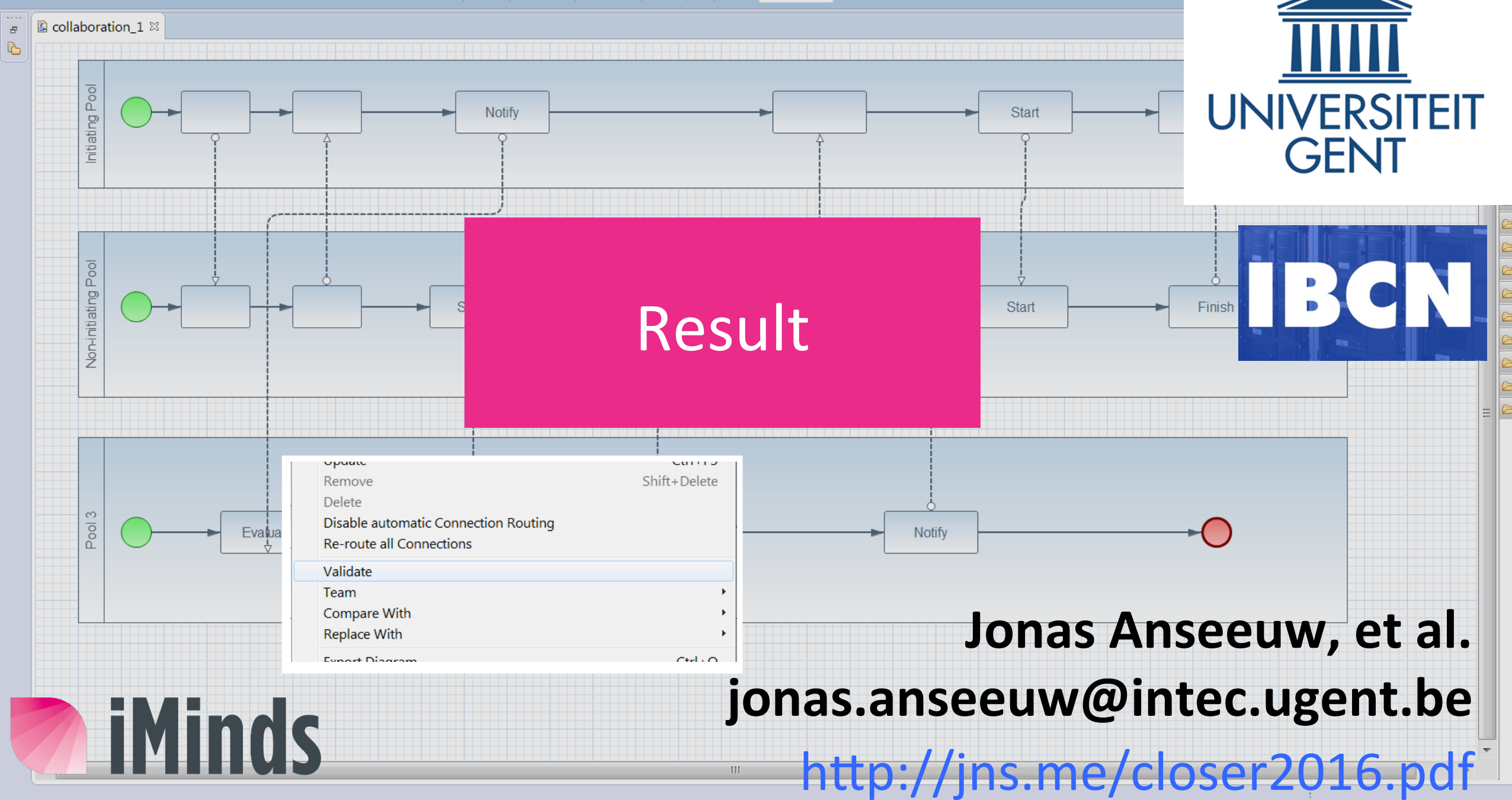
Properly validated BPMN model



Takeaway points

- BPO results in decentralized workflows
- Decentralized workflows can be modeled in BPMN
- The correct execution of BPMN Collaborations can be validated during design time





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