

Explication of Termination Semantics as a Security-Relevant Feature in Business Process Modeling Languages

Jens Gulden

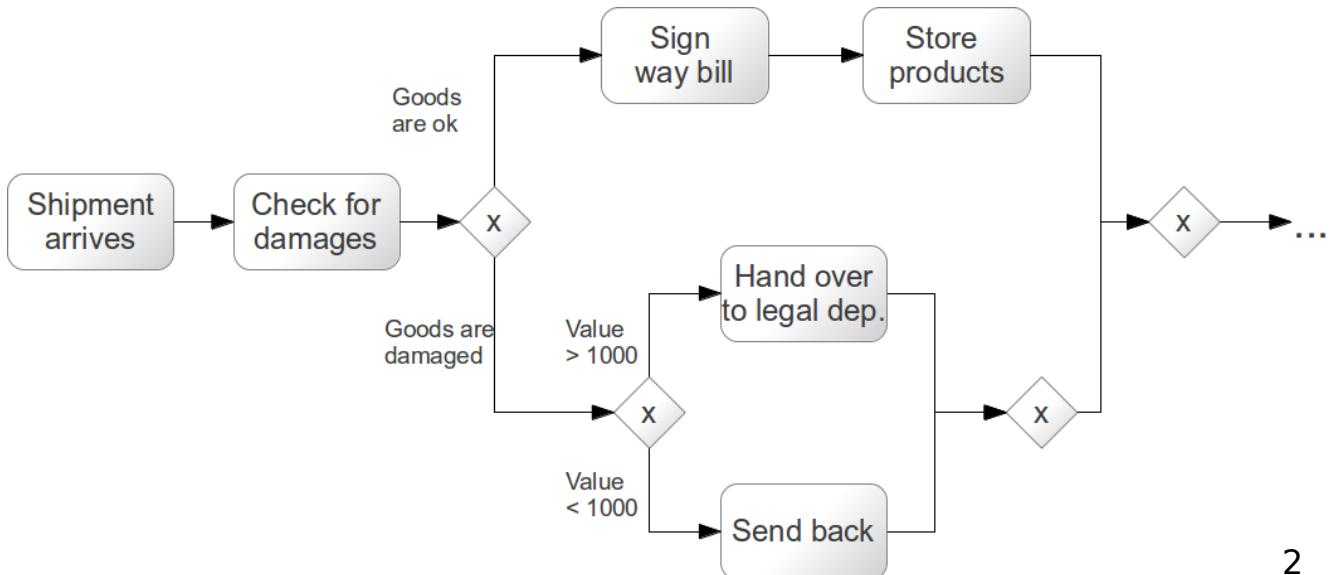
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Nature of Business Processes

- Describe the “**real world**”
- **Not** purely **algorithmic**
- Actors and resources are (mostly)
outside computer systems
- **Rich semantics** of individual
process-steps

Example Business Process Model



2

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Business Process Model Properties

- Soundness [vanDongenEtAl06, FahlandEtAl11]
 - structural feature
 - no blocking / deadlocks possible
 - no endless loops possible
- Reachability, executability [WeberEtAl08, GruhnLaue06]
- “Forbidden behavior” [SimonMendling06]

3

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Business Process Model Properties

- **Soundness** [van DongenEtAl06, FahlandEtAl11]
 These are properties of the **process structure**!
Not saying anything about single **process steps**!
- **Reachability, executability**
[WeberEtAl08, GruhnLaue06]
- “**Forbidden behavior**” [SimonMendling06]

3

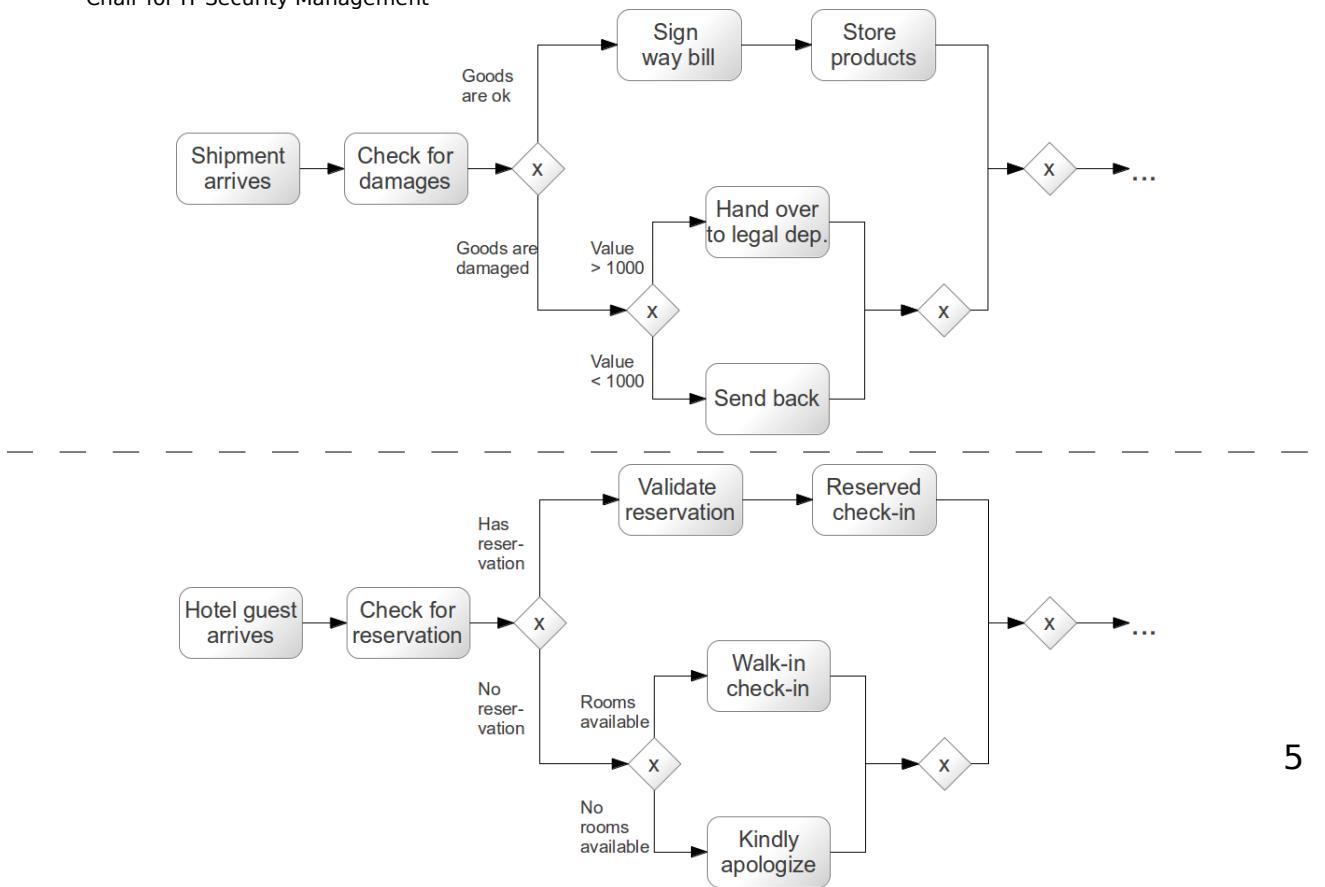
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Process-Steps

- **Atomistic** elements from a process-definition's point of view
 - “Black-boxes” from process point of view
- But carrying most process **semantics**
 - coarse-grained actions of different types
 - manual operation, human decision making, machine communication, web-service invocation...

4

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5

Process-Step Execution

- Existing (general-purpose) Business Process Modeling Languages (BPMNs)
 - some make rudimentary distinctions (e.g. **“manual” vs. “automatic”** step)
 - hints about how to **begin a process step** (e.g. notification to human worker)
 - hints about how to **end a process step** (e.g. wait for human worker's ok)

6

Process-Step Execution

- Existing (general-purpose) Business Process Modeling languages (e.g. BPMN)
 - some make rudimentary distinctions (e.g. "start", "end", "initial")
 - hints about how to begin a process step
- ! **Too simple** notion of process behavior!
● **Not sufficient for security!**
- (e.g. notification to human worker)
– hints about how to **end a process step**
(e.g. wait for human worker's ok)

6

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Process-Step Termination

- Different **kinds of termination**:
 - with a **valid** result
 - with an **invalid** result
 - with an **undefined** result
 - with a **non-fatal** error
 - with a **fatal** error
 - **no** termination
 - **unknown** termination

7

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Limitations in existing BPMNs

- Only **implicit** begin / end semantics
 - types of process-steps give **hints only**
 - **blind towards alternative** semantics due to general-purpose approach
- However: **Event** handlers
 - e.g. in BPMN, BPEL, but not **cleanly integrated** with control-flow specification
 - remains from programming languages

8

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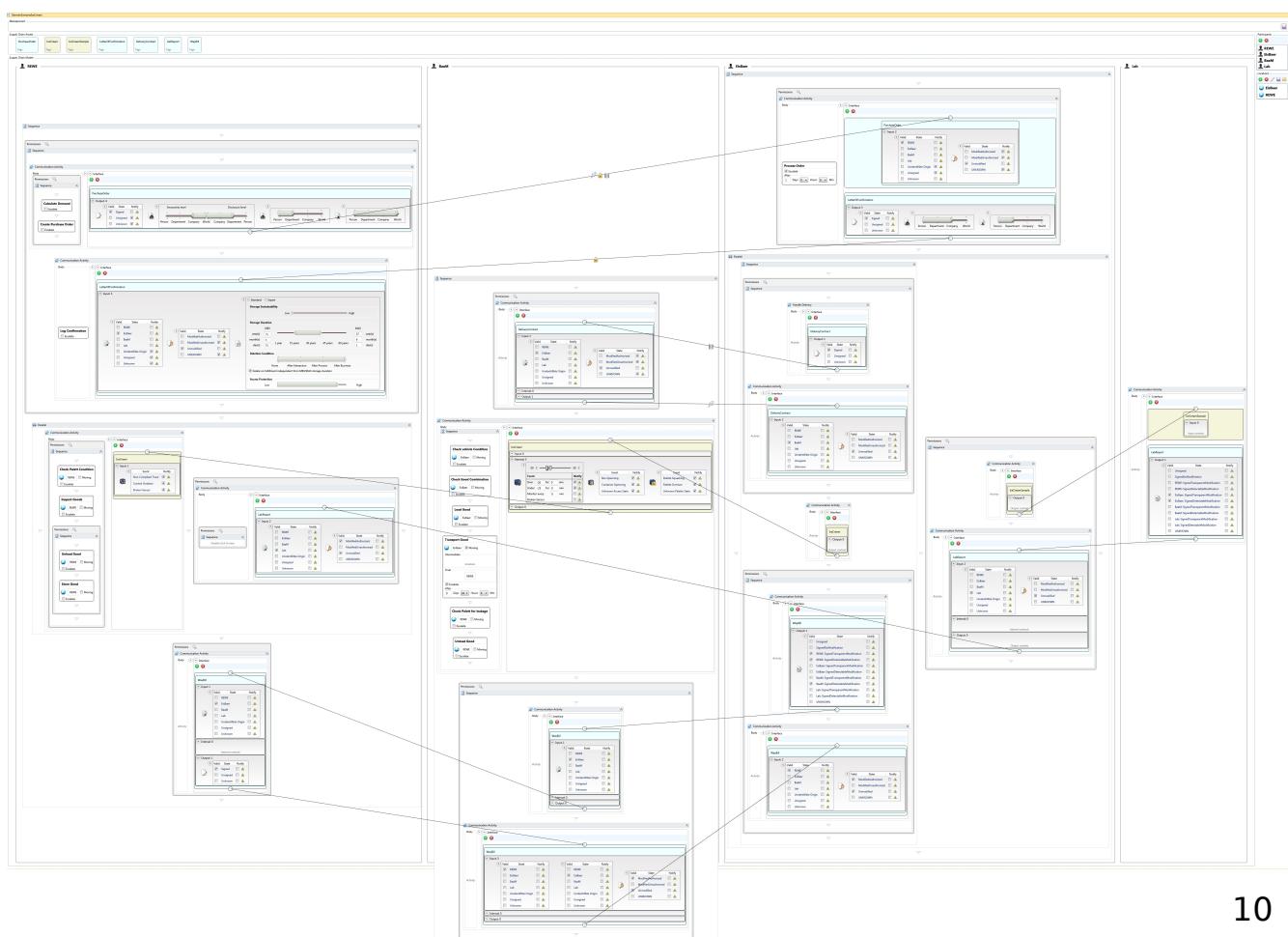
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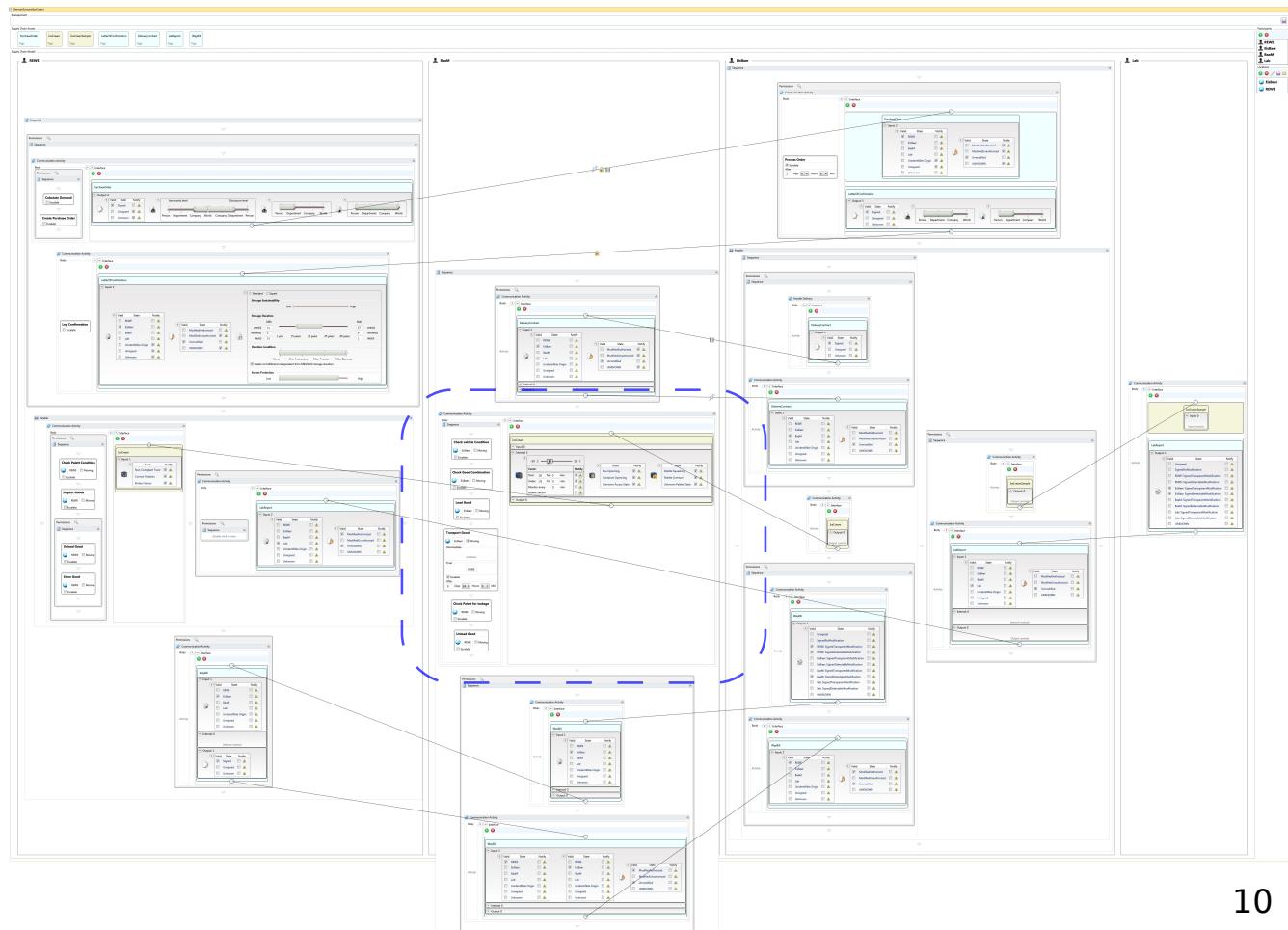
Suggestion for a Solution

- Create a **Domain-specific Business Process Modeling Language (DSBPML)** in security-relevant contexts
 - incorporate **explicit modeling language elements** for different kinds of process-step termination
 - define a **mapping** to execution logic, e. g. by a model-to-model transformation

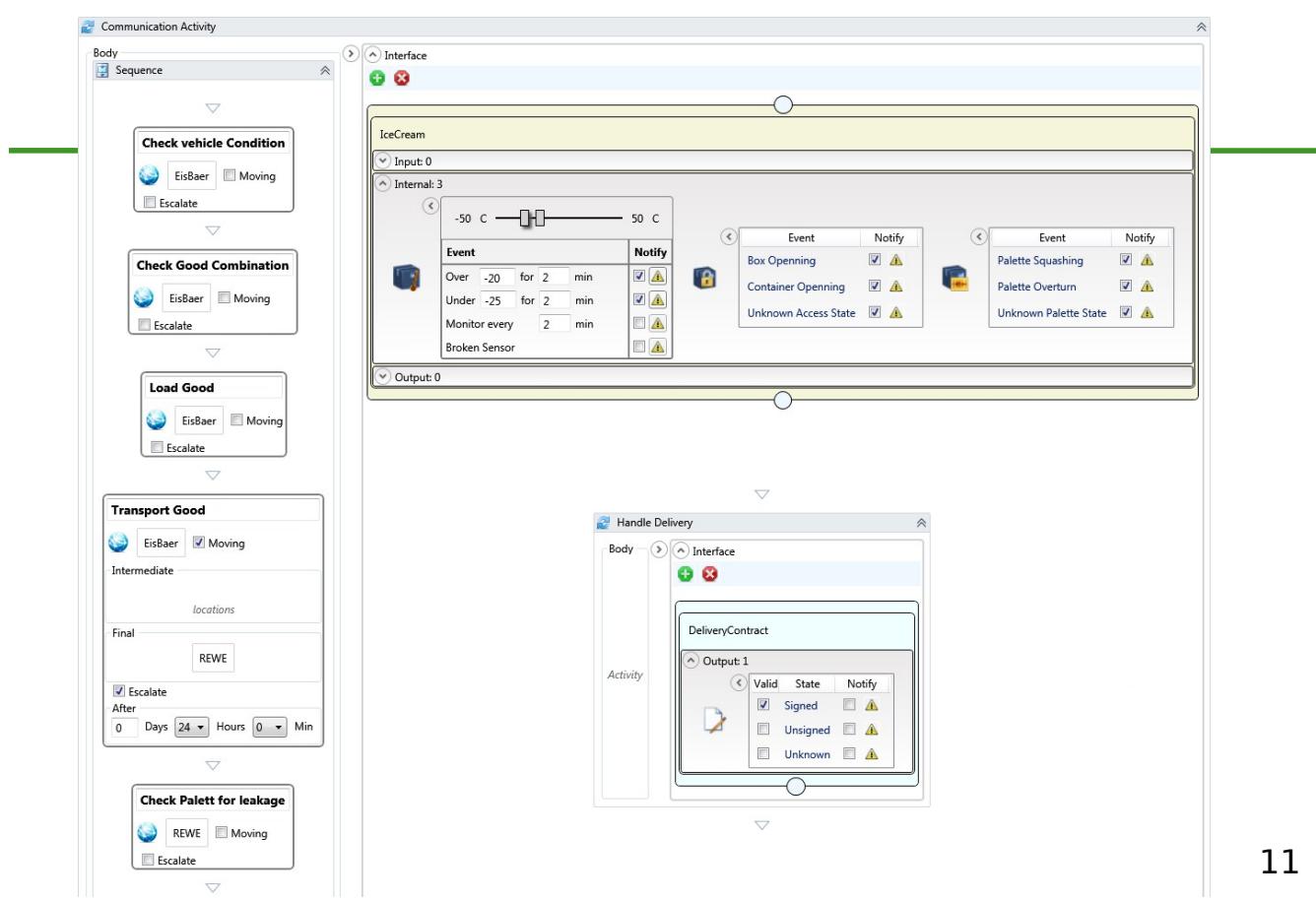
9

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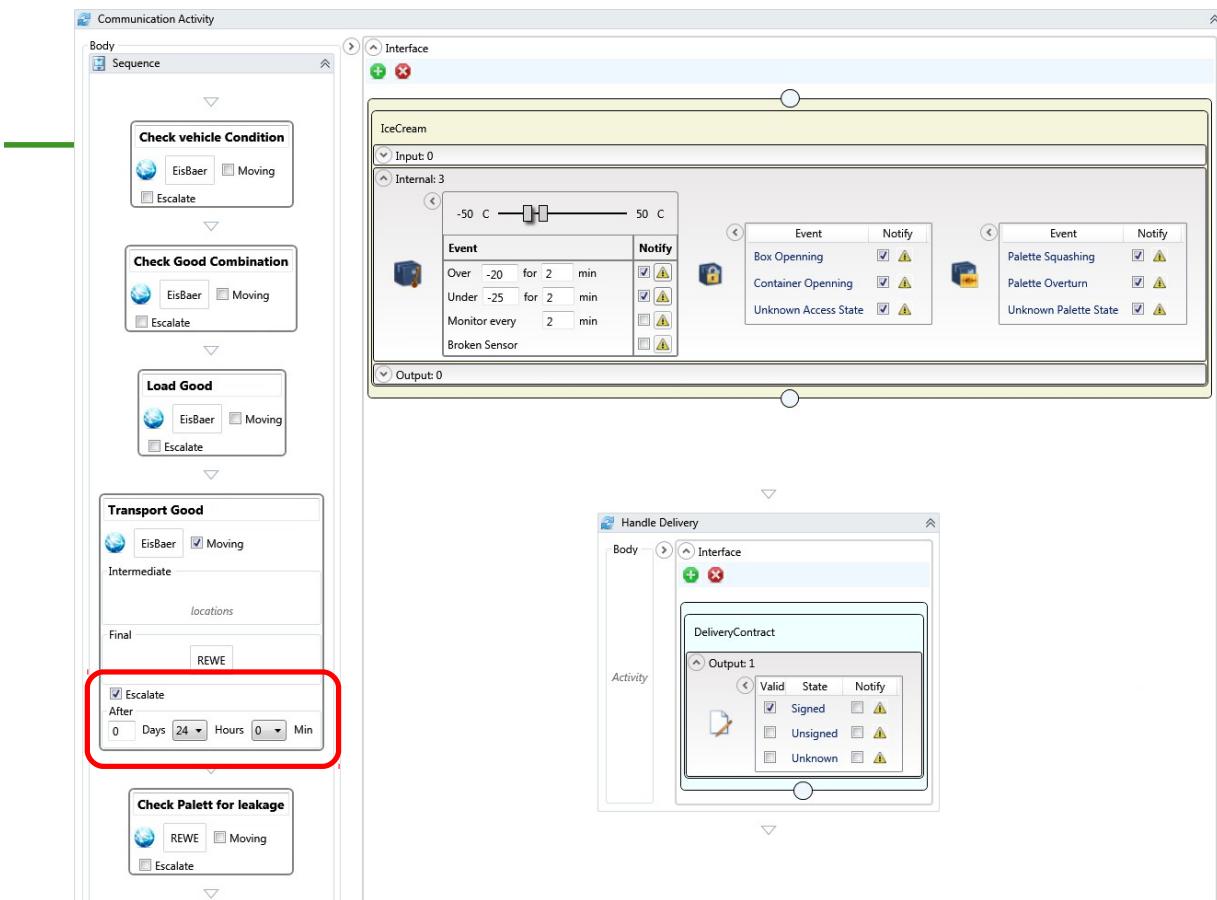




10



11



11

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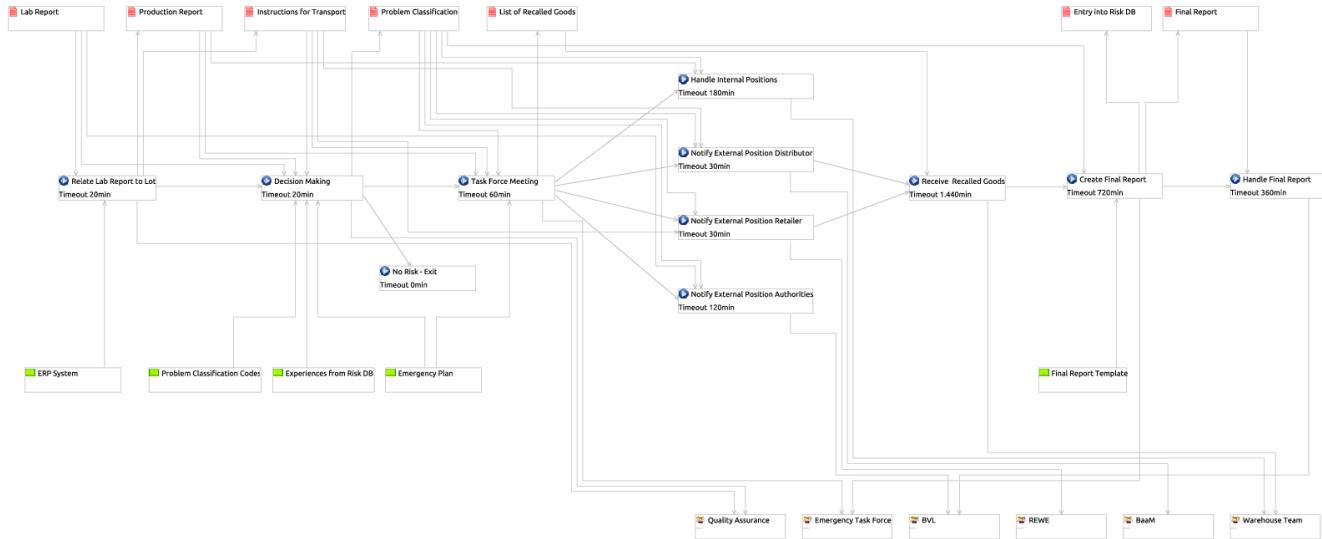


The screenshot shows the configuration for the **Transport Good** activity:

- EisBaer**, **Moving**
- Intermediate**
- locations**
- Final** location: REWE
- Escalate** checkbox checked, "After" dropdown set to 0 Days 24 Hours 0 Min

12

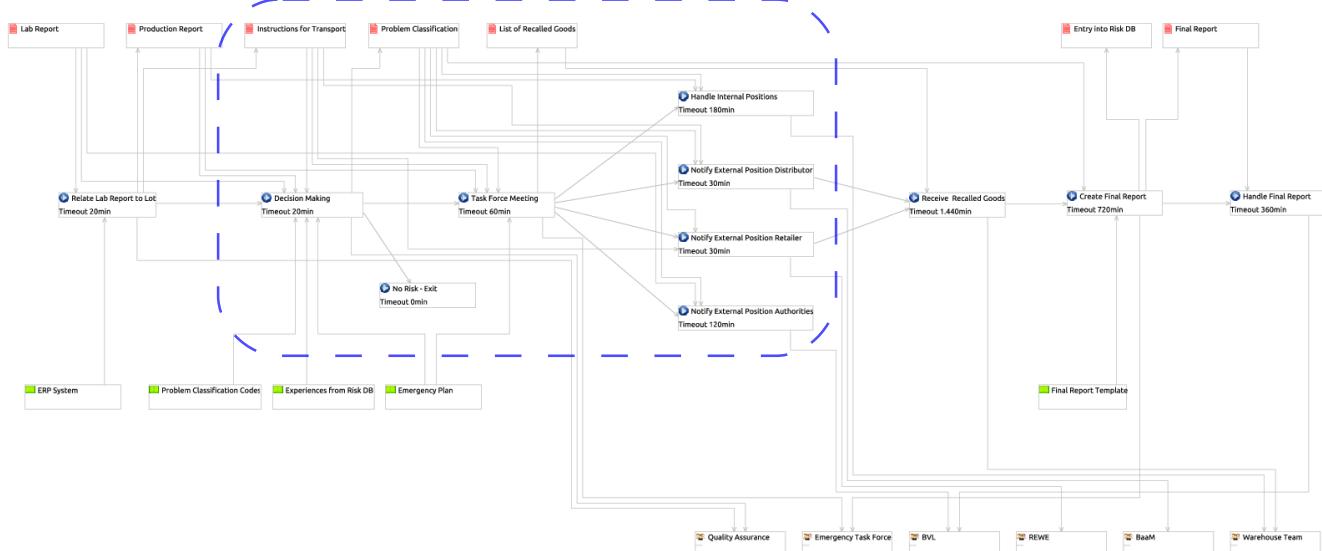
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13

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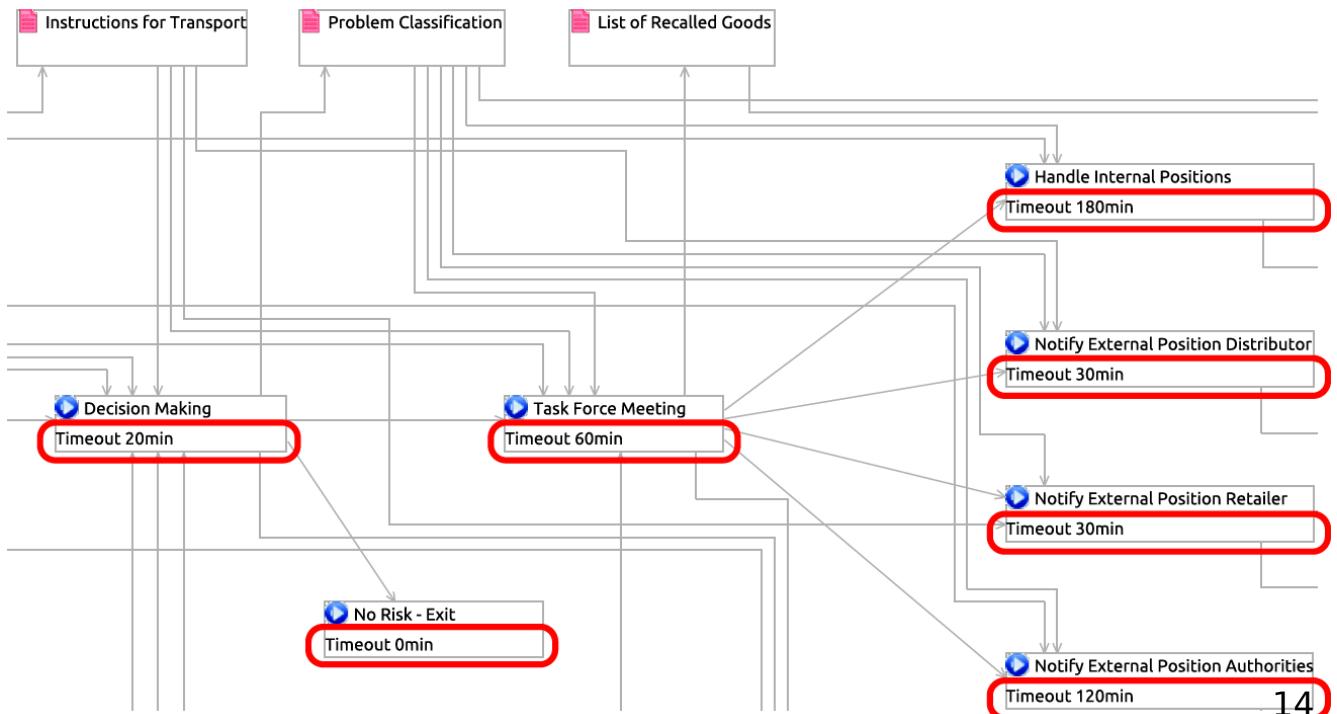
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13

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14

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Thank you!

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