Workflows and Decision Tables for Flexible Early Warning Systems

(work in progress)

Felix Riedel

felix.riedel@iosb.fraunhofer.de

Fernando Chaves

fernando.chaves-salamanca@iosb.fraunhofer.de

9th International Conference on Information Systems for Crisis Response and Management
ISCRAM 2012, Vancouver, Canada

TRICEC

Fraunhofer IOSB

Presentation Outline

- TRIDEC Project
- Objectives
- Workflows
- Decision Tables
- Planned work

The TRIDEC Project

TRIDEC focuses on new technologies for **real-time intelligent information management** in collaborative, complex critical decision processes in earth management.

Key developments:

- A communication infrastructure for the management of dynamically increasing volumes and dimensionality of information
- A robust and scalable service platform supporting the integration and utilization of resources such as sensor systems, simulation-, and data-fusion-tools
- A knowledge-based service framework for context information and intelligent information management with flexible orchestration of system resources
- An adaptive framework for collaborative decision making with the support of **complex business processes and workflows**

Objectives of this Work

Goals:

- Automate processes as far as possible (and wanted)
  - make processes reproducible and traceable
- Allow end-users to configure and adapt processes
  - allow adaption of system behavior
- Provide interfaces that are easy to comprehend and to use

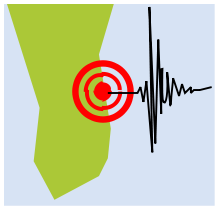
Why:

- Facilitate system evolution
  - different end-users have different policies
  - new information sources affect business processes and decision rules

Motivation for Workflows

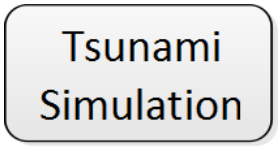
- Information consumers

- Operators



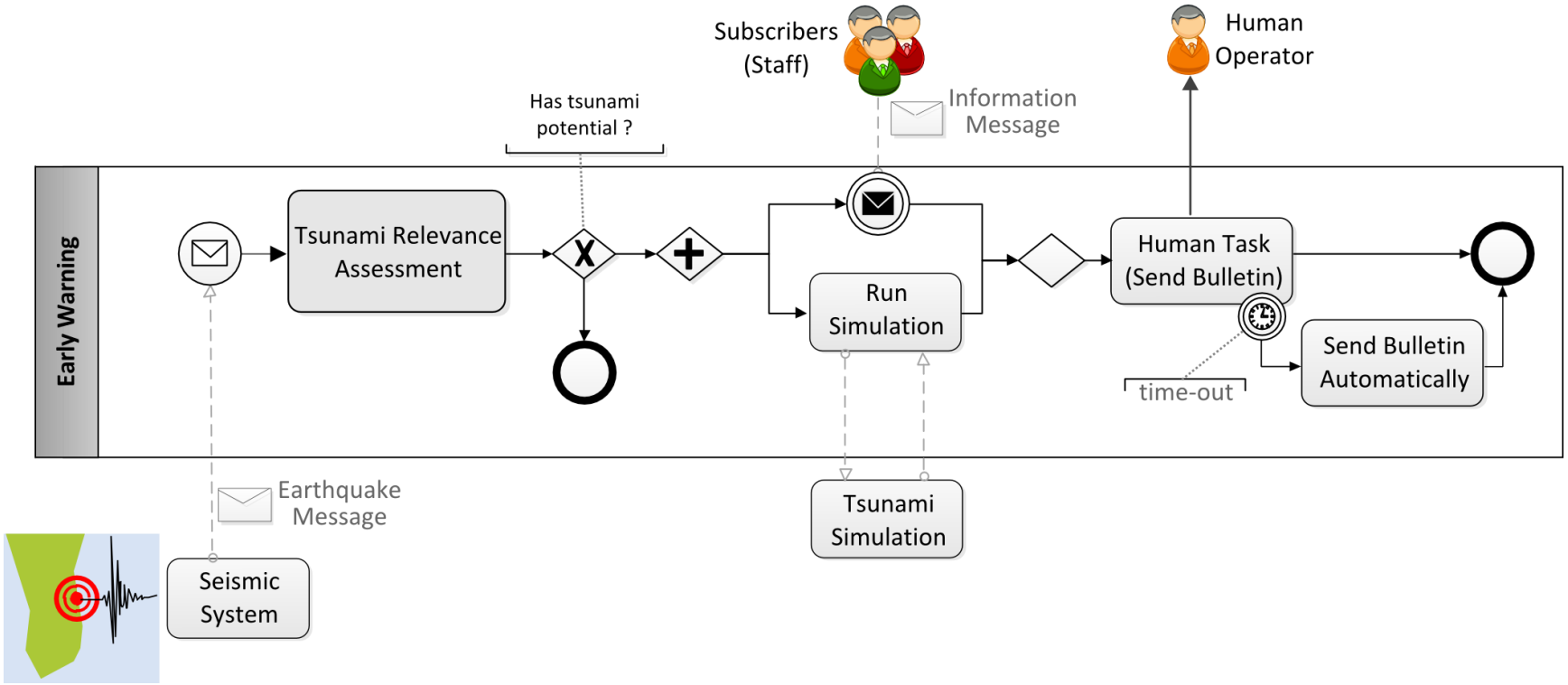
- Events

- Messages



- Services

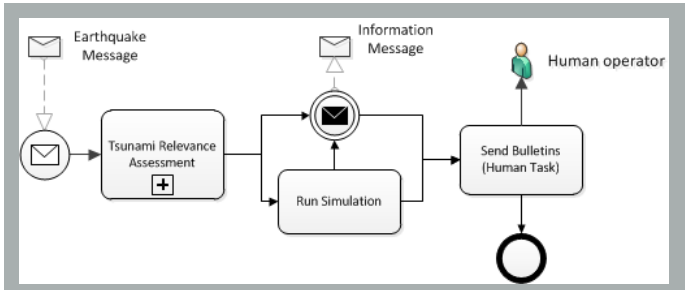
Motivation for Workflows



Fraunhofer IOSB

Advantages of Workflows

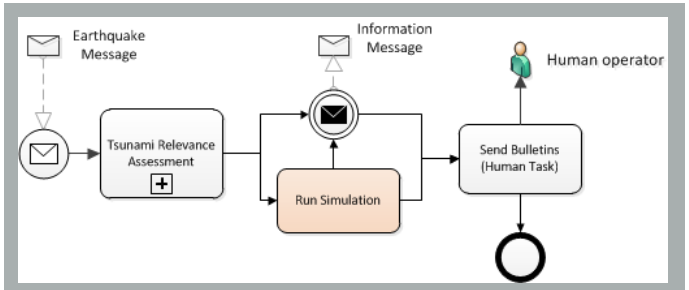
- Comprehensibility
  - End-Users understand workflows
  - workflows can be discussed between IT and non-IT



Simple workflow in BPMN 2.0

- Tracing
  - Execution can be automatically traced

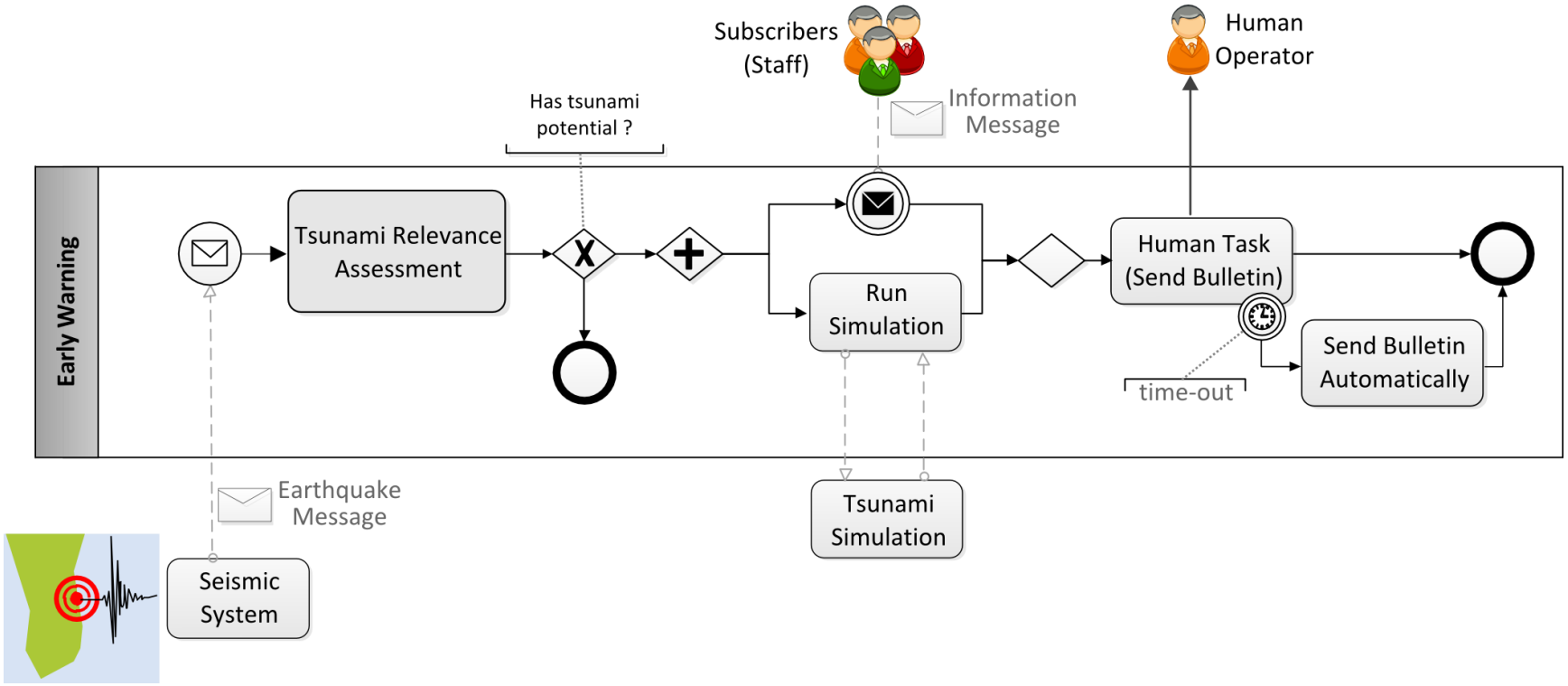
- Monitoring
  - Users can inspect status of workflows
    - *What task is currently executing?*



Currently executed task is highlighted

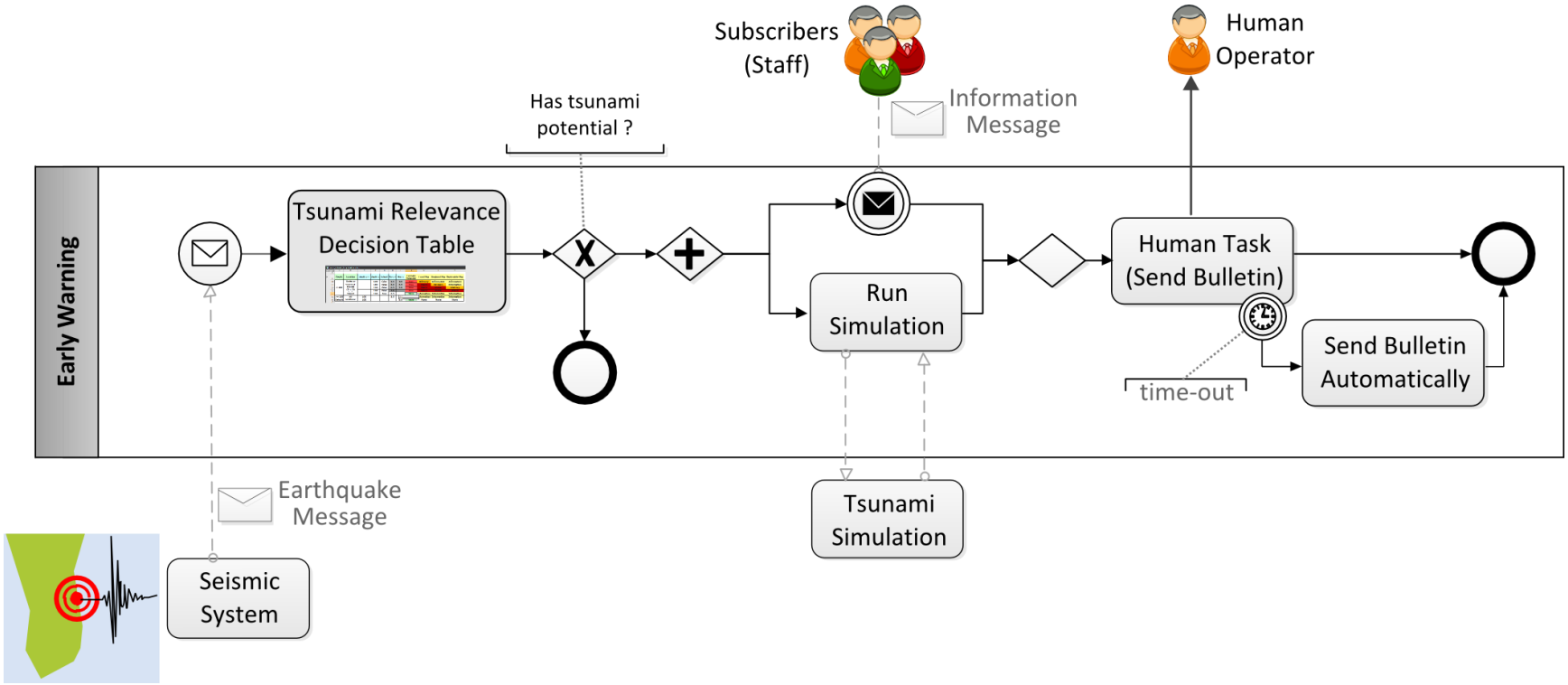
Fraunhofer IOSB

Tsunami Early Warning Workflow



Fraunhofer IOSB

Tsunami Early Warning Workflow



Fraunhofer IOSB

Decision Tables

- Decision Tables
  - are representation of propositional if-then-rule
  - have been around since the 60s
- Best representation of rules with regard to several aspects
  - comprehensibility
  - ease of use
- Can be edited in Spreadsheet application
- Already used in official guidelines

tsunami_matrix.xls [Kompatibilitätsmodus]

	Depth	Location	depth >=	depth <	inland	Mw >=	Mw <	Tsunami Potential	Local Msg	Regional Msg	Basin-wide Msg
10	< 100	Under or very near the sea (D < 30		100	false	5.5	6.0	true	Advisory	Information	Information
11				100	false	6.0	6.5	true	Watch	Advisory	Information
12				100	false	6.5	7.0	true	Watch	Watch	Advisory
13				100	false	7.0		true	Watch	Watch	Watch
14		Inland		100	true	5.5		false	Information	Information	Information
15	>= 100	All locations	100			5.5		true / false	Information	Information	Information
16	Default		100					false	None	None	None

ICG/NEAMTWS decision tables (executable)

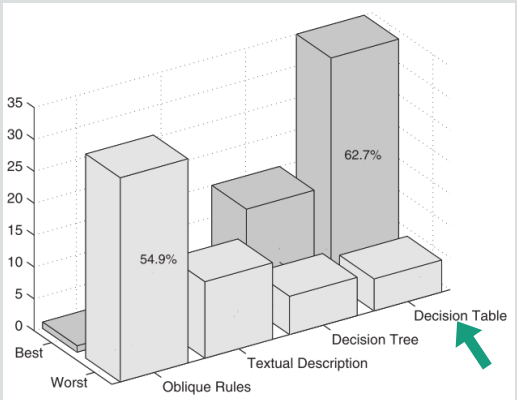


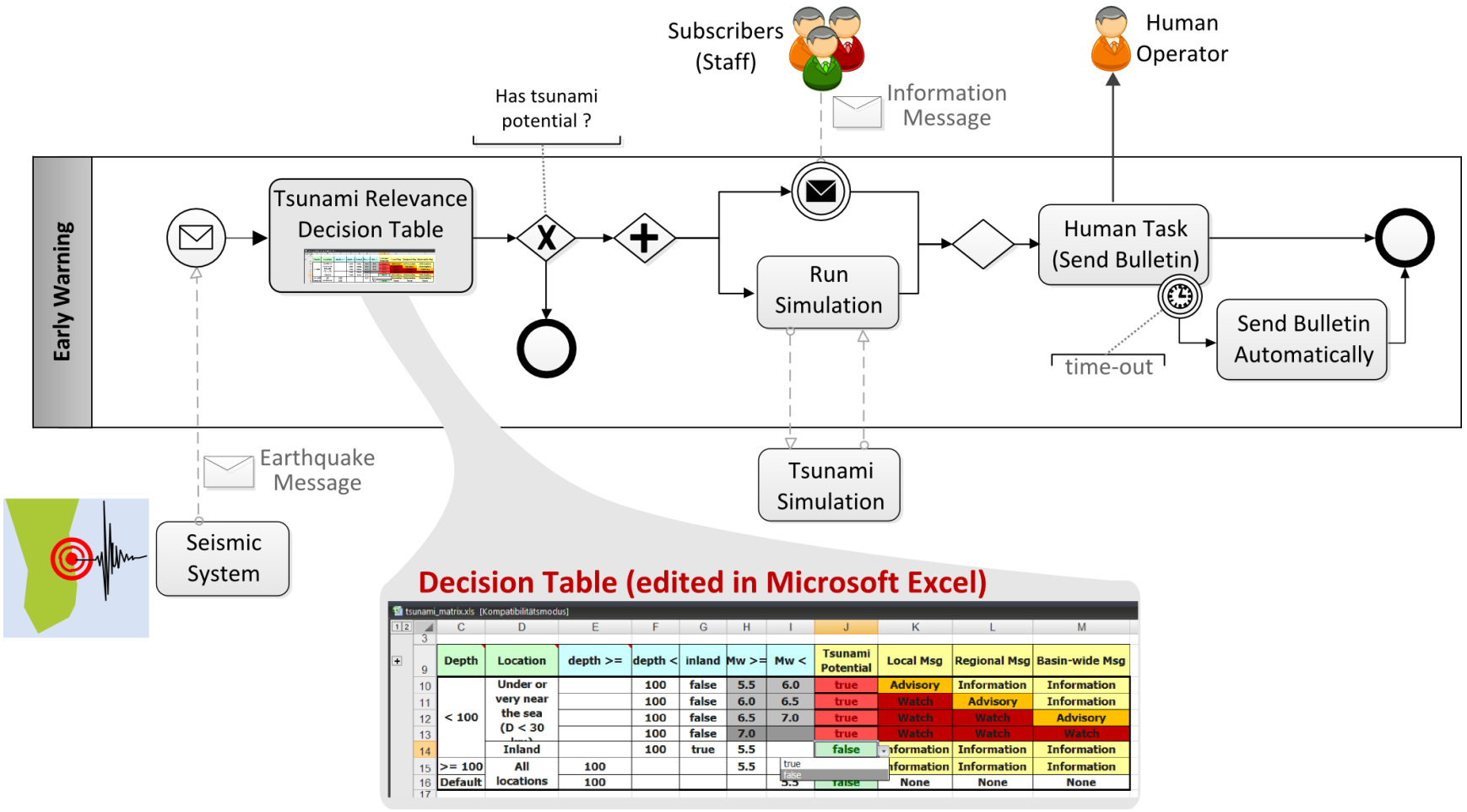
Fig. 8. Ease of use: Percent of respondents evaluating each representation as best/worst.

Huysmans et al. (2011) [link]

"The results showed that, on the aspect of comprehensibility, **decision tables provide significant advantages**"

Fraunhofer IOSB

Tsunami Early Warning Workflow



tsunami_matrix.xls [Kompatibilitätsmodus]

	Depth	Location	depth >=	depth <	inland	Mw >=	Mw <	Tsunami Potential	Local Msg	Regional Msg	Basin-wide Msg
10	< 100	Under or very near the sea (D < 30		100	false	5.5	6.0	true	Advisory	Information	Information
11				100	false	6.0	6.5	true	Watch	Advisory	Information
12				100	false	6.5	7.0	true	Watch	Watch	Advisory
13				100	false	7.0		true	Watch	Watch	Watch
14		Inland		100	true	5.5		false	nformation	Information	Information
15	>= 100	All	100			5.5		true / false	nformation	Information	Information
16	Default	locations	100				5.5	false	None	None	None

Fraunhofer IOSB

Planned work

- Fuzzy Decision Tables
- Semantic Decision Tables
  - semantic descriptions of information sources
  - users use concepts of an ontology to refer to input facts