Crowd-based safety investigations: the role of ontologies for functional modelling

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- The views expressed are ours and do not necessarily reflect the position of the funders.
FOUNDATIONS: THE FRAM

FRAM 4 principles
Equivalence of successes and failures
Approximate adjustment
Emergence
Functional resonance
**FOUNDATIONS: WAI vs WAD**

**Work-As-Imagined**  
(at the blunt end)

**Work-As-Done**  
(at the sharp end)

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Specialized computer data structures to give formal representation of category, properties and relations between data concepts and entities on a certain domain.
**FOUNDATIONS: MPCS**

**Mobile Participatory Crowd-Sensing** is a data collection mechanism for gathering context-specific information directly from sharp-end operators, through a mobile app that gives his/her actual work activity.
**H(CS)₂I METHODOLOGY**

**At an abstract level**

1. Documentary knowledge elicitation
2. FRAM WAI modeling
3. Ontology engineering
4. Creative redesign
5. MPCS and validation
6. FRAM WAD modeling
7. Safety assessment

**At a more granular level**

1. FRAM analyst
   - Documents (identifiers)
2. myFRAM
3. FRAM WAI
4. FRAM WAD
5. parser ENEA
6. FRAM Upper Model
7. Domain Based Ontology
8. Ontology analysis
9. Creativity Machine Pattern-based
10. Prioritization
11. Filtering (based on ranking)
12. Sharp-and operators
13. FRAM experts

**INDICATORS**
- Semantical differences
- Differences on aspects

**FUNCTIONS**
- Attributes
- Phenotypes
- Abstraction level
- Prioritization
- Updated prioritized functions
METHODOLOGY (FOCUS ON ONTOLOGIES)

Semantic services
- Ontology building/enrichment from WAx models
- Patterns-based generation of questionnaires to elicit WAD knowledge (starting from WAI knowledge)
- Semantic comparison between WAI and WAD models
METHODOLOGY (FOCUS ON ONTOLOGIES)

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CREAtivity Machine

Automatic WAx ontology builder  Gamified survey generator  Similarity engine

FRAM WAI Ontology
METHODOLOGY (FOCUS ON ONTOLOGIES)

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CASE STUDY
A MULTI-NATIONAL PHARMACEUTICAL COMPANY
FIRST STAGES

PHASE 1
Documental studies

PHASE 2
Semi-structured Interviews (30 min each)

PHASE 3
Focus Groups (60 min each)
SEMANTIC LIFTING of WAX KNOWLEDGE
FRAM MODELLING

Work-As-Imagined
(at the blunt end)

Differences appear in functions, and aspects, showing systematically where WAD diverges from WAI

Work-As-Done
(at the sharp end)
RESULTS (excerpt)

List of indicators (excerpt)

- **Function**: Check environment conditions
  - **Aspect**: Alert on rejects
  - \( I_7 = \text{Frequency of reported cues / frequency of rejected batch} \)

- **Function**: Check environment conditions
  - **Aspect**: Change on sounds
  - \( I_2 = \% \) of correct identification of sound changes
  - *Note that this indicator might be used to address specific training actions; sounds could also be recorded to facilitate training, and allow operators recognizing them in actual operations.*
GROUP DISCUSSION

• How much do you consider valuable the purpose of the research for safety management?

• Which are the strengths and weaknesses of the proposed participatory approach?

• Any suggestion for future digitalization of the methodology? (see mock-up for data gathering attached)

• ...Any suggestion?
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