Conceptual Human Emotion Modeling (HEM)

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- Emotion Recognition and Modeling
- Modeling Method Development
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- Towards embedding HEM-L into DSMLs

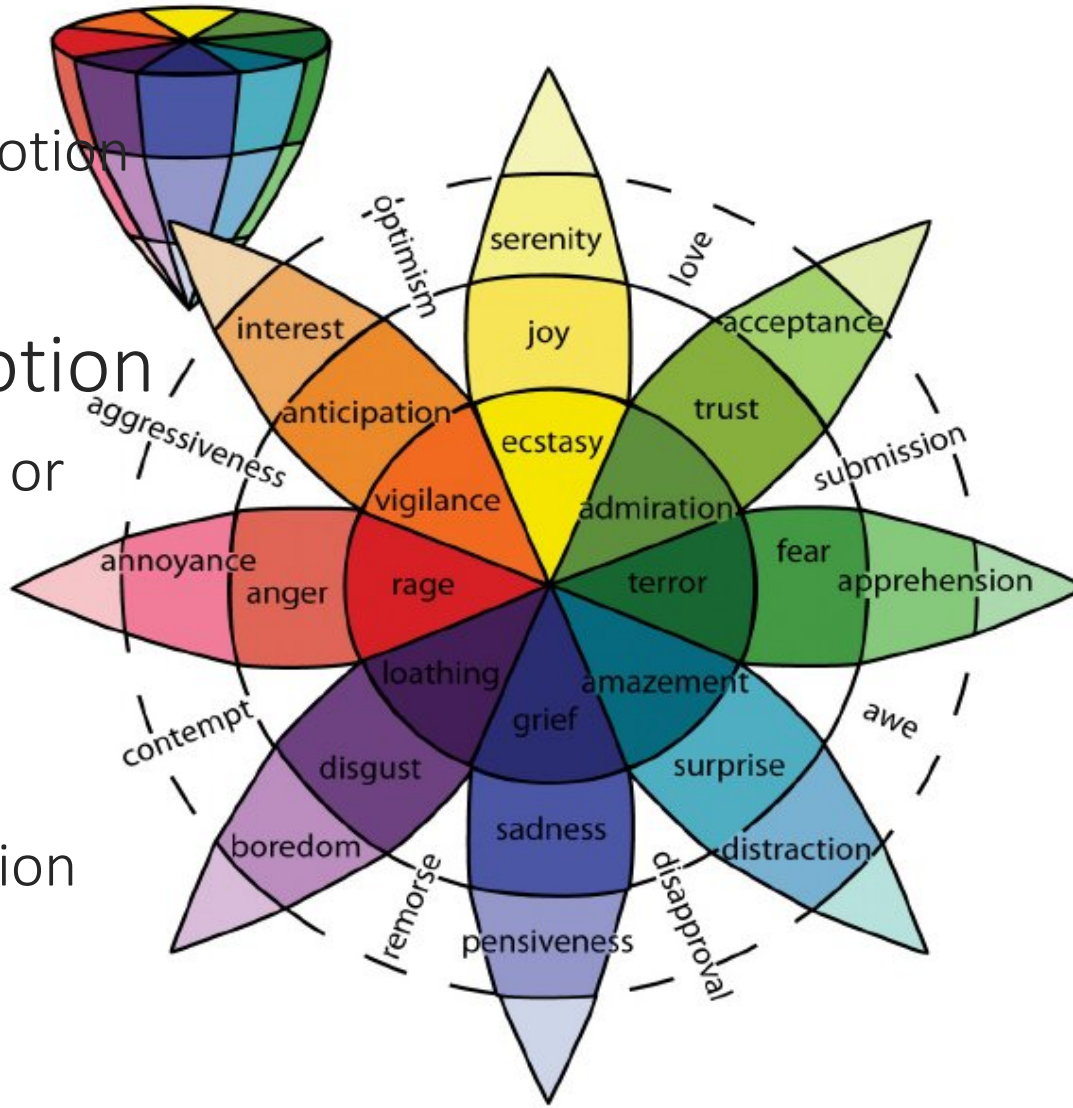
Why Dealing with Emotions

- Human emotion is a biological state
  - influenced by a situation and
  - associated with behaviour, thought, and feeling
- Emotions affect human activities
  - from evoking a significant cognitive boost able to strengthen capabilities
  - to the opposite making usual routines hard or impossible to perform
- Emotions influence the daily activities of people with cognitive or other impairments

  ⇒ relevant for our research dealing with AAL

Emotion Recognition and Modeling

- No comprehensive representation
  - neither a unified conceptualization of the emotion
  - nor a widely used modeling language
- Categorizing the Manifestations of Emotion
  - Facial cues, speech variations, gestures, body or brain sensors, and more …
- Emotion Theories
  - Basic Emotion
  - Appraisal Theory
  - Dimensional Theory
  - Plutchik's wheel
  - OCC model of Emotion



Emotion Recognition and Modeling

- Emotion Recognition Systems
  - text based Interface: **IBM Watson, ToneAPI, ++**
  - audio based Interface: **EMOSpeech, Vokaturi, ++**
  - video based Interface: **FaceReader, RealEyes, ++**
  - image based Interface: **Face++, SkyBiometry, ++**
  - multimodal Interface: **Cloud Vision, MS cognitive services, ++**
- Information Systems (IS) exploiting Emotion Data
  - Health/Medical, E-learning, Hiring/interview, Entertainment, Marketing, Automotive industry

Our Method Development Goals

- comprehensive
  - conceptual representation of emotions and their "context"
- plug-in
  - to be embedded into other modeling standard or domain specic languages
- in particular into our AAL/HBMS world
  - covering emotional situations in a set of common AAL scenarios,
  - collected within our Human Behavior Monitoring and Support project
- provide support for other research groups in the field
  - HEM-L can share its implementation functionality

Modeling Method Development: the process

Preparation

- Clarify Scope and Purpose
- Analyse Requirements
- Analyse Context
- Conception

Language Development

- Select a Base Modeling Language
- Specify Language
- Design the (Graphical) Notation

Modeling Process

- Provide a stepwise Procedure for Modeling using the developed Language

Modeling Tool Development

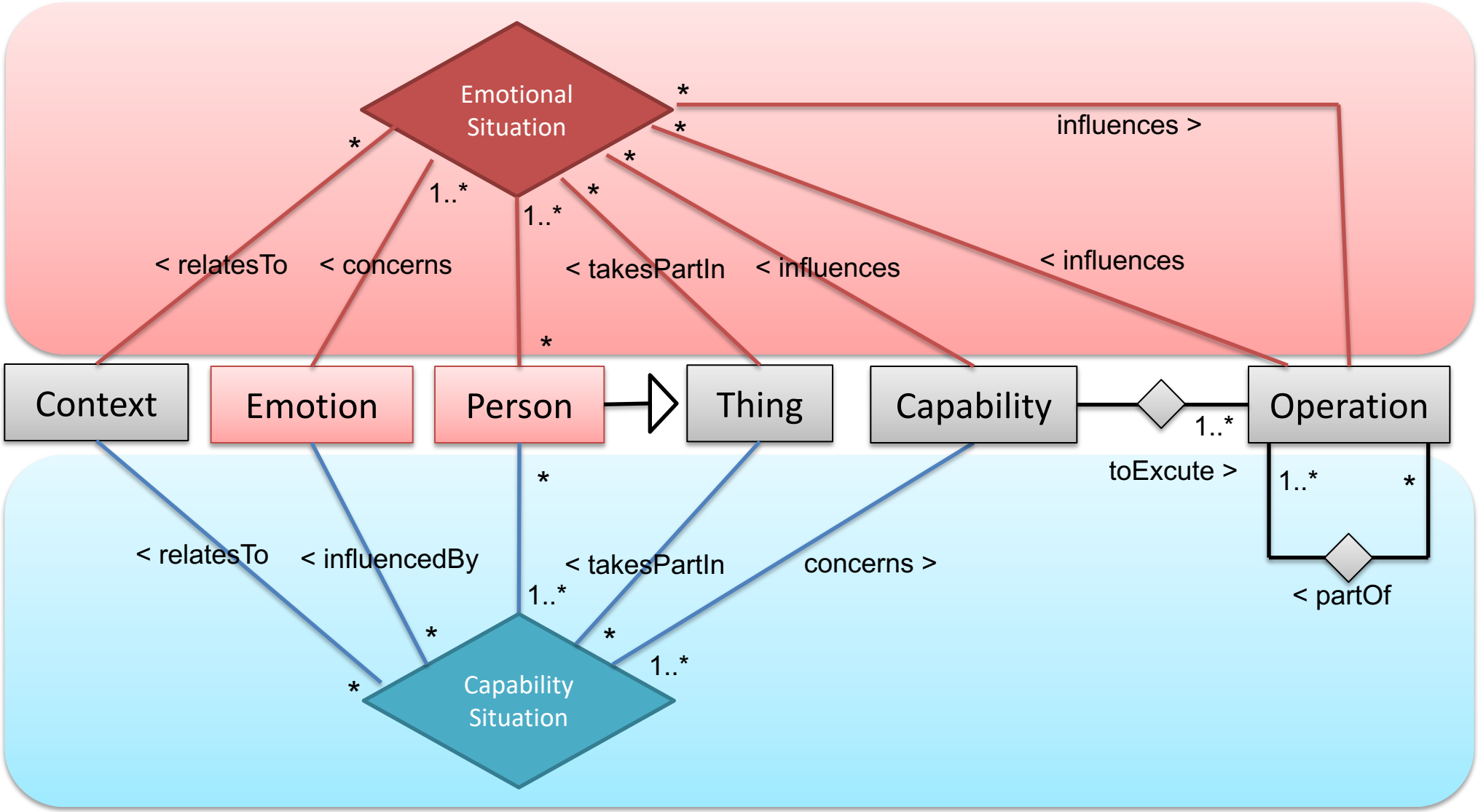
- Specify Tool Requirements
- Select Platform & Meta Mode-ling Language
- Define View
- Implement Tool
- Platform Dependent Add-ons

Evaluation

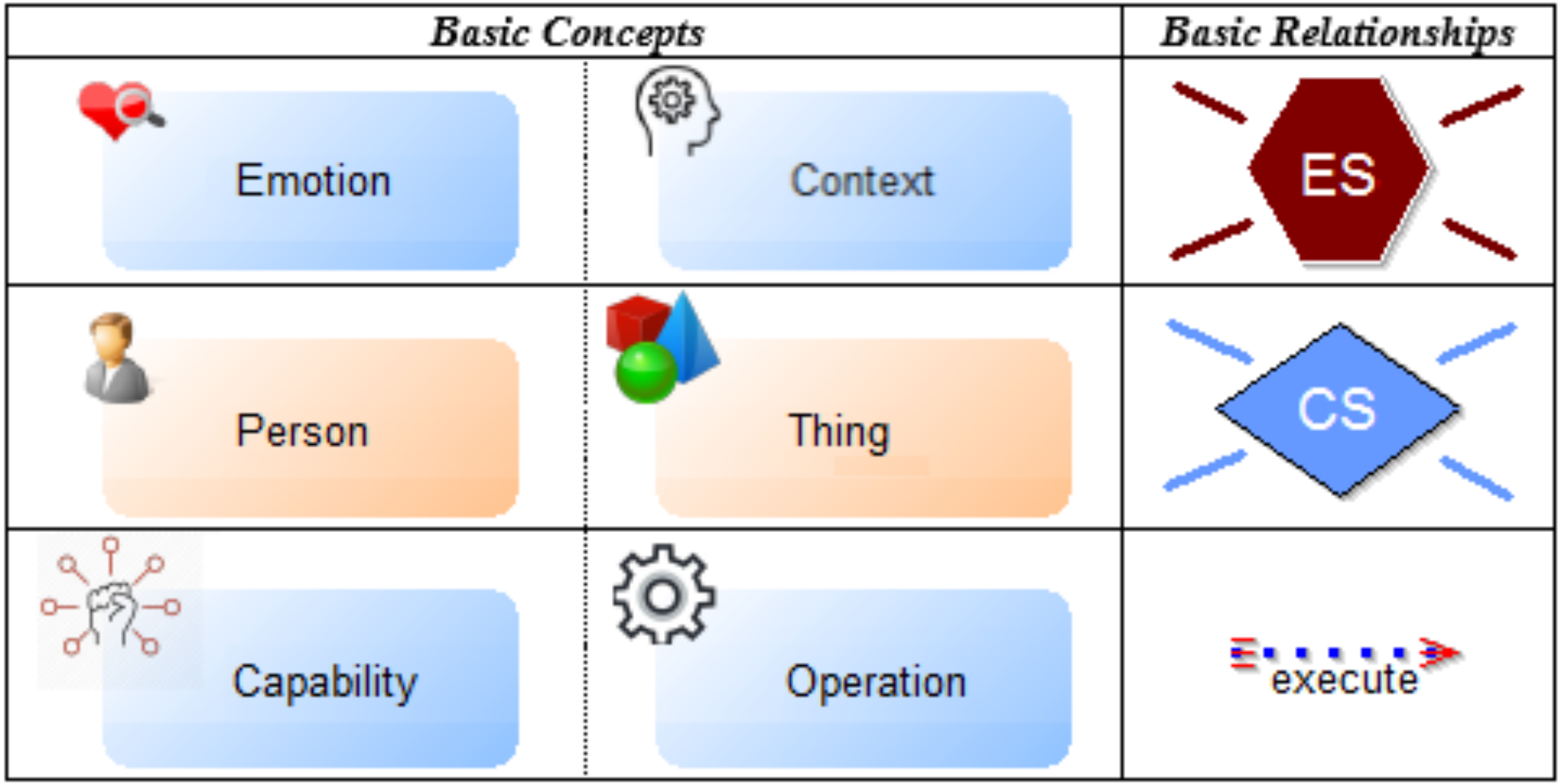
- Design Evaluation
- Perform Evaluation
- Assess the Results

J. Michael, H. C. Mayr: Creating a Domain Specific Modelling Method for Ambient Assistance. Proc. ICTer 2015
U. Frank: Domain-Specific Modeling Languages: Requirements Analysis and Design Guidelines. In: Domain Engineering, Springer, 2013, pp. 133-157.

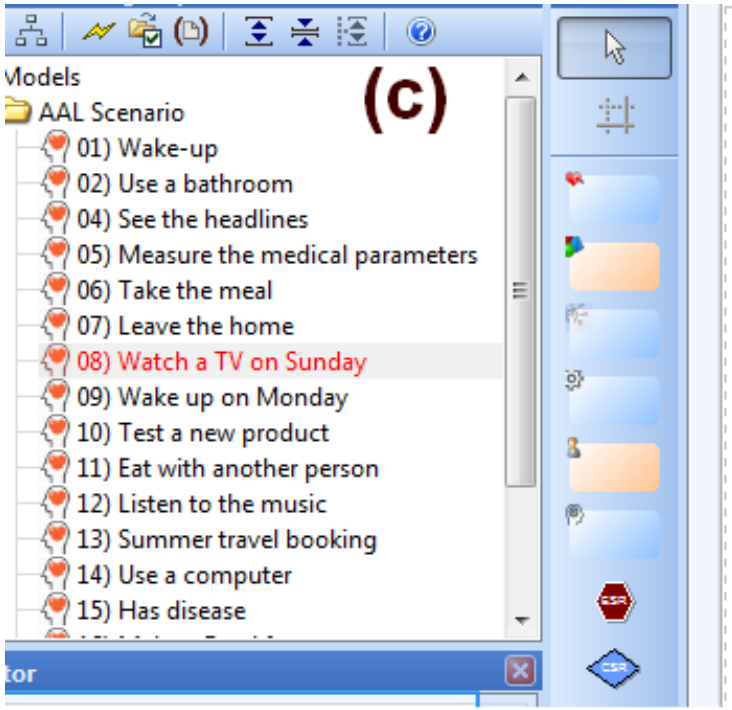
Conceptualization: the HEM-L Metamodel

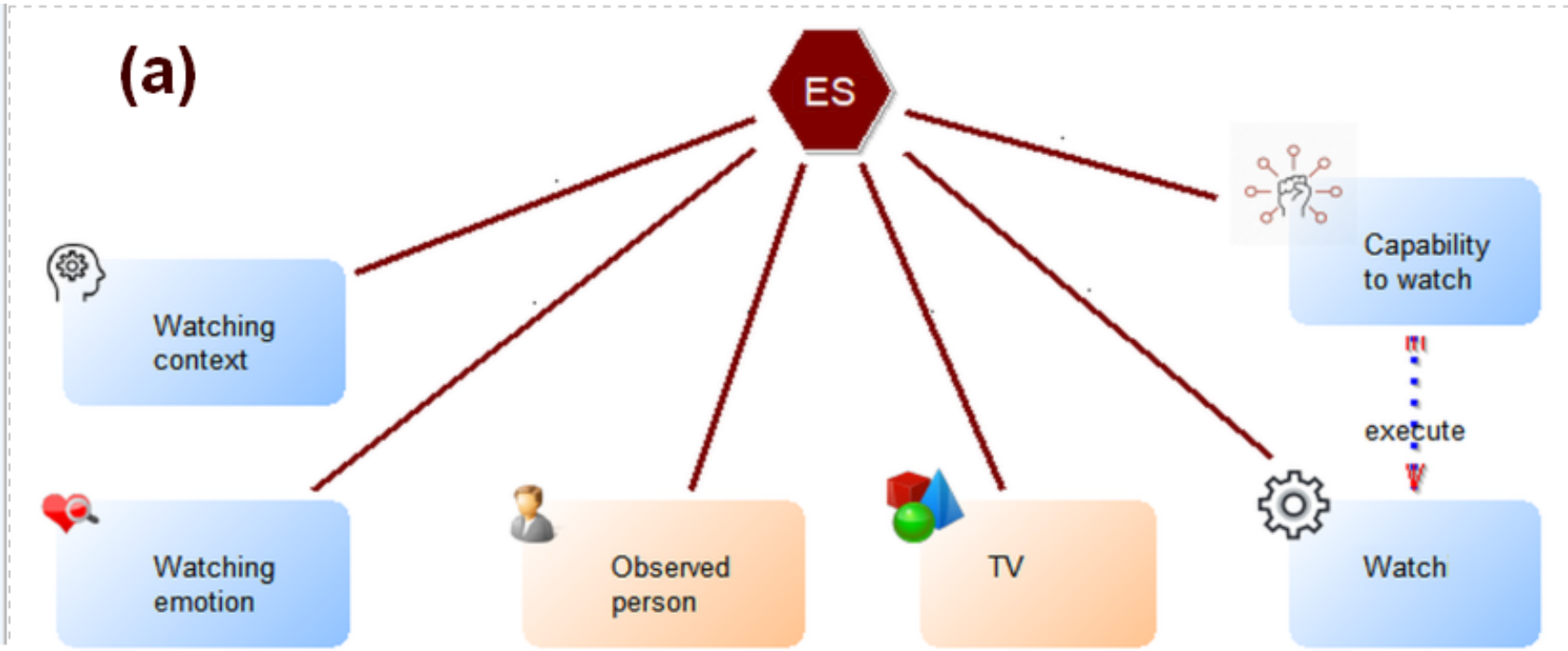


Representation: the HEM-L (Graphical) Notation



Example

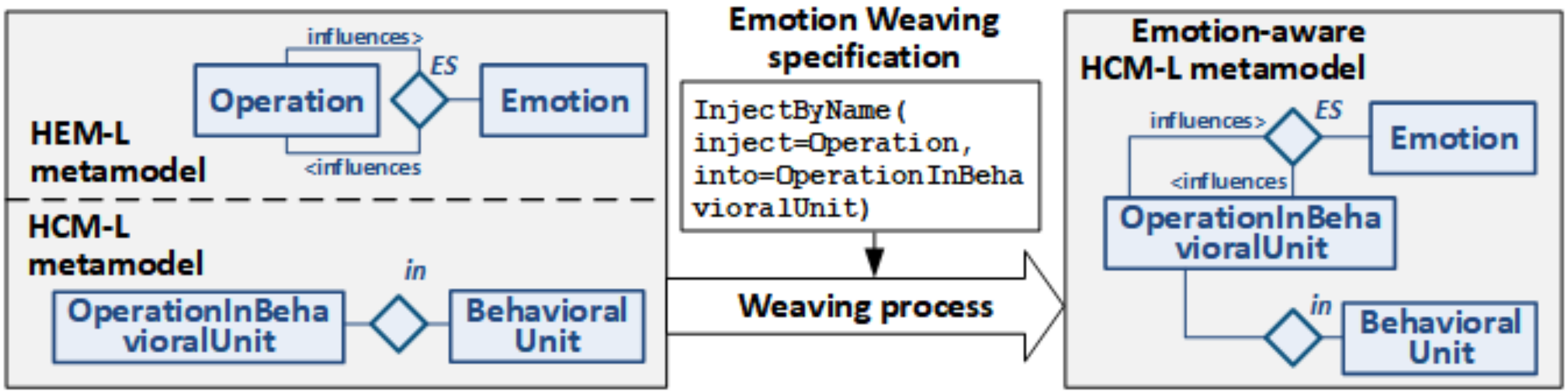




ES<
Context < Watching Context <time: Sunday 26-05-2019 18:10:05, location: living room, companion: alone>>
Emotion < Watching Emotion <anger: 0, fear: 0, happy: 0.8, sad: 0, surprise: 0.2>>
Thing < Observed Person <name: Alex, gender: man, age: 40 >, TV <name: Samsung >>
Capability < Capability to watch <precondition: The person sits near the TV >>
Operation < Watch <precondition: TV is on, NoiseIntensity is low, start_at: 18:10:05, end_at: 19:50:05, is_executed: true >>
>

(b)

Towards embedding HEM-L into DSMLs



The Summary

- we introduced HEM-L
  - a DSML for modeling human emotions
  - metamodel, graphical notation, text-based language
  - embeddable into other DSMLs
- next steps:
  - provide the plug-in modeler in OMILab
  - run evaluations using the HBMS environment incl. activity recognition by weaving data sets
  - links HBMS to emotion recognition and run comprehensive experiments in the HBMS environment

The Authors

Thanks

for your attention!