Integrated discussion session: Are we already at the dead end of context modelling and retrieval?

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Why do we want to use context?

Context is a **filter** striking against the everyday information overload.
Why do we want to use context?

"You have been driving for 10 hours now and the weather is becoming bad. How about a stopover at a quiet hotel at the lake nearby?"

reduced I/O

less active attention
Context Modelling and Retrieval

A well designed context modell is a key accessor to the context in any context-aware system!
Context Modelling Approaches (1/3)

- Key-Value-Pairs Models
  - most simple category of models
  - not very efficient for more sophisticated structuring purposes
  - exact matching, no inheritance

- Markup Scheme Models
  - scheme implements model
  - typical representatives: profiles
  - Examples:
    - Extensions of
      - Composite Capabilities/Preference Profile (CC/PP)
      - User Agent Profile (UAProf)
    - Comprehensive Structured Context Profiles (CSCP)
    - Pervasive Profile Description Language (PPDL)
    - Centaurus Capability Markup Language (CCML)
Context Modelling Approaches (2/3)

- **Graphical Models**
  - particularly useful for structuring, but usually not used on instance level
  - Examples:
    - Well known: UML
    - Contextual Extended ORM

- **Logic Based Models**
  - Logic defines conditions on which a concluding expression or fact may be derived from a set of other expressions or facts (reasoning)
  - context is defined as facts, expressions and rules
  - High degree of formality
  - Examples:
    - McCarthy’s Formalizing Context
    - Akman & Surav’s Extended Situation Theory

```
\[ S_1 = [s | \hat{s} \vdash \leftarrow bird, \hat{a}, 1 \] ]
\[ S_2 = [s | \hat{s} \vdash \leftarrow flies, \hat{a}, 1 \] ]
\[ B \vdash \leftarrow present, air, 1 \] \land \leftarrow penguin, \hat{a}, 0 \] \land \ldots
\[ C = S_1 \Rightarrow S_2 | B \]
```

Context Expression from Extended Situation Theory
Context Modelling Approaches  (3/3)

- **Object Oriented Models**
  - Intention behind object orientation is (as always) encapsulation and reusability
  - Examples:
    - *Cues* (TEA project)
    - *Active Object Model* (GUIDE project)

- **Ontology Based Models**
  - Ontology used as explicit specification of a shared conceptualization → strong in the field of normalization and formally
  - Context is modelled as concepts and facts
  - Examples:
    - CoBrA system
    - ASC model of Context Ontology Language (CoOL)
    - CONON; cont-el ontologies
# Context Retrieval

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Integrated discussion session

Let’s get interactive ...
Location vs. Context

- Is context really more than location? [Schmidt et al. 1999]
  - spatial pre-filter ("location is primary access path for context")
  [Becker and Nicklas 2003] always applicable?

- Other primary aspects (available in more or less all models)
  - time
  - identity
  - activity

- Are there interesting other ones?
- More than time-space-correlation for context fusion?
Do we use the right examples?

- Predominantly: Location based
  - Outside
    - Tourist Guide
    - Restaurant Finder
  - Inside
    - Museum

- Communication channel establishment

- eLearning
  
  *Location is irrelevant at all!*

- Are there other interesting ones?
Solid vs. Hybrid; Experience Transfer

- Is one modelling and retrieval technology optimal for all purposes?
  - pro’s / contra’s of each technology
  - how promising are hybrid approaches?

- What can we learn from other research areas?
  - e.g. Semantic Web
  - e.g. Artificial Intelligence
  - e.g. Robotics
Are they addressed in current models?

- Security / privacy
  - information bluring / lies

- quality of context, ambiguity, uncertainty

- Traceability of retrieval
Summary

- A lot has been done in the context modelling and retrieval area
- Different approaches with different characteristics
- **But...** still a lot of open issues & challenges

Thank you!