SOPHIE
Context Modelling and Control

The Context Model

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Goals of this Diploma Thesis

• Find a comprehensive model for context that can be used to describe context in database applications
• Metadata to react to the incoming context
• Prototype based on OMS Pro demonstrating the context model and its control
**What Does Context Mean?**

- Context is a term that has several overloaded meanings
- From the Online Merriam Webster Dictionary: *The interrelated conditions in which something exists or occurs.*
- Dey and Abowd [DA00]: *Context is any information that can be used to characterize the situation of an entity. An entity is a person a place, or object that is considered relevant to the interaction between a user and an application, including the user and application themselves.*
Several Kinds of Context

- **Computing context**
  - Connectivity
  - Communication costs
  - Bandwidth
  - Resources

- **Time**
  - Absolute time
  - AM/PM
  - Week, Month
  - Season

- **User context**
  - Identity
  - Profile
  - Social situation
  - Activity

- **Physical context**
  - Temperature
  - Lighting
  - Noise
Active or passive?

- Context awareness can be active or passive
- *Active Context Awareness*
  - an application adapts its behaviour automatically dependent on changes in context
- *Passive Context Awareness*
  - the application makes the new context persistent for later explicit retrieval
SOPHIE’s Requirements

- **Context sensing**
  Get the context information from the context producers

- **Contextual augmentation**
  Store the context information in relation to its subject

- **Contextual adaptation**
  Adapt to the incoming changes in context

- **Contextual resource discovery**
  Discover context dependent resources and information

[Pas98]
The Architecture Model

• Several layers that represent different abstraction levels

<table>
<thead>
<tr>
<th>SOPHIE</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>existing information stored in databases</td>
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<td>Contextual Resource Discovery</td>
<td>discover relevant information resources</td>
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<td>Contextual Adaptation</td>
<td>adapt the behaviour to the current context</td>
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<td>Contextual Augmentation</td>
<td>bind the context information to its subject</td>
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<tr>
<td>Context Sensing</td>
<td>detect changes in the environment</td>
</tr>
<tr>
<td>Environment</td>
<td>the real world</td>
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</tbody>
</table>
Context Sensing

Contextual Augmentation

context

getValue()
user: o534

Producer Monitors

Dictionary

oID: o615
(user)

providedBy

contexts

hasProducer

hasWeight

hasQuality

context

type: face recognition
value: 01293

coverage:
resolution: 8
accuracy: 70%
repeatability:
frequency: 5 Hz
timeliness: 40ms [GS01]
Contextual Adaptation

Contextual Adaptation

Contextual Augmentation

Actions
  ↓
  Performs
  ↓
  Actors
  ↓
  oID: o536 (audio actor)

Context Monitors
  ↓
  welcomesMonitor()

sayHello()
Contextual Resource Discovery

- **Actors**
  - Environment Actors
  - Audio Actors
  - Video Actors

- **Locations**
  - Campus
  - Buildings
  - Rooms
  - Stairways

- **People**
  - Michael

- **Publications**
  - IFW D35
    - title: Metatemplate Driven Multi-Channel Presentation
    - desc: GlobIS Lab

- **Discoverers**
  - getUserPublication(+User, -Publication)

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SOPHIE: Context Modelling and Control, The Context Model
Context Examples: worksOn

name: worksOn

context: SOPHIE
value: o890
timestamp: now()

oID: o638 (user)
Context Examples: Temperature

- Context Element
  - User Context
  - Physical Context
  - Computing Context

- Context Instance
  - hasFormat
    - context: cold
    - value: 16
    - timestamp: now()

- Context Representations
  - name: celsius
  - name: temperature

- Dictionary
  - oID: o615
    - location: (location)

- Free Attributes
  - name: unit
    - value: °C
Conclusion & Outlook

- Context is used to enrich the content
- General model to represent context
- Not bound to a fixed application specific model

- Define details
- Connection between different data sources?
- Implement prototype
Questions?

These slides and a bibliography are available at http://www.rudibelotti.com
I wish you
Merry Christmas
and Happy New Year!