Run-Time Adaptation of a Universal User Interface for Ambient Intelligent Production Environments\cite{1}

Personalizing the User Experience
Talk with the focus on Useware

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Outline

1. Motivation
   - Our Daily Life
   - The Industrial Environment
2. Ambient Intelligence
3. Useware
   - Definition
   - Development Process
   - Goals
   - useML
   - Adaption
4. Real World Application
5. Conclusion
Our Daily Life
Our Daily Life

Problems

- Hard-and software are still developed in a classical way (developer-driven)
- Requirements Engineering is done, but often without sufficient effort
- Formal ways of describing software are too technical
- Focus on single devices
- Digital Division
Bad Examples
The Industrial Environment - Status Quo

- Useware
- Our Daily Life
- The Industrial Environment

Motivation
Ambient Intelligence
Useware
Real World Application
Conclusion
Literature

- The Industrial Environment - Status Quo

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Useware
The Industrial Environment

**Problems**

- Heterogeneous environment with a lot of different operating systems and operating philosophies
- Long training periods
- High risk of operating errors
- There are no models to specify highly technical environments
The Industrial Environment - The Vision
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Ambient Intelligence

Pervasive Computing
- Already realized
- Mobile devices can be used everywhere at any time

Ubiquitous Computing\([2]\)
Information processing is integrated into every-day objects.

Many computers share each of us.\([3]\)
Ambient Intelligence

- Close to Ubiquitous Computing
  - Invisible ubiquitous computer
  - User friendly systems
- Contains more aspects of Artificial Intelligence (AI) as well as Human Computer Interaction (HCI)
- Intelligent environments
Useware

Useware is meant as equivalent to hard- and software with the focus on human abilities and demands.

Useware Development

Useware Development is the discipline of engineering useware.
Development Process

- Analysis
- Structuring
- Design
- Realization
- Evaluation

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Useware
Development Process[5]

Analysis

Define the characteristics & behaviors of current and prospective users.

- Interviews
- Observations
- Surveys
**Development Process**

**Structuring**

Harmonization of the individual task models and user requirements in order to obtain a common, system comprehensive, **platform independent** use model.

- What kind of tasks can be performed?
- What kind of tasks are allowed?

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**Useware**
Development Process[5]

Design

Concepts of visualization, navigation and interaction are chosen and combined appropriately.

- Design of coarse mask layouts
- Fine design
- Decision-making aids
Development Process[5]

Realization

The concrete implementation of the developed concepts into a user interface using the selected soft- and hardware platforms.
Evaluation

Continuation of the analysis phase.

- Development results are continuously tested and evaluated
- Iterative improvement of the UI
- Adjustments of use model by returning to earlier phases
**Development Process in a Nutshell**

- **Analysis**: Understanding the users, their tasks and the context-of-use
- **Structuring**: Deduction of a single, harmonized task structure
- **Design**: Deduction of abstract & concrete UIs
- **Realization**: Concrete implementation
- **Evaluation**: Iterative testing with users
Goals

Reality

- High penetration of computers
- High availability of computational power
- Countless number of different usage scenarios
- Heterogeneous infrastructures
- Different tasks, demands and skills of users
Goals

What should be achieved

- Customizable devices
- Individualized processing of contents
- Software should adapt to the context-of-use (runtime-adaption)
useML

What is useML

A XML-based modeling language with a graphical notation that was developed to model Human Machine Interaction (HMI).

- Integration of use models into a soft- and hardware independent structure
- Tasks of **user groups** are organized in a hierarchical structure called use objects (UOs)
- Atomic tasks are called elementary use objects (eUOs)
**UseML**

- **Use model**
- **Use object**
- **Elementary use object**
  - change
  - release
  - choose
  - enter
  - inform

**Useware**

**Goals**

**Development Process**

**useML**

**Adaption**

**Literature**

**Real World Application**

**Conclusion**

**Definition**

**Motivation**

**Ambient Intelligence**

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Model-Based User Interface Design

1. Task & concepts (useML)
2. Abstract UI (DISL)
3. Concrete UI (UIML)
4. Final UI
What is meant with Runtime-Adaption?

The user interface (UI) is automatically adapted in dependency of the context-of-use (user, location, goal, …). That happens in real-time.

Two general approaches

<table>
<thead>
<tr>
<th>Adaptable Systems</th>
<th>Adaptive Systems</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configurable by users</td>
<td>Automatic adaption</td>
</tr>
<tr>
<td>Customizable</td>
<td>Create user profiles</td>
</tr>
</tbody>
</table>
Some Questions . . .

- Which system is easier to “use”? Why?
- What is a resource adapted system?
- What is a resource adaptive system?
- What is a resource adapting system?
User-Adaption[6]

Personas . . .
- are virtual persons with wishes, requirements and goals regarding an interactive system
- are described by name, gender, qualification, wishes, interests

Roles (Groups) . . .
- are describing a relationship between users and systems
- are describing core functions, competences and responsibilities of persons
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Real World Application[7]

http://www.youtube.com/watch?v=EUnnKAFcpuE
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Advantages

- Useware development focus on human abilities and limitations
- Useware development helps in making systems easier to use, preventing faulty user behavior and saving costs

Disadvantages

- Alienation of technical devices
- Privacy
THANK
YOU
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