LV 706.046 3SE AK Mensch-Maschine Kommunikation
Usability Engineering for Software Developers
Applying User Centered Design

Andreas Holzinger
Associate Professor of Information Processing
Institute for Medical Informatics, Statistics & Documentation
Affiliation

Andreas Holzinger
Associate Professor of Information Processing
www.basiswissen-multimedia.at
www.basiswissen-it.at

www.basiswissen-multimedia.at
Reading:


Medical faculty, founded in 1772, combined with the University Hospital Graz approx. 2.300 beds

- One of the biggest Hospitals in Europe ...
- is the flagship of 21 Styrian County Hospitals ...
Styria Pop. 1.200.000

Hospitals 21
Beds approx. 6.900
Inpatients 250.000/year
Physicians approx. 1850
Total staff approx 14.700

My assistants ...

Angela
Katharina
Barbara
"The old computing is about what computers can do; The new computing is about what people can do"
Shneiderman (2002)

"Research is what I'm doing when I don't know what I'm doing"
Wernher von Braun (1912-1977)
Some facts about Medical Informatics

Why Health Care and Medicine?

IT in Hospitals - everywhere!

Photo by Institute of Medical Informatics
(Computer Guided Surgery)
medical people are highly mobile workers

consequently we considered early to make various applications mobile ...
Why you could be working with Ubicomp

The Major Trends in Computing

Annual Death Rates in US

Philadelphia Enquirer (9/12/99)

One jumbo jet crash every day
**Human-Computer Interaction (HCI)**

& **Usability Engineering (UE)**


**Mission statement**

**Easy-to-use Interfaces ...**

"... the Vision of ambient intelligence seeks to place the user, the human being, at the centre of the future development of the knowledge based society ..."

*IST Framework Programme 6*
For an interface to be a success:
- it must provide
  - the right functionality
  - at the right time
  - in the right place
  - and in the right form
  - from the user’s point of view!

Usability testing is the process of ensuring that a user-interface is usable.

Two different approaches:

**System Centered Design**
- Feature driven: What can be realized on our platform?
- Tool driven: What can be created by using available tools?
- Interest Driven: What do the programmer find interesting?

**User Centered Design**
- Task based: What do the users really need?
- Ability based: What abilities do the users have?
- Domain based: In what context do the users work?
Requirements > User Analysis > Task Analysis > Lo-Fi Prototype > Evaluation > Reengineering > Prototype > Evaluation > Reengineering


Holzinger (2004)
Holzinger, Errath, Searle, Thurnher, Slany (2005)

It is rare that projects adopt a fully integrated UCD approach in one strategic shift ...

... not only Task analysis ...

- Requirements Analysis
  (Def. formaler Anforderungen)
- User Analysis
  (Feststellung der Eigenschaften potentieller Benutzer)
- Context Analysis
  (Analyse des organisationalen, politischen und sozialen Umfeld)
- Task Analysis
  (detaillierte Aufgabenbeschreibung)
- Functional Analysis
  (Abbildung auf die Implementierungsebene)
- Task/Function Allocation
  (Aufteilung zwischen Benutzer und System)


... an example of a typical task ...

Holzinger (2004)
- who are the end-users? what are the tasks?
- iterative design
- mock-ups, prototypes
- develop and test designs with end-users!

Holzinger & Errath (2004)
Rapid Prototyping ...


paper mock-ups > electronic prototypes

Rapid development ... traditional

VMC Graz UCD first cycle (25 weeks)

Holzinger (2004)
Nielsen's famous findings

Caveat: graphs for a specific example

Geoffrey Nielson (1994)

Some Previous HCI Theory

- Model Human Processor & GOMS (Card, Moran, & Newell, 1983)
- Artifact Theory (Carroll & Campbell, 1986)
- Human Factors Engineering (Dowell & Long, 1989)
- Activity Theory (Nardi, 1996)
## Example: Metrics

<table>
<thead>
<tr>
<th>Objective</th>
<th>Effectiveness</th>
<th>Efficiency</th>
<th>Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Suitability</strong></td>
<td>% of goals achieved</td>
<td>Time to Complete</td>
<td>Subjective Rating</td>
</tr>
<tr>
<td><strong>Appropriateness</strong></td>
<td># of power features used</td>
<td>Relative to expert</td>
<td>Rating of power</td>
</tr>
<tr>
<td><strong>Learnability</strong></td>
<td>% learned</td>
<td>Time to learn</td>
<td>Rating of learning</td>
</tr>
<tr>
<td><strong>Error</strong></td>
<td>% errors corrected</td>
<td>Time to correct</td>
<td>Rating of error handling</td>
</tr>
</tbody>
</table>

Dix et al. (1998), ISO 9241, ISO 13407

## Methods used

<table>
<thead>
<tr>
<th>Inspection Methods</th>
<th>Test Methods</th>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Heuristic Evaluation</td>
<td>Cognitive Walkthrough</td>
<td>Action Analysis</td>
<td>Thinking Aloud</td>
<td>Field Observation</td>
</tr>
<tr>
<td>Applicably in Phase</td>
<td>all</td>
<td>all</td>
<td>Design</td>
<td>Design</td>
<td>Final Testing</td>
</tr>
<tr>
<td>Required Time</td>
<td>low</td>
<td>medium</td>
<td>high</td>
<td>high</td>
<td>medium</td>
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<tr>
<td>Required Users</td>
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<td>none</td>
<td>none</td>
<td>3+</td>
<td>20+</td>
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<tr>
<td>Required Evaluators</td>
<td>3+</td>
<td>3+</td>
<td>1-2</td>
<td>1</td>
<td>1</td>
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<tr>
<td>Required Equipment</td>
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<td>low</td>
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<td>medium</td>
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<tr>
<td>Required Expertise</td>
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<td>high</td>
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<td>high</td>
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<tr>
<td>Intrusive</td>
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<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
</tbody>
</table>

Comparison of Usability Evaluation Techniques

Experiences within implementation

- UCD paid off during implementation
- Small team, rapid prototyping, iterative development
- Development and Testing totally integrated, immediate feedback

Problems

- Resistance from end-users generally! (Much persuasiveness was necessary)
- the broad non-informatics audience (end-users) needed special attention (low computer literacy)
- acceptance resulted in severe interface adaptations
Conclusion

**User Centered Development ...**

- ... is a must, NOT an option!
- ... is still NOT common sense!
- ... is much more than design!
- ... is a Project-Philosophy, not only a Methodology!
- ... is inherently interdisciplinary!
- ... generates clear added values!
- ... is realized by a mosaic of techniques!
- ... can be seen as a mediator!
- ... means research matters!

We must provide benefits and gain acceptance!