Perspektiven für das m-Working
5.10.2005 Wien

Herzlich Willkommen
conex
conference & exhibition
Danke fürs Kommen!

Affiliation

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Styria
1.200.000

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

Work area
Medical faculty, founded in 1782, combined with the University Hospital Graz 2.300 beds

Is one of the biggest Hospitals in Europe ...

"The old computing is about what computers can do; The new computing is about what people can do"
Shneiderman (2002)
Why is **Human-Computer Interaction (HCI)** and **Usability Engineering (UE)** important ... Example Health Care!

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**Annual Death Rates in US (1999)**

- Commercial aviation deaths: 329
- Drowning deaths: 3959
- Deaths from falls: 14000
- Motor vehicle deaths: 43649
- Deaths from medical errors: 120880

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"At a medical convention some years ago an upper body X-ray was displayed near the registration desk. The doctors were asked to "diagnose the ailment from the X-ray, and place your answers in the contest box".

Because of the focus on the chest, almost all answers suggested almost every known lung ailment/disease.

Only one doctor discovered the correct diagnosis: A broken left arm...

Karr (2002)

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Medical people are highly nomadic workers
- Complex, hectic, ad-hoc, interrupted, collaborative
- Clinical workload versus Inefficiencies in workflow, I & C

"Clinicians are very busy and under constant pressure to perform. They will NOT change their behavior, unless the new workflow is clearly more efficient on a personal and individual level"


Complexity! Technical knowledge required, regular software installation, updates & maintenance, usability of hardware, software & manuals, loads of unwanted features, crashes, ...

The most profound technologies are those that disappear (Weiser, 1991)
Only when things disappear are we freed to use them without thinking about them (Abowd & Mynatt, 2000)
Differences?

The future is mobile ... (Best practice example)

http://drei.fh-joanneum.at/ml/e/start.php

Meisenberger (2004)
Holzinger, Nischelwitzer, Meisenberger (2005)

Example: Randomizer
Holzinger & Errath (2004)

Pictures on peephole displays
Holzinger & Errath (2004)

bai wen bu ru yi jian
Seeing it once is better than being told 100 times (Zhou Chongguo, Han Dynasty)
or, A picture is worth ten thousand words Barnard (1927), often misquoted as an old Chinese proverb.

Elliot Soloway:
"A picture is worth a thousand words?"

BTW:
"As long as computer labs are down the hallway and up the stairs, teachers will consider them irrelevant to learning and teaching. Handheld Devices are Ready-at-Hand" Soloway et al. (2002)

Why Speech?

"Speech is the ultimate, ubiquitous interface. It is how we should be able to interact with computers...Speaking is the most natural and universal method of communication between people. The aim of speech systems is to extend that communication modality to interaction with machines"

Markowitz (1996)
Speech-to-Text

Mean Value (s)

Speech Recognition: 139.02
Dictation to Tape: 30.32
Handwritten report: 107.97


Text-to-speech (Audio Example)

Added Value (Benefit Example from Health Care)
text-to-speech engines tested

- An open source speech synthesizer, developed in Java: http://freetts.sourceforge.net/docs/index.php
- MBROLA Speech synthesizer (not open source, but free of charge): http://tcts.fpms.ac.be/synthesis/mbrola.html
- Open Source Speech Recognition Software, developed completely in Java (originally from IBM): http://sourceforge.net/projects/cmusphinx
- SayzMe TTS Engine (open source): http://sayzme.sourceforge.net/
- Voxox open source speech recognition and TTS: http://voxoxopensource.sourceforge.net/

Nischelwitzer, Meisenberger, Holzinger (2005)

Future: Multi-modal User Interface

Stylus
Speech
Text
Graphics
Audio
Speech

Adaptation Levels

- Level 1: Location Adaptation (relative or absolute (e.g. GPS position etc.))
- Level 2: Hardware Adaptation (Device Conversion); and
- Level 2 User Adaptation (User Conversion)

Holzinger, Nischelwitzer, Breiteneder (2005)
Level 1: Location Adaptation

- End-user tracked via GPS
- Salient locations automatically determined
- Latitude/longitude translated to virtual location
- To-do list associated (site specific or shared)
- Select user interface structure for the current interaction
- Location information used to select user interface structure for the current interaction

Level 2: Hardware Adaptation

- Connectivity for different device types (Automatic rendering)
- Support different user interface structures
- Device type detection and related content adaptation
- Voice/data switching and synchronization

Voice/data switching and synchronization:

<table>
<thead>
<tr>
<th>Device Type</th>
<th>Connectivity</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low-end phone</td>
<td>GPRS/UMTS</td>
<td>Symbian</td>
</tr>
<tr>
<td>Smartphone</td>
<td>Bluetooth/WLAN/GPRS</td>
<td>PocketPC</td>
</tr>
<tr>
<td>PDA</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Absolute Device independence enables pervasive m-Working
What about engineers on the building site?

A mobile phone is always at hand...

And students can see both: sim. & real life
Similar to medical personnel, civil engineers are a highly mobile end-user group. We could develop our applications User-centered due to long experience available in Human-Centered Design – especially in the medical application area. Consequently, our first field studies showed that the mobile part of our application is an added value for the end-users.

Technically, apart from some minor problems, Flash Lite worked well on our prototypes. However, the mobile solution cannot be the 1:1 transformation of the main application. Human-Centred aspects must always be taken into consideration.

"Mobile Info" from the end-user perspective is the ability to access the same content and information anywhere, anytime, by any method...

<table>
<thead>
<tr>
<th>Delivery Method</th>
<th>Text</th>
<th>Visual</th>
<th>Graphical</th>
<th>Delivery</th>
<th>Voice</th>
<th>Machine</th>
<th>Human</th>
</tr>
</thead>
<tbody>
<tr>
<td>IM</td>
<td>Web</td>
<td>Low</td>
<td>High</td>
<td>SMS</td>
<td>High</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>WAP</td>
<td>Web</td>
<td>High</td>
<td>Low</td>
<td>WAP</td>
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</tbody>
</table>

It's not just about visual delivery of applications.
But how to we achieve good usability – which is of vital importance for the acceptance amongst end-users in every field of application?

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5.10.05 Wien
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Field studies
Evaluate
real life
Evaluate
Field studies

User studies,
function tests
Evaluate
Implement

Low-fi Design
Thinking aloud

Hi-fi Design
Thinking aloud

Usability testing
Prototype

Low-fi Prototyping

Hi-Fi Prototyping

How can we achieve Usability ...

Identification of end-users
Objectives

Analysis
Task Analysis
Paper Mock-up
Usability inspection

Task Analysis
Contextual inquiry
Specs

Development
Implement
Evaluate

... make the success snails as small as possible

In principle:
- mini success snails (see fig. 2)
- are used in XP, thus, testing
- takes place practically constantly.

Holzinger, Errath, Searle, Thurnher, Slany (2005)
Unser Ziel ist es, Software-MENSCHEN und Usability-MENSCHEN zusammenzubringen.
Unser Motto lautet:
Heute GEMEINSAM für bessere Software von morgen!
Ein Wort dazu ist entscheidend: MEHRWERTE!

AK HCI&UE: http://www.oxg.at/ueber-uns/arbeitskreise/usability
Symposium: http://www ifs.tuwien.ac.at/usab-symposium

Thank you!

www.basiswissen-multimedia.at
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