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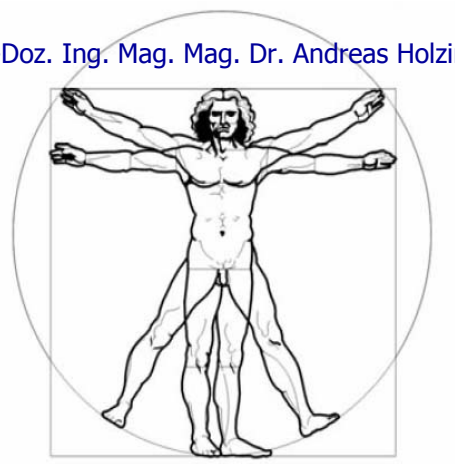

Von den „New Technologies“ zum „New Computing“

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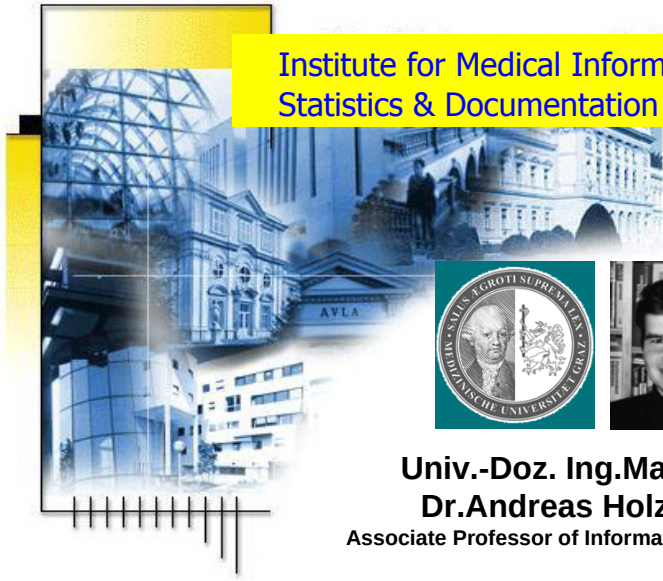


Institute for Medical Informatics, Statistics & Documentation

Univ.-Doz. Ing.Mag.Mag. Dr.Andreas Holzinger
Associate Professor of Information Processing

OESTERREICHISCHE COMPUTER GESELLSCHAFT
AUSTRIAN COMPUTER SOCIETY

- "Arbeitskreis HCI &UE" in Google auf Nummer 1!

3

1) New Technologies ⇒ New Computing
2) Beispiele aus internationaler Forschung
3) Beispiele aus eigener Forschung

My Hometeam ...

... my personal motto ...

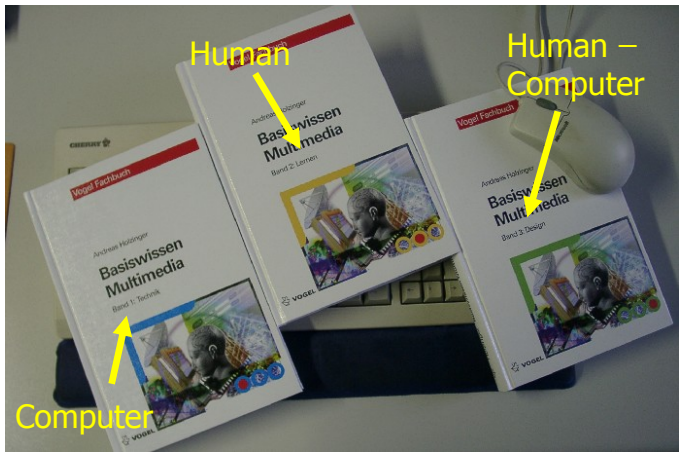
1963 1978 2003

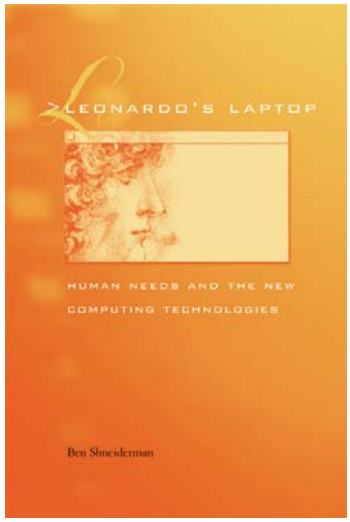
t

akademisches Alter ≠ biologisches Alter

www.basiswissen-it.at

www.basiswissen-multimedia.at





Deutsch von Andreas Holzinger (2005) by Springer

Innovator: Ben Shneiderman

- Zusammen mit Ike Nassi Nassi-Shneiderman Diagramme (Struktogramme, DIN 66261)
- Direct manipulation of interfaces (Shneiderman, 1983)
- Gründer (1982) und Leiter (bis 2000) HCI-Lab University of Maryland

http://www.cs.umd.edu/hcil

Inspirational Muse Leonardo da Vinci (1452-1519)

Renaissance Man

- Combined
  science & art
- Integrated
  engineering & esthetics
- Balanced
  technology advances
  & human values
- Merged
  visionary & practical

Source: License free from Planet Art

Innovation means both: Doing OLD things more effectively and more efficiently AND doing entirely NEW things …

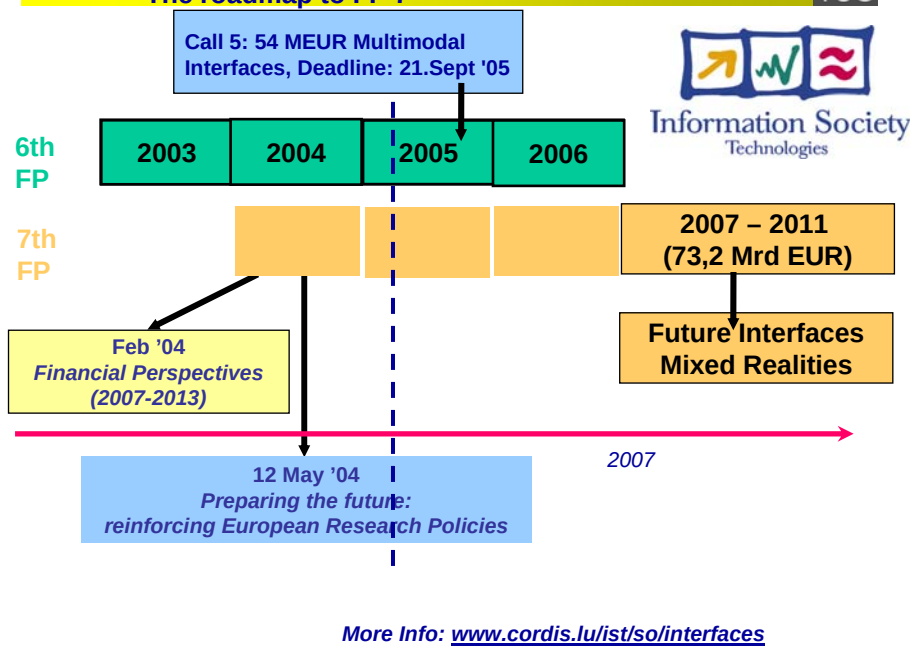
Allerdings: alles was NEU ist, muss nicht automatisch gut, brauchbar, benutzbar sein …

" ... 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 FP 6)

Ambient Intelligence is merging Ubiquitous Computing, Future Interfaces, Mixed Reality and Context-aware Computing …

Ducatel (2001)

27.04.05 **The roadmap to FP 7** TUG



More Info: www.cordis.lu/ist/so/interfaces

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27.04.05 **One Vision of Future Interfaces** TUG

- verbally ask the computer for information
- may be common in mobile/hands-busy situations
- problem: hard to design, build & use!
- need perfect speech recognition & language understanding

Vgl. Holzinger, Ackerl, Searle, Sorantin (2004)

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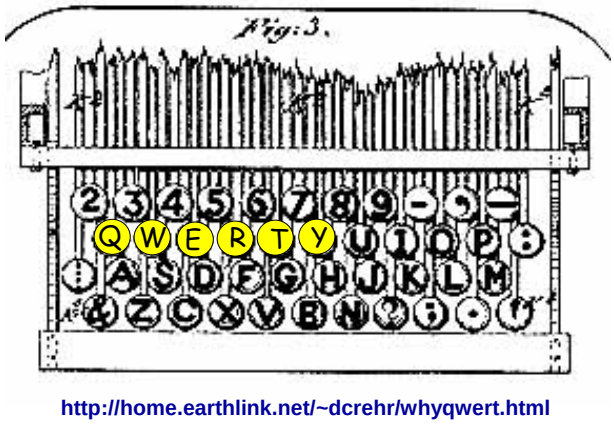
Beispiel für ein Universal Interface?

US Patent von 1878 ! Seit 127 Jahren Standard



http://home.earthlink.net/~dcrehr/whyqwert.html

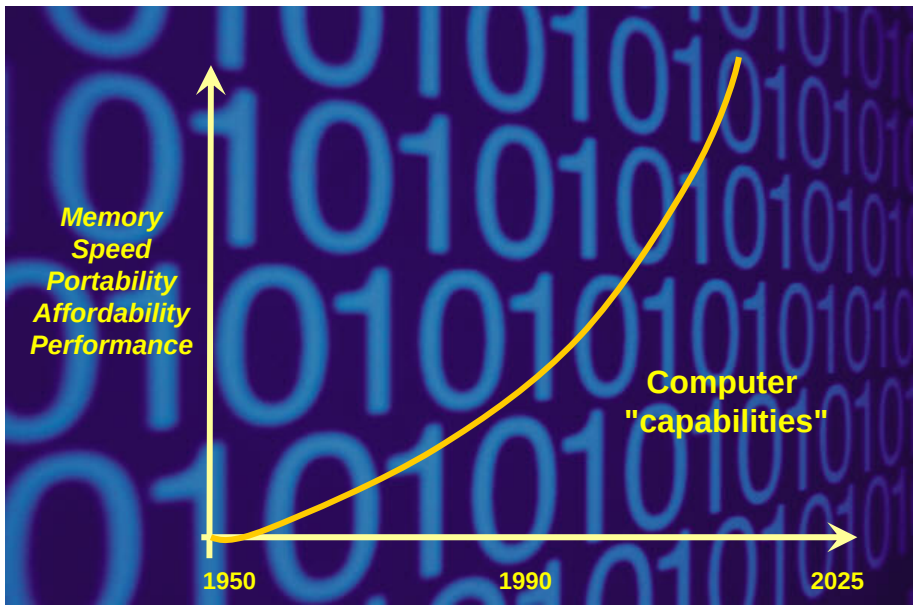
Litterick (1981), Grudin (1983), Clarkson et al. (2005)

Nesbitt (2005)

- But new interfaces will be necessary to interact with new technologies …

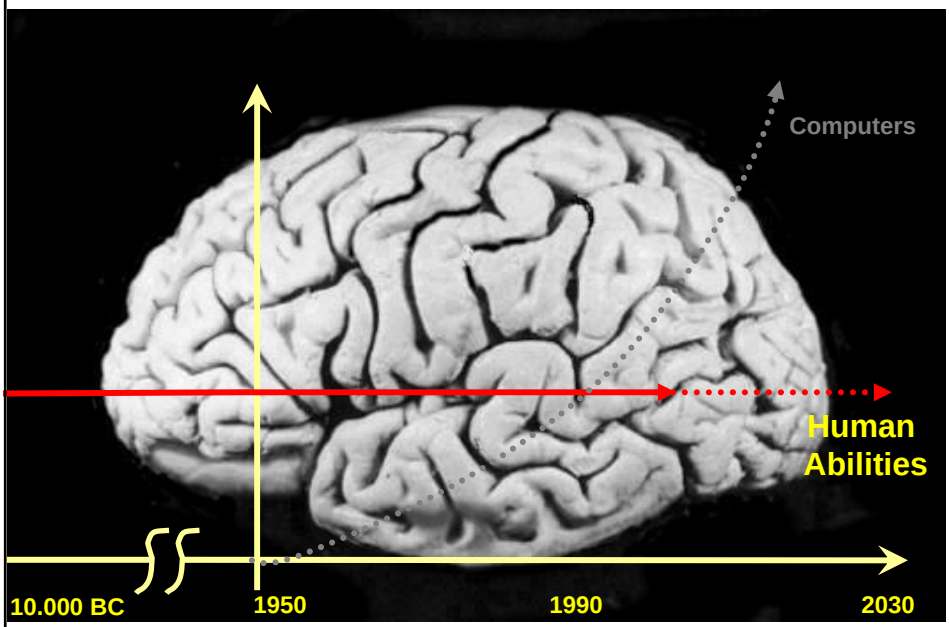
In Summary: Given a New Computer Class Every 10 Years … Bell's Law

Vgl. Moore (1965), Holzinger (2002), Scholtz & Consolvo (2004)



Moore (1997)

27.04.05 **Human versus Computer (cf. Bill Buxton)** TUG



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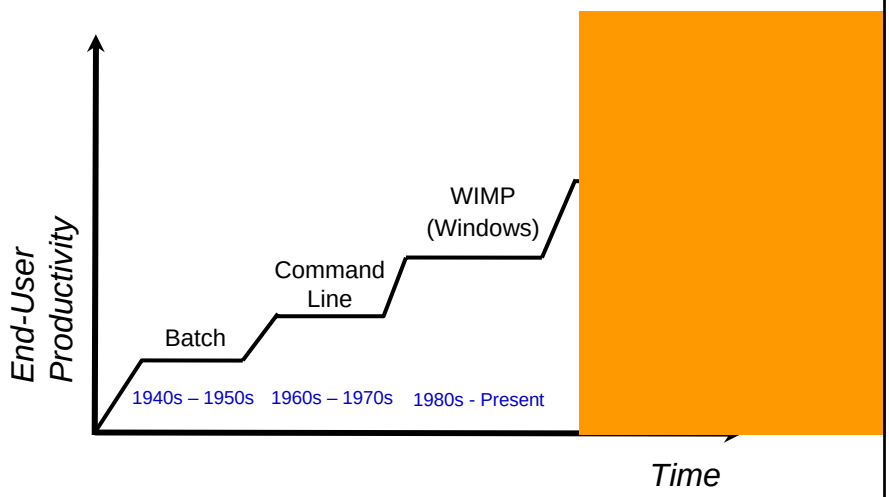
27.04.05 **Windows, Icons, Menus, Pointing device** TUG



Hartson & Hix (1989); Dix (1993); Oviatt, Coulston & Lunsford (2004)

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Was ist denn so schlecht an unserem guten alten PC?

Marcus (2004)

It's a Swiss Army Knife!

Tries to be everything to all people!

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

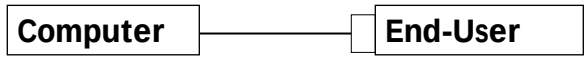
Demands attention

Mark Weiser (1952-1999)

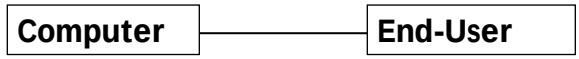
http://www-sul.stanford.edu/weiser

- 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)

- Phase I – The Mainframe Era

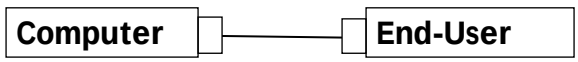


- Phase II – The PC Era



Transition: Internet and distributed computing

- Phase III – The UC Era



Weiser (1993) http://www.ubiq.com/hypertext/weiser

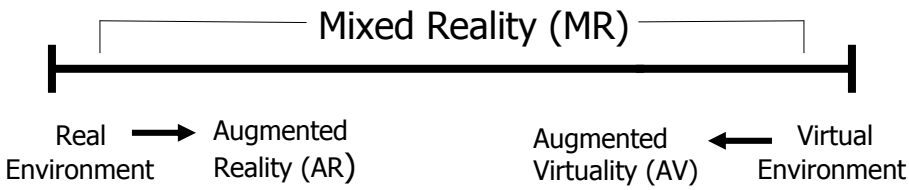
- Computer in allen Gegenständen eingebettet, nahtlos, unscheinbar in die Umgebung integriert und miteinander vernetzt
- Nicht Virtual Reality – sondern Augmented reality
- Computer in die Welt – statt Welt in den Computer

Weiser (1993), Birnbaum (1997), Kersten et al. http://www.cwi.nl

Milgram's Reality-Virtuality Continuum

TUG

Milgram & Kishino (1994)



Vgl mit Ishii (1993), (Billinghurst & Kato, 2002), Russell, Streitz & Winograd, 2005

Beispiel für Multimodalität und Multicodalität

TUG

- symbolic (abstract)

- iconic (visual)

- enactiv (haptic)

Holzinger (2000a, 2000b)

- Head-Up Display (HUD):
  dem Nutzer werden wichtige Informationen unaufdringlich in das Sichtfeld projiziert
- Beispiel: Automobilbereich

http://www.siemensvdo.de

- Einbettung der Computer in die Umgebung und deren natürliche Benutzung steht im Vordergrund
  => Computer werden einfach, intuitiv bedienbar und unspektakulär
- Calm Technology
  => calm : Verschwinden der Technologie in den Hintergrund
- readiness to hand
  => Gute Werkzeuge sollten sich nicht ins Bewusstsein drängen und uns ablenken, sondern uns einfach nur unterstützen

Was ist mit Sozialen Aspekten?

- *Ubicomp* stellt sich nicht zwischen die sozialen Kontakte
- Bildschirmarbeitsplatz in heutiger Form verschwindet
- Förderung der Gruppenarbeit und des Umgangs mit Menschen
- Mensch wird in den Vordergrund gerückt, die Technik in den Hintergrund
  - Übergang zu Ubicomp zwischen 2006 und 2020

Shneiderman (2002)

Ähnlicher Ansatz von Don Norman

Norman (1998)

- A distinguishing feature of information appliances is their ability to share information amongst themselves
- The appliance should fit the activity
- An information appliance should be:
  - simple - the task may be complex, but not the tool. The technology should be invisible
  - versatile: appliances should enable novel creative use
  - pleasurable: fun to use!

- **Carnegie Mellon University HCI Group** www.hcii.cmu.edu
  - **GM/CMU Project: Driver-Vehicle Interface**
  - **Manipulation in a Virtual Haptic Environment Based on Magnetic Levitation**
  - **Robotic Assistants for the Elderly**
- **ETH Zurich** www.ethz.ch
  - Perceptual Computing and Computer Vision Group
    - **Smart-Its [with Lancaster University (UK), University of Karlsruhe (GER), Interactive Institute (SWE) and VTT (FIN)]**
  - Wearable Computing Lab
    - **Wearable Microsensor Network**
    - **Advanced care and alert portable telemedical MONitor (AMON)**
- **Max Planck Institute for Biological Cybernetics** www.kyb.tuebingen.mpg.de/bu
  - **HapSys - High-Definition Haptic Systems**
  - **CogVis - Cognitive Vision Systems**
  - **ECVision**

- **MIT Media Lab** www.media.mit.edu/research
  - Context-Aware Computing
    Chrysler 300M IT Edition, Context-Aware Tables, Disruptive Interruptions, Electronic Necklace
  - Human Design
    Learning Humans, MIThril, Project Zaurus, Shortcuts
  - Object-Based Media
    Smart Architectural Surfaces
  - Responsive Environments
    Design Principles for Efficient Smart Sensor System, Functional Integration for Embedded Intelligence, Modular Platform for High Density Wireless Sensing, Wearable Badge
  - Robotic Life
    Sensate Skin, Sociable Robots
- **Tampere Group for Computer-Human Interaction,** University of Tampere
  - Multimodal Interaction Group www.cs.uta.fi/hci/mmig
    - Tactile User Interfaces
    - Multimodal Interfaces
    - Recognition and Synthesis of Faces, Gestures, and Actions

- Nun, Exemplarisch einige Beispiele …

- Classical Medical Informatics - standalone era
  - Systems for the storage, retrieval, sharing and optimal use of biomedical data, information and knowledge
- Health Telematics - early telecom days
  - Regional health care networks, remote diagnosis and telemedicine applications, Decision Support Systems
- e-Health - Internet era
  - Internet-based applications and services, medical content for prevision, intranets for health service management
- Ubiquitous e-Health - Ambient Intelligence era
  - health knowledge infrastructure, wearable and implantable systems, Biomedical informatics for personalized health, Health GRIDs

E-Health ?

"Nurse, get on the internet, go to SURGERY.COM, scroll down and click on the 'Are you totally lost?' icon."

http://www.thebluething.com/img/surgery.jpg

Workflows

- Medical people are highly nomadic workers
- Complex, hectic, ad-hoc, interrupted, collaborative
- Intense clinical workload *versus*
- Inefficiencies in workflow, information and comm.

"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"

Sullivan (2002),

online at: www.masoftware.org/download/Sullivan10-18.ppt

vgl. Holzinger & Errath (2004)

Landay & Hong (2002)

Area 1 Example

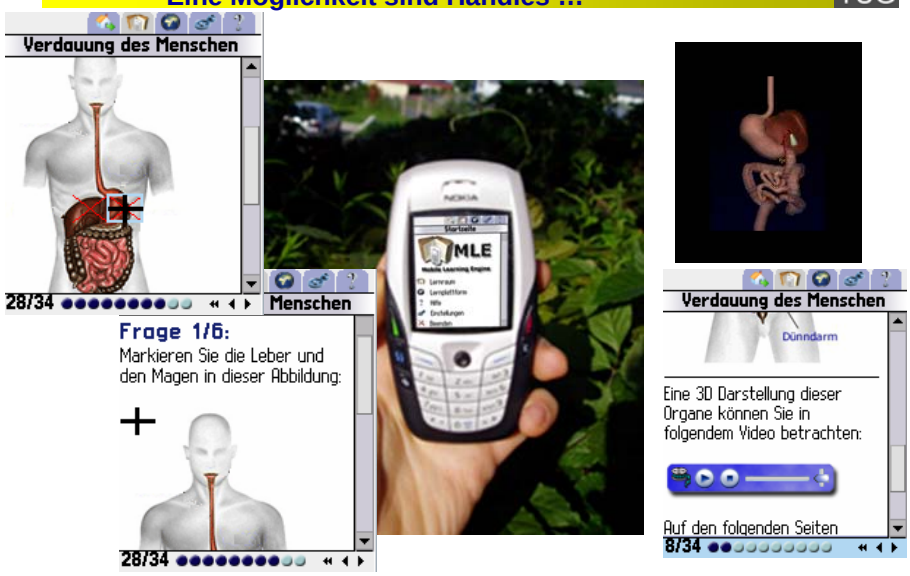
Holzinger (2004)

Holzinger, Schwaberger, Weitlaner (2005)

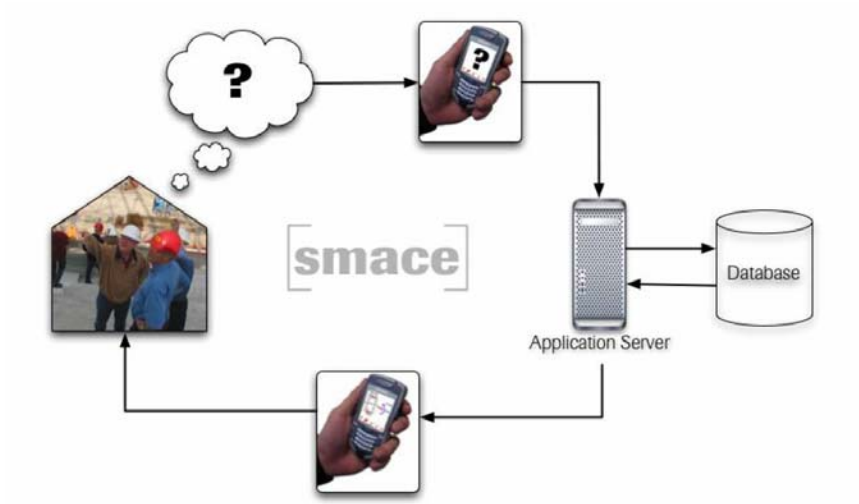
Our pilot works …

Holzinger, Schwaberger, Weitlaner (2005)

Eine Möglichkeit sind Handies …



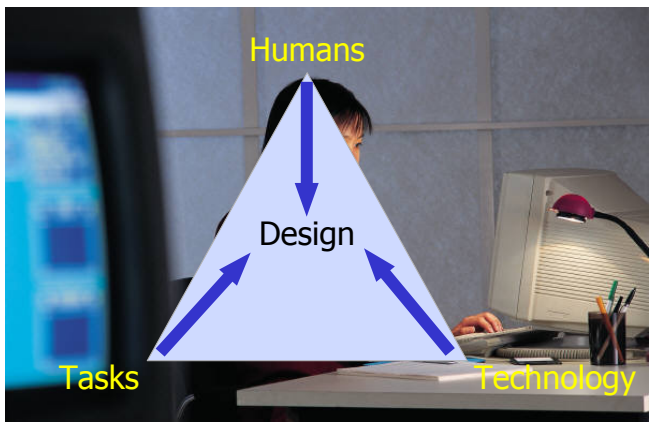
Holzinger, Nischelwitzer, Meisenberger (2005)



Holzinger & Ebner (2005)

Holzinger & Ebner (2005)

Human-Computer Interaction (HCI) & Usability Engineering (UE)



Holzinger (2004), Holzinger (2005)

Der Schlüssel erfolgreicher Anwendungen sind klare MEHRWERTE …

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Vielleicht erhalten Sie ihre Zeitungsnews morgen schon über Ihren Badezimmer-spiegel …

http://www.ijsselsteijn.nl

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- Machen auch Sie mit im Arbeitskreis "HCI &UE"