Human-Computer Interaction and usability in health care

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http://www.it.uu.se/research/hci
IT is useful !?!
ISO 9241:

Definition of usability:

"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use"
Humans in interaction with technology (HCI)

We must understand the nature of such interactions.

Requirements and needs in health care.

How can design of work processes and technology be based on such knowledge?
Human cognition

• Human cognition
  – Memory and short term memory (working memory)
  – Pattern recognition
  – Automated processes

• Human cognitive strengths and weaknesses must be considered when designing user interfaces.
Human memory

• Short term (working) memory
  – 5-8 ”chunks”
  – Declining time c:a 15 sec.
  – Sensitive to cognitive disturbances.

• Long term memory
  – Active “learning”
  – No information loss (“for life”)
  – Difficult to retrieve information (find “triggers”)

Automated (cognitive) processes

- On a high cognitive level
  - Advanced performance (skills)
  - One thing at a time
- On a low cognitive level
  - High parallel capacity
  - ”Automatic” processing
  - Requires much training
Pattern recognition
Conclusions

- A human user can overview very large sets of information, if relevant, well known and presented in a good way.
- Very small information sets can otherwise be totally confusing.
- We can not efficiently handle information we can’t see.
- “Information overload” is caused by too little information or bad design!
- A user must be focused on the work task, not on how to handle the information tool.
Example

Reading of a laboratory report in a health care unit

Question to physicians:

“How do you read this report?”
What does this report contain?

How can it be perceived and analysed by a professional user?
<table>
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<tr>
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<td>xx:x</td>
</tr>
</tbody>
</table>
Different types of users in different contexts

• Different professionals
  – Physicians, nurses, assistants, secretaries, physiotherapists etc.
  – Technicians etc.
  – Administrative personal

• Different work contexts
  – Read/write patient records
  – Order lab investigations and receive reports
  – Patient administration
  – Medical technology….
  – Laboratory work
  – Primary care units
  – Home care
  – Communication structures
ISO 9241:

Definition of usability:

"The extent to which a product can be used by specified users to achieve specified goals with effectiveness, efficiency and satisfaction in a specified context of use"
Human-Computer Interaction is especially important in health care.

Design of user interfaces must be based on analysis of e.g.:
- Which information?
- Used by who?
- In which way and form?
- Where?
- When?
- In which context?
- Of which purpose?
- Integration of systems
- Communication and collaboration?
User interface design

• Design metaphor: Room and work-spaces
• Use e.g. design heuristics to design usable interfaces

• See course in basic HCI (or advanced interaction design) for more about interface design!!!!
Design heuristics (main parts)

- Design for skilled users
- Let humans "be in full control"
- Support the user’s understanding of the process, reduce complexity and support efficient visualisation of information
- Do the design "complete"
- *Management by awareness* vs. *Management by exception*
- Disposition of the screen area
  - Show overview and details simultaneously
  - Fixed and logic spatial visualisation
- Use colours in an efficient way
- Avoid scrolling of text.
- Etc. (See course in HCI and user interface design)
An example of interface design

- One task – one work space
- The interface should be ready for immediate use
- See details and overview simultaneously
- Emphasize important information
- Simple and obvious navigation
- Support identification of important relations
- Support pattern recognition
- Support speed for skilled users
- Allow users to jump between tasks
- Support communication and cooperation
- Etc.
Example

Select "record room" and patient ID
Epikris

92-05-22 Rygkkirurgiska klin, evd 1, Dr Tord Stjernberger/se

Vårtdag 92-05-18 - 92-05-22

Diagnos Lumbalt diskbräck

Dekompression + extirpation av vänstersidigt
diskbräck nivå LV - S I

Ur anamnes Rotationstruma januari 1992 med ryggsmärta och
därefter utstrålande smärtor i vänster ben. Utredning
har visat diskbräck nivå LV - S I, vilket stämmer med patientens klinik. Undersökning hårvarande klinik i
början på april men var då under förbättring, varför
man avböjde operation.

Inkommer nu med accentuerade besvär för operation.

Ur status Vid inkomsten noteras uttalad högerkonvex smår-
tskoliose. Nedsatt rörlighet framförallt vid bakåt-
böjning och böjning åt sidan som ger smärtor ut i
vänster ben.

På nedre extremiteter noteras nedsatt sensibilitet
S I-dermatomet vänster. Akillesreflexen bortv
vänster. Leseque positiv från 45° vänster.

Förlopp Operation 92-05-20 /Stjernberger

Dekompression och borttagande av härt mediolateralt
diskbräck av äldre datum samt en fri sequester

Postoperativt helt komplikationsfritt. År tre dagar
etter operationen vid utskrivningen besvärsvrid ved gäller
den tidigare bensmärtan. Utskrivet till hemmet. Sjuk-
skrivs sex veckor. Sedvanlig efterbehandling. Telefon-
kontakt om fyra veckor.