Human-Computer Interaction and usability in health care

Bengt Sandblad

Medical informatics, period 2, 2012
Is IT in HC 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 of visualization!
• 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?
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And this?
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
Patient

Personnr: 600214-1324
Name: Halmkrone-Hed Bengt-Gunnar

Aktuell medicinering:
- Digoxin 0,25 mg 1x1
- Cardizum 60 mg 1x3

Överkänslig mot Penicillina!
Epikris

92-05-22 Ryggkliniska klin, avd 1, Dr Tord Stjernberger/se

Vårdtid 92-05-18 - 92-05-22

Diagnos
Lumbalt diskbräck
Dekompression + extirpation av vänstersidigt diskbräck nivå LV - S I

7229B
9341

Ur anamnes
Rotationstræuma januari 1992 med ryggsmärta och därav utstrålade smärta i ben. Utredning har visat diskbräck nivå LV - S I, vilket stämmer med patientens klinik. Undersökt hörvarande klinik 1 början på april men var då under förbättrings, varför man avböjt operation.

Inkommer nu med accentueradbesvär för operation.

Ur status
Vid inkomsten noteras uttalad högerkonvex smärtskolsis. Nedsatt rörlighet framförallt vid bakbörjning och böjning åt sidan som ger smärta ut i vänster ben.


Föreläpp
Operation 92-05-20/Stjernberger
Dekompression och borttagande av hårt mediolateralt diskbräck av äldre datum samt en fri sequester 6341 V g se operationsberättelse.