Seminar 8
Title: Human computer interaction (HCI) principles
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Unit framework

Seminar Objectives

• Establish an awareness and an appreciation of the need to adhere to established human computer interaction principles.
• Understand the role of interface design in systems development.
• Differentiate between the users of a system— their interface needs and expectations.
Seminar overview

- What is HCI?
- Why bother with HCI?
- HCI
  - theories and principles
  - standards
  - guidelines
- User centred design
  [To learn more about HCI, do ims3470]

“The most compelling design solutions are ones that are simple, natural to use, and completely in tune with users’ needs and experiences. Achieving these solutions in the design of technology products and e-business applications requires building a multi-disciplinary team, tapping resources such as published research, guidelines, standards, and involving users throughout the design process.”


“If technology developers start from an understanding of human needs, they are more likely to accelerate evolutionary development of useful technology”

(Shneiderman, 2002: Chapt 5: 76)

“The available technology also shapes what one may consider possible”

(Shneiderman, 2002: Chapt 5: 77)
What is HCI and why bother with HCI design?

- The actions required of a human to obtain action from a computer.
- Poor system design can result in system failure due to no use, under use or incorrect use.
- Software with poorly designed interface can have deadly or inhibiting consequence.
  - Some examples – see Shneiderman (2003: 22-24)

Homer Simpson video

HCI

**HCI theories and principles**

- Consistency reduces cognitive load and learning time, improves performance, and reduces accidental error.
- Standards
- Guidelines

**DESIGN RULES**

- Guide designers of interactive applications to design applications that are easy to use, and aesthetically pleasing to the user.
- Suggestions to improve the user experience with the interface.

Even the big guns do it...

- “Ease of Use is vital to the success of most products and services. The user experience directly affects sales, service cost, productive use, customer loyalty and almost every other aspect of doing business.”

  [Link to IBM's Ease of Use page]

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Theories of HCI tend to fall into the following five categories:

- descriptive,
- explanatory,
- predictive,
- prescriptive, or
- generative (Popper, 1968)

These categories are not mutually exclusive, and so some theories fall into more than one category.

Theories allow practitioners and researchers to:

- describe objects and actions in a consistent and clear manner to enable cooperation,
- explain processes to support education and training, predict performance in normal and novel situations so as to increase the chances of success,
- prescribe guidelines, recommend best practices, and caution about dangers, and
- generate novel ideas to improve research and practice.

Theories are not myths

They are based on scientific evidence, and research

For example:

- Colour—paring,
- Memory – Miller’s 7±2, sensory/short/long term
- Ergonomics – Fitts’ Law
- Learning styles – visual,
HCI principles are built on theories

Some principles are based on:
• Cognitive load (mental mapping, metaphors,
• Learnability (affordance, visibility, perception, expectations, learning style preference)
• Readability (topology, typography, language)
• Accessibility (universal access - disabilities,
• Colour (disabilities, cultural differences, coding)

HCI in practice

• What does all this mean?
• A brief look at some principles in practice:
  – Reduce data entry
  – Colour coding
  – Consistency
  – Learnability

HCI Guidelines

Guidelines are based on principles
• Physical: applies to the hardware portion of the user interface eg input devices, the location of the keys, the layout and design of the keys on the keyboard, how the mouse is used, pen gestures.
• Syntactic: refers to rules about presenting information on the screen and the sequence and order of user actions.
• Semantic: refers to rules about the meaning of elements, objects, and actions that make up part of the interface.
HCI Standards [1]

- Formalised guidelines
- Help produce good software
- Constraint designers

1. Why do you think it is important to produce standards for interface design?
2. What advantage could a large organisation perceive in constraining the creativity of its designers?

HCI Standards [2]

- Formal – formal, legal (e.g., International Organisation for Standardization http://www.iso.ch/). The most prominent standard for the ergonomic and usability of information technology products is ISO 9241 (Ergonomic requirements for office work with display terminals), and ISO 13407 (Human centered design process for interactive systems).
- Propriety – company or manufacture (e.g., Microsoft, IBM)
- In-house – style guides, checklists for the company’s products
- De facto – no formal status but generally accepted

ISO 9241, part 14

3.1 Structuring into levels and menus (overall structure).
- Menu structures should reflect user expectations and facilitate the user’s ability to find and select menu options relevant for the task. In order to increase the probability of meeting this objective, the following conditional requirements and recommendations shall be evaluated.
  - 3.1.1 Conventional categories
    - If options can be arranged into conventional or natural groups known to the users, options shall be organised into levels and menus consistent with that order.
The bottom line of HCI

1. put users in control
2. reduce user's cognitive load
3. make the interface consistent

References

- Preece, J., Rogers, ……….