

Four main threads in the program

- Ethical, legal, social issues in computing
- IS Application areas:
 - information architecture
 - **human-computer interaction** Usability Testing
- CS Application areas:
 - artificial intelligence (natural language processing, information retrieval, machine learning)
- Computer programming

Human-Computer Interaction

- The study of the design, evaluation, and implementation of interactive computing systems for human use and the major phenomena surrounding them
- **Observing** the human's interaction with the technology and **designing** novel interaction/technology are both essential
- Three parts: the person, the computer, and the ways they work together

H. Rosenbaum, Indiana University
S. Krug, *Don't Make Me Think*

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Who is the "human" in HCI?

The user—a person with a laptop, a group working together or remotely, a series of people working in sequence...

A person or persons trying to get a job done using computing technology

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The "human" in HCI

- Physiology
 - What are the physiological constraints?
 - How small can a PDA keypad be and still be usable?
 - Is a keypad the best type of input device for _____?
- Cognitive psychology
 - What is the role of sensory perception?
 - Improved legibility of hypertext (font, background, colors) result in improved reading comprehension
 - Distinguishable sounds indicate whether a task has been successfully completed
 - What is the role of memory?
 - Interface design can take advantage of short term memory by providing appropriate stimuli for recall

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The "computer" in HCI

- A computer
- Computer clusters, grid computing
- Mobile devices
- Embedded computing
- Ubiquitous computing

- Websites, computer games, etc.

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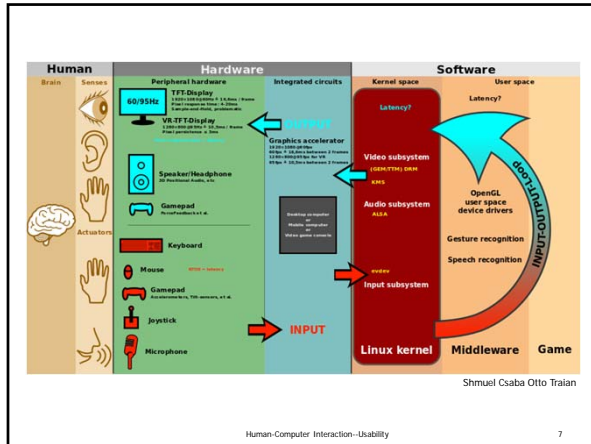
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The "interaction" in HCI

- Two directions:
 - We initiate actions when using technology
 - We respond to actions initiated by technology
- Technology allows us to interact indirectly with one another
- Contextual understanding
 - Study context in which actions and events occur
 - Deliver information at appropriate times/places

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Overall goals of HCI

- Design and develop systems that are usable, efficient, and safe
- Design and develop systems that are intuitive
 - Allow people to use them with a minimum of change and disruption
- Make data exchange between people and machines less stressful and less prone to misunderstandings

How do we shut off our PCs?



GREEN	BLUE	ORANGE
BLUE	PINK	GREEN
YELLOW	GREEN	RED
RED	YELLOW	PINK
ORANGE	RED	YELLOW
PINK	ORANGE	BLUE

RED	ORANGE	RED
YELLOW	GREEN	ORANGE
GREEN	RED	BLUE
ORANGE	GREEN	GREEN
BLUE	BLUE	PINK
YELLOW	PINK	YELLOW

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HCI draws from many fields

- Computer science
- Behavioral science
- Ergonomics (human factors)
- Engineering and design
- Language and communication
- Sociology

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Current topics in HCI

- Embedded computation
 - From desktop computers to everyday objects
 - How will human interfaces to embedded devices differ from those appropriate to workstations?
- Mixed media
 - Images, video, voice, sounds, text, formatted data... exchangeable over broadband
- Group interfaces
- User tailorability

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Current topics in HCI

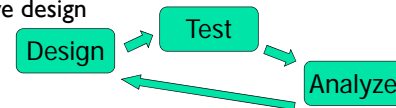
- Embedded computation
- Mixed media
- Group interfaces
- User tailorability
- Information utilities
 - Public information utilities and specialized industry services continue to proliferate (e.g., e-banking, e-government)
 - More and more digital information stored on networks, in remote servers
 - Computing appears to “dissolve” into the environment

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Fundamental design principles

- Early focus on the users and the tasks
 - Users: specific and different
 - Tasks: what and how often
- Empirical measurement
 - Test, test, and test
 - Quantitative measurements
- Iterative design



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Usability in design

- An approach to product development that incorporates direct user feedback throughout the development cycle
 - To reduce costs
 - To create products that meet user needs

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Analyze usability through inspection methods and testing methods

- Inspection methods involve direct observation
 - of user by experimenter/designer
 - of designer by designer
- Testing methods requires user participation
 - Online, large scale tests allow for analytics
 - Small number of observed user tests provide qualitative and quantitative data
- What about “alpha testing”, “beta testing”?
 - Focused on function not usability, but can give usability data

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Inspection methods

- **Card sort**
 - contents written on cards and participant is asked to organize in the way that he/she sees fit
- **Ethnography**
 - field observation of user's environment and work/activity flow
- **Heuristic evaluation**
 - participants (users or designers) evaluate the user interface based on recognized design principles/heuristics, e.g., Nielsen's Heuristics
 - the most popular inspection method

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Jakob Nielsen's 10 Usability Heuristics

- *Visibility of system status*
- *Match between system and the real world*
- *User control and freedom*
- *Consistency and standards*
- *Error prevention*
- *Recognition rather than recall*
- *Flexibility and efficiency of use*
- *Aesthetic and minimalist design*
- *Help users recognize, diagnose, and recover from errors*
- *Help and documentation*

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Testing methods for usability

- Each test done by an individual, NOT focus group
- **Remote usability testing**
 - real-time or recorded
 - Great for recruiting participants in remote areas
- **Live usability testing**
 - Observe user at testing facility
 - Real-time and recorded--test conducted by a team of evaluators, one with the participant and others observe remotely

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Web usability

- **Purpose and strategy**
 - What is the purpose of the site?
 - How is it made clear to the users?
- **Content, navigation, interaction**
 - How should the content be organized so that users can navigate the site easily?
 - How will users search the content?
- **Presentation and media design**
 - How should individual pages be designed so people can make use of the information?
 - How should multimedia be used by people?

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How do people use the web?

- What a developer wants to design for:
- A user who reads a page in an orderly way, sees and thinks about the options, and clicks on a carefully chosen link
- The reality:
- User looks for anything that vaguely resembles what he/she is looking for and is clickable!
- If it doesn't pan out, click the Back button and try again

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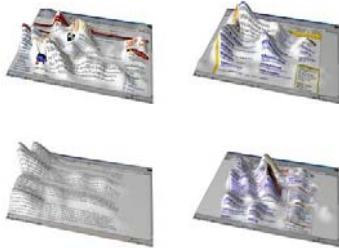
How do people use the web?

- ... as though they are in a great hurry
- They scan—they do not read everything
- They do not choose the *best option*—they choose the *first reasonable option*
 - No real penalty for guessing wrong
 - Weighing options may not greatly improve their chances
 - Guessing is less work
 - And they **are** in a great hurry

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Eye-tracking experiment



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Eye-tracking experiment



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Usability testing

- Observe a user's actions and reactions when using a website
- Includes both general navigation through the site and attempts to accomplish specific tasks
 - Want both quantitative and qualitative data
- Done throughout the development process, not just at the end!

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Usability test ≠ focus group

- In a usability test, one user at a time is shown something (on a website) and asked to work with it
- In a focus group, a small group of people react to ideas and designs that are shown to them—a group process

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Role/duty of the test facilitator

- Try the test yourself first!
- Protect the participants
- Be empathetic
- Try to hear the participant's thought
- Don't give hints about what to do
- Keep instructions simple
- Take notes during or immediately after each session

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What should observers look for?

- Do they get it?
- Can they find their way around?
- "Head slappers" and shocks
- Inspiration
- Passion
-
-
-
-

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What should observers look for?

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- Passion

- Remember that we’re seeing the user’s best behavior
- Pay more attention to actions and explanations than opinions

After a usability test

- Complete notes/report
- Debrief as soon as possible
- Try to “fix” the problems
 - Tweaking vs. major overhaul
 - Resist adding instructions
- Test again!