Human-Computer Interaction
IS 4300

Prof. Timothy Bickmore

Overview for Today

- Overview of the Course
- Logistics
- Overview of Team Projects
- Introductions
- Overview of HCI
- Some basic concepts

9/7/16

Overview of Course

- Topics covered
  - HCI Practice
  - HCI Programming
  - a little theory & research

- Prerequisites
  - Official: CS 3500 Object-Oriented Design
  - Java basics (you must be proficient in 3 weeks)
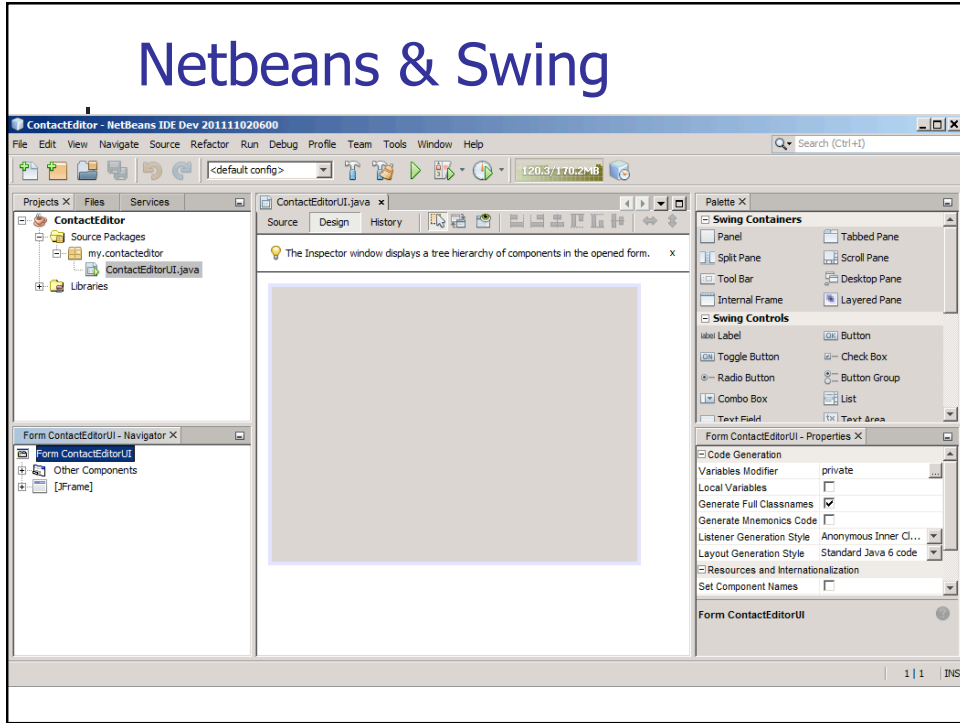
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What this course is about

- General methodology for designing and evaluating user interfaces
  - General GUI software concepts and architecture
  - Enough background in a particular API and IDE to enable novices to build a simple GUI

What this course is not

- Web development
- Mobile development
- Game development
- In-depth GUI development using a particular language, framework/API, or IDE

Netbeans & Swing

Course website

http://ccs.neu.edu/course/is4300f16/

IS4300– Human-Computer Interaction

[Syllabus] [Schedule] [Homework] [Projects] [Resources] [Directory]

Schedule

Date	Topics & Readings	Assignments	
		Due	Start
9/7	Overview of HCI and course. Getting started on projects.		I1,P1
9/12	HCI development process (Benyon Ch 1 & 3). Critical Analysis of UIs (Benyon 10.2). Team project brainstorming.	I1	I2
9/14	Humans (Benyon Ch 21 & 25). Team project brainstorming.		
9/19	Doing observational studies (Benyon Ch 2 & 7; Fetterman; Example 1; Example 2).	I2	I3
9/21	Interaction (Benyon Ch 23) GUEST LECTURE: Zessie Zhang & Shuo Zhou	P1a	
9/26	Requirements analysis: Users & Tasks (Benyon Ch 11), Scenarios (Rosson part of Ch 2), Intro to Usability (Benyon Ch 4).	P1b	P2
9/25	GUI Software Architecture. [Overview][Intro to Java Swing][Intro to Netbeans]	I3	I4
10/3	Design I (Benyon Ch 5 & 9; Rosson Ch 3).	P2	P3
10/5	Design II (Rosson Ch 4). [CHI1,CHI2,CHI3,example][Swing events.]	I4	I5
10/10	HOLIDAY		
10/12	Design III (Benyon Ch 12). UI Design Layout principles. Interface design guidelines.	P3	P4
10/17	Evaluation (Benyon Ch 10). [Swing layout managers]	I5	I6
10/19	Envisioning (Benyon Ch 8). Paper Prototyping (Rettig, PP1, PP2, PP3).	P4	P5a
10/24	Intro to usability studies (Nielsen Ch 6). In class paper prototyping rehearsal. Sample user briefing.	P5a	P5b
10/26	Reporting usability test results. Usability report template (usability.gov).	I6	

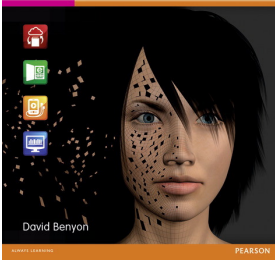www.ccs.neu.edu/course/is4300f16/schedule.htm

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Overview of Course

- Texts
    - **Req'd: Benyon, *Designing Interactive Sysems, 3rd ed***
    - Opt: Rosson & Carroll, *Usability Engineering: Scenario-Based Development of Human-Computer Interaction ($70)*
    - Opt: Nielsen, *Usability Engineering ($11)*
    - Opt: Norman, *The Design of Everyday Things ($12)*

THIRD EDITION

Designing Interactive Systems

A comprehensive guide to HCI, UX and interaction design

David Benyon

PEARSON

Overview of Course

- Weekly Requirements
  - Read ~40 pages
  - Individual homework assignment
  - Project assignment
  - In-class Quiz
  - Describe and discuss assignments in class

Typical Class

1. Occasional Quiz
2. Review assignments. Presentation and discussion by randomly selected students.
3. Lecture on HCI practice topic.
4. In class exercise
5. Discussion of next assignments.

Quizzes

- Quizzes
  - Check understanding and ramifications of readings.
  - Usually 1-2 questions directly from readings, possibly applying the material to a new problem.

  - "Describe the Squishy Interface."
  - "Describe two usability metrics appropriate for a new xbox game."
  - "Give an example of inter-application consistency."

Grading

- Team project (30%, comprised of 10% for each of P1-P8, 20% for T9)
- Individual homework (25% divided equally among graded assignments)
- Final Exam (25%) **No make ups!**
- Quizzes (10%)   *Lowest grade dropped*
- Class participation (10%)

Administrivia

- Tim
  - is4300f16@ccs.neu.edu
  - Office hours: Thurs 4:00-5:30, 177-911
    - Please contact me if coming!
- TA – Stefan Olafsson
- Class: is4300f16-all@ccs.neu.edu

Semester Team Project

Schedule
Based on Team Project

- P1 – Find a Project (2.5 weeks)
- P2 – Requirements Analysis (1 week)
- P3 – Conceptual Design (1.5 weeks)
- P4 – Design Sketches (1 week)
- P5 – Paper Prototyping (1.5 weeks)
- P6 – Computer Prototyping (2.5 weeks)
- P7 – Heuristic Evaluation & Prototype Revision #1 (1.5 wks)
- P8 – User Testing & Prototype Revision #2 (2 weeks)
- P9 - Final Presentation and Report

Project Guidelines

- Must have a substantial UI
- UI must be interactive
- Creative, original, non-obvious is better
- Ideas: research papers & past CHI, UIST, IUI, CSCW
- Each team must have 2-4 members
- Ideally complementary skills
- If you are having "issues" with your teammates, please talk to me!

Example Past Projects

- Advanced Directives for Geriatrics
- D&D Character Editor
- NU Course Finder
- NU Course Scheduler
- MBTA Alerts / Schedules
- Vocal Warm Up App
- Virtual Yoga Instructor

To Do for Next Class

1. Read
   - HCI development process (Benyon Ch 1 & 3).
   - Critical Analysis of UIs (Benyon 10.2)
2. Get a CCIS account
3. Set up individual course web page (I1 – by next class)
   - Email me URL
   - Next class: post 3 project ideas to your web page
   - Review CHI Proceedings for inspiration.
4. Start getting up to speed on Java basics.
5. Project P1 (thinking about projects – 2.5 weeks)
6. Buy a sketchbook – start doodling

Note: All assignments must be posted by noon before class on due date.

Introductions

- Name
- Your background
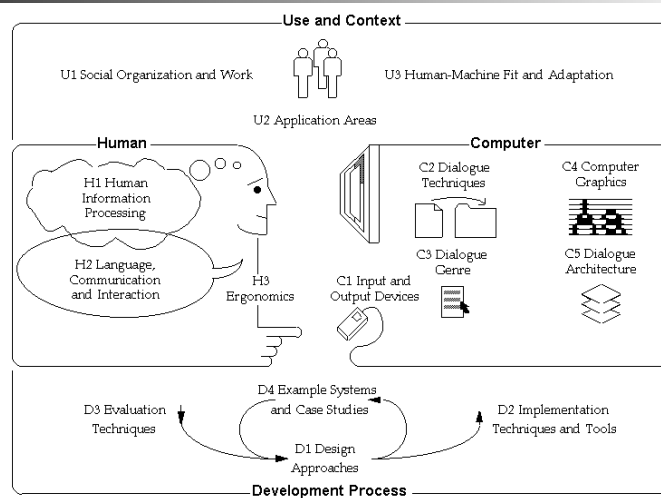- Worst user interface you have ever used & why

Overview of HCI

- What is HCI?
- Motivation for HCI
- Some basic concepts

What is HCI?
ACM SIGCHI Curricula for HCI

- Human-computer interaction is a discipline concerned with the **design, evaluation and implementation** of interactive computing systems for **human use** and with the study of major phenomena surrounding them.

SIGCHI Framework

HCI is an Interdisciplinary Field

Ethnography
Robotics
Graphics
Human factors
Social Psychology
Computational Linguistics

Cognitive Psychology
Software engineering
Communications
Experimental Methods
Art/Design

What is HCI?
extensional definition

- GUIs & toolkits
- Mobile computing
- Conversational interfaces
- Collaborative & Social interfaces
- Multimodal interfaces
- …

What do UI professionals do?

- **interaction designers** – (IxD) people involved in the design of all the interactive aspects of a software product
- **user experience designers (UX)** – extends IxD with all aspects of user experience, including hardware, manual, etc.
- **web designers**
- **mobile app designers**
- **usability engineers** - people who focus on evaluating products, using usability methods and principles

Why Study HCI?

HCI is Important
from Nielsen – Usability Engineering

- Redesign of rotary dial telephone speeded up users' dialing behavior by 0.15 sec/digit, saving $1M in reduced demand on central switches.
- Redesign insurance forms to reduce customer errors: cost Aus$100,000; savings Aus $500,000/year.
- Redesign of Boeing 757 flight deck interface to reduce flight crew from 3 to 2

HCI is Important
from Nielsen – Usability Engineering

- Study of software engineering costs
  - 63% significantly overran budgets
  - 4 reasons rated with highest responsibility:
    - Frequent change requests by users
    - Overlooked tasks
    - Users' lack of understanding of their own req'ts
    - Insufficient user-analyst communication & understanding

Lederer & Prasad, CACM '92
115 surveys of projects >=$50K

HCI is Important

- UI strongly affects perception of software
  - Usable software sells better
  - "Ease of use" ratings
- For many shrink-wrapped products a single call to customer support can wipe out profits

HCI is Important
FDA Center for Devices and Radiological Health report

- Many deaths and injuries attributable to poor human interface (hardware & software) design.
  - oxygen flow control knob, smooth rotation but with discrete settings and no flow at intermediates

HCI is Important
JAMA. 2005;293:1197-1203

- Study of a hospital computerized physician order entry system (CPOE)
  - Identified 22 ways in which the system caused patients to get the wrong medicine, e.g.
    - fragmented displays that prevent a coherent view of patients' medications
    - pharmacy inventory displays mistaken for dosage guidelines
    - separation of functions that facilitate double dosing and incompatible orders

■ Three quarters of the house staff reported observing each of these error risks, indicating that they occur weekly or more often

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HCI is Important
Therac-25 Accidents

Therac-25 performed both radiation treatment and X-rays

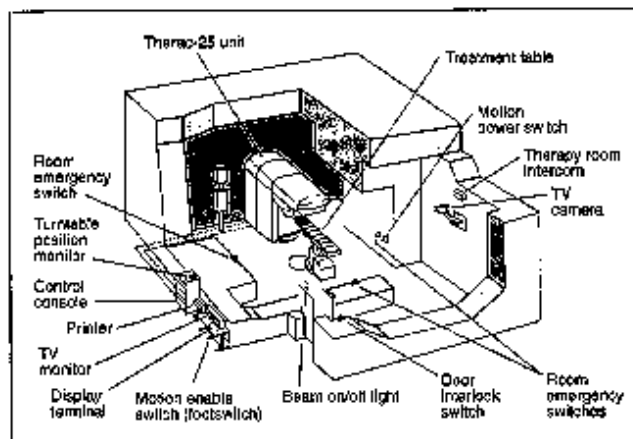Figure 1. Typical Therac-25 facility.

HCI is Important
Therac-25 Accidents

```
PATIENT NAME  : TEST                              A     1
TREATMENT MODE: FIX    BEAM TYPE: X ENERGY (KeV):  25

                                      ACTUAL        PRESCRIBED
            UNIT RATE/MINUTE              0           200
            MONITOR UNITS          50    50          200
            TIME (MIN)                    0.27         1.00

GANTRY ROTATION (DEG)             0.0         0   VERIFIED
COLLIMATOR ROTATION (DEG)    359.2        359  VERIFIED
COLLIMATOR X (CM)                14.2         14.3  VERIFIED
COLLIMATOR Y (CM)                27.2         27.3  VERIFIED
WEDGE NUMBER                      1            1  VERIFIED
ACCESSORY NUMBER                 0            0  VERIFIED

DATE  : 84-OCT-26  SYSTEM: BEAM READY   OP.MODE: TREAT    AUTO
TIME  : 12:55. 8   TREAT : TREAT PAUSE          X-RAY     173777
OPR ID: T25VO2-RO3 REASON: OPERATOR      COMMAND:
```

HCI is Important
Therac-25 Accidents

- Six accidents involving massive overdoses to patients occurred between 1985 and 1987
- Occasional machine malfunctions with little feedback, resulting in repeated dosages (6 in one case)
  - Displayed "MALFUNCTION" with an error code
  - Manual did not describe error codes
  - Result: operators just overrode error message
- Poor feedback about which mode the machine was in caused treatments with 125x the expected dose

- Several patients died as a result.

Why do work in HCI?

- Interdisciplinary work
- Interact with people, learn about them and their work
- Help people
- It's cool…

HCI is Cool!
Now ubiquitous examples…

HCI is Cool

HCI is Cool

HCI is Cool

HCI is Cool

HCI is Cool

Chocolate is getting bigger with your exercise

HCI is Cool

Just another boring presentation!

Studies have shown that the quality of many scientific presentations is poor
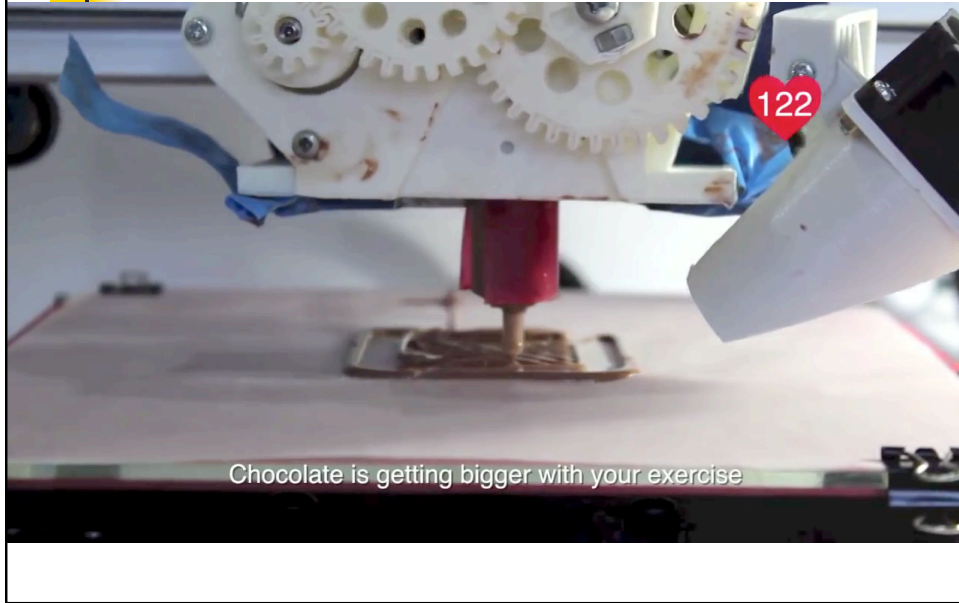
Some basic issues & concepts

- Building good UIs is hard
  - Many iterations
  - Much user interaction
  - Many kinds of expertise
  - 50% of the total lifecycle effort in modern software
    - *Survey of 74 projects, Myers & Rosson, CHI'92*

Some basic issues & concepts

System acceptability
- Social acceptability
- Usefulness
  - Utility — Whether the functionality of the system in principle can do what is needed.
  - Usability — How well users can use the system's functionality.
    - Easy to learn
    - Efficient to use
    - Easy to remember
    - Few errors
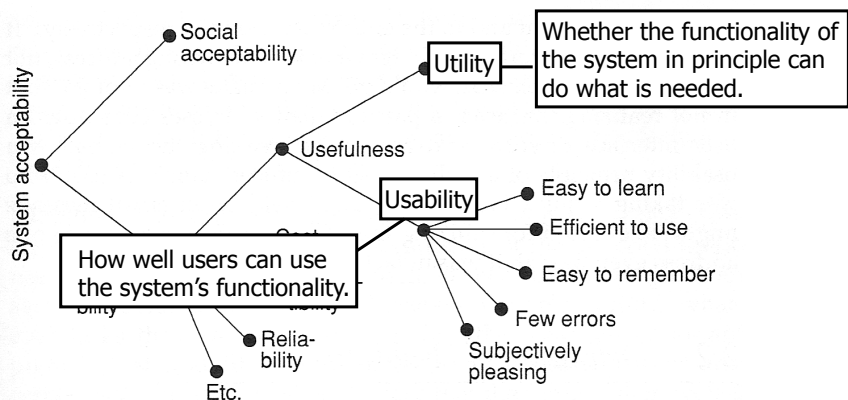   - Subjectively pleasing
- Reliability
- Etc.

Figure 1 *A model of the attributes of system acceptability.*

From Nielsen, Usability Engineering

Some basic issues & concepts

Design

• Ethnography
• Task analysis
• Design guidelines
• Scenarios

• Expert evaluation
• Usability testing

Evaluate

Implement

• Sketching
• Prototyping
• GUI tools

The HCI development process

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