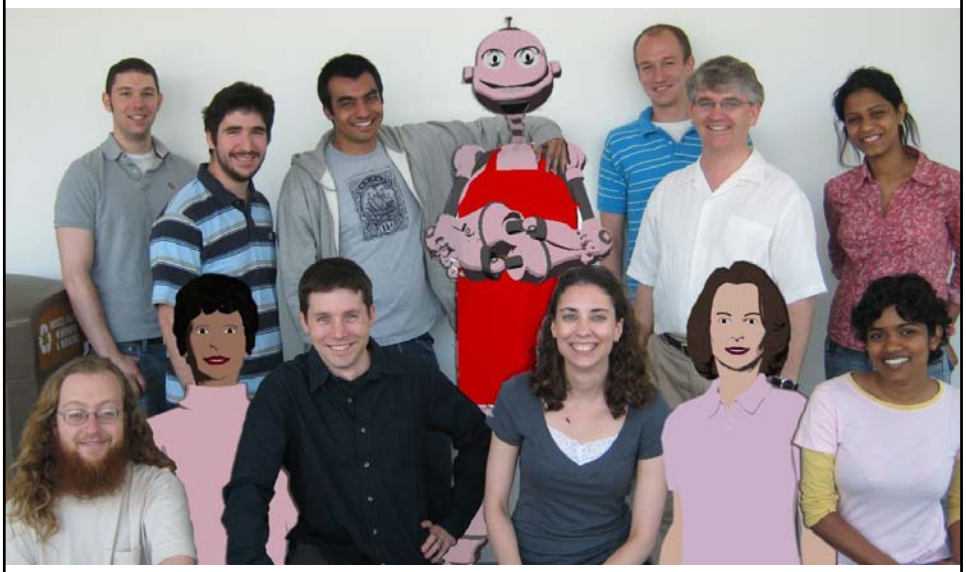
Human-Computer Interaction
IS 4300

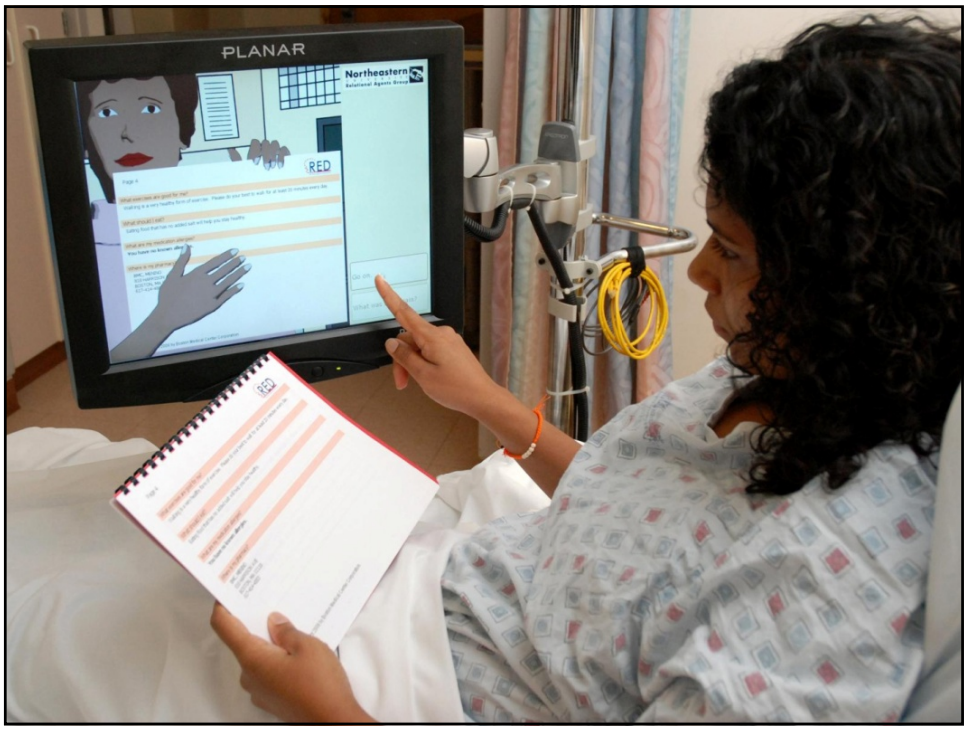
Prof. Timothy Bickmore

Overview for Today

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

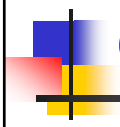


Northeastern
UNIVERSITY
Relational Agents Group



Introductions

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



Overview of Course

ccs.neu.edu/course/is4300f13/

Course Website

IS4300– Human-Computer Interaction

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

Schedule

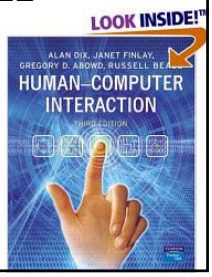
Date	Topics & Readings	Assignments	
		Due	Start
9/5	Overview of HCI and course. Getting started on projects.		I1,P1
9/9	HCI development process (Dix Ch 6). Critical Analysis of UIs (Dix Ch 7)		I2
9/12	Humans (Dix Ch 1). Team project brainstorming.	I1	
9/16	Computers (skim Dix Ch 2). Doing observational studies, Fetterman; Example 1; Example 2).	I2	I3
9/19	Interaction (Dix Ch 3-4).	P1a	
9/23	Requirements analysis: Users & Tasks (Dix Ch 13 & 15), Scenarios (Rosson part of Ch 2), Intro to Usability.	P1b	P2
9/26	GUI Software Architecture (Dix Ch 8). [Intro to Java Swing (1st three)]	I3	I4

Overview of Course

- Topics covered
  - HCI Practice
  - HCI Programming
  - ... and a little theory & research
- Prerequisites
  - Official: CS 3500 Object-Oriented Design
  - Java basics (you must be proficient in 3 weeks)

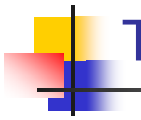
Overview of Course

- Texts
  - Req'd: Dix, et al, *Human-Computer Interaction*
  - Opt: Nielsen, *Usability Engineering ($11 digital)*
  - Opt: Rosson & Carroll, *Usability Engineering: Scenario-Based Development of Human-Computer Interaction*



Overview of Course

- Weekly Requirements
  - Read ~50 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 week's assignments.

Overview of Course

- 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."

Administrivia

- Tim
  - WVH448, is4300f13@ccs.neu.edu
  - Office hours: Weds 2:30-4:30, or by appt.
  - In class prior to start (NOT AFTER)
- TA – TBD
- Class: is4300f13-all@ccs.neu.edu

Schedule

Date	Topics & Readings
5-Sep	Overview of HCI and course. Getting started on projects.
9-Sep	HCI development process (Dix Ch 6). Critical Analysis of UIs (Dix Ch 7)
12-Sep	Humans (Dix Ch 1). Team project brainstorming.
16-Sep	Computers (skim Dix Ch 2). Doing observational studies..
19-Sep	Interaction (Dix Ch 3-4).
23-Sep	Requirements analysis: Users & Tasks (Dix Ch 13 & 15), Scenarios (Rosson part of Ch 2), Intro to Usability.
26-Sep	GUI Software Architecture (Dix Ch 8). [Intro to Java Swing (1st three)]
30-Sep	Design I (Dix Ch 5; Rosson Ch 3).
3-Oct	Design II (Rosson Ch 4 & 5). [Swing events.]
7-Oct	Design III. UI Design Layout principles. Interface design guidelines.
10-Oct	Evaluation (Dix Ch 9). [Swing layout managers]
14-Oct	HOLIDAY
17-Oct	Paper prototyping (Rettig).

Schedule

Date	Topics & Readings
21-Oct	Universal design (Dix Ch 10). Intro to usability studies. In class paper prototyping rehearsal. Sample user briefing.
24-Oct	User support (Dix Ch 11). Reporting usability test results. Usability report template (usability.gov).
28-Oct	[GUEST LECTURE]
31-Oct	Communication & Collaboration (Dix Ch 14). Embodied Conversational Agents.
4-Nov	CSCW (Dix Ch 19)
7-Nov	Expert evaluation. Cognitive models (Dix Ch 12). Heuristic Evaluation (review Dix Ch 7; Nielsen Ch 5, Nielsen, Pinelle)
11-Nov	HOLIDAY
14-Nov	Designing Embedded & Mobile UIs (Dix Ch 20, Leung, Chaudry)
18-Nov	Usability testing (Nielsen Ch 6). Other assessment methods (Nielsen Ch 7). Motivation for Usability (Nielsen Ch 1).
21-Nov	Designing for the Web (Dix Ch 21).
25-Nov	Case study (Gould). Review for Final.
28-Nov	HOLIDAY
2-Dec	Final Project Presentations.
TBD	Final Exam

Grading

- Quizzes (10%).
- Class participation (10%).
- Individual homework (25% divided equally among graded assignments).
- Team project (30%, comprised of 10% for each of T1-T8, 20% for T9).
- Final Exam (25%)

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.

What is HCI?

Ethnography

Robotics

Graphics

Human factors

Social Psychology

Computational Linguistics

Cognitive Psychology

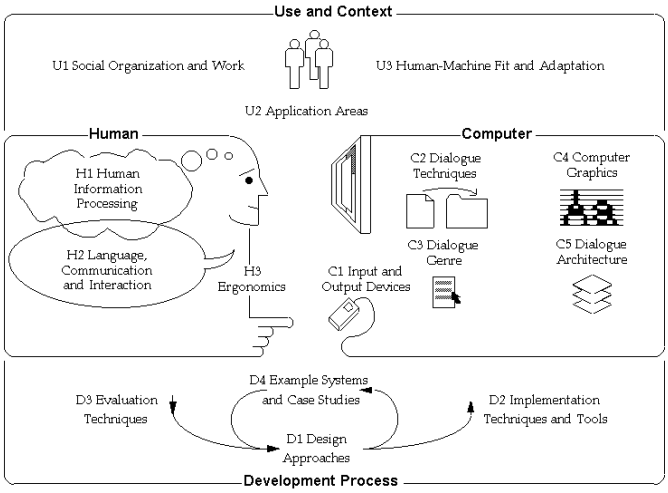
Software engineering

Communications

Experimental Methods

Art/Design

SIGCHI Framework

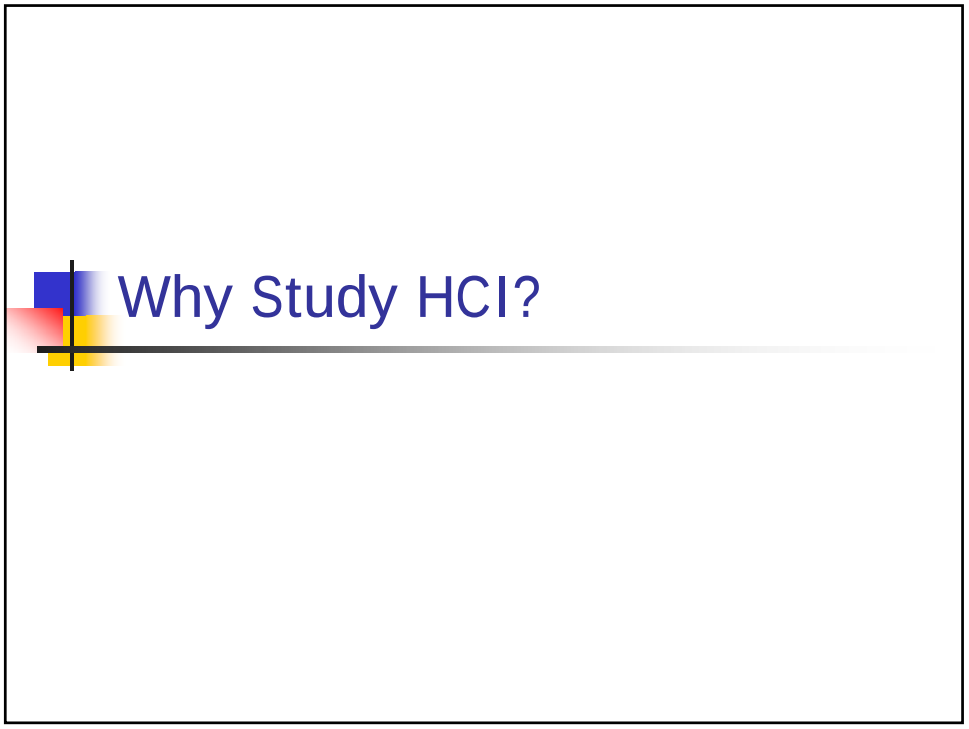


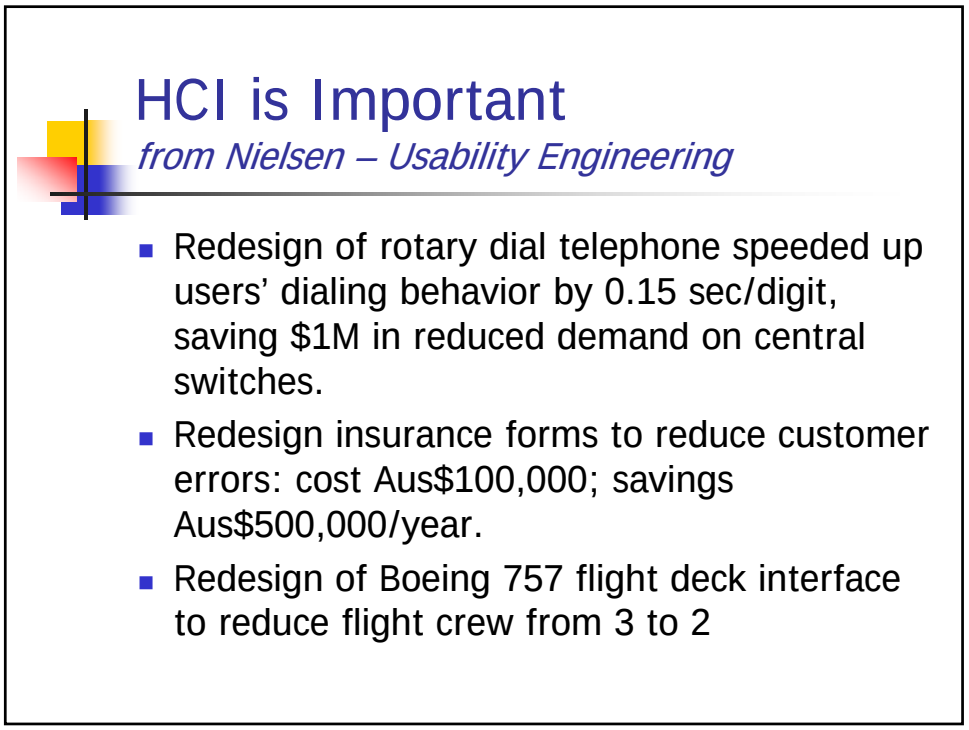
What is HCI?
extensional definition

- Human factors
- GUIs & toolkits
- Mobile computing
- Speech interfaces
- Social interfaces
- Multimodal interfaces
- ...

What do UI professionals do?

- **interaction designers** - people involved in the design of all the interactive aspects of a product
- **usability engineers** - people who focus on evaluating products, using usability methods and principles
- **web designers** - people who develop and create the visual design of websites, such as layouts
- **mobile app designers**
- **information architects** - people who come up with ideas of how to plan and structure interactive products
- **user experience designers (UX)** - people who do all the above but who may also carry out field studies to inform the design of products


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**

HCI is Important

Therac-25 Accidents

Therac-25
- performed both radiation treatment and X-rays

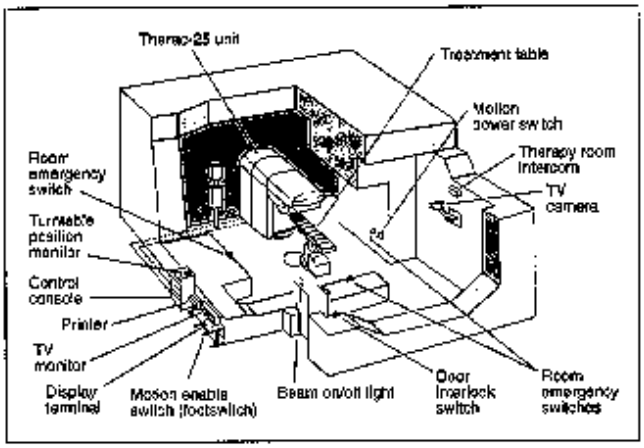


Figure 1. Typical Therac-25 facility.

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: T25V02-R03 REASON: OPERATOR     COMMAND:
```

HCI is Important

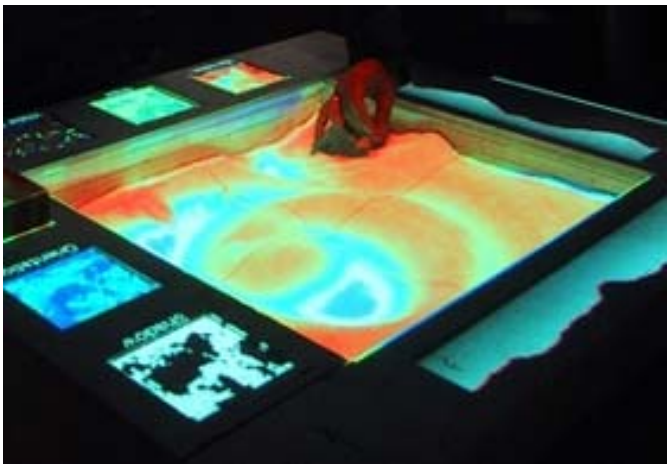
Therac-25 Accidents

- 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)
- Poor feedback about which mode the machine was in caused treatments with 125x the expected dose
- Machine occasionally underreported dosage

Why do work in HCI?

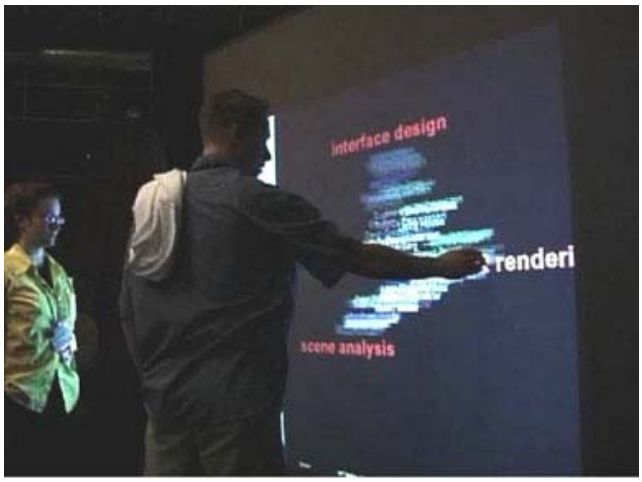
- Interdisciplinary work
- Interact with people, learn about them and their work
- Help people
- It's cool...

HCI is Cool

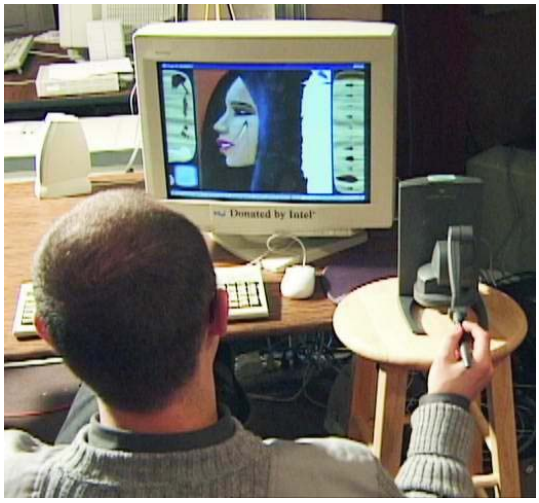


HCI is Cool

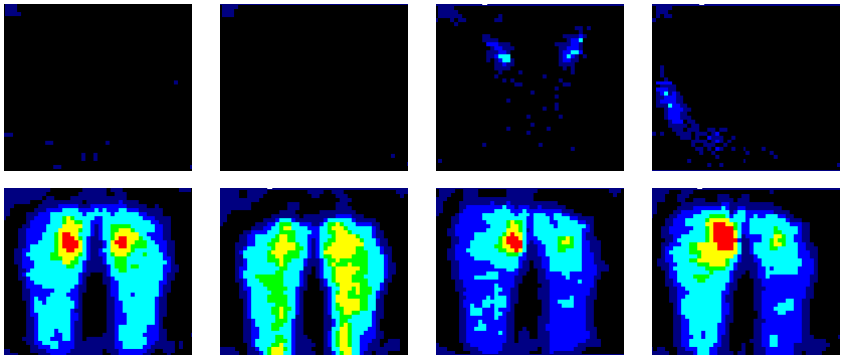
HCI is Cool



HCI is Cool



HCI is Cool



HCI is Cool

I/O Brush

Ryokai & Marti
MIT Media Laboratory (C) 2005

Now ubiquitous examples...

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

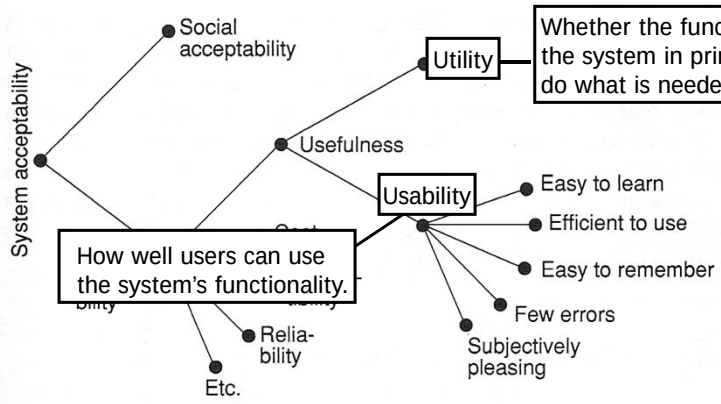
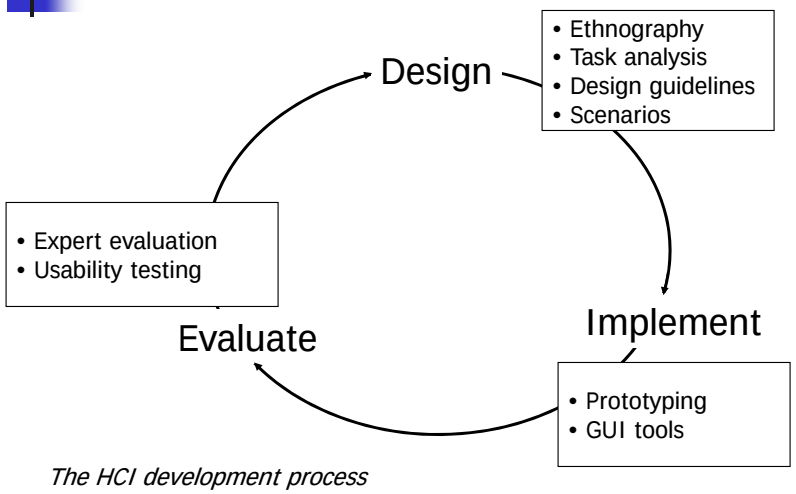


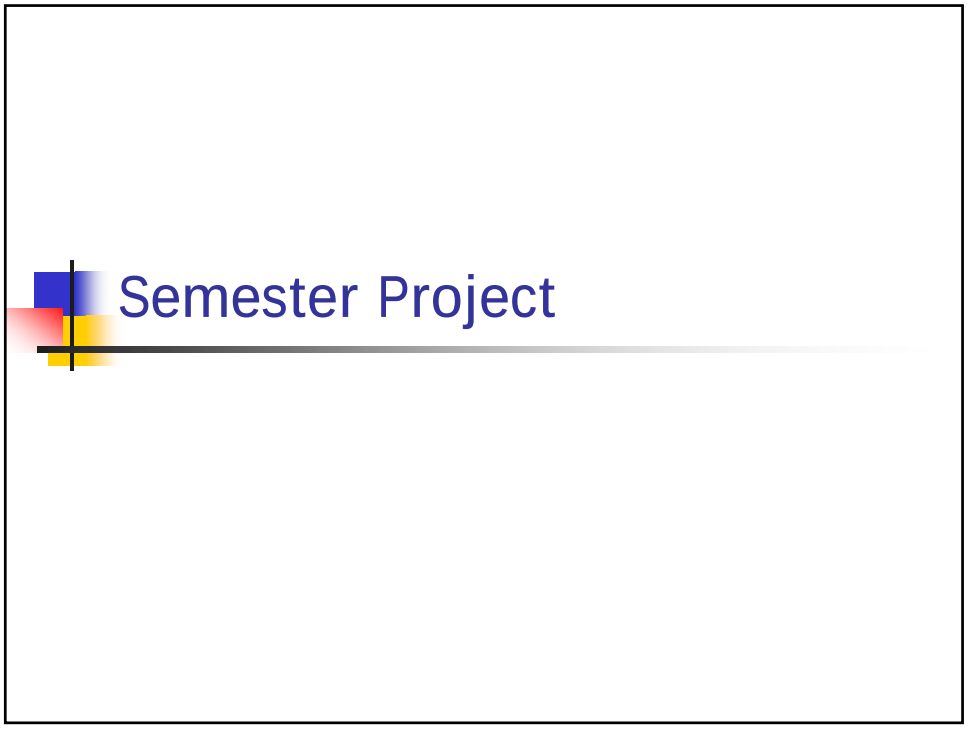
Figure 1 *A model of the attributes of system acceptability.*

From Nielsen, Usability Engineering

Some basic issues & concepts

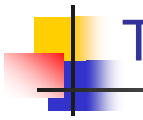


The HCI development process



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 1-2 members
- Ideally complementary skills



To Do for Next Week

- Read
  - HCI development process (Dix Ch 6).
  - Critical Analysis of UIs (Dix Ch 7)
- Set up individual course web page (I1 – 1 week)
- Start getting up to speed on Java basics.

- Project P1 (thinking about projects – 2.5 weeks)
  - In one week: post 3 project ideas
- Review CHI Proceedings for inspiration.

- *Note: All assignments must be posted 1 hour before class on due date.*