1. Introduction

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About the Course

Objectives:
• Appreciate the need to address the human side of systems design
• Become familiar with techniques for achieving usability, and their assumptions and merits
• Decide for yourself which techniques you find to be useful
Sample Definitions of HCI

- "Those aspects of the system that the user comes in contact with" (1981)
- "Processes, dialogues, and actions through which a human user employs and interacts with a computer" (1987)
- "Design, evaluation, and implementation of interactive computing systems for human use and the study of major phenomena surrounding them." (1992)

HCI's domain has expanded

Notice how the definition has expanded to the broader context...
**HCI's Goals & Usability**

- Understanding, designing, evaluating and implementing interactive computing systems for human use.
- **Improve the safety, utility, effectiveness, efficiency, learnability and usability of systems that include computers.**
- Ensure that they integrate well in the organizational settings in which they are used.

**User-Centered Design**

- Focus on users and their tasks early in the design process
- **Measure acceptance and usability using prototype manuals, interfaces, simulations**
- Design iteratively to optimize these metrics
Ways to Involve Users

User-centered, Usage-centered and Participatory design differ in emphasis:

• Study them (in their situation)
• Ask them what they need
• Test designs on them
• Include them on the design team

Star Model

• Ordering of activities is inappropriate
• Evaluation (with metrics) is central
  - Start anywhere
  - Evaluate
  - Iterate
Overview of Methods

Guidelines

Refinement of Scenarios

Evaluation

Refinement of Abstract Models

XP / Rapid Prototyping

Guidelines

• Include
  - General principles
  - Specific design rules
  - Heuristics for evaluation

• Challenges
  - Tradeoff between generality (applicability) and specificity (does it tell you what to do?)
  - Can you codify this stuff?
**Guidelines: Principles**

- **Generic high level advice, such as:**
  - Know the user population
  - Support rather than obstruct the task
  - Reduce cognitive load
  - Make state and functionality visible
  - Maintain consistency and clarity
  - Engineer for errors
  - Design for user growth

- **Requires interpretation to apply**
- **Can help focus design**

**Guidelines: Design Rules**

- **Specific instructions, such as:**
  - Always issue a warning before deleting
  - Provide “undo” for all actions
  - The first two menus should be “File” and “Edit”
  - Represent dates with mm/dd/yy in North America and dd.mm.yy in Europe
  - Represent decimals with xxx.xx in North America and xxx,xx in Europe

- **Easy to apply but limited generality**
- **Sometimes wrong!**
Usage-Centered Design

- Constantine and Lockwood
- Focus on design for Use, not Users ("user friendly")
- Refinement of Models from Abstract to Implementation: don’t commit too early!
- Challenge: can users understand the abstractions?
Usage Centered Design Overview

Operational Model (environmental and contextual factors)

User Roles

Use Cases

Content Model

Navigation Map

Visual and Interaction Design

Domain Model (glossary, data model, or object class model)

User Roles

- Hard Coach
- Coach’s Coach (Relator)
- Professional Developer
- Project Researcher
- Support
- Client Technician
- Sys Admin
- Learner
- Teacher
- Visitor
- Potential User
- External Researcher
- Sponsor
Essential Use Cases (Task Model)

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Mapping Task to Content Model

![Diagram showing the mapping between user intentions and system responsibilities]
Navigation Map

Main Dialogue

- Name-holder does increment as letters typed
- Found-people b preloaded with frequently used

![Diagram](image)

- Access Denied message
- Security
- Editing corporate entry
- Editing personal entry

Abstract Layout

**Film Viewing and Editing**

- Film Clip Identifier & Name (criteria)
- Find
- Film Clip List
- (Name)
- Back 1 Frame
- Up 1 Frame

- Film Clip View
- (Frame Image)
- Frame
- Time

- Play
- Stop
Usage Centered Design Summary

Scenario-based Design

Rosson & Carroll
Scenarios in Usability Engineering

Stories of people and their activities, sometimes includes computer use, always includes goals

• Typical elements of the story are:
  - a setting
  - one or more actors or agents
  - an orienting or motivating goal or objective
  - mental activity, plans or evaluation of behavior
  - a “storyline” sequenced by actions and events

• Emphasis on use, i.e., people’s needs, expectations, actions, and reactions

Problem Scenario

A problem scenario describes the current situation.

You work on these until you and the users agree that you understand the situation

• Marissa was not satisfied with her class today on gravitation and planetary motion. She is not certain whether smaller planets always move faster or how a larger or denser sun would alter the possibilities for solar systems.

• She stays after class to speak with Ms. Gould, but she isn’t able to pose these questions clearly, so Ms. Gould suggests that she re-read the text and promises more discussion tomorrow.
Activity Scenario

Rewrite the problem scenario to describe the activity we would like to support

Do not provide details on how it is supported (abstracts from implementation)

You work on these until you and the users agree that you share the same objectives

Marissa, a 10th-grade physics student, is studying gravity and its role in planetary motion. She goes to the virtual science lab and navigates to the gravity room. In the gravity room, she discovers two other students, Randy and David, already working with the Alternate Reality Kit, which allows students to alter various physical parameters (such as the universal gravitational constant) and then observe effects in a simulation world. The three students, each of whom is from a different school in the county, discuss possible experiments by typing messages from their respective personal computers. Together they build and analyze several solar systems, eventually focusing on the question of how comets can disrupt otherwise stable systems. They capture data from their experiments and display it with several visualization tools, then write a brief report of their experiments, sending it for comments to Don, another student in Marissa's class, and Mr. Arkins, Randy's physics teacher.

Information & Interaction Scenarios

Rewrite the activity scenario to describe the details of
- How information is represented and visualized
- Sequences of interactions with the system and how these are supported by interface widgets and devices

Often supported with sketches and storyboards

You work on these until you and the users are comfortable with the design, and usability tests show that users can interpret the design
**Claims Matrix, Metaphors, ...**

Various other representations are used:

*Most prominent is the Claims Matrix*

- Lists proposed features along with desirable and undesirable aspects of those features
- Claims are derived from and illustrated by the scenarios
- Evolves across many scenarios and ties them together

See http://ucs.cs.vt.edu/ for case library

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**Tradeoffs (from Rosson)**

- **Design by definition is invention, creativity**
  - never just one approach, never one correct answer
  - BUT some answers are demonstrably better

- **Interactive system design tremendously complex**
  - many interdependencies, eg schedule, cost, competitive advantage, local expertise, ...
  - users and their needs are one large set of dependencies

- **Tradeoffs are useful in analyzing these relations**
  - here, we focus on tradeoffs affecting users' experiences
  - guides design thinking, also serves as design rationale
Themes

• Abstraction versus concreteness
  – Abstracting from Situations
  – Abstracting from Implementations

• Avoiding introducing low level considerations too early versus connecting with users

• Utility of Representations

Abstraction and Accessibility

• The major methods we study differ on whether their design representations:
  – Abstract from the implementation (scenario-based, model based)
  – Abstract from the situation of use (model-based, extreme-programming)

• A fundamental tradeoff is avoiding premature commitments versus the accessibility of design representations to users
A design is an information base that describes aspects of this object, and the design process can be viewed as successive elaborations of representations, such as adding more information or even backtracking and exploring alternatives.”
Suitable Representations

- Meet needs of both designers and users
  - Accurate enough
  - Simple enough
  - Makes important issues salient
- Needs change throughout the design process: range of representations
- You will try many representations and pick the ones that help you the most
Participate in the design!

This is a work in progress

• Be gentle
• Use "Email Developers" link (forthcoming) to report errors or private comments
• Use the disCourse Feedback Discussion to comment on and discuss the design
• Consider how you can learn to be a better designer by participating in our design process as a user

What now?

• Request a disCourse account
• Read through Ch. 2 of Rosson & Carroll and Ch. 3 of Constantine & Lockwood
• Do your Assignment by next week ...
Assignment 1

The Good, the Bad and the Ugly

• Read C&L Ch. 3 and skim Smith & Mosier (online)
• Find examples of an interface or system that
  - follows a guideline or design rule successfully
  - follows a guideline or design rule unsuccessfully
  - violates a guideline or design rule unsuccessfully
  - violates a guideline or design rule successfully
    (try to get all four; the latter two are harder)
• Make screen dumps and put them in a web page with a brief argument justifying your choice
• Post a new thread in disCourse Assignment 1 discussion (URL of your page is the artifact)

Stuff I covered Monday about course mechanics follows ... see the web site.

Discussion?
First Half of Semester

• Step through a plausible design scenario, trying design methods from both Rosson & Carroll and Constantine & Lockwood

• Apply these techniques to a small problem in individual assignments

Second Half of Semester

• Focus primarily on group projects
  - Real problem, real user group
  - You chose the design methods
  - You present your work online or in class
  - Emphasis on evaluation

• Continue to cover chapters on evaluation, documentation, help, usability in context ...
Other Details

• A summary is on the web site ...  
  http://iiliit.ics.hawaii.edu/classes/ICS667/Spring2005/  
  - Overview  
  - Format  
  - Readings  
  - Assessment  
  - Instructor  
  - Schedule  
  - News  
  - disCourse (more on this later)

My contact info

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Our communications

• **News page on web site:**
  - Getting you into disCourse
  - News when disCourse is down
  - Pointers to major news in disCourse

• **Email**
  - Class list used for announcements of time limited value or great urgency
  - Private email for truly private matters: ICS667 in subject (or telephone, office hours)

• **All other:**
  - Communicate as much as possible in disCourse discussions, so everyone benefits

Your suggested weekly routine

• **Check email daily if possible**
• **Check disCourse at least 3x/week**
  - Home page will indicate recent news, messages, resources
  - Subscribe to and participate in current discussion
  - Check for assignments and changes to schedule

• **Get slides from general discussion**
• **Begin readings the week they are dated**