Who are these people?

- Jacob Somervell (instructor)
  - PhD candidate in computer science
  - interested in large screen displays as notification systems
- Christa Chewar (collaborator)
  - PhD candidate in computer science
  - interested in notification systems design and evaluation
- Pardha Pyla (teaching assistant)
  - PhD student in computer science
Textbooks

• Mary Beth Rosson and John M. Carroll, Usability Engineering: Scenario-Based Development of HCI (RC)

• Don Norman, The Design of Everyday Things (DOET) [only used rarely]

Other Useful Books

• Ben Shneiderman, Designing the User Interface
• Deborah Hix and Rex Hartson, HCI
• Don Norman, The Invisible Computer
• Fred Brooks, The Mythical Man Month
Other Resources

• Email is the best way to contact Jacob (jsomerve@cs.vt.edu), and Parhda (ppyla@cs.vt.edu)
• The listserv is best for questions and comments CS3724_71140@listserv.vt.edu
• Web page (courses.cs.vt.edu/~cs3724) contains lecture outlines, assignments, and related materials

Evaluation

• Activities (55%)
  - Every Tuesday and Thursday (some Fridays)
  - Quiz and participation
• Group project (30%)
  - 5 parts or phases
  - Due on Sundays, electronically to TA
• Final (15%)
  - Saturday August 9, 2003 @ 8:00 AM
Administrative Stuff

- Prerequisite forms
  - Everyone fills one out
- Background survey
  - Used to form project teams
  - Self ratings of abilities and experience
  - Ratings are confidential, will not affect grade

Course Format

- Alternating lectures and class activities
- Class activities will focus on case studies
  - Student led for most part
  - Instructor takes a back seat, only facilitates discussion
  - Should be fun and exciting!
Human Computer Interaction

High level introduction to HCI, scenarios, and what it all means.

What is HCI?

• The Human
  - Single user, groups, I/O channels, memory, reasoning, problem solving, error, psychology
• The Computer
  - Desktop, embedded system, data entry devices, output devices, memory, processing
• The Interaction
  - Direct/indirect communication, models, frameworks, styles, ergonomics
**HCI at VT**

- Scott McCrickard
- Doug Bowman
- Chris North
- Manuel Perez
- John Carroll
- Mary Beth Rosson
- Others in CS, ISE, etc

**An Aside: VTURCS**

VTURCS = Virginia Tech Undergraduate Research in Computer Science

- Work with professors on ongoing research projects.
- Receive travel money to attend conferences.
- Present your work at annual symposium.

Attend the Project Fair in mid-fall for details (see http://vturcs.cs.vt.edu for details)
Why Usability Engineering?

• Waterfall models of development do not work
  - Too many unknowns (Brooks: No Silver Bullet)
• Need an iterative discovery-oriented process
  - But at the same time need to manage it
• Demands well-defined process with metrics
  - Specifying usability goals as objectives
  - Assessing and redesigning to meet these objectives
  - Manage usability as a quality characteristic, much like modularity or nonfunctional requirements

How Should We Measure Usability?

• Bottom line is whether the users got what they wanted, i.e., is the client satisfied
• Practically speaking, need to break this down so that we can operationalize our objectives
• Our textbook definition:
  The quality of an interactive computer system with respect to ease of learning, ease of use, and user satisfaction
  - Can the users do what they want to do in a comfortable and pleasant fashion?
Scenarios in UE:
A Simple Example

A *problem scenario* describing current 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.

A *design scenario* describing our initial vision:

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.
Scenario-Based Development

1.3: Make decisions but keep options open.
- Scenarios are concrete descriptions but are also very flexible.
- Scenarios describe use in detail, but as a tentative, working representation.
- Scenarios focus on the usability consequences of specific design proposals.
- Scenarios offer a vivid description of use that provokes questions and "what if" discussions.
- Scenarios describe the problem situation using natural language understood by all stakeholders.

1.4: Analyze use but let it evolve.
- Scenarios describe use in detail, but as a tentative, working representation.

1.5: Be innovative but only if adding value.
- Scenarios focus on the usability consequences of specific design proposals.

1.6: Be precise but include everyone on the team.
- Scenarios describe the problem situation using natural language understood by all stakeholders.

1.7: Balance action with reflection.
- Scenarios offer a vivid description of use that provokes questions and "what if" discussions.

Why Scenarios?

Problem scenarios
- Analysis of stakeholders, field studies
- Claims about current practice

DESIGN

Activity scenarios
- Metaphors, information technology, HCI theory, guidelines
- Iterative analysis of usability claims and re-design

Information scenarios
- Interaction scenarios

Usability specifications
- Summative evaluation

ANALYZE

claims about current practice

formative evaluation
Tradeoffs and SBD

• 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, e.g. 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

Learning SBD — By Example

• Virtual science fair as a case study
  – Complement to real world physical science fairs
  – Goal is to extend interactions across time & space

• Cumulative, illustrates activities at each phase
  – Detailed examples of the methods used in projects
  – Use as a model for group materials & analyses

• Many details specific to this example
  – E.g., collaboration, community network, education
  – Other case studies under construction on the Web at http://ucs.cs.vt.edu
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

Scenarios and Claims

- Scenarios convey what actors are like, what forces influence their behavior
- Claims elaborate on scenarios, explaining how and why a feature has impacts
- Claims analysis documents why scenarios were written by isolating the most important features
Claims (see pgs 73-4)

<table>
<thead>
<tr>
<th></th>
<th>+ increases competence</th>
<th>+ encourages community</th>
<th>- hard to break in</th>
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<tbody>
<tr>
<td>Repeated involvement by same students</td>
<td></td>
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</tr>
<tr>
<td>Competition among students for prizes</td>
<td>+ rewards time/effort</td>
<td>- increases frustration</td>
<td>- hard to compare diversity</td>
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History and Future of HCI

- Much of the class will consider systems that are in use today
- Class projects will focus on an emerging paradigm (large screen information exhibits)
- To understand present and future, start with the emergence of HCI
History of HCI

• Vannevar Bush, 1945
  “As We May Think”
• Vision of post-war activities, Memex
• “...when one of these items is in view, the other can be instantly recalled merely by tapping a button”

History of HCI (con’d)

• JCR Licklider, 1960
  “Man-Computer Symbiosis”

• Tightly coupled human brain and machine, speech recognition, time sharing, character recognition
History of HCI (con’d)

• In 1968, workstation with a mouse, links across documents, chorded keyboard

History of HCI (con’d)

• XEROX Alto and Star
  - Windows
  - Menus
  - Scrollbars
  - Pointing
  - Consistency
• Apple LISA and Mac
  - Inexpensive
  - High-quality graphics
  - 3rd party applications
History (and future) of HCI

- Large displays
- Small displays
- Peripheral displays
- Alternative I/O
- Ubiquitous computing
- Virtual environments
- Implants

- Speech recognition
- Multimedia
- Video conferencing
- Artificial intelligence
- Software agents
- Recommender systems
- ...