Human Computer Interaction
COMP 3511 / 9511
Session 2, 2004
Week 1 - Introduction

tonight’s discussion
Sets the stage for this class:
• What is HCI
• Why care about usability
• The role of user-centred design in achieving success

what HCI is all about
• Designing computer systems that support people so they can carry out their activities productively and safely...
• Neither the study of humans, nor the study of technology, but the bridging between the two...

user interface design vs HCI
• User interface (UI) design is about "those aspects of a computer system that the user comes in contact with"
• HCI emphasises the fact that, to be successful, the design must focus beyond the UI

the challenge of HCI
• Keep abreast of the changes in technology
  • new features, more powerful
• Ensure that the design is appropriate for the user and the total environment
goals of HCI

- Understand factors influencing use of technology
  - psychological, ergonomic, organisational, social
- Utilise tools and techniques to help designers create suitable systems
- Produce efficient, effective, and safe systems

the impact of HCI

- Individual productivity
  - efficiency, accuracy, satisfaction
- Organisational productivity
  - job content, personnel policies, job satisfaction, power and influence, working environment

an interdisciplinary practice

- Computer science
- Cognitive psychology
  - human behaviour & cognitive processes
- Social and organisational psychology
  - individual’s influence on another person, group’s influence on its members, member’s influence on group, relationship between groups

HCI disciplines - continued

- Human factors / ergonomics
  - design to suit capacities and capabilities of its users
- Linguistics
  - study of language to drive design of human-computer dialogue
- Artificial intelligence
  - simulating human behaviour

HCI disciplines - concluded

- Philosophy, sociology and anthropology
  - not traditionally involved with IT, but now with the analysis of user needs
  - gets at the interaction between users, their work, the technology and the environment
- Engineering and design
  - model building and empirical testing

life

it isn’t always easy!
what is usability?

A usable system is one that allows its users to focus on their tasks, not on the system...

attributes of usable systems

- Necessary
- Safe
- Appropriate
- Simple
- Clear
- Powerful
- Consistent
- Flexible
usability issues

Usability issues often only become obvious when it is too late

The crash of a Cali-bound American Airlines jet December 1995 in Colombia, S.A., occurred because the plane's captain entered an incomplete command into the on-board computer — and the default action taken by the software pointed the plane in the wrong direction. The beacons at the Cali and Bogota airports both begin with the letter R, which is the only character the pilot typed. Instead of proceeding toward Cali, the plane turned in the opposite direction (toward Bogota) and crashed into a mountain.

(From York Times, 24 Aug 96 p7)

common usability myths

• Users don’t need better interfaces, just better training
• Usability is subjective - it can’t be measured or engineered
• User interface design is implicit to software design
• Usability increases development costs and length of the development cycle

why care about usability?

• Reduces user errors
• Reduces training costs
• Reduces support costs
• Reduces development costs
• Increases user satisfaction
• Increases user acceptance

reduces development costs

<table>
<thead>
<tr>
<th>Time</th>
<th>Design $1</th>
<th>Development $10</th>
<th>Deployment $100</th>
</tr>
</thead>
</table>

reduces budget overruns

63% of large software projects significantly overrun their estimate

Source: (Lederer & Prasad, 1992)

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top reasons for budget overruns

• Frequent change requests from users
• Overlooked tasks
• Users’ lack of understanding of requirements
• Insufficient user-analyst communication and understanding
post-implementation costs

- Approximately 80% of total software development costs occur after release
- 80% of the fixes are due to unmet or unforeseen user needs

unmet user requirements

- Designing to developers’ model
  - user groups becoming experts
  - merely asking users what they want
- Removing context from user requirements
- Not considering indirect users
- Testing functionality, not usability

creates competitive advantage

“The PC software industry may be somewhat unique in that the marketplace demands usability and failure to deliver it can be fatal. Usability is not an optional feature in this market.”

Borland International

“The pressure that came from the marketplace provided the motivation for the product group to focus on usability and make it work.”

Lotus (IBM)

“Every click is a vote.”

Jakob Nielsen

towards highly usable systems

the power of user-centred design

if it were only this easy

you are not your user
don’t assume users...

• Work like you work
• Know your product
• Understand the technology
• Like what you like
• Talk like you talk

consider the range of users

• Different kinds of tasks
• Different requirements for information and functionality (new users vs existing users)
• Different amounts of knowledge about the domain (novices vs experts)
• Different amounts of knowledge and experience with the technology (infrequent vs frequent users)

consider all levels of design

user-centred design process

why traditional methods are less effective

• Users seconded to development teams often lose perspective
• Joint Application Development (JAD) has different goals and focuses
• Usability/acceptance testing is not design
• Rapid prototyping is not design
• Designers and developers are not suitable user representatives

reducing design cost and effort
low-tech approach

scalable and modular

- Not all projects warrant all activities
- Not all projects warrant a long period of time
- Some user-centred design will always be better than none

observe & analyse

Observe & Analyse establishes the constraints for design using:
- Field studies
- Stakeholder interviews
- Business goals and usability goals
- Affinity diagrams
- Activity scenarios

field studies/site visits

- Conducted to understand the context and actual 'work'
- Identifies user problems and opportunities that direct design solutions
- Important because people aren’t typically able to articulate what they do and how they do it
- Important because users are experts at their tasks, not at systems design

stakeholder interviews

- Conducted to understand the business imperatives to then understand how the system might help support them
- Important for understanding the range of (often competing) issues being addressed
- Important for identifying what the stakeholders consider to be a successful outcome
- Essential for getting buy-in to the system
striking a balance

Business Goals

User Goals

sample business goals

- Provide better customer service through more efficient service
- Develop and improve relationships with customers
- Attract, grow, and retain high value customers

sample usability goals

- Complete tasks easily
- Prevent user error and enable easy correction
- Easily learnable
- Motivating, so people want to use it

aligning usability and business goals

<table>
<thead>
<tr>
<th>Business Goal</th>
<th>Design Goal</th>
</tr>
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<tbody>
<tr>
<td>Reduce cost of mailing information to customers</td>
<td>Key information immediately obvious</td>
</tr>
<tr>
<td>Find information quickly</td>
<td>Support natural workflow</td>
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</tbody>
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affinity diagramming

- Creates a high-level list of issues
- Develops a shared understanding of the analysis
- Provides a user-centred reference point for the team
- Delivers data that can be used in requirements documents, decision-making processes and can focus design

example affinity diagram
example scenario - home loan calculator

Jim and Tammy are very excited about a home they’ve just seen for sale in Rose Bay. They are first time homebuyers and are not sure if they will be able to afford the $360,000 two-bedroom apartment. They decide to check out the home loan calculator on their bank’s website to help them determine what they can afford.

After connecting to their bank’s home page, it is obvious where to find the calculator. They access the calculator and are pleased that the instructions and calculator functions are clear and easy to understand. They need to borrow $354,000 at a 15-year term. The bank offers a “First Timers” loan package which provides a current fixed rate of 9.8% for the term of the loan. The calculator returns a monthly payment amount of $3,865 per month. Jim and Tammy are disappointed at this, as they cannot afford such high monthly payments. So they recalculate the loan with a 30-year term. The result is a monthly payment of $2,976, which they then compare with the 15-year term loan...

example scenario - continued

...$2,976 is still more than they can afford, so they take another approach by entering in a payment of $2,200, to determine how much they can borrow. They enter $2,200 for a 15 year term. They then change the term to 30 years and compare the two loan amounts which indicate they can afford a loan of $298,000 to $355,000.

The bank offers some more options which Jim and Tammy decide to explore. Leaving all the information intact, they change the loan package to the “Savers” option that offers a variable rate currently at 8.2%. This will add this loan option to a table of other loan options to allow them to compare everything they’ve looked at so far...
tips for creating scenarios

- Focus on the critical tasks that impact usability (not just functionality)
- Identify the most important characteristics of the workflow and incorporate into scenario
- Write about human activities, not system activities
- Consider the interaction of tasks and exaggerate that interaction

tips - continued

- Write scenario in prose (not bullet points) to assist users understanding what it might be like
- Clearly identify any details that users are required to enter
- Keep scenarios brief – use multiple scenarios for complex systems
- Have a user representative review or collaborate on writing scenarios

envision & design

Envision & Design takes results from the analysis phase to guide design, using:

- Paper mock-ups
- Collaborative design
- Storyboarding
- Creating design templates

collaborative design

- Iterative process for refining information architecture and interaction design, focusing on important 'high-level' design issues
- Demonstrates the design early in the development cycle - when there is still ample time to easily make changes
- Gives users a valuable role in design, not simply in evaluating what has been done after the fact

evaluate & refine

Evaluate & Refine confirms that the design addresses critical features using:

- Expert reviews/heuristic evaluation
- Usability walkthroughs
- Usability testing

paper mockups

- Quick & easy to develop
- No special skills needed
- More valuable customer responses
- Don’t jump to electronic too quickly
heuristic/expert evaluation
- Review of application against principles of good design (heuristics)
- Combines usability expertise with domain knowledge and context through use of scenarios
- UnCOVERS key issues quickly and effectively
- Effective with limited resources or time
- Can be applied throughout project lifecycle (earlier is better)

general heuristics/review criteria
How well does the application meeting the following criteria:
- Support task flow
- Be consistent
- Provide clear navigation & orientation
- Give users control
- Increase learnability
- Reduce memory load
- Provide effective feedback
- Optimise visual clarity

usability walkthroughs
- Allow users to give feedback about how they would interact with the design (as opposed to how they would design it)
- User feedback can be obtained very early in the cycle - before the interface is coded
- Feedback can be collected from a number of users simultaneously
- Useful technique with developers and stakeholders as well as users

usability testing
- Allows collection detailed subjective and objective data from typical users performing typical tasks
- Participants work through scenarios to complete tasks; observers record actions and comments
- Participant completes questionnaire to obtain opinion information
- Identifies potential trouble-spots and usability issues: yields a prioritised set of recommendations

this HCI class...
- Will investigate the challenges facing us as we design systems for use by humans
- Will investigate the challenges of designing given the technologies we have today - and in the future
- Will give you hands on experience applying the tools and techniques for achieving highly successful systems