Human Computer Interaction ...

... or the key to successful application design
Evolution of Computing

50s - Mainframes

70s - Personal Computing
Man-Machine Interface
Cockpit studies

Today - Ubiquitous computing
HCI studied since mid 80s
Number of Cockpit Displays

- 1920
- 1940
- 1950
- 1960
- 1975

Y-axis: 0 - 70
X-axis: 1920 - 1975

Graph shows an increase in the number of cockpit displays from 1920 to 1975.
Terminology

User Interface Designer → User Interaction Designer → User Experience Designer
Common Myths

- Quality of the UI does not really matter.
- The user will "learn" how to use the system.
- The more functions an application has, the better the application.
- Usability is subjective
  - can not be measured
- UI design can be done right the first time.
What is Usability?

- A measure of the **quality** of the user experience when interacting with something
- The five characteristics of usability
  - ease of learning
  - efficiency of use
  - memorability
  - error frequency and severity
  - subjective satisfaction
- Usefulness is a measure of both usability and utility
- Usability is where you make or break productivity gains
The Triumvirate of Usability

Users

Usability

Task

Context of Use
The Cost of Un-Usability

- System becomes the source of uncontrolled overhead
  - confusing to comprehend
  - inconsistent across functions
  - requiring excessive training
  - error prone
  - discouraging to explore
- Usability Engineering seeks to minimize the overhead
  - mapping work onto functions
  - recovering from errors
  - learning and remembering commands
Reference


video break !
Lifecycle of Good Design

Requirements Analysis

Interviews and Observations

Analyze Findings

Preliminary Design

Evaluate with users

Iterate

Design

Test
Step 1. Create a User Profile

- typing skills
- reading level
- education
- native language
- knowledge and experience level
  - for task
  - for computer
- frequency of use
- amount of training
- turnover rate
- age, gender, color blind, glasses
Tools for creating a user profile

- Questionnaires
  - combination of multiple choice and exploratory
- Interviews
- Focus groups
- Observations
Tips for Interviews

- Record the interview
- Work up to complex topics
- Ask unbiased questions
  - avoid confirmation of your beliefs
- Avoid using jargon
- Do not ask leading questions
  - e.g. "how did that poorly designed dialog affect you?"
- Use probes
  - obtain further information after the original question is answered
- Can’t ask users what they want
  - instead ask about what they know
- Let the interview follow unexpected paths
Focus Groups

- Users should be representative
- Moderator must be skilled
- Create a guide for the moderator
- Video tape the session
- Each participant must speak up
- Great for understanding how users work
- Bad for feedback of a particular screen design
- Feed them !!
Observations

- Field visits - observe context of use
- Ask about their job
  - what do they like best
  - what is their biggest problem
- Notice use of artifacts
- Take photos
  - if remote send a disposable camera
- Make note of information flows
- Observe environmental conditions!
Step 2. Task Analysis

- Goals:
  - generate ideas for new products
  - identify key features for products
  - improve the usability of existing products
  - design the user interface for both

- Create a model of the work as it is currently performed
  - gain insight into opportunities for improvement

- Learn the users’ language

- Create task scenarios
Usability Goal

- Set a specific and measurable Usability goal right up front
  - "the user will be able to create a report with no errors using this system in 5 minutes of less after 2 hours of training."
- Serves as acceptance criteria during usability evaluation
- Good to have one or two qualitative goals also
  - support task interruptions
  - structure task and guide the user step by step
Step 3. Usability Testing

- Recruit representative users
  - within the company or newspaper ad
- Offer incentive
- Overbook and confirm
- Do a dry run
- Decide on role of test facilitator
  - scientist, flight attendant, sportscaster
- Use the think-aloud protocol
  - if benchmarking, use a retro analysis of the tape
Paper vs. Electronic

- Use Paper if:
  - cost of implementation or revisions are high
  - design questions
  - development cycle is very long
- Paper does not require screen shots
- Use Electronic if:
  - response times are a concern
  - running comparison with competitor
  - implementation time is short
- Consider Wizard of Oz as a happy medium
  - especially useful for speech systems
User Tests

- Collect both objective and subjective data
  - time on task
  - number of errors
  - quantitative data on questionnaires
  - subjective feedback and quotes
- Can be conducted in a usability lab
  - or can be done ad-hoc
  - videotaped or not
  - more users creates statistical significance
- Lab findings don’t always generalize to the field
Bottlenecks in Dissemination

- Avoid reports and presentations
  - get developers to observe
- Test as few users as necessary
Why does this computer hate me?

- Negative user experiences - the user blames himself
- People respond unconsciously to computers as they would to other humans
- Reference: The Media Equation
  - Byron Reeves and Cliff Nass
HCI Guidelines

- The user is always in control
- Maintain consistency across the interface
- Give feedback
- Speak the user's language
  - in menu choices
  - push button labels
  - error messages
- Error prevention
- Support different levels of users
Usability Methods - A Box of Tools

- **Requirements Gathering**
  - interviews, groups, observations

- **Prototyping**
  - low fidelity
  - wizard of oz versions
  - full working versions

- **User Testing**
  - how many users
  - video tape vs. notes only
Problems for HCI specialists

- Time and resources not allocated in the project plan
- Usability added as an after thought
  - spit shine and a polish
- Usability is just "common sense"
- Everybody is a designer
- Problems more common at companies behind the curve
- Having lots of UE does not guarantee a usable product!
HCI Knowledge

Sociology
Comp. Science
Cog. Psycho.
Engineer
Human Factors
Linguistics
Social Psycho.
Design
Where to find out more ...

- **Books:**
  - Ben Shneiderman, Designing the User Interface, Addison Wesley
  - Jenny Preece, Human Computer Interaction, Addison Wesley
  - any book by Jakob Nielsen or Don Norman

- **Conferences:**
  - ACM SIGCHI conference CHI
  - Interact
  - HCII

- **Journals:**
  - HCI by Lawrence Erlbaum Assoc.
  - Communications of the ACM
  - ACM Transactions on Computer Human Interaction