Computers and People

CSEP 510
Lecture 5, February, 2004
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Announcements

Outline

- Ethnography
  - Understanding work processes
- Beliefs about software
  - Informed consent
- Usability analysis
  - Voting software
- Support for low fidelity prototyping
  - Wizard of Oz
  - Sketching

Ethnography

- Basic approach
  - Study work process in the natural environment
  - Long term
  - Observational
  - Qualitative

CSCW

- Computer Supported Collaborative Work

Understanding work processes

- Introducing computing technology to support an existing process
- What is expected to be accomplished
- How is the task currently accomplished

Stakeholders

- Workers
- Management
- Technologists
- Customers

Service Technician Domain

- Mobile technicians on call for problems
  - Service call
  - Trouble shoot and fix
  - Multiple tools
- Substantial shared knowledge of the domain
- Long term employment

Yamauchi et al. study

- Methodology
  - Observed 48 service calls
  - Spent entire day with technician
- Study use of information sources
- Eureka system
  - Shared Tips
- Repair Analysis Procedures (RAP)
  - Official documentation

Figure 1: Eureka interface

Case 1

- Call starts with minimal information
  - Fault Code 8-110 (paper transport)
  - Suggest to replace tray 1 feed rolls
- Visual inspection
- Expect common problem
- Simple tests to reproduce the problem
- Check service log
  - Replaced tray 1 feed kit

Case 1

- Typed code 8-110 into Eureka
- Eight results
- Result entitled "Tray 1 only"
- Based on title alone chose to narrow fault to Tray 1
- Looked at results
  - Skipped results with official documentation
  - Concluded "either aligner or baffle"

Case 1

- Cleaned and examined aligner and rollers
- Eventually found a deformed bracket
- Reshaped this and discussed this with co-workers

Conclusion

- "Gleaning"
- Technicians combined information from range of sources
- Eureka used in parallel with other sources – not as primary source
- Extracted ideas from Eureka
- Equate to talking with fellow technicians

Case 2

- Began with obvious problems
- After initial identification of a roll not turning, went to van to get computer and noted fault code
- Read through titles of large number of matches
  - Did not want system to filter items
- Selected several by title and read carefully

Case 2

- Moved to official documents (RAP)
- Followed initial instruction dialog
- Entered some manual codes into the dC330 program
- Final instructions to wipe down rollers
  - Which appeared to work
- First step: gleaning
- Second step: following instructions

Use of information sources

- Conversational use of information source
- Information source concise, written by technicians
  - "Reform the baffle"
  - In contrast Raps very complete
  - Tips – locally discovered solutions
- Tips used in conjunction with other sources
- Titles of tips critical
- Weak structuring: Problem, Cause, Solution
- System for experts – not expert system
- Information written by technicians
  - Social forces for supporting contributions

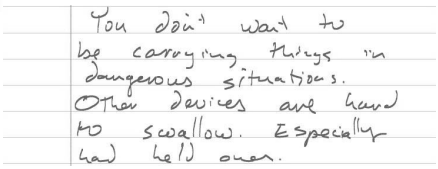
Paper contributions

- Studied 48 service calls, reported on two of them
- We trust that the results are representative
- Observations about real world information extraction
- Very different domain from library or WWW

UW Study Technician Interviews

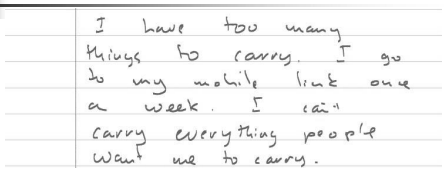
- Course Project CSE490ra
- Design Tablet PC based application to support an elevator technician
- Collaboration with Schindler Elevator

Carrying things



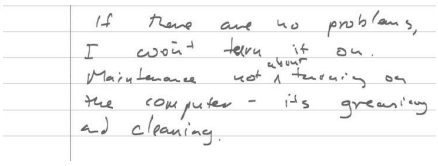
You don't want to be carrying things in dangerous situations. Other devices are hard to swallow. Especially hand held ones.

Carrying things (2)



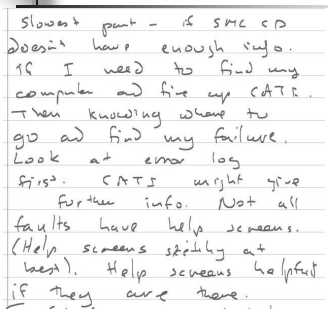
I have too many things to carry. I go to my mobile link once a week. I can't carry everything people want me to carry.

Using the computer



If there are no problems, I won't turn it on. Maintenance [is] not about turning on the computer – its greasing and cleaning.

Information searching



Slowest part - if SML CD doesn't have enough info, if I need to find my computer and fire up CATI. Then knowing where to go and find my failure. Look at error log first. CATI might give further info. Not all faults have help screens. (Help screens sketch at best). Help screens helpful if they are there.

Homework assignment

- Ethnographic observation of a subject performing a task that may require use information sources (~ 1 hour)
  - Cooking (especially an unfamiliar recipe)
  - Debugging
- Conduct a short interview with subject on use of information (~ 20 minutes)

Values in computing

- How are human values reflected in software
- Implicit assumptions that have implications for social values
- Value Sensitive Design
  - Aims to be value neutral
  - Analysis of values from stakeholder perspective
- Values
  - Privacy, accountability, access

Analysis in terms of informed consent

- Work in medicine has lead to an understanding of "informed consent"
- Does this apply in the context of using software?

Informed consent

- Disclosure
  - Accurate information about benefit and harm
- Comprehension
  - Individuals accurate interpretation of what is disclosed
- Voluntariness
  - Action is not controlled or coerced
- Competence
  - Capable of giving informed consent
- Agreement
  - Clear opportunity to accept or decline

Informed Consent (?)

From: A Friend To: Richard Anderson

Subject: hi

Attachments: file.zip (30 KB)

```
The message contains Unicode characters
and has been sent as a binary
attachment.
```

Cookies and informed consent

- Millett, Friedman, Felten CHI 2001
- A web site wants to store a short text string in a file – what's the big deal?

Netscape 1.1

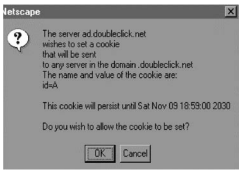
- Cookies installed automatically

Netscape 2.0

- Ability to modify cookies by editing a protected file

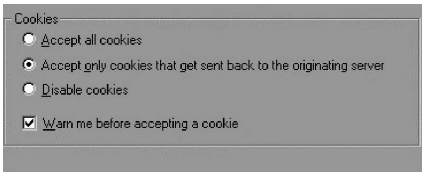
Netscape 3.0

- Default to accept all
- Options to accept all, or alert
- Dialog on Alert



Netscape 4.0

- Additional options – accept only cookies that get sent back to original source



Cookie Issues

- Little disclosure on benefit / harm of cookies
- Preferences hard to get to
- No control on how long cookies exist
- No alerts on when cookies are used (as opposed to set)

Informed Consent Summary

- Disclosure
- Comprehension
- Voluntariness
- Competence
- Agreement

Electronic voting systems

- Wide spread concern about accuracy of mechanical systems
- Suggestion to replace with electronic systems
  - Increased Flexibility (?)
  - Increased Accuracy (?)
  - Increased Reliability (?)
  - Easier to use (?)

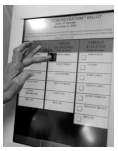
Usability in Voting Systems

- Values and Issues for electronic voting systems
  - Accessibility
  - Technical Expertise Required
  - Bias
  - Accountability and Verifiability
  - Privacy
  - Trust

Vote entry system

- Ballot displayed on screen
- Voter enters votes
- Voter commits
- Votes recorded



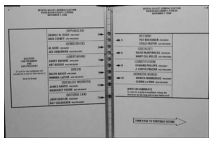



Special considerations

- System used by wide range of users
- Occasional use with limited training
- One shot use
- Possible time pressure
- Limited ability for assistance

Studies of mechanical systems

- Many studies of influence of voting mechanics on results
  - E.g., facility for party line voting
- Ballot layout impacts results
  - Advantage to being listed first
- Systematic voter error based on layout




Possible UI Issues for electronic voting

- Accuracy
- Visibility
  - Fonts
  - Color
  - Glare
- Ease of use by novice
- Workflow
- Reliability of device

Study

- Expert Review
  - Experts study product using predefined heuristics
  - 5 experts from UMD
- Inconsistent Labeling (5)
- Color usage (4)
- Inserting card (4)
- Help (4)
- Layout (4)
- System startup screen (4)
- Glare (3)

Close observation

- Observed and videotaped non-expert users.
- Think aloud protocol
- 47 UMD students
- Measurements
  - Time
  - Survey

Close observation

- One of two machines failed
- Card insertion problematic
  - Expected to behave as ATM
- Few layout concerns (but small ballot)
- Language selection
  - Expected start on language selection (instead of "start")
- Under voting on multi vote race

How good does the system need to be?

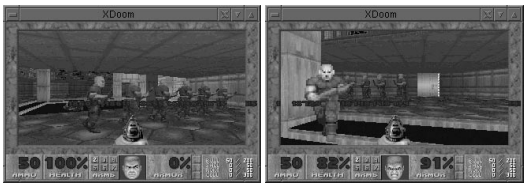
- As good as mechanical
- Better than mechanical?
- Much better than mechanical?
- Almost perfect?
- Perfect?

Field Study

- 365 subjects from general public
- Demographics not representative of general population
- Did not record individual interaction with voting machines
- Surveys positive
  - 10% said difficult to use (similar for other categories)
  - Individuals who use computers frequently reported having less trust than did others

Diversion

- Doom as an Interface for Process Management

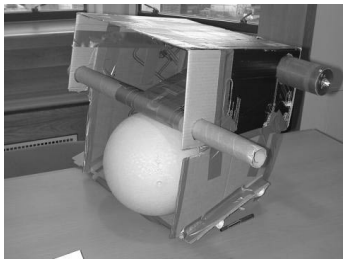


Is this paper serious?

It is unique in that it allows the processes to fight each other and the user. Thinking of our computing environments as being adversarial can be enlightening…The user may want to kill processes to free needed resources, so from the process's perspective, the user may be its greatest threat. The processes are given the ability to shoot back and defend themselves

The enormous interest that PSDoom generated naturally raises the question of why people find it so compelling. Perhaps even more interesting than the application itself is the set of issues that it raises.

Prototyping

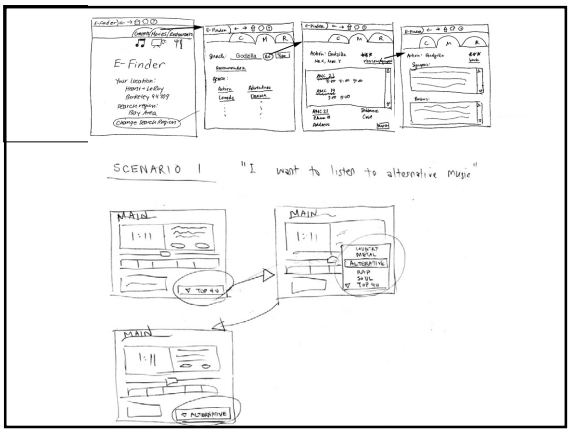


Why prototype

- Get feedback on our design faster
  - saves money
- Experiment with alternative designs
- Fix problems before code is written
- Keep the design centered on the customer

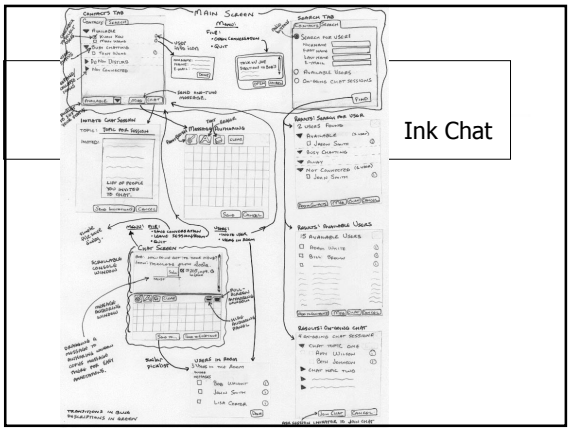
LoFi vs HiFi

- Fidelity refers to the level of detail
- High fidelity,
  - prototypes look like the final product
- Low fidelity,
  - artists renditions with many details missing



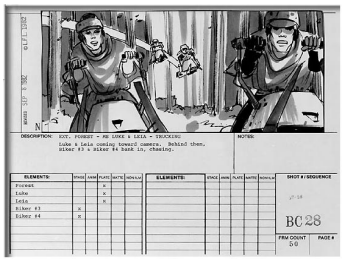
Storyboards

- Where do storyboards come from?
  - film & animation
- Give you a "script" of important events
  - leave out the details
  - concentrate on the important interactions



Ink Chat

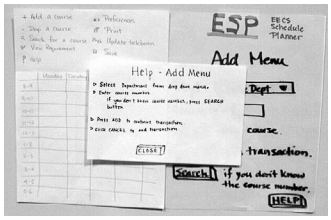
Storyboard from Starwars



Creating paper prototypes

- Set a deadline
  - don't think too long - build it!
- Draw a window frame on large paper
- Put different screen regions on cards
  - anything that moves, changes, appears/disappears
- Ready response for any customer action
  - e.g., have those pull-down menus already made
- Use photocopier to make many versions

Paper prototype



Paper prototypes

- Takes only a few hours
- No expensive equipment needed
- Can test multiple alternatives and iterations
- Almost all interaction can be faked

Wizard of Oz Testing

- Faking the interaction. Comes from?
  - from the film "The Wizard of OZ"
    - "the man behind the curtain"
- Long tradition in computer industry
  - prototype of a PC w/ a VAX behind the curtain
- Much more important for hard to implement features
  - Speech & handwriting recognition

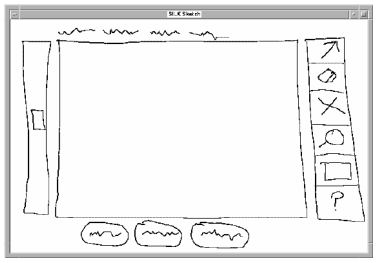
Informal UIs for Early Stage UI Design – "Design Exploration Phase"

- Brainstorming
  - put designs in a tangible form
  - consider different ideas rapidly
- Incomplete designs
  - do not need to cover all cases
  - illustrate important examples
- Present several designs to client

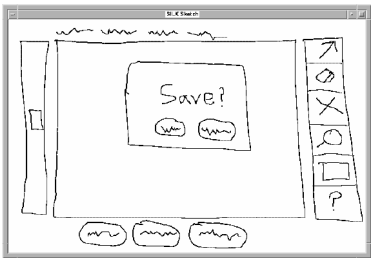
Informal UI Design Tools

- Allow designers to
  - quickly sketch interface ideas
  - test these ideas with customers
  - transform to a more finished design without reprogramming

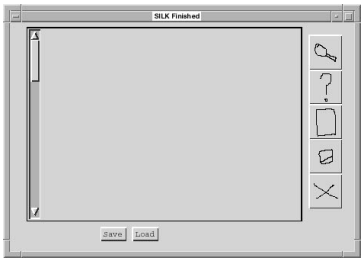
Sketch this



Add behavior



Transform into this

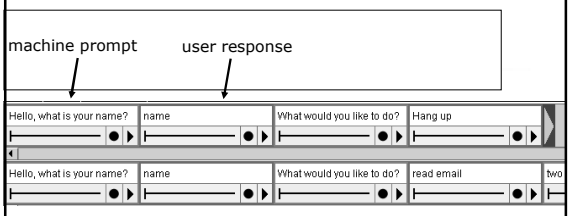


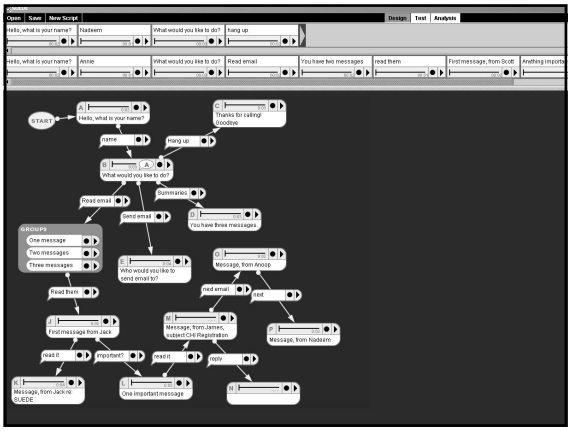
Drawbacks of Current Tools

- Require specification of lots of detail
  - must give specific instance of a general idea
    - e.g., exact widgets, fonts, alignments, colors
  - designers led to focus on unimportant details
  - evaluators focus on wrong issues
- Take too much time to use
  - poor support for iterative design
    - sketched interface took 5 times longer with traditional tool (no icons)

SUEDE: Informal Prototyping for Speech-based UIs

- Supports design practice
  - example scripts
  - Wizard of Oz
  - error simulation
  - iterative design (design-test-analysis)
- Informal user interface
  - no speech recognition/synthesis
  - need not be programming expert
  - fast & fluid design





Lecture summary

- Studying users in natural environment
- Values and Software
- Prototyping

- Next up: Pen computing