Designing the Future: Early Visions of HCI & Design Discovery

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Interface Hall of Shame or Fame?

- From IBM’s RealCD
  - prompt
  - button

• Black on black???
  - cool!
  - but you can’t see it
  - “click here” shouldn’t be necessary
  - like a door that has a sign telling you to push

Outline

- Review
- Computing in 1945
- Vannevar Bush & As We May Think
- Doug Engelbart & Augmenting Intellect
- Administrivia
- Design Discovery

Interface Hall of Shame!

Misused Metaphors

• Direct translations
  - software telephony solution that requires the user to dial a number by clicking on a simulated keypad
  - software CD player that requires turning volume knob with the mouse
  - airline web site that simulates a ticket counter!
Review

Humans
Technology
Task
Design
Organizational & Social Issues

Review

Humans
Technology
Task
Design

Context - Computing in 1945

- Harvard Mark I
- 55 feet long, 8 feet high, 5 tons

Vannevar Bush Kicked Off Big Science

- MIT faculty member
- Coordinated WWII scientific effort
- Social contract for science
  - federal government funds universities
  - universities do basic research
  - helps economy & national defense
- "As We May Think", the Atlantic Monthly, July 1945
- Futuristic inventions / trends
  - wearable cameras to record life
  - encyclopedia for a nickel
  - automatic transcripts of speech
  - trails of discovery
  - capture of nerve impulses
  - Memex

As We May Think

"Instant messaging has unleashed many new tasks"

Picture from http://www.dynamicdiagrams.com/design/memex/model.htm#download
Predicting → Inventing the Future

Computers weren’t always like this...

Computers don’t *have* to be like this!

Douglas Engelbart
*Augmenting Human Intellect*

- Stanford Research Institute (SRI) in the 1960s
- 1962 Paper “Conceptual Model for Augmenting Human Intellect”
  complexity of problems increasing, need new tools to solve
- Demoed NLS (oNLine System), ’68 Fall Joint Computer Conf. (SF)
  a real paradigm shift here

Augmenting Human Intellect

- First mouse
- First hypertext
- First word processing
- First 2D editing & windows
- First document version control
- First groupware (shared screen teleconferencing)
- First context-sensitive help
- First distributed client-server
- Many, many more!

Tricycles & Bicycles: Specialized Tools

Tricycles Versus Bicycles

The Future
“The best way to predict the future is to invent it”
Alan Kay

Administrivia

- Attendance
- Turn in assignment #1 now!
- courseware.stanford.edu
  - Register (use UW NetID)
  - Updates there (including videos & slides)
- Will link to this from UW CSE440 page

“You Are Not the Customer”

- Seems obvious, but...
  - different experiences
  - different terminology
  - different ways of looking at the world

- Easy to think of self as typical customer
- Easy to make mistaken assumptions

Design Process: Discovery

Discover needs
- understand client’s expectations
- determine scope of project
- characteristics of customers & tasks
- evaluate existing practices & products

Understanding the Customer

- How do your customers work?
  - task analysis, interviews, self report, experience sampling (ESM), & observation
- How do your customers think?
  - understand human cognition
  - observe users performing tasks
- How do your customers interact with UIs?
  - observe!

Example of Design Failure

- BART “Charge-a-Ticket” Machines
  - allow riders to buy BART tickets or add fare
  - takes ATM cards, credit cards, & cash
Example of Design Failure:

Problems?

• One “path” of operation
  – ticket type → payment type → payment → ticket
• BART Plus has minimum of $28, no indication of this until after inserting $1
  – can’t switch to regular ticket
• Large dismiss transaction button does nothing
• Multiple keypads/screens

Lessons from the BART machine

• Failure to create convenient machine
  • Did the designers understand or care
    – range of customers using the machine?
    – what tasks they would want to carry out?
    – that some would find the behavior of the machine disconcerting?
  • How can we avoid similar results?
    – “What is required to perform the customer’s task?”

A Better BART Machine

Hong Kong MTR System

Contextual Inquiry

• Way of understanding customers’ needs and work practices
  • Master / Apprentice model allows customer to teach us what they do!
    – master does the work & talks about it while working
    – we interrupt to ask questions as they go
  • The Where, How, and What expose the Why
Principles

• Context
  – go to the workplace & see the work as it unfolds
  – people summarize, but we want details
    • keep it concrete when people start to abstract
      – "We usually get reports by email", ask "Can I see one?"

Principles (cont.)

• Focus
  – interviewer needs data about specific kind of work
    • "steer" conversation to stay on useful topics
  – respect triggers (flags to change focus)
    • shift of attention (someone walks in)
    • surprises (you know it is "wrong")

Principles (cont.)

• Context (cont.)
  – go to the workplace & see the work as it unfolds
  – people summarize, but we want details
    • keep it concrete when people start to abstract
      – "We usually get reports by email", ask "Can I see one?"

• Interpretation
  – facts are only the starting point, design based on interpretation
    • validate & rephrase
      • share interpretations to check your reasoning
        – Ex. "Is accountability means a paper trail?"
      • No, not here. It means safety for personnel/equipment
    • people will be uncomfortable until the phrasing is right
    – be committed to listening ("Huh?", "Umm...", "Yes, but...")

Users: Unique or One of Many?

“Take the attitude that nothing any person does is done for no reason; if you think it’s for no reason, you don’t yet understand the point of view from which it makes sense. Take the attitude that nothing any person does is unique to them, it always represents an important class of customers whose needs will not be met if you don’t figure out what’s going on.” (p. 63, Contextual Design)

Thoughts on Interviews

• Use recording technologies
  – notebooks, tape recorders, still & video cameras

• Structure
  – conventional interview (15 minutes)
    • introduce focus & deal with ethical issues
    • get used to each other by getting summary data
    • transition (30 seconds)
    • contextual interview (1-2 hours)
    • state new rules “they work while you watch & interrupt
    • take notes, draw, be nosy! "who was on the phone?"
    • wrap-up (15 minutes)
    • summarize your notes & confirm what is important

• Master / apprentice can be hard
  – e.g., sometimes need to put down your company

What Customers Might Say

• “This system is too difficult”
• “You don’t have the steps in the order we do them”
• Do not take comments personally
  – you shouldn’t have a personal stake
• Be careful not to judge participants

• Goal is to make the system easy to use for your intended customers
In Situ ("in place")

- Studying people in naturalistic settings
  - direct observation
  - indirect observation
  - diary method
  - Experience Sampling Method (ESM)
- Naturalistic data collection method
  - outside the lab
    - "Ecologically valid"
  - studying behaviors in real-life situations...
- Key for places we will deploy contextually-aware/mobile apps

Experience Sampling Method (ESM)

- Also called "signal-contingent" sampling...

Why is ESM Interesting?

Emotional Intensity

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<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
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<td>retrospective surveys</td>
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<tr>
<td>ESM</td>
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Barrett, Cognition and Emotion, 1998

Computerized ESM

- Advantages
  - ensures compliance
  - sophisticated presentation
    - Conditionals
    - Probabilities
    - "Question pools"
  - record reaction times
  - data already in computer
    - reduces data entry error

- Disadvantages
  - input constraints (limited free response)
  - human factors
    - small screen, buttons, etc.
    - requires some prior experience with technology
  - costs

Context-Triggered Sampling

- Use sensors to achieve targeted triggers
- Do not need to bug the customers as often
  - e.g., after a walk, in a certain place, etc.
Using the Data

• Figure out what is important
• Affinity diagramming
  – group info & find relations between groups
  – Post-Its on large surfaces
  • haptic UI
  • immersive
  • persistent
  • brainstorming
  – also used for creating web info architecture

Next Time

• Readings
  – As We May Think, V. Bush
  – Engelbart article
  – Chapter 3 of Contextual Design

• Lecture
  – Choose team projects
  – Task Analysis