

CS 160: Lecture 3

Professor John Canny
Spring 2006

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Administrivia

- ☐ Please turn in project idea in class today.
- ☐ Project groups will be announced to you by email by Monday when the next assignment will be handed out.

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A design success story

- ☐ The Xerox Star was a landmark in computer design, the origin of the "WIMP" interface and the ancestor of the Apple Mac, MS Windows etc.
- ☐ Not only the device, but the **design process** that its developers followed was revolutionary.
- ☐ Today we'll cover this process in detail.



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Good design lasts

- ☐ People often criticize modern computers for not going beyond the WIMP interface.
- ☐ But this misses the point: people and their office work practices haven't changed. The Star WIMP interface was an excellent solution, and remains so.
- ☐ UI design is *mostly evolutionary*, not revolutionary.
- ☐ Of course when you go outside the office and desktop (i.e. to smart phones) all best are off...

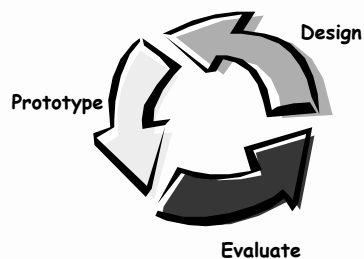


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Human-Centered Design

- ☐ In a nutshell it's:



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The Art of UI Design

Of course, there's more to it than that...

A soufflé is eggs, butter, milk & flour, but the difference between soaring and sinking is in the execution.

Same with UI design.



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The Human-Centered Design Process

- Who is going to use the system?
- What are their characteristics, goals and desires?
- Choose representative tasks and analyze them
- Rough out a design (plagiarize as needed)
- Rethink the design - does it best address a need?
- Create a prototype
- Test it with users
- Iterate
- Build a production version (and ship it!)
- Track use
- Evolve the design

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Human-Centered Design

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Who is the user?

- It's one of the most important design questions you will ask - everything else follows from that.
- Remember that most users are different from you, in ways you may not realize:
 - * Test, don't guess
- Remember that the user is *paying* for the product, so give them something worthwhile.

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Egoless design

- Cooper Interaction design emphasizes "egoless design":
- You design for a customer, not yourself.
- Although good UI designs are visually pleasing, they are not works of art.
- Design is about realizing the customers goals and needs, not the designer's.



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Human-Centered Design

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User characteristics: Personae

- Personae are **concrete** representations of the user group as individuals.
- Things to strive for in a good persona:
 - * Attributes (age, gender, occupation)
 - * Likes, dislikes
 - * Values and desires (or life's goals)
- A good persona is generative (of ideas) - like a good fictional character.

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Personae

- ☐ You know it's a good persona if the design team is passionate about what the persona would or would not like.



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User Characteristics

- ☐ Another way to understand the lives of users is to document them with informal photographs (IDEO and many other design firms do this).
- ☐ Things to look for:



Rituals



Sacred places

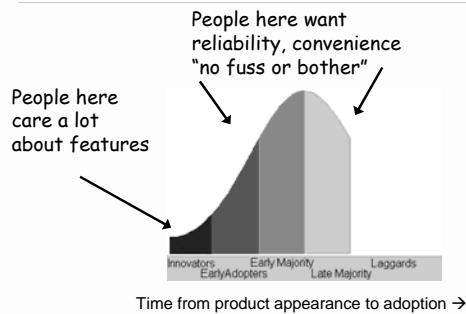


Relationships

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How users are not like you



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Human-Centered Design

- ☐ Who is going to use the system?
- ☐ What are their characteristics, goals and desires?
- ☐ **Choose representative tasks and analyze them**
- ☐ Rough out a design (plagiarize as needed)
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Tasks

- ☐ Tasks are goal-directed behaviors like:
 - * Finding a table in a restaurant
 - * Composing an email message
 - + Searching an address book
 - * Performing a web search
 - * Getting money from an ATM...
- ☐ Tasks are the building blocks for user behavior, and we can study them with or without a design solution...

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Task Analysis and Contextual Inquiry

- ☐ You normally discover tasks during a structured observation/interview process called "Contextual Inquiry" (next time).
- ☐ The "analysis" in task analysis provides more information to guide you in design. There are several approaches, which we'll talk about later.

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Human-Centered Design

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Rough out the design

- Sketch**, if sketching works for you.
- Collage - use actual clip art, cardboard, fabric etc.
- Use plastic clay...

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Rough out the design

- Rough out your ideas in a *shared space* to negotiate them with other designers.
- Focus on high-level issues (what features are needed and why).
- Keep the task analysis and personae in mind when discussing features.



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Plagiarism

Quote from a famous artist:

"Good artists borrow (from other artists),
but great artists steal !"

- Pablo Picasso

Works for UI design too!



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Innovation can be harmful!

Where *not* to innovate:

- Brake pedal on left, accelerator on right
- Steering wheel CW -> right, CCW -> left
- Analog clocks that go CCW
- Light switch up = on, down = off
- Keyboard layout: QWERTY, Dvorak
- Directory/file icons
- Typical contents of file/edit/view menus
- What scroll bars look like
- Active areas of windows for move and resize

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Moral

Good UI design is an *evolutionary* process.



Ergo, its better to start from an advanced
"species" (UI design) than a primitive one,
even if its someone else's (Star->Mac->PC)



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Human-Centered Design

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Think about the design

- Don't get stuck on your original idea.
- Now that you have users, tasks and needs, **explore** some completely different solutions.
- Rethink** your assumptions:
 - * Does this have to run on a PDA?
 - * Does it really require continuous net access?
 - * Will users really adopt this product (even if you like it)?
- Force yourself to sketch some designs that are **very different**.

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Think about the design

- This is the phase to do **engineering analysis** if appropriate.
- For usability, automated systems are not very powerful, and there are few (GOMS, EPIC).
- Heuristic evaluation is a systematic method for human evaluation of an interface.
- Another method is "cognitive walkthroughs" explained later in Lewis and Rieman.
- More elaborate techniques include:
 - * scenario development
 - * role-playing

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Break

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Human-Centered Design

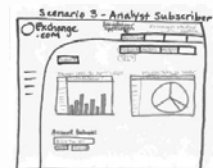
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Prototype the design

- Prototypes let you simulate a lot of detail of an interface.
- Informal (paper or digital sketch) interfaces keep designs more fluid - more changes happen
- They allow presentations to the user
- The "Wizard of Oz" method has the designer simulate the **behavior** as well as the **appearance** of the system



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Wizard of Oz Technique

- ☐ Faking the interaction.
 - * Comes from the film "The Wizard of Oz"
 - * The wizard was actually a "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, vision & handwriting recognition

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Wizard of Oz Technique

- ☐ One designer works as "the system" and moves around paper menus and dialogs, in response to user actions.
- ☐ The other designers observe and note problems.



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Human-Centered Design

- ☐ Who is going to use the system?
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- ☐ Choose representative tasks and analyze them
- ☐ Rough out a design (plagiarize as needed)
- ☐ Rethink the design
- ☐ Create a prototype
- ☐ **Test it with users**
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Test the prototype

- ☐ User testing is one of the critical stages in design.
- ☐ Goal is to:
 - * Discover **problems** as early as possible
 - * Discover **other needs or features** from the users, i.e. needs analysis is not a one-shot deal
- ☐ What testing isn't for:
 - * Proving that all your design decisions were right

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Test the prototype

- ☐ User is asked to "think aloud" while performing the task.
- ☐ Testers observe user and makes notes about user actions (especially any problems) and what the user says.
- ☐ Testers prompt the user to explain something they said or did.
- ☐ Testers don't help users to do the task.
- ☐ Testers don't let users take shortcuts.

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Human-Centered Design

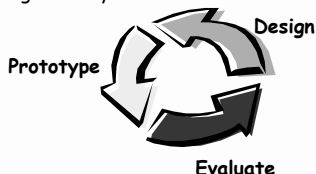
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- ☐ Create a **prototype**
- ☐ **Test** it with users
- ☐ **Iterate**
- ☐ Build a production version (and ship it!)
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Iterate!

- Testing will expose problems with various severity
- You can then attack those problems in order of severity - and work on features in order of value
- Beware of interactions between design elements - fixing one may break another



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Human-Centered Design

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Build It!

- Some prototyping tools (IDEs or UIMS) allow you to move prototype code to production code - most do not, and this method is not recommended.
- When you move from prototype to production code, remember that commitments you make will be hard to undo - check everything first!
- Remember that UI code is at least half of all code for interactive systems. Allow enough time for development.

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Build and Release

- Early releases (alpha and beta) allow yet more testing. Make sure you have good mechanisms in place to get developer/early adopter **feedback**.
- The time from "fully-working" code to "industrial-strength" code can be 6 months or more.
 - * Program defensively, anticipate and deal with errors inside *and* outside your system.
 - * Test at appropriate scale
 - * Introduce stress on the system (other apps, lots of users, unusual command sequences, undos etc.).
 - * Stress on testers would be a good idea - but hard to implement!

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Another bit of history

Q: What was the Zoomer?

A: The Palm Pilot's parent.

It failed in the marketplace.



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Palm Pilot

- Intensive studies of Zoomer users began in 1994.
- Decided the PDA should be a paper replacement, not a PC replacement.
- Switched to graffiti.
- Shrunk to pocket size.
- Unveiled the Palm Pilot in 1994.



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Tracking Use

- Interview real users, log their complaints and praise.
- Talk to maintenance and support staff.
- Put in logging and bug reporting software.
 - * Be very careful about privacy.

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Toolbelt Design + Technology Probes

- There is a trend in design to build suites of inter-operable tools that the customer can adapt (something like MS office + VBasic).
- Toolbelt design allows user evolution of the basic features of the design.
- New generations of the system can move user ideas into the core system.

- In other words, users can become your best designers.

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Evolve the Design

- Real user feedback should help you figure out what needs to change.
- Its often a challenge to accept what you find, and act on it:
- The company's strategy and assumptions may have been wrong (Zoomer again).



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Evolve the Design

- But remember that many truly successful products were 2nd or 3rd attempts:
 - * Palm Pilot
 - * Apple Mac
 - * Windows 3.1



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The Recipe again

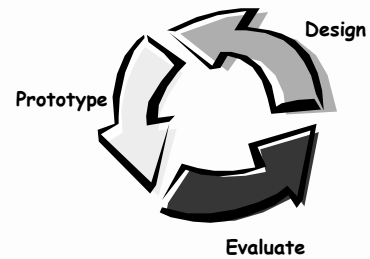
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Human-Centered Design

- In a nutshell:



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Summary: Human-Centered Design

- This iterative design process has been "best practice" since the Xerox Star.
- Executing the entire process gives a very good chance of success.
- Skipping steps (e.g. tracking use) can lead to missed opportunities.

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