#### Lecture 9 – Prototyping

Terry Winograd CS147 - Introduction to Human-Computer Interaction Design Computer Science Department Stanford University Autumn 2006

# Learning Goals

- Understand the uses of different types of prototypes for different kinds of designs and be able to choose appropriately
- Know the basic techniques for lowfidelity prototyping
- Be able to determine and apply the relevant techniques for your project

# What is a Prototype?

- A representation of a design before the final artifacts exist
- To evoke reactions from stakeholders in the design process
  - -Designers
  - -Users

-Clients

# Uses of Prototypes

- Design by doing
  - Clarify goals and requirements
  - "Reflective conversation with the materials"
- Give users the experience of use
  - Look and feel
- Test specific aspects
  - Compare alternatives
  - Make changes
- Show feasibility for buy-in
  - Proof of concept
  - Manage expectations

#### What to Prototype?

"...Prototypes provide the means for examining design problems and evaluating solutions. Selecting the focus of a prototype is the art of identifying the most important open design questions."

Houde and Hill – What do Prototypes Prototype?

#### Design Process



#### Iterative Prototyping

- Quality is a function of the number of iterations and refinements a design undergoes before it hits the street.
- To get a good idea, get lots of ideas.
- Enlightened trial and error is better than than the planning of a flawless intellect.

#### FAIL EARLY



(Cost of failure vs. project time curve)

From Hans Haenlein, IDEO

#### FAIL OFTEN



From Hans Haenlein, IDEO

### 3 stages of prototyping



prototype driven specs  $\rightarrow$  spec driven prototypes

From Hans Haenlein, IDEO

# Designing the Prototype

- Choose what aspects to prototype for relevance to your project goals
- Identify measurable design goals
- Good enough to provide feedback but flexible enough for significant changes to be made down the line

### What can be a Prototype?

- Sketches
- Diagrams & Frameworks
- Hand Made Constructions
- Machined Constructions
- Virtual Models
- Graphics
- Packaging
- Spaces
- Role Play, Experiences
- Video
- •



#### Prototypes

- Look like...
- Work like...
- Experience like .....

#### PROTOTYPE RAPID



(IDEO "surgical tool")

#### PROTOTYPE ROUGH



#### **Experience** Prototyping



Figure 4: Bodystorming layouts for an airplane interior.

Jane Fulton Suri - IDEO

#### Cardboard Computers: Mocking-it-up or Hands-on the Future

Pelle Ehn and Morten Kyng





From Greenbaum and Kyng, Design at Work 1991

A mock-up of a laser printer "reinventing" the old proof machine.

# Early Stage Prototypes

- Low Fidelity (Paper)
  - -Work with artifacts
- Skits / Informance
  - -Understand roles and context

Focus on concepts, not detail

Low investment in status quo

Openness to change

## Storyboards



### Paper Prototype

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http://www.mindspring.com/~bryce\_g/projects/lo\_fi.html

#### Low-Fidelity Prototype



http://bmrc.berkeley.edu/courseware/cs160/fall99/projects/t4/body/low-fi/









### Flipbook



### Flow Diagrams



From a previous cs147 project...

# Be Clever About Faking It

- Device Mockups
  - Palm, Utopia,..
- Device substitution
  - PC prototype for small device
  - Tethers for wireless
  - Pager for defibrillator

• Wizard of Oz techniques

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### Wizard of Oz

- Some aspects of interface are implemented
- Operation requires processing that is actually done by a human, not directly visible to the user
- The "wizard" intervention needs to be designed to be believable, both technologically and to the user

### Wizard of Oz for Multimedia Design (Oviatt)



## Fidelity is a Spectrum

- Medium fidelity
  - -Cleaned up but not decorated
  - -Wireframes, Blocks, Greeking,...

# Medium Fidelity Prototypes



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# High Fidelity Tools

- Web
  - FrontPage, GoLive, Dreamweaver,...
- Screen mockups
  - Illustrator, Photoshop, PowerPoint,....
- Clickthroughs
  - Flash, PowerPoint,...
- Graphic interface builders
  - Visual Basic, Visual C#, ...
  - Smalltalk, Lisp,...
  - Flash, Director,...
- Graphic toolkits
  - Java JFC/Swing, TCL/TK, Prefuse,...

## Breadth vs. Depth

- Horizontal Prototype
  - -Top level
  - -Basic features
- Vertical Prototype
  - -Path in depth
  - -Clickthrough or interactive
- Combinations

# Web prototypes (Van Duyne)

- Industrial strength methods
- Artifacts
  - -Site maps
  - -Storyboards
  - -Schematics