Quiz #2

• What is the purpose of Marissa’s Gravity Project?

• Write one tradeoff in usability engineering.

Projects

• Project Phase 1 reports due on Oct. 25
  – Phase 1: team formation & topic choice, understanding the problem
  – Deliverables for Phase 1:
    • Names of team members
    • Project topic
    • Description of the problem domain and functionalities that will be provided
    • What tools will be used for the project

Projects

• Submit a printed hard-copy of your report in class on October 25.
• If you or your teammates cannot attend the lecture, submit your report to your TA Ahmet Ketenci before class on October 25.
• Check the newsgroup for possible announcements related to the project.

Projects

• Additional material you can put in the report
  – Description of your potential users
    • Age, gender, physical and cognitive abilities, education, cultural or ethnic background, training, motivation, goals and personality
    • Skill level of your users: Novice or first-time users, knowledgeable users, or expert frequent users
  – Identification of the tasks
    • Users’ needs?
    • Observing and interviewing users
    • Decomposition of high level tasks
    • Relative task frequencies

– What type of interaction style will be employed?
  • Direct manipulation?
  • Menu selection?
  • Form fill-in?
  • Command language?
  • Natural language, speech?
  • Vision?
– Which tools (software/hardware) are you planning to use in your project?

Reading Assignment #3

• “LINC-ing” the Family: The Participatory Design of an Inkable Family Calendar by Neustaedter and Brush
• Appeared in CHI 2006
Prototyping techniques

Overview
• Prototyping and construction
• Conceptual design
• Physical design
• Tool support

Prototyping and construction
• What is a prototype?
• Why prototype?
• Different kinds of prototyping
  low fidelity
  high fidelity
• Compromises in prototyping
• Construction

What is a prototype?
In other design fields a prototype is a small-scale model:
  a miniature car
  a miniature building or town

What is a prototype?
In interaction design it can be (among other things):
  a series of screen sketches
  a storyboard, i.e. a cartoon-like series of scenes
  a Powerpoint slide show
  a video simulating the use of a system
  a lump of wood (e.g. PalmPilot)
  a cardboard mock-up
  a piece of software with limited functionality
  written in the target language or in another language

Why prototype?
• Evaluation and feedback are central to interaction design
• Users can see, hold, interact with a prototype more easily than a document or a drawing
• Team members can communicate effectively
• You can test out ideas for yourself
• Prototypes answer questions, and support designers in choosing between alternatives
What to prototype?

• Technical issues
• Work flow, task design
• Screen layouts and information display
• Difficult, controversial, critical areas

Prototyping Techniques

Low Fidelity
- Hand drawn mockups of some design ideas
- Focus on:
  - Brainstorming as many ideas as possible (discount usability)
  - Making it clear enough to be understandable
- But don’t focus on making it “pretty”
  - They are not computer generated images (don’t use drawing programs to generate them)
- May be used to elicit feedback from the user

Medium Fidelity
- Control panel for pump 2
- Coolant flow 45%
- Retardant 20%
- Speed 100%
- Shut Down

High Fidelity

Types Of Low Fidelity Prototypes

• Sketches
• Storyboards
• Pictive

Low Fidelity Prototypes

• Sketches:
  - A drawing of the high-level appearance of the intended system
  - The crudity of the prototype means people concentrate on high level concepts
  - It may be hard to envision the progression of a dialog
  - Don’t be inhibited about drawing ability. Practice simple symbols

Sketches

Screen 1: Initial order screen
Low Fidelity Prototypes

• Storyboarding
  - It's a series of key frames
  - Originally from film; used to get the idea of a scene
  - Snapshots of the interface at particular points in the interaction
  - For interfaces it allows users to quickly evaluate the direction of the design

Storyboards

• Often used with scenarios, bringing more detail, and a chance to role play

• It is a series of sketches showing how a user might progress through a task using the device

• Used early in design
Storyboarding

Initial order screen

Storyboarding (2)

User orders an "Ecstatic Burger"

Storyboarding (3)

Order is placed

Storyboarding (4)

Payment screen comes up

Storyboarding (5)

User pays with cash

Storyboarding (6)

Order confirmation screen comes up
Storyboarding (7)

Order is placed

Storyboarding (8)

Order confirmation is shown

Storyboarding: Alternate Path

Initial order screen

Storyboarding: Alternate Path

User orders a "Basic Merry Burger"

Storyboarding: Alternate Path

User orders "Smirking small fries"

Storyboarding: Alternate Path

User orders a "Giggle sized pop"
Storyboarding: Alternate Path

(5) Order is placed

(6) Payment screen comes up

(7) User pays by debit

(8) Order confirmation screen comes up

(9) Order is placed

(10) Order confirmation is shown
Low Fidelity Prototypes

• Pictive
  – “Plastic interface for collaborative technology initiatives through video exploration”
  – Key points:
    • Design consists of multiple layers of sticky notes and plastic overlays
    • Interaction is demonstrated by manipulating notes
  – Session is videotaped for later analysis
    • Usually end up with mess of paper and plastic!
    • “How does it work again?”

Medium Fidelity Prototypes

• Many different types
  – Range from simple computer draw images to partially working systems
• They may take longer to generate and change than simple low fidelity representations
• Benefits
  – It seems more like the completed system so it provides a clearer idea of how it works
  – May be used to elicit feedback from the user when low-fidelity approaches cannot be used
  – Depending upon the type of medium fidelity prototype it may allow for some user testing.
• Pitfalls
  – User’s reactions are usually “in the small”
    • Blinds people to major representational flaws
  – Users reluctant to challenge / change the design itself
    • Designs are too “pretty”, egos…
  – Management may think its real!

Medium Fidelity Prototypes

• Tutorials and manuals
  – Write them in advance of the system
  – What are they?
    • Tutorial for step by step description of an interaction
    – an interface "walk-through" with directions
    • Manual for reference of key concepts
    – in-depth technical description of the different parts of the system
  – If highly visual, then storyboard is set within textual explanations
  – Does this work?
    • People often read manuals of competing products to check:
      – interface, functionality, match to task
    • Acts as a design tool
Medium Fidelity Prototypes

- Approaches to limiting prototype functionality
  - Vertical prototypes
    - Includes in-depth functionality for only a few selected features
  - Horizontal prototypes
    - Surface layers includes the entire user interface with no underlying functionality
    - A simulation; no real work can be performed
  - Scenario
    - Scripts of particular fixed uses of the system; no deviation allowed
Medium Fidelity Prototypes

- Approaches to integrating prototypes and the final product:
  - Throw-away
  - Incremental
  - Evolutionary

**Throw-Away Approach To Prototyping**
- The prototype only is used to get feedback
- The prototype is built, tested and then discarded

**Incremental Approach To Prototyping**
- Build the system as separate modules (component)
- Each module is designed, prototyped and completed separately before being added to the final system

**Evolutionary Approach To Prototyping**
- Change the prototype itself in order to incorporate changes
- Eventually the reworked prototype becomes the final system

Medium Fidelity Prototypes

- Scripted simulations and slide shows
  - Encode the storyboard on the computer
  - Scene transition activated by simple user inputs
  - A simple horizontal and vertical prototype
- User given a very tight script/task to follow
  - Appears to behave as a real system
  - Deviations from the script blows the simulation

Medium Fidelity Prototypes

- Painting/drawing packages
  - Draw each storyboard scene on computer
  - Neater/easier (?) to change on the fly than paper

Medium Fidelity Prototypes

- Control panel for pump 2
  - Coolant flow 45%
  - Retardant 20%
  - Speed 100%

Medium Fidelity Prototypes

- Control panel for pump 2
  - Coolant flow 0%
  - Retardant 20%
  - Speed 100%

Medium Fidelity Prototypes

- System

Medium Fidelity Prototypes

- System

Medium Fidelity Prototypes

- System
Medium Fidelity Prototypes

- Interface builders
  - Tools for letting a designer lay out the common widgets
  - Construct mode
    - Change attributes of objects
  - Test mode:
    - Objects behave as they would under real situations
    - Excellent for showing look and feel
      - A broader horizontal prototype
      - But constrained to widget library
  - Vertical functionality added selectively
    - Through programming
The Wizard Of OZ: The Movie

Wizard Of Oz: The Prototyping Technique

- A method of testing a system that does not exist
  - Human simulates the system's intelligence and interacts with user
  - e.g., the voice editor, by IBM (1984)

The Prototyping Process

- Early designs
  - Brainstorm different representations
  - Choose a representation
  - Rough out interface style
  - Task centered walkthrough and redesign
  - Fine tune interface, screen design
  - Heuristic evaluation and redesign
  - Usability testing and redesign
  - Limited field testing
  - Alpha/Beta tests
  - Low fidelity paper prototypes

- Medium fidelity prototypes
  - Fine tuned prototypes

- High fidelity prototypes / restricted systems
  - Working systems
  - Full functional systems

High-fidelity prototyping

- Uses materials that you would expect to be in the final product.
- Prototype looks more like the final system than a low-fidelity version.
- For a high-fidelity software prototype common environments include Macromedia Director, Visual Basic, and Smalltalk.
- Danger that users think they have a full system

Compromises in prototyping

- All prototypes involve compromises
- For software-based prototyping maybe there is a slow response? sketchy icons? limited functionality?
- Two common types of compromise
  - ‘horizontal’: provide a wide range of functions, but with little detail
  - ‘vertical’: provide a lot of detail for only a few functions
- Compromises in prototypes mustn’t be ignored. Product needs engineering

Wizard Of Oz: Examples

- IBM: an imperfect listening typewriter using continuous speech recognition
  - Secretary trained to:
    - Understand key words as “commands”
    - Types responses on screen as the system would
    - Manipulating graphic images through gesture and speech

- Intelligent Agents / Programming by demonstration
  - Person trained to mimic “learning agent”
    - User provides examples of task they are trying to do
    - Computer learns from them
  - Shows how people specify their tasks

What the user sees

What the user sees

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**Conceptual design: from requirements to design**

- Transform user requirements/needs into a conceptual model
- "a description of the proposed system in terms of a set of integrated ideas and concepts about what it should do, behave and look like, that will be understandable by the users in the manner intended"
- Don’t move to a solution too quickly. Iterate, iterate, iterate
- Consider alternatives: prototyping helps

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**Three perspectives for a conceptual model**

- Which interaction mode?
  - How the user invokes actions
  - Activity-based: instructing, conversing, manipulating and navigating, exploring and browsing.
  - Object-based: structured around real-world objects

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**Expanding the conceptual model**

- What functions will the product perform?
  - What will the product do and what will the human do (task allocation)?
- How are the functions related to each other?
  - Sequential or parallel?
  - Categorisations, e.g. all actions related to telephone memory storage
- What information needs to be available?
  - What data is required to perform the task?
  - How is this data to be transformed by the system?

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**Using scenarios in conceptual design**

- Express proposed or imagined situations
- Used throughout design in various ways
  - Scripts for user evaluation of prototypes
  - Concrete examples of tasks as a means of co-operation across professional boundaries
- Plus and minus scenarios to explore extreme cases

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**Using prototypes in conceptual design**

- Allow evaluation of emerging ideas
- Low-fidelity prototypes used early on, high-fidelity prototypes used later
**Screen design**

Two aspects:
- How to split across screens moving around within and between screens
  - how much interaction per screen? serial or workbench style?
- Individual screen design
  - white space: balance between enough information/interaction and clarity
  - grouping items together: separation with boxes? lines? colors?

**Screen design: splitting functions across screens**

- Task analysis as a starting point
- Each screen contains a single simple step?
- Frustration if too many simple screens
- Keep information available: multiple screens open at once

**Screen design: individual screen design**

- Draw user attention to salient point, e.g. colour, motion, boxing
- Animation is very powerful but can be distracting
- Good organization helps: grouping, physical proximity
- Trade off between sparse population and overcrowding

**Information display**

- Relevant information available at all times
- Different types of information imply different kinds of display
- Consistency between paper display and screen data entry

**Summary**

- Different kinds of prototyping are used for different purposes and at different stages
- Prototypes answer questions, so prototype appropriately
- Construction: the final product must be engineered appropriately
- Conceptual design (the first step of design)
- Physical design: e.g. menus, icons, screen design, information display
- Prototypes and scenarios are used throughout design