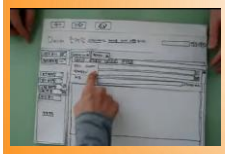
Prototyping



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Low fidelity prototypes

- Why?
  - Get feedback earlier, cheaper
  - Obtain users feedback concerning general aspects
  - Easy to modify and throw away even during user tests
  - Valuable to test the UI conceptual model

2

Low fidelity prototypes

- Specifically adequate to get feedback concerning
  - Concepts and terminology
  - Navigation
  - Contents
  - Functionality

3

Low fidelity prototypes

- It does not need to have much detail, nor to be very realistic, e.g.:
  - Text may be replaced by some lines
  - Images may be replaced by words
  - In general no colour is needed
  - Sizes of windows, fonts, etc. don't need to be final

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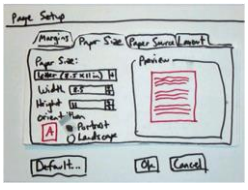
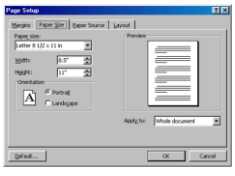
Comparing Fidelity of Look & Feel





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Paper Prototype

- Interactive paper mockup
  - Sketches of screen appearance
  - Paper pieces show windows, menus, dialog boxes
- Interaction is natural
  - Pointing with a finger = mouse click
  - Writing = typing
- A person simulates the computer's operation
  - Putting down & picking up pieces
  - Writing responses on the "screen"
  - Describing effects that are hard to show on paper
- Low fidelity in look & feel
- High fidelity in depth (person simulates the backend)

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Why Paper Prototyping?

- Faster to build
  - Sketching is faster than programming
- Easier to change
  - Easy to make changes between user tests, or even *during* a user test
  - No code investment– everything will be thrown away (except the design)
- Focuses attention on big picture
  - Designer does not waste time on details
  - Customer makes more creative suggestions
- Nonprogrammers can help
  - Only simple skills are required

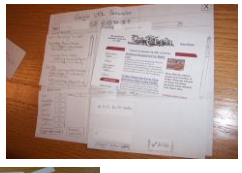
Tools for Paper Prototyping

- White poster board
  - For background, window frame
- Big (unlined) index cards
  - For menus, window contents, and dialog boxes
- Restickable glue
  - For keeping pieces fixed
- Post Its
  - For text fields, checkboxes, short messages
- Overhead transparencies
  - For highlighting, user "typing"
- Photocopier
  - For making multiple blanks
- Pens & markers, scissors, tape

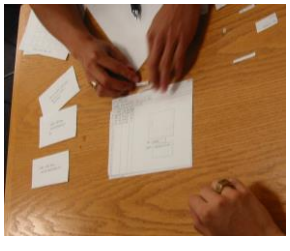
Tips for Good Paper Prototypes

- Make it larger than life
- Make it monochrome
- Replace tricky visual feedback with audible descriptions
  - Tooltips, drag & drop, animation, progress bar
- Keep pieces organized
  - Use folders & open envelopes

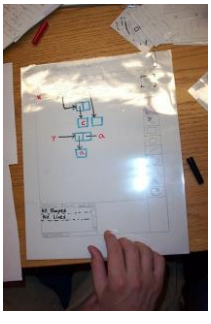
Hand-Drawn or Not?



Size Matters



Post-it Glue and Transparencies are Good



Low-Fidelity Prototypes Aren't Always Paper

http://www.designinginteractions.com/interviews/JeffHawkins

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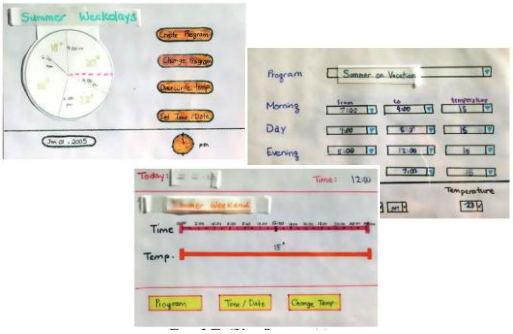
Multiple Alternatives Generate Better Feedback



"Getting the Right Design and the Design Right: Testing Many Is Better Than One." *CHI 2006.*

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How to prepare and use a paper prototype

- Draft the conceptual model
- Draw the screens, menus, dialog-boxes, messages etc. needed
- Prepare the test protocol
- Perform the user tests (see next slide)
- When needed change the prototype

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How to prepare and use a paper prototype

- Perform the user tests – 3 Roles
  - Computer
    - Simulates system
    - No additional feedback from computer
  - Facilitator
    - Presents interface and tasks to the user
    - Encourages user to "think aloud" by asking questions
    - Keeps user test from getting off track
  - Observer
    - Don't talk
    - Takes copious notes

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What You Can Learn from a Paper Prototype

- Conceptual model
  - Do users understand it?
- Functionality
  - Does it do what's needed? Missing features?
- Navigation & task flow
  - Can users find their way around?
  - Are information preconditions met?
- Terminology
  - Do users understand labels?
- Screen contents
  - What needs to go on the screen?

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What You Can't Learn

- Look: color, font, whitespace, etc
- Feel: efficiency issues
- Response time
- Are small changes noticed?
  - Even the tiniest change to a paper prototype is clearly visible to user
- Exploration vs. deliberation
  - Users are more deliberate with a paper prototype; they don't explore or thrash as much

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Change blindness

Example of change blindness
(Spence, 2007)

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Change blindness

Example of change blindness
(Spence, 2007)

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Change blindness example (Spence, 2007)

- Inattentional blindness (monkey business)
https://www.youtube.com/watch?v=IGQmdoK_ZfY
- Change blindness (Person swap)
http://www.youtube.com/watch?v=vBPG_OBgTWg&feature=related

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Change blindness

Example of change blindness
(Spence, 2007)

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Change blindness

Example of change blindness
(Spence, 2007)

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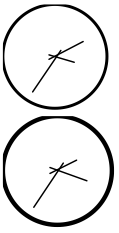
Change blindness example

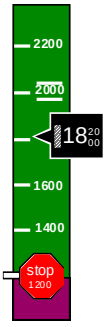
- A single number can be difficult to represent ensuring a user is made aware of it

Example: the altimeter
(Spence, 2007)

The original aircraft altimeter, responsible for many accidents



Two altimeter representations easily assumed to be the same due to change blindness



The modern aircraft altimeter,

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What You Can't Learn

- Look: color, font, whitespace, etc
- Feel: efficiency issues
- Response time
- Are small changes noticed?
  - Even the tiniest change to a paper prototype is clearly visible to user
- Exploration vs. deliberation
  - Users are more deliberate with a paper prototype; they don't explore or thrash as much

Several studies have shown that low-fidelity prototypes identify substantially the same usability problems as high-fidelity prototypes

Computer Prototype

- Interactive software simulation
- High-fidelity in look & feel
- Low-fidelity in depth
  - Paper prototype had a human simulating the backend; computer prototype doesn't
  - Computer prototype may be **horizontal**: covers most features, but no backend

What You Can Learn From Computer Prototypes

- Everything you learn from a paper prototype, plus:
- Screen layout
  - Is it clear, overwhelming, distracting, complicated?
  - Can users find important elements?
- Colors, fonts, icons, other elements
  - Well-chosen?
- Interactive feedback
  - Do users notice & respond to status bar messages, cursor changes, other feedback
- Efficiency issues
  - Controls big enough? Too close together? Scrolling list is too long?

Why Use Prototyping Tools?

- Faster than coding
- No debugging
- Easier to change or throw away
- Don't let your UI toolkit do your graphic design

Computer Prototyping Techniques

- Storyboard
  - Sequence of painted screenshots
  - Sometimes connected by hyperlinks ("hotspots")
- Form builder
  - Real windows assembled from a palette of widgets (buttons, text fields, labels, etc.)
- Wizard of Oz
  - Computer frontend, human backend

Storyboarding Tools

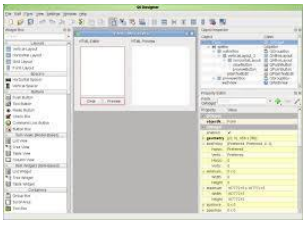
- Photoshop
- Balsamiq
- Pencil
- Mockingbird
- Proto IO
- Excel
- …

Pros & Cons of Storyboarding

- Pros
  - You can draw anything
- Cons
  - No text entry
  - Widgets aren't active
  - "Hunt for the hotspot"
    - Often useless for user testing
    - Better evaluated with other technique such as Heuristic Evaluation

Form Builders

- Silverlight
- Visual Studio
- Mac Interface Builder
- Qt Designer
- Android Studio
- …



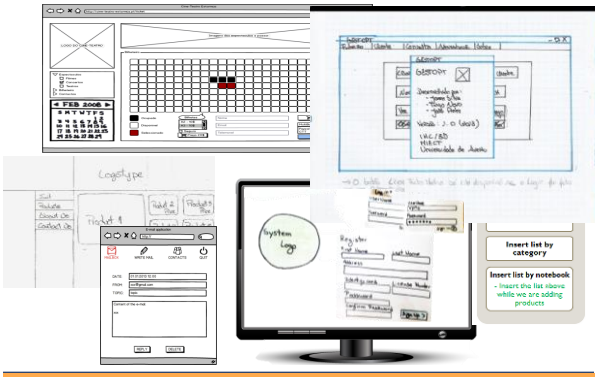
Pros & Cons of Form Builders

- Pros
  - Actual controls, not just pictures of them
  - Can hook in some backend if you need it
    - But then you won't want to throw it away
- Cons
  - **Limits** thinking to standard widgets
  - Less helpful for rich graphical interfaces

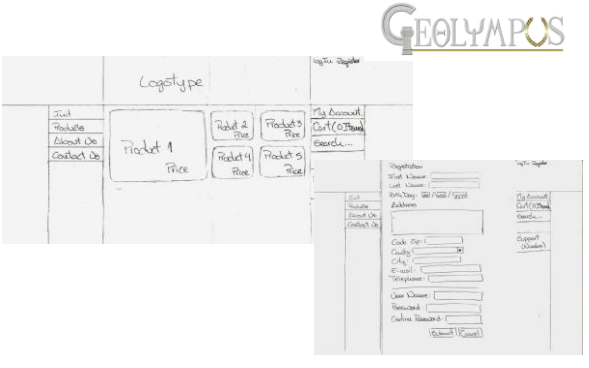
Wizard of Oz Prototype

- Software simulation with a human in the loop to help
- "Wizard of Oz" = "man behind the curtain"
  - Wizard is usually but not always hidden
- Often used to simulate future technology
  - Speech recognition
  - Learning
- Issues
  - Two UIs to worry about: user's and wizard's

May be more or less "sophisticated"



Example: "on-line shop"



Example: "E-Doctor"

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Example: "E-Doctor"

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Example: "My shop" app

- Participant #1
  - Insert "Previous" and "Next" buttons
- Participant #2
  - Scroll and swap options
  - Prev and Next should be arrows

Search Localization	Shopping List	Shopping Map
New localization - Change name "Mark" to "Supermarket Name" - Change order of "City" and "Supermarket"	**Recent lists**	**Interact with map** - Insert button "Next produt"
Recent localizations	**Insert list by category**	**Modify list**
Localization by GPS	**Insert list by notebook** - Insert the list above while we are adding products	

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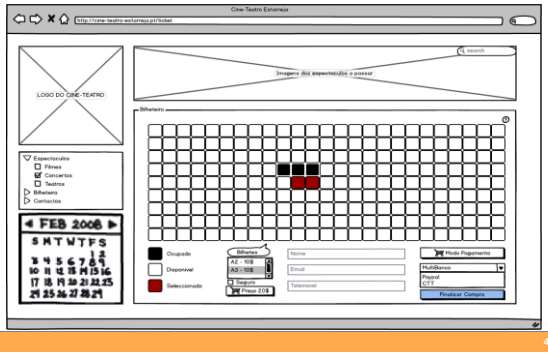
Example: a "ticketline" prototype



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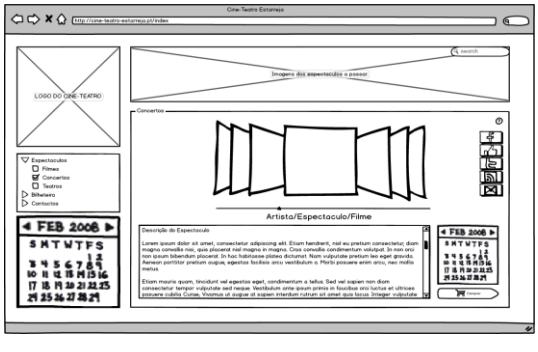
Example: a "ticketline" prototype



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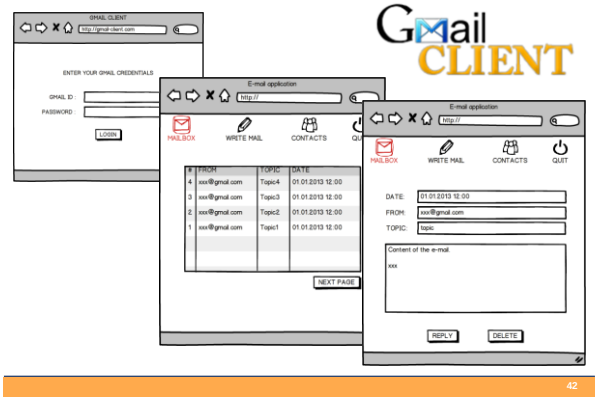
Example: "email client"



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Example: DETImt

- The results for “check which brand is the most popular” had horrible results. People weren’t able to find the dashboard button which was at the top-right of the application window. Also, users commented that “dashboard” is not an obvious name for that.

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Even for less conventional applications

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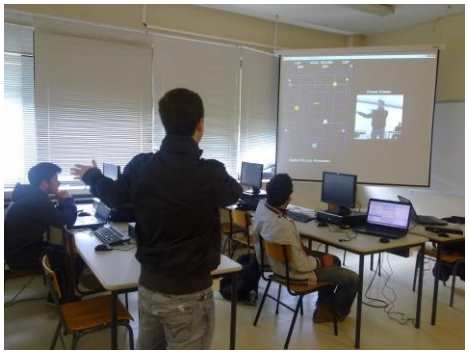
Example: gesture controlled “Pac-Man”



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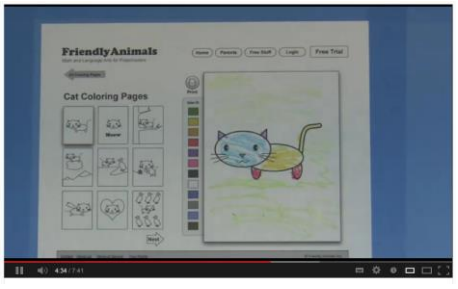

“Performing a usability test early in your website planning process can have huge returns - a paper prototype allows you to do this with a minimal time investment”
http://www.youtube.com/watch?v=9wQkLthhHKA

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Summary

- Prototype fidelity
  - Depth, breadth, look, feel
- Kinds of prototypes
  - Paper
  - Computer: storyboard, forms
  - Wizard of Oz
- Don’t get attached to a prototype
  - Because it may need to be thrown away

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Useful links

- https://www.userfocus.co.uk/articles/paperprototyping.html
- http://www.dreamscapedesign.co.uk/user-interface-design-the-use-of-paper-prototypes/
- https://balsamiq.com/
- https://prottapp.com/
- http://web.mit.edu/6.813/www/sp16/

- Acknowledgment

To all students who have used paper prototyping in previous editions of the Human-Computer interaction course and colleagues who supervised them

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