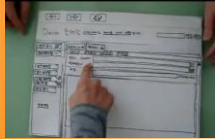


Prototyping



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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

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Low fidelity prototypes



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

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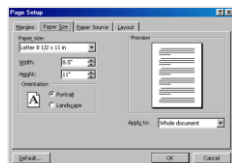
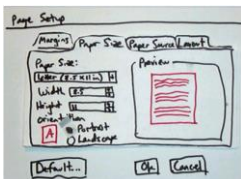
Low fidelity prototypes



- 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

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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

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Tips for Good Paper Prototypes

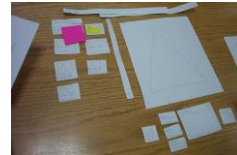


- Make it larger than life
- Make it monochrome
- Replace tricky visual feedback with audible descriptions
 - Tooltips, drag & drop, animation, progress bar
- Keep pieces organized
 - Use folders & open envelopes

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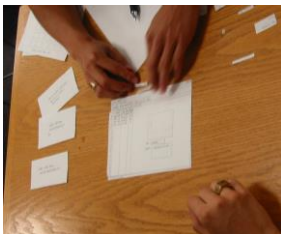
Hand-Drawn or Not?



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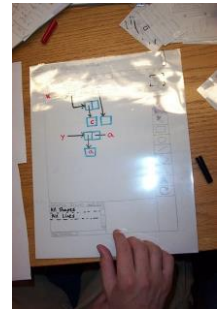
Size Matters



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Post-it Glue and Transparencies are Good



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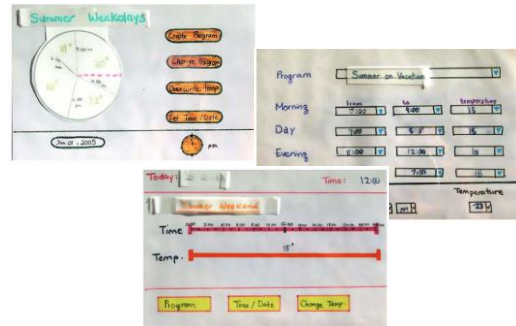
Low-Fidelity Prototypes Aren't Always Paper



<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)



- Inattention blindness (monkey business)

https://www.youtube.com/watch?v=lGQmdoK_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

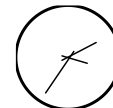


- A **single number** can be difficult to represent ensuring a user is made aware of it

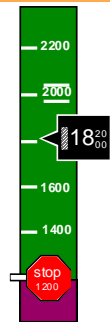
Example: the altimeter
(Spence, 2007)



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

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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

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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?

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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

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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

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Storyboarding Tools



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



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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

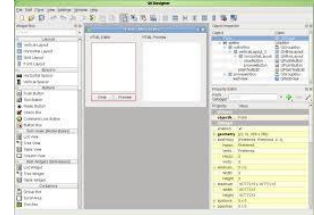
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Form Builders



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



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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

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Wizard of Oz Prototype



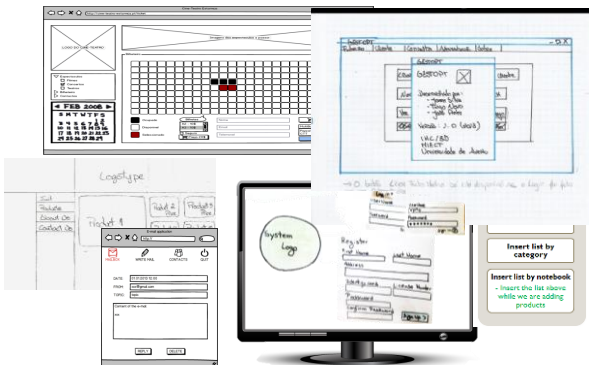
- Software simulation with a human in the loop to help
- "Wizard of Oz" = "man behind the curtain"
 - Wizard is usually but not always hidden
- Often used to simulate future technology
 - Speech recognition
 - Learning
- Issues
 - Two UIs to worry about: user's and wizard's



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May be more or less "sophisticated"



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Example: "on-line shop"



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Example: "E-Doctor"

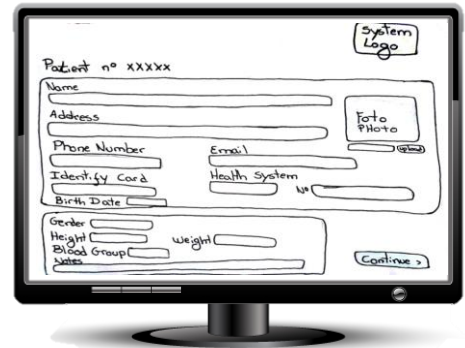


e-DOCTOR

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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

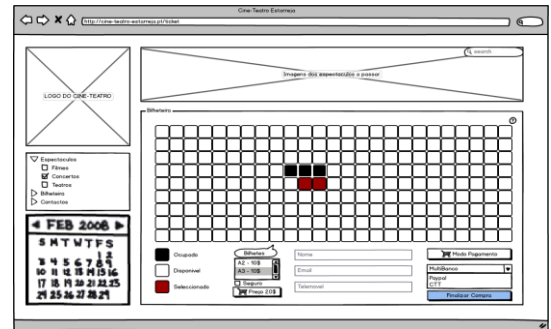


Search Localization	Shopping List	Shopping Map
New localization - Change name "Mark" to "Supermarket Name" - Change order of "City" and "Supermarket" Recent localizations Localization by GPS	Recent lists Insert list by category Insert list by notebook - Insert the list above while we are adding products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

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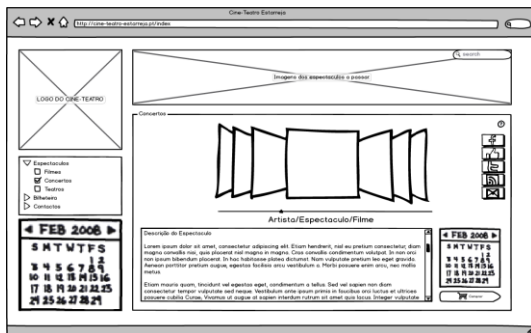
Example: a "ticketline" prototype



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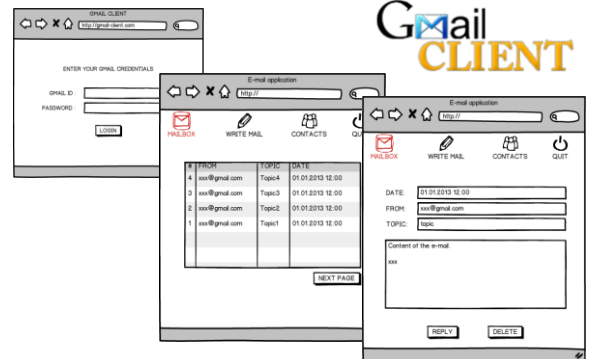
Example: a "ticketline" prototype



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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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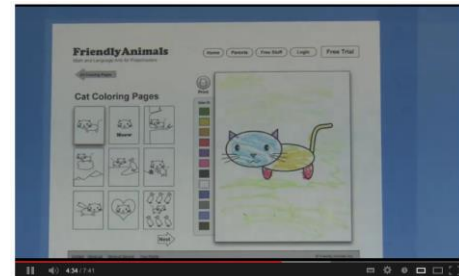
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Example: gesture controlled “Pac-Man”



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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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