Prototyping

Today

- Questions?

- D3.js tutorial on Thursday
- No classes next week

Prototypes

- The use of **simplified** and **incomplete** models of a design
  - Explore ideas
  - Elaborate requirements
  - Refine specifications
  - Test functionality

- Help designers
  - Get to know real-world design requirements
  - Visualize, evaluate, learn, and improve design specifications

Prototypes

- Why prototypes?
  - Design by designers OR design with users
  - Early usability testing

- Prototype types
  - Low-tech prototypes are inexpensive, so you can do more of them
  - Pay less now or more later
  - More ideas => good ideas

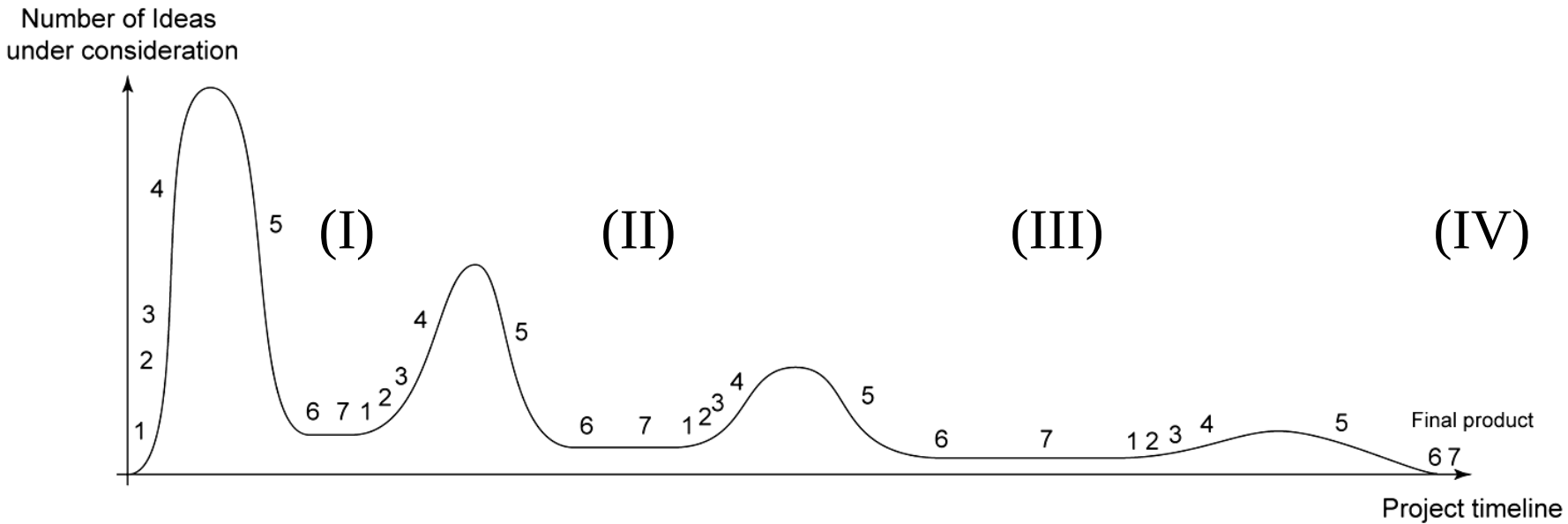
- Studies have shown low-fidelity (“LoFi”) prototypes help find as many usability issues as high-fidelity (“HiFi”) ones. **[Virzi et al., 1996]**

Idea Selection

- Define each idea's importance
  - Think about reality
  - User preference and target user population
  - Available hardware
  - Available software
  - Cost
  - Window to market
  - …
- Rank ideas according to the your criteria
- Pick the tops 1-5
  - Depend on resources and stage of the project

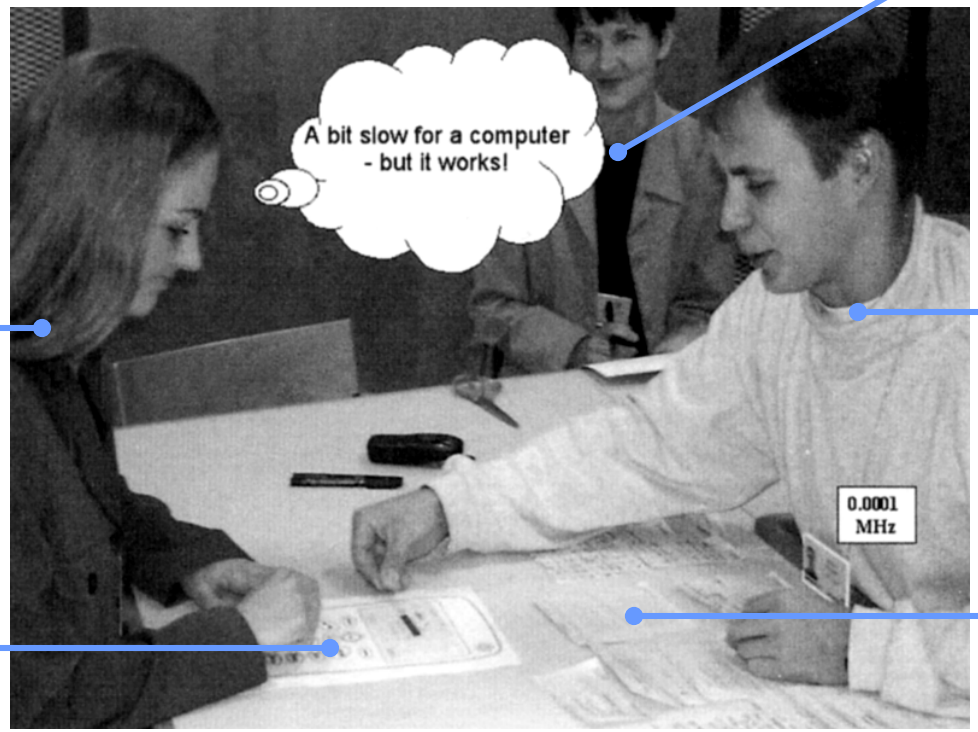
Prototyping Methods

- Depending on the phase of the project
  - Rapid low-fi implementation (I)
    - Walk-throughs and paper based interface
  - Rapid prototyping (II)
    - *Director*, *Flash*
    - Simulation of the interface and Wizard of Oz approaches
  - Toolkit based implementation (III)
    - *Larger and larger group of users using the real interface*
  - Full implementation (IV)



Low fidelity prototypes

- Paper/plastic based interface simulation
  - Using sketches, foamcore, transparency, and PICTIVE*
- Mode of operation

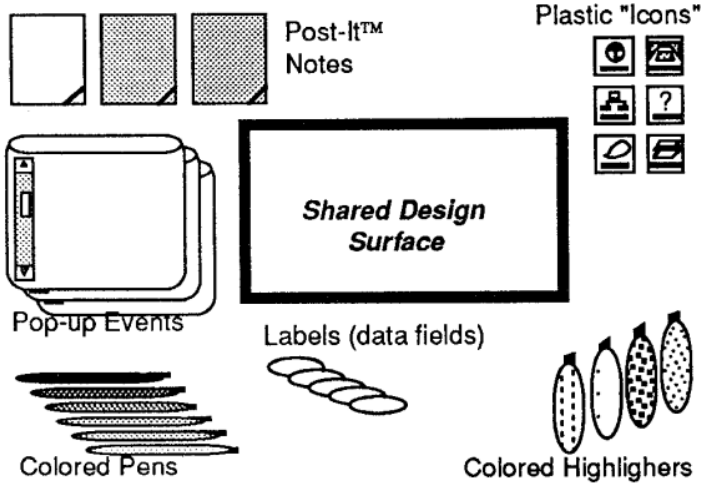


Paper prototyping (Carolyn Snyder)

*Plastic Interface for Collaborative Technology Initiatives through Video Exploration" Muller, CHI 91

Low fidelity tools

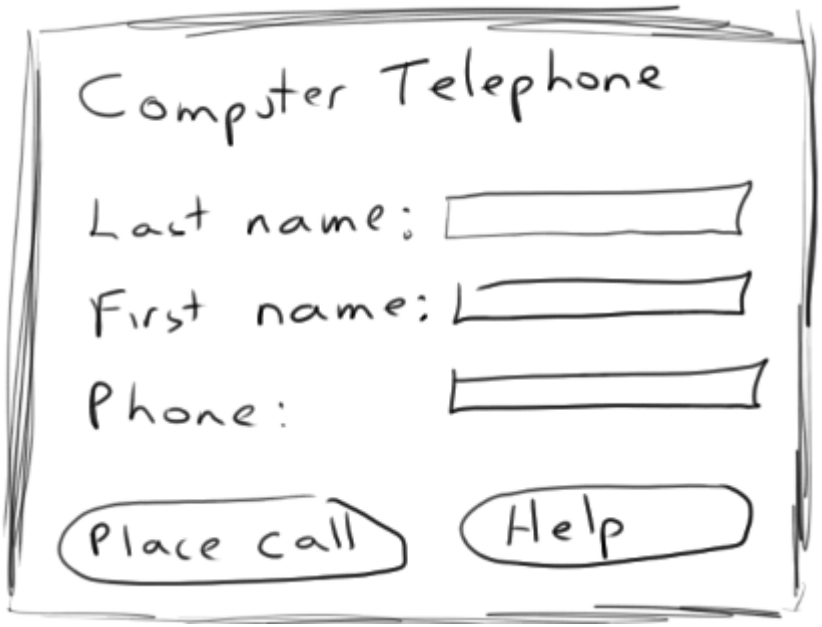
- PICTIVE: experimental participatory design technique that is intended to enhance user participation in the design process
  - low-tech objects
  - high-tech video

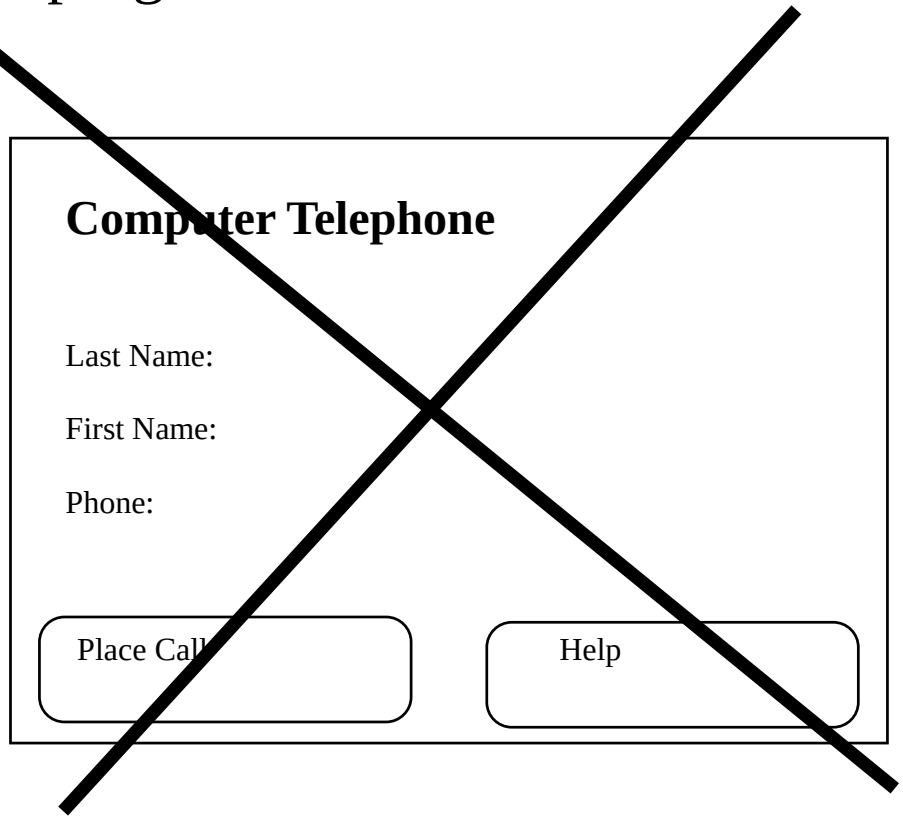


Michael J. Muller. 1991. PICTIVE\—an exploration in participatory design. In Proceedings of the SIGCHI conference on Human factors in computing systems: Reaching through technology (CHI '91), Scott P. Robertson, Gary M. Olson, and Judith S. Olson (Eds.). ACM, New York, NY, USA, 225-231. DOI=10.1145/108844.108896 http://doi.acm.org/10.1145/108844.108896

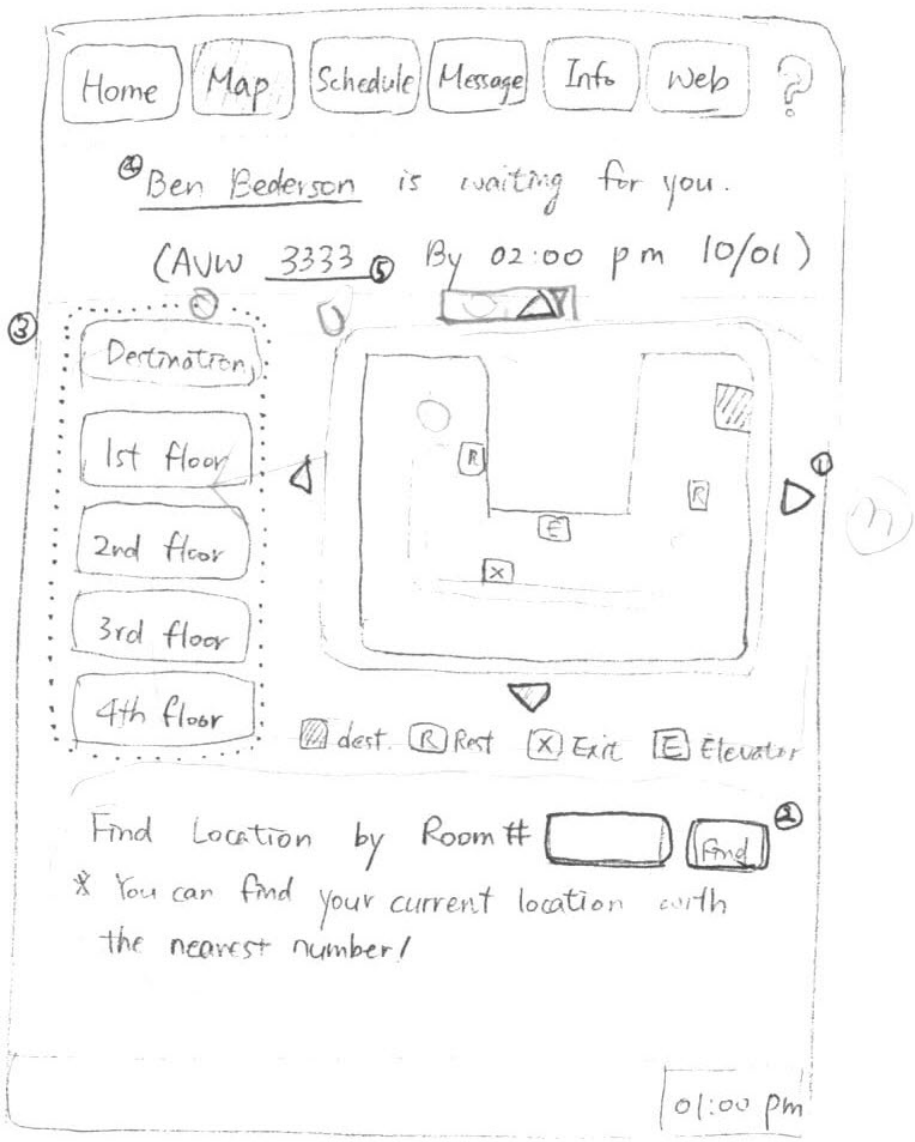
Sketches

- invention through sketching
- drawing of the outward appearance of the intended system
- **crudity** means people concentrate on **high level** concepts
- but hard to envision a dialog's progression





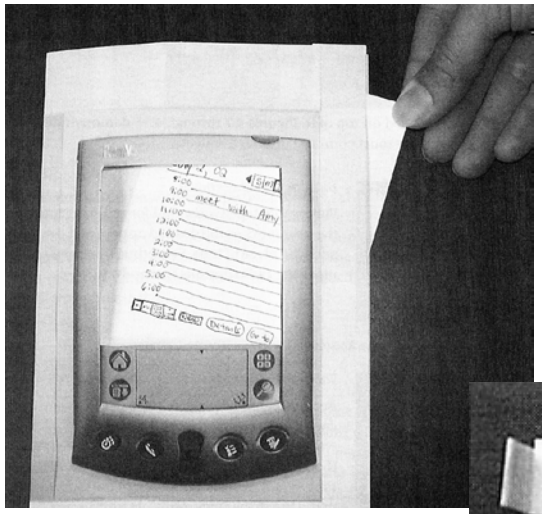
Map Screen

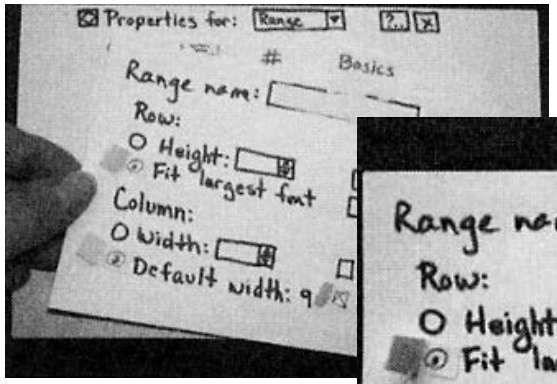

Home
Map
Schedule
Message
Info
Web
Ben Bederson is waiting for you.
(AVW 3333 By 02:00 pm 10/01)
Destination
1st floor
2nd floor
3rd floor
4th floor
dest. R Rest X Exit E Elevator
Find Location by Room #
Find
* You can find your current location with the nearest number!
01:00 pm

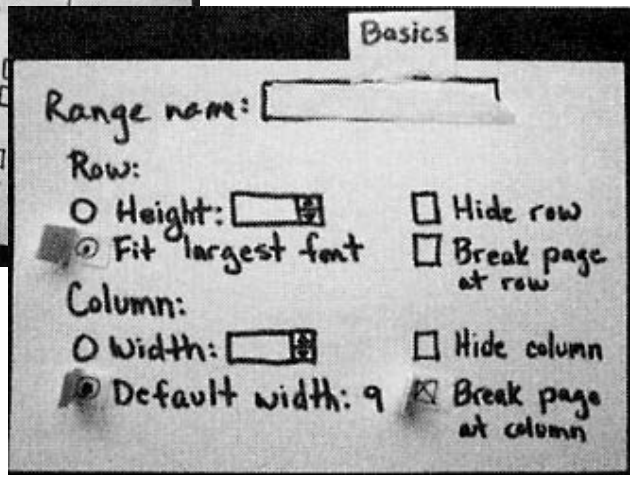
Low fidelity prototypes (summary)

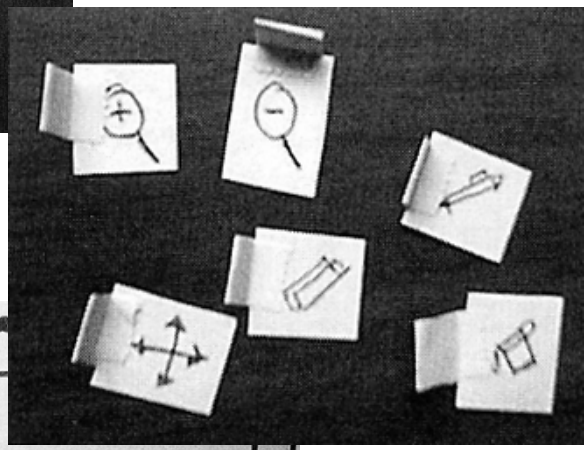
- Inexpensive
- High level feedback about the dynamic of the interface
- Trigger users reactions
  - Debrief (or listen to) users
- Might be inaccurate
  - Speed, human-human interferences…

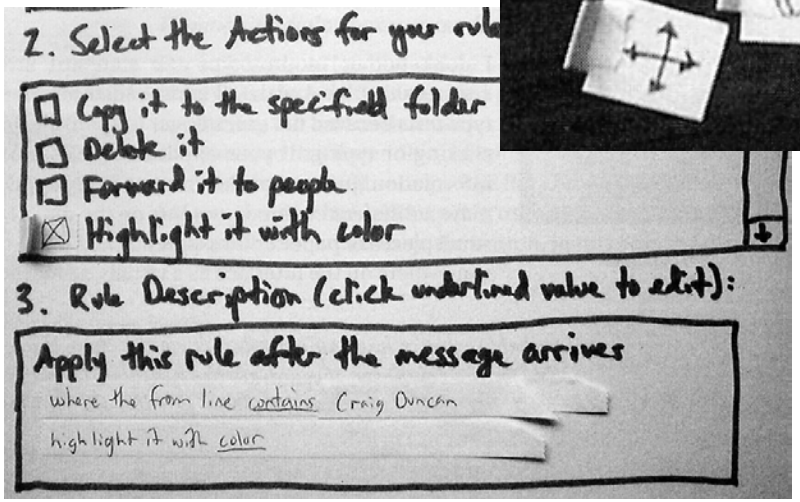
Low fidelity interface elements

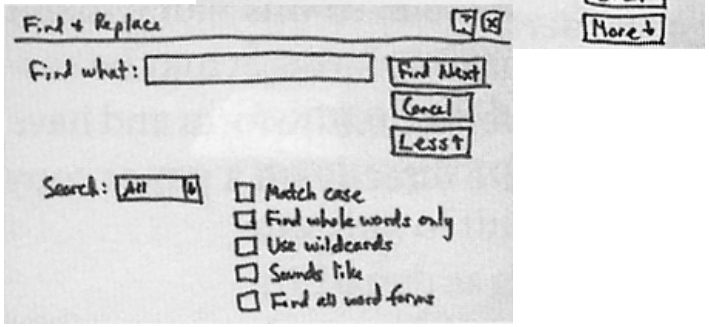




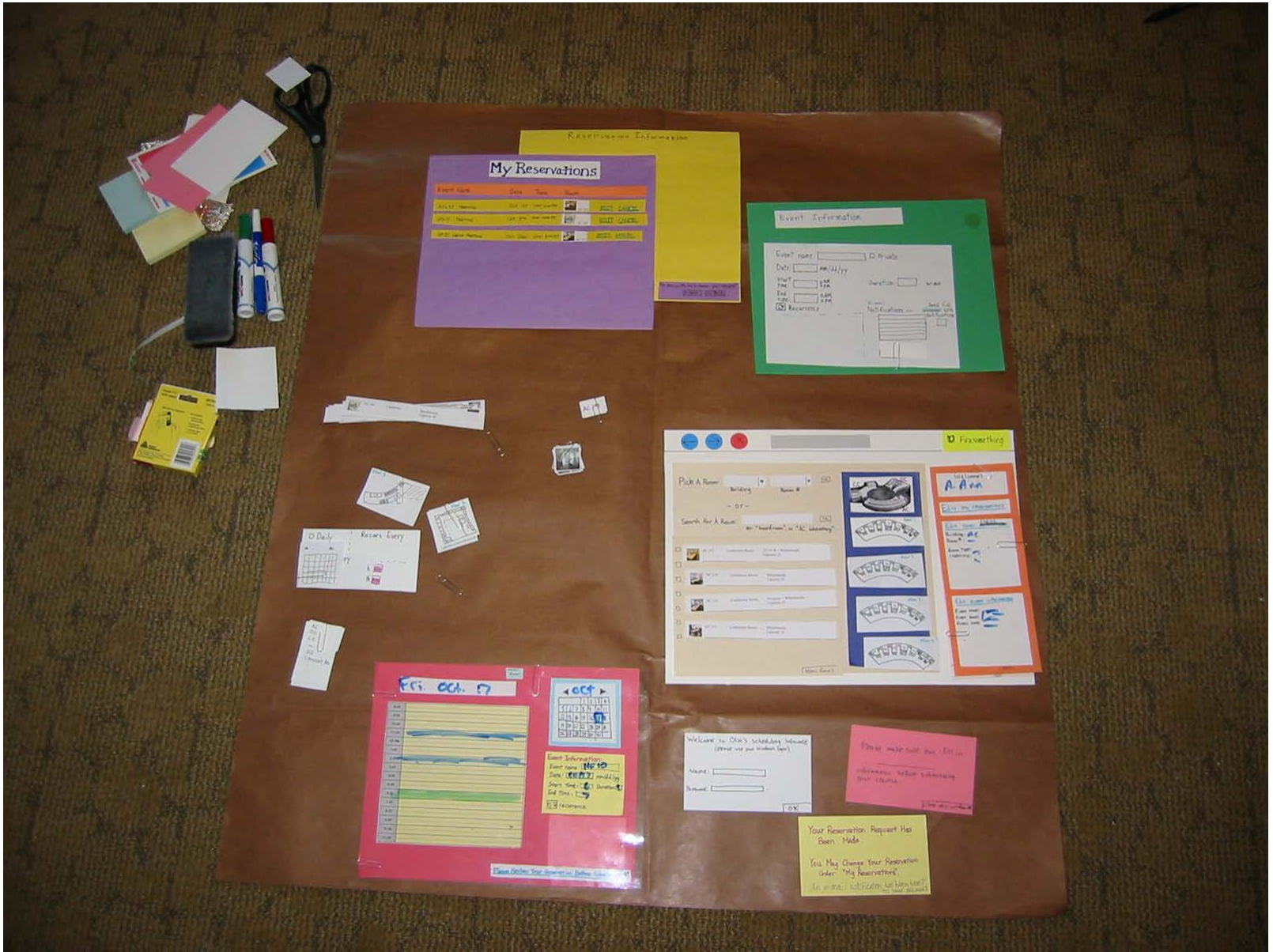






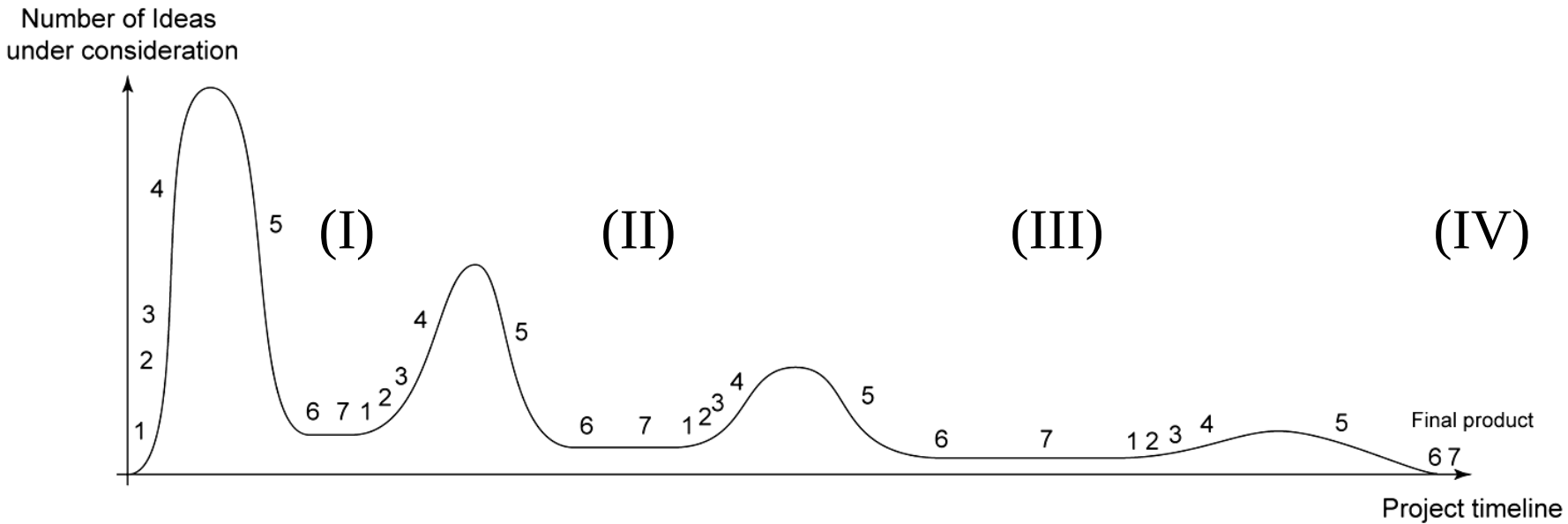


Example


My Reservations
Event Information
Pick A Room:
Fri. Oct.
oct
Your Reservation Request Has Been Made.

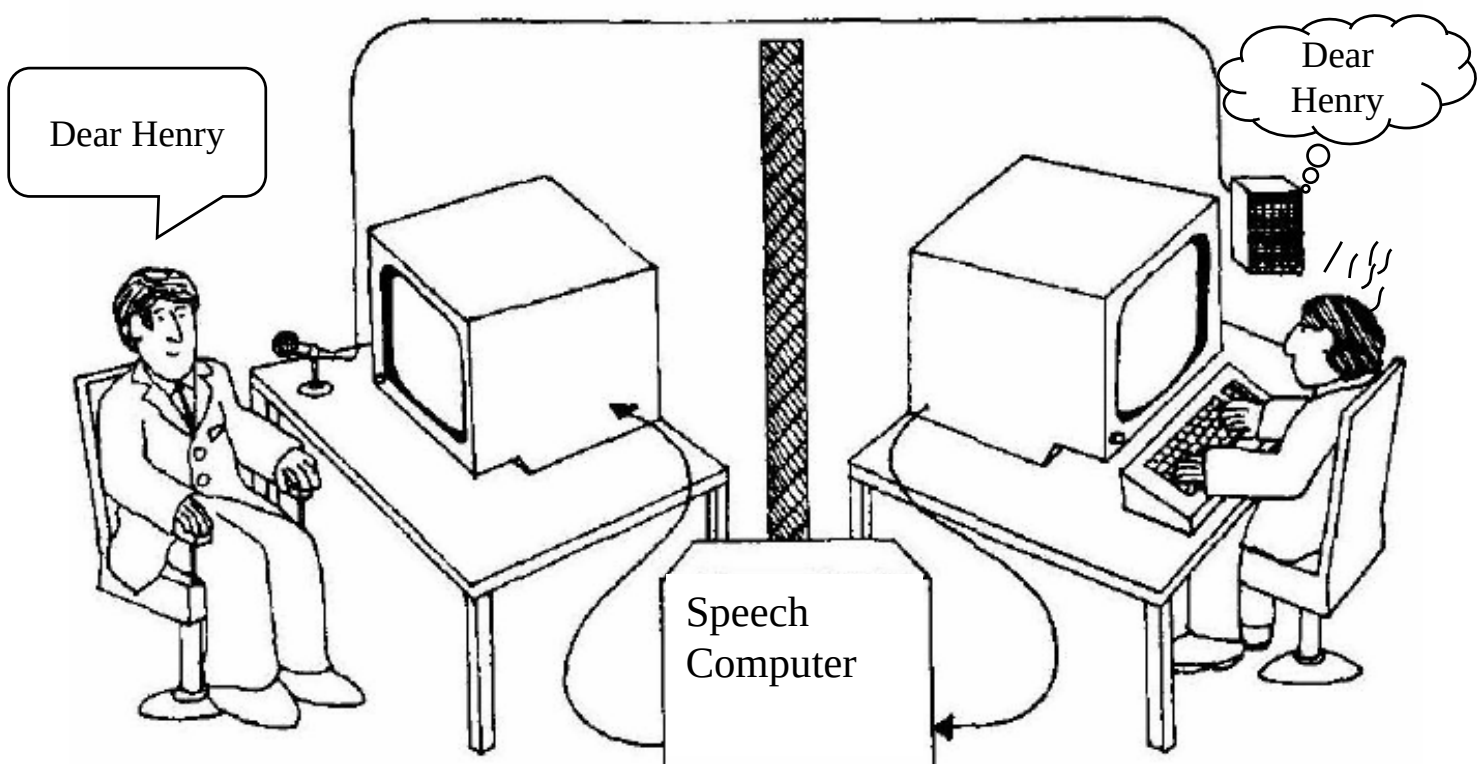
Wizard of Oz (I, II, III)

- Testing a system that does not exist
  - Voice recognition, face identification, handwriting recognition
- Mode of operation
  - Users use the interface as intended
  - A wizard (sometime hidden) responds to users behavior
    - *Follow an algorithm*
    - *Reproduce the expected capability of the system*
  - Example: an shopping cart assistant (in IDEO video)



Wizard of Oz Example

- the listening typewriter, IBM 1984

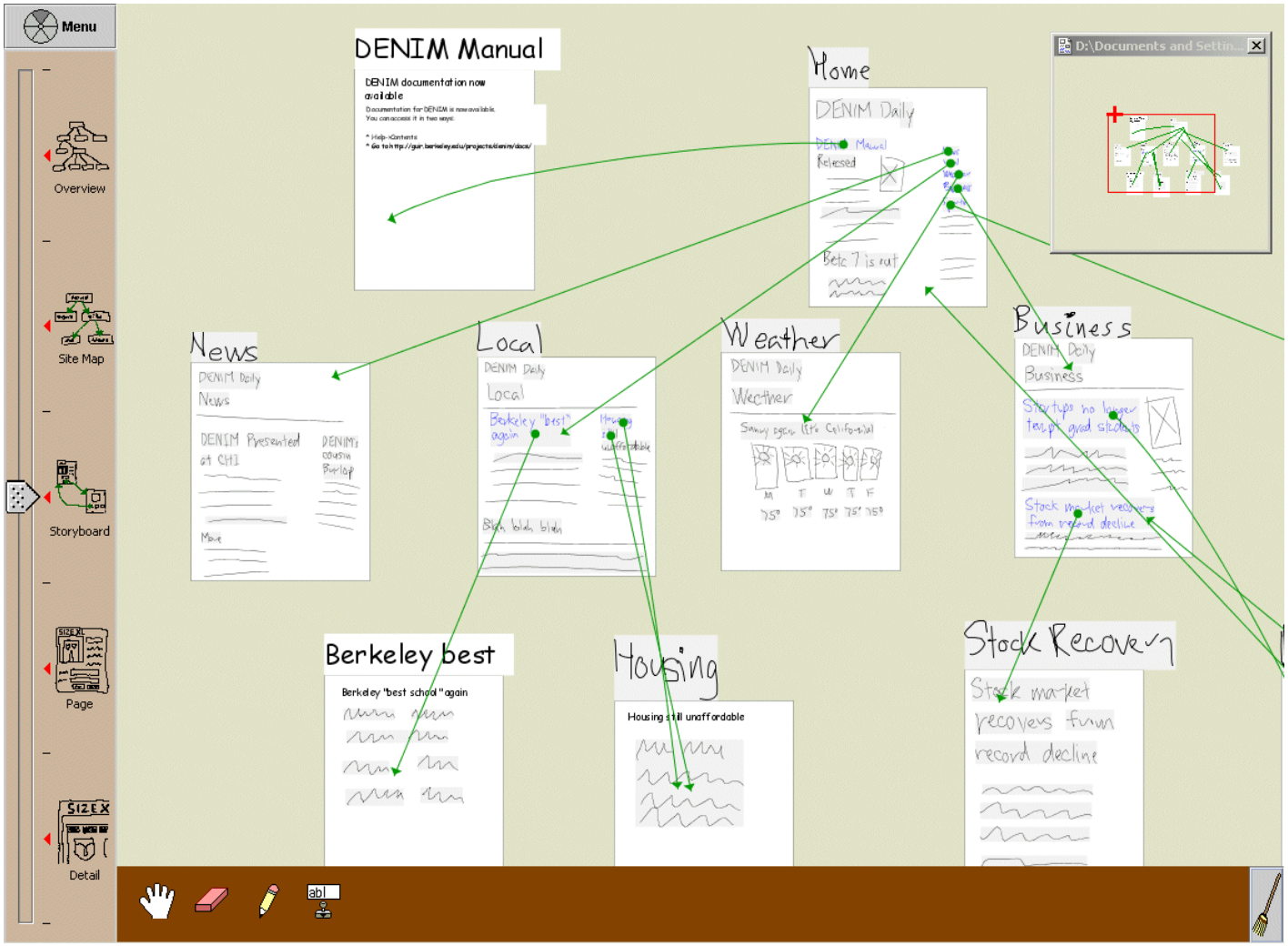


John D. Gould, John Conti, and Todd Hovanyecz. 1983. Composing letters with a simulated listening typewriter. *Commun. ACM* 26, 4 (April 1983), 295-308.

Using a Paper Prototype – Example 1

Using a Paper Prototype – Example 2

DENIM: An informal tool for early stage web site design



Storyboard

James Lin, Mark W. Newman, Jason I. Hong, and James A. Landay. 2001. DENIM: an informal tool for early stage web site design. In *CHI '01 extended abstracts on Human factors in computing systems* (CHI EA '01). ACM, New York, NY, USA, 205-206. DOI=10.1145/634067.634190 http://doi.acm.org/10.1145/634067.634190

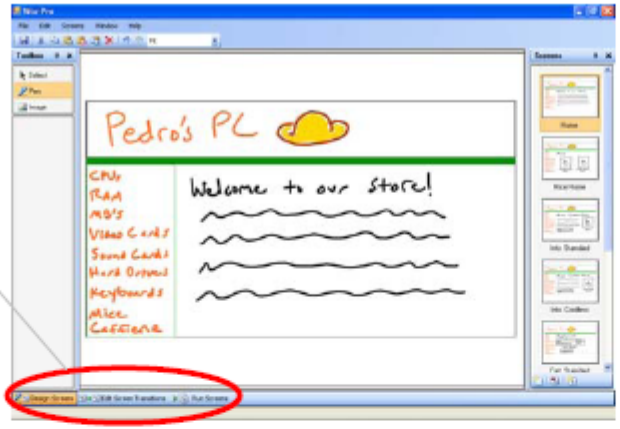
Low-Tech Prototype Problems

- Design changes cumbersome
  - repetitive erasing and redrawing
  - even with computer-based tools, it may be difficult to apply changes to a specific subset of screens.

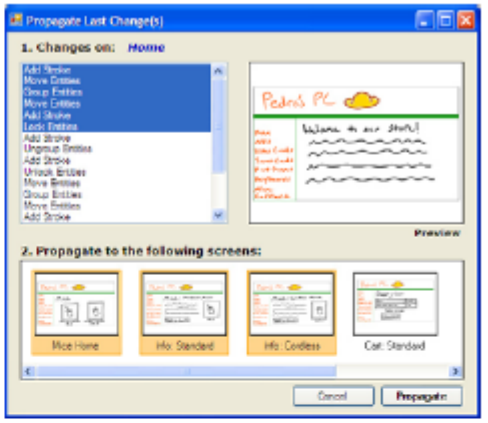
- Wizard-of-Oz studies requires high cognitive load
  - Low fidelity prototypes can grow to dozens, even hundreds, of screens
  - It is difficult for human wizards to quickly navigate from screen to screen

WOZ Pro

Tabs at bottom of interface allow user to switch between three modes: *Design Screens*, *Edit Screen Transitions*, and *Run Screens*

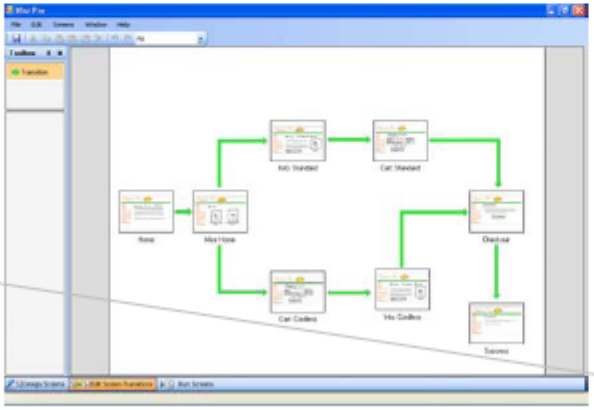


(a) WOZ Pro interface

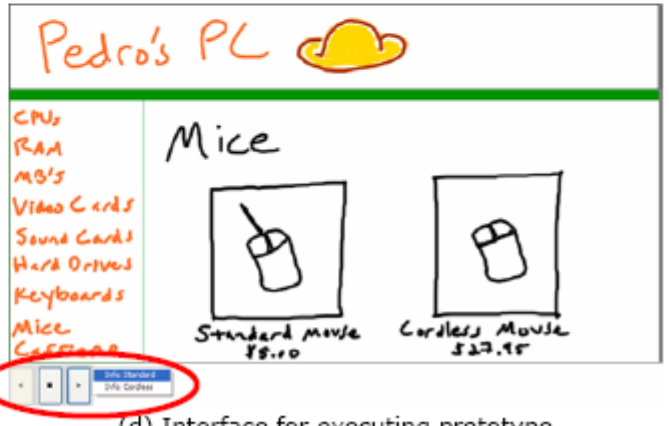


(b) Interface for propagating last change(s)

Pop-up menu constrains possibilities to only valid next screens, thus reducing cognitive load on human wizard



(c) Interface for defining state transition network



(d) Interface for executing prototype

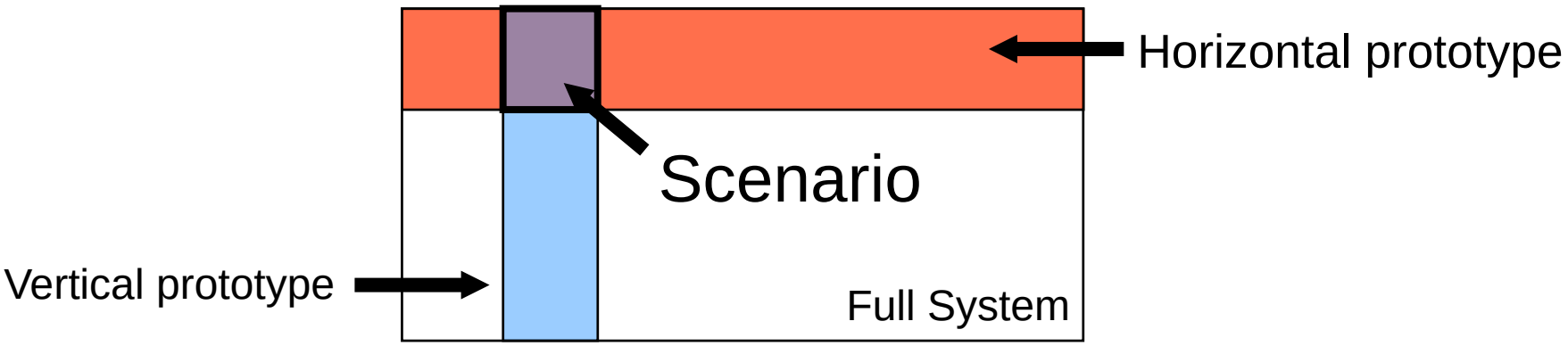
Figure 1. Screen Shots of the WOZ Pro Interface

A pen-based software environment that supports the quick-and-easy creation of low fidelity user interface prototypes **[Hundhausen at al., 2007]**

http://www.eecs.wsu.edu/~veupl/soft/woz/index.htm

Medium fidelity prototypes (II and III)

- Using prototyping tools (Flash, Director, JavaScript,…)
  - **Vertical** prototype: Provide answer about a specific question
    - *includes in-depth functionality for only a few selected features*
    - *Is dialog box design A faster than dialog box design B?*
  - **Horizontal** prototype: the full interface without the functionality
    - *a simulation; no real work can be performed*
    - *Is the command/menu structure OK?*
  - **Scenario (**prototype)
    - *scripts of particular fixed uses of the system; no deviation allowed*



Medium fidelity prototypes (Summary)

- Time consuming
- Be careful about user expectations
  - Developer might resist change
  - Management might think it is real
- Do not get distracted by too small a detail
  - Color, font,…

High fidelity prototypes

- Piecewise prototype
  - Horizontal, vertical, scenario
  - Controlled setting
- Alpha and Beta releases
  - Small scale distribution
- Final product?
  - Monitor help line
  - Monitor sell rep.
- Costly
  - Problem can be deeply rooted in the software architecture

Prototyping (different classification)

- Types of Prototyping (Universal principle of design, Lidwell, p. 158)
  - **Concept** prototyping to develop and evaluate preliminary design ideas
    - *Concept sketches and storyboards*
    - ***Artificial reality problem***
      - Designs by a good artist or modeler look like they will work?
  - **Rapid(throw-it-away)** prototyping to explore and test functionalities and performances
    - *e.g., New automobile design in wind tunnels*
    - ***Scaling fallacy***
  - **Evolutionary** prototyping when design specs are uncertain or changing
    - *Iterative process (design → evaluation → refine)*
    - *Software developers using the facilities for actual product development*
    - *Designers tend to get tunnel vision, not exploring design alternatives*
    - *Incremental prototyping*

Questions?