Sketching and Prototyping

SWE 632
Fall 2015

Administrivia

- HW 3 due in 1 week

- In-class midterm exam in two weeks

Expectations for midterm exam

- Multiple choice questions, free response, essay questions
- Will include definitions, key ideas & concepts, how to use methods
  - May link multiple ideas together in applying them to a scenario
- Lectures, assigned readings, tech talks
- Sample questions:
  - For a given scenario, select the concept it best illustrates
  - Given UI image w/ description, conduct a heuristic evaluation to identify at least 3 issues
  - Define consistent mapping

Sketching

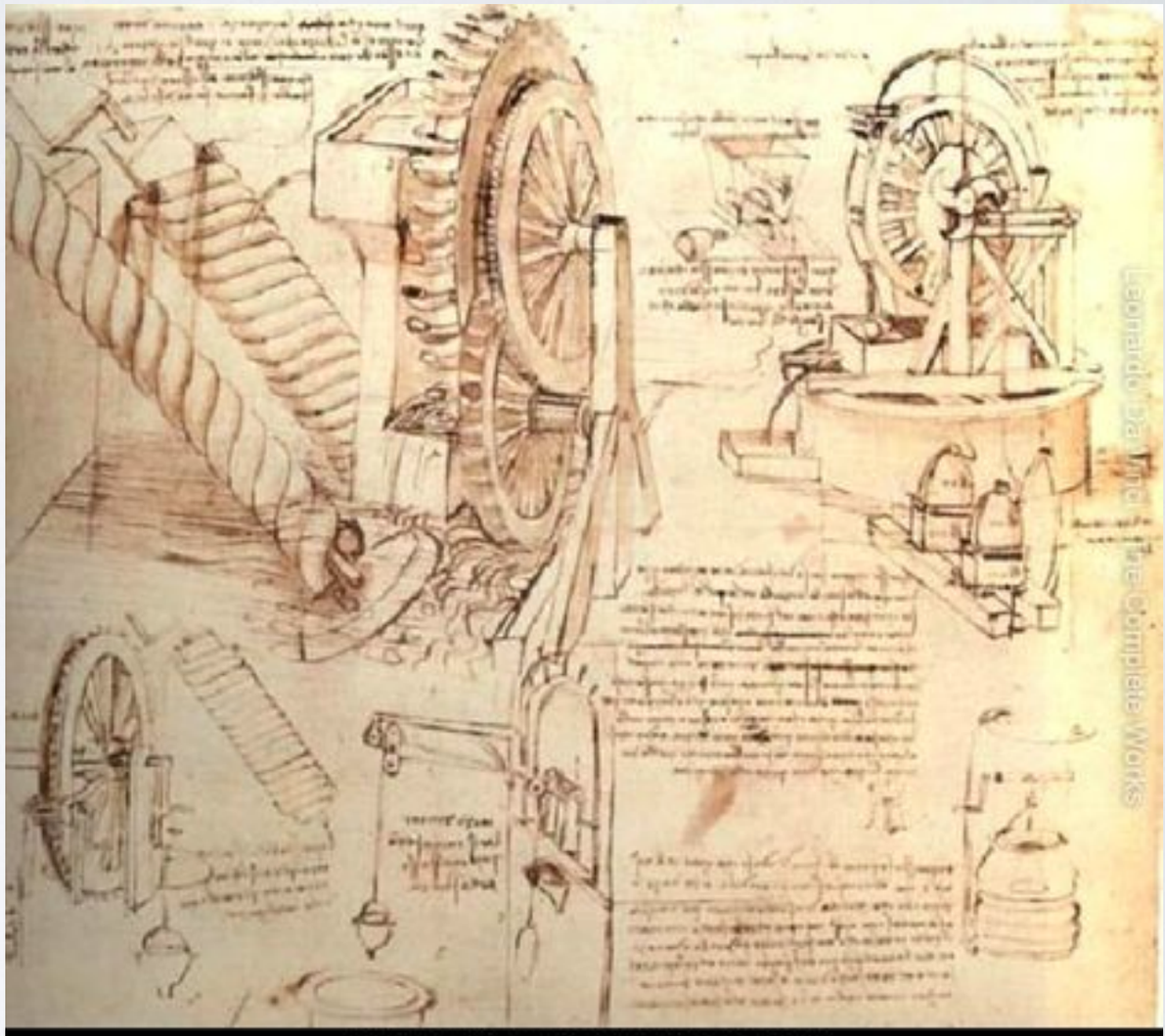
Based on slides by Bonnie John and Jennifer Mankoff

sketch - a conversation between the sketcher or designer and the artifact (Hartson & Pyla)

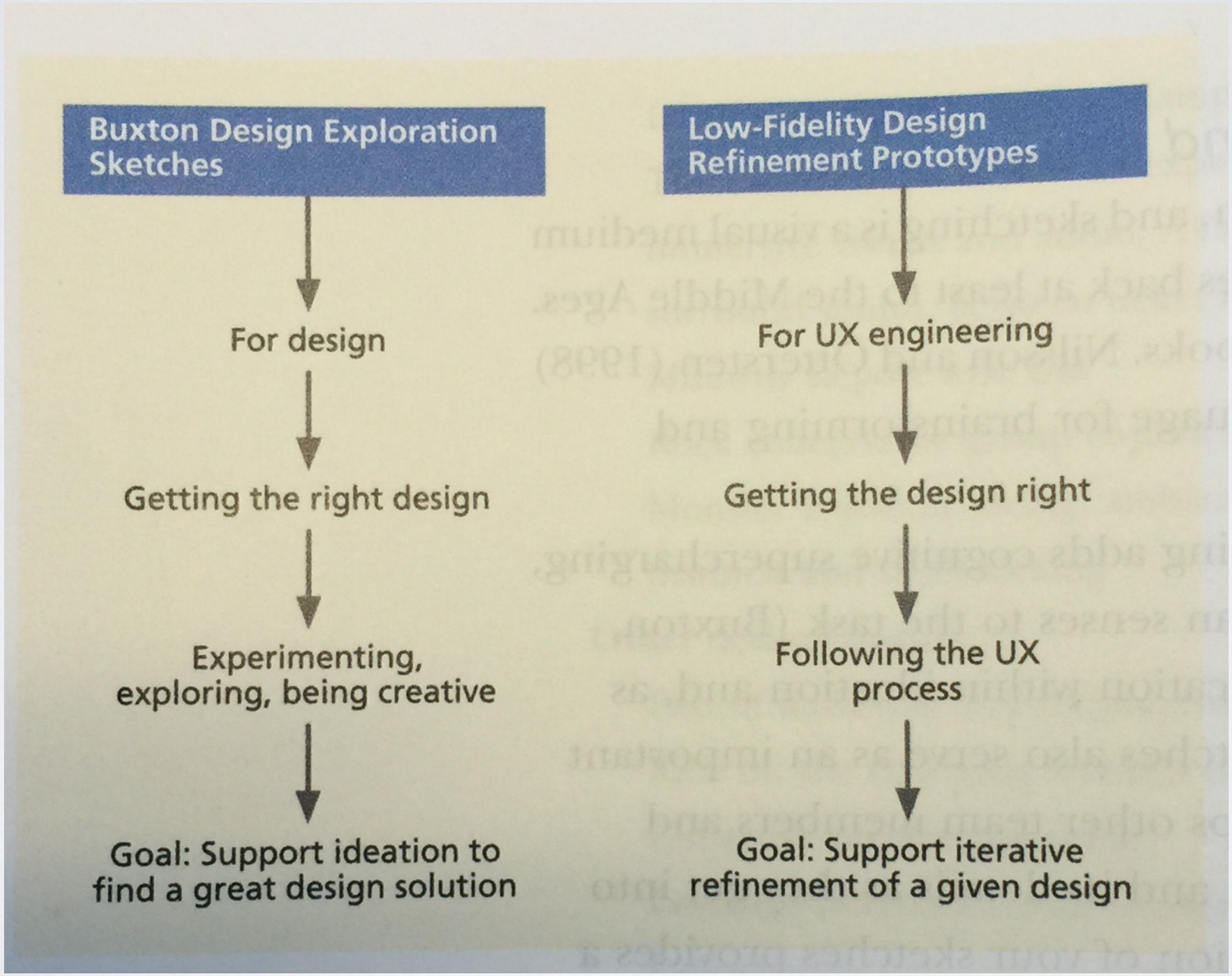
Why sketch?

- Design is process of creation & **exploration**

- Sketching offers **visual** medium for exploration, offering cognitive scaffolding to externalize cognition



Sketching vs. Prototyping



Physical sketches

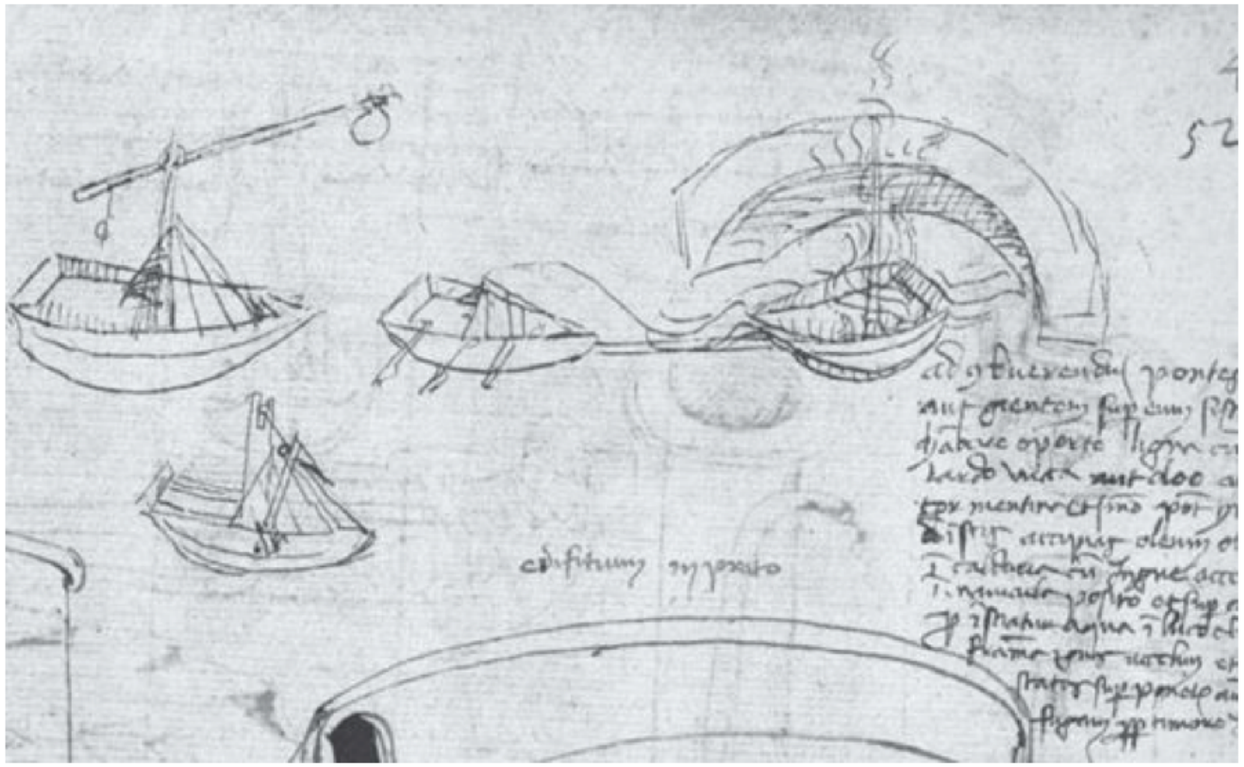
- Production tools for sketching:
  - whiteboards, blackboards, cork boards, flip chart easels
  - post it notes
  - duct tape, scotch tape, push pins, staples
  - marking pens, crayons, spray paint
  - scissors, hobby knives, foam core board
  - duct tape
  - bits of cloth, rubber

The space remembers

- Covering walls, whiteboards, etc. w/ materials is extremely useful
- Provides broad overview of design exploration
- Facilitates group discussion of designs

Sketches are sketchy

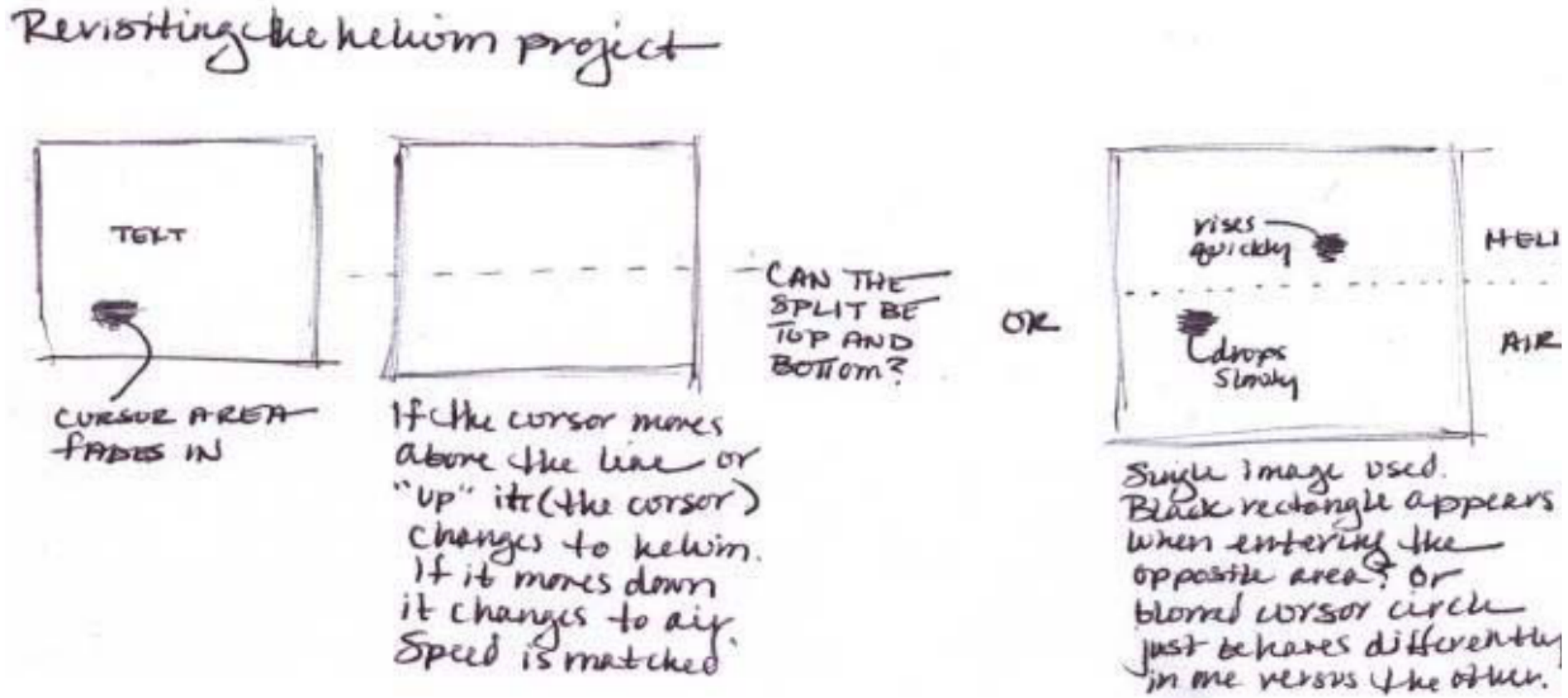
- Not mechanically correct and perfectly straight lines
- **Freehand**, open gestures
- Strokes may miss connections
- Resolution & detail **low** enough to suggest is concept
- Deliberately **ambiguous** & abstract, leaving "holes" for imagination



Rules for sketching

- **Everyone** can sketch; you do not have to be artistic
- Most ideas conveyed more effectively with sketch than words.
- Sketches are **quick** and inexpensive to create; do not inhibit early exploration
- Sketches are **disposable**; no investment in sketch itself
- Sketches are **timely**; made in-the-moment, just-in-time
- Sketches are **plentiful**; entertain large # of ideas w/ multiple sketches of each

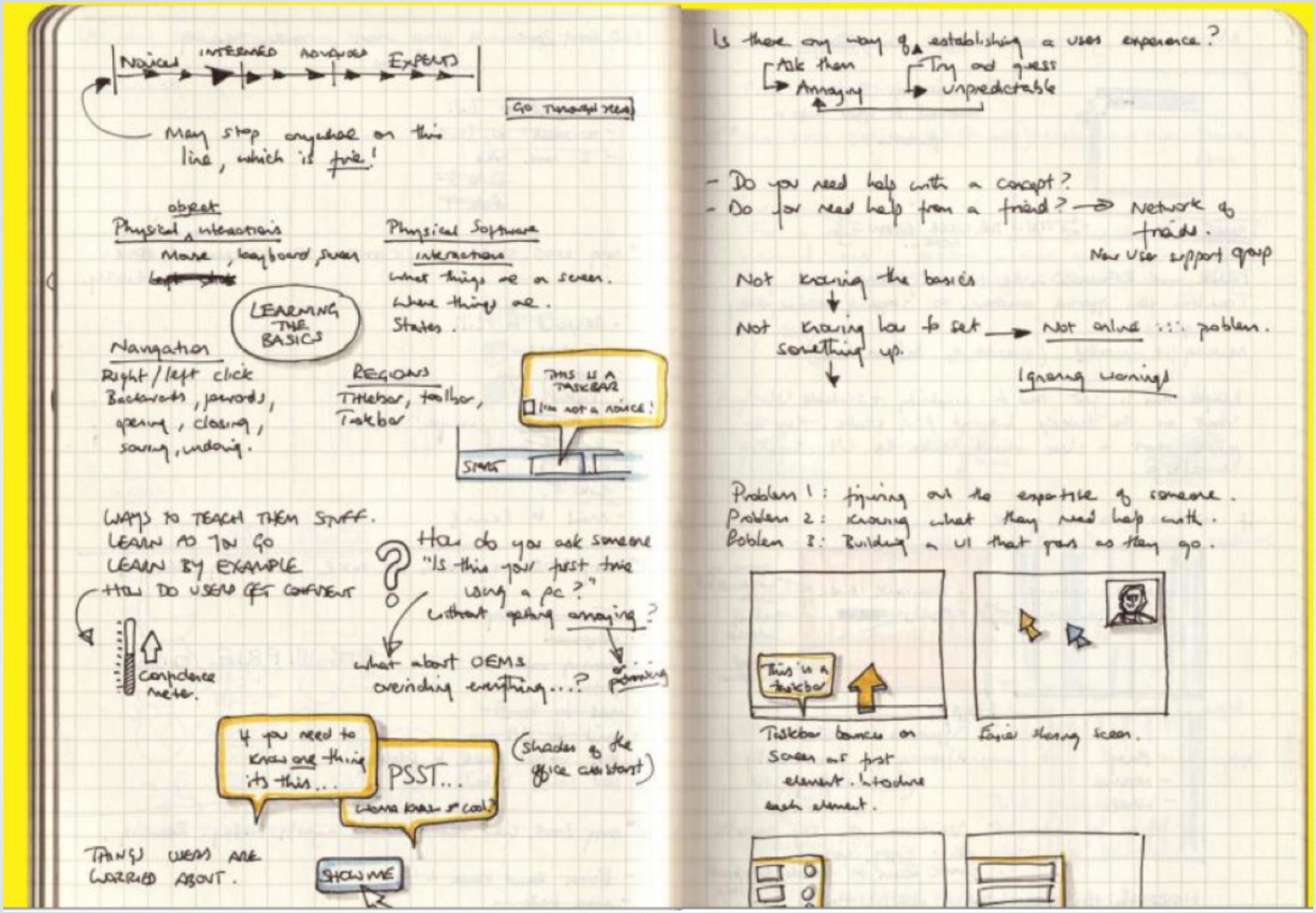
Sketches include annotations



Myers et al. (2008). How Designers Design and Program Interactive Behaviors. *VL/HCC 2008.*

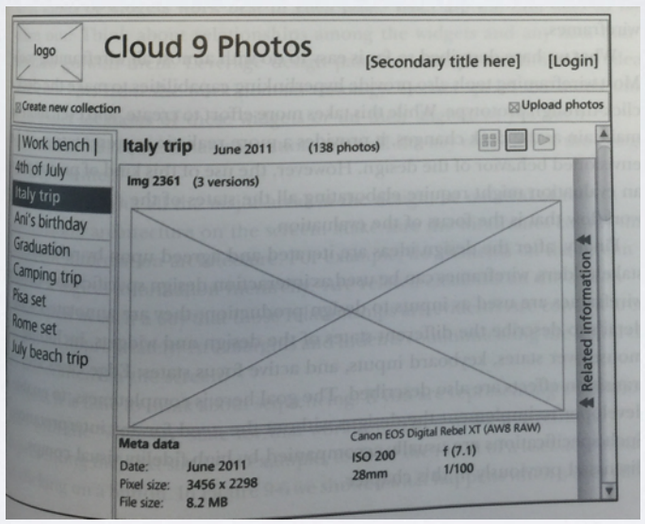
- Annotations explain what is going on in each part of sketch & how

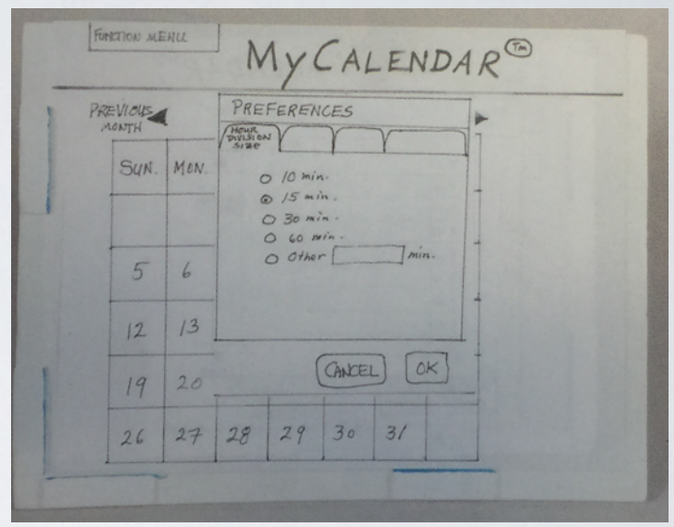
Sketches part of design exploration



B. Buxton. Sketching User Experiences.

Fidelity of sketches & mockups





storyboard — wireframe — prototype

low ⟷ high

fidelity

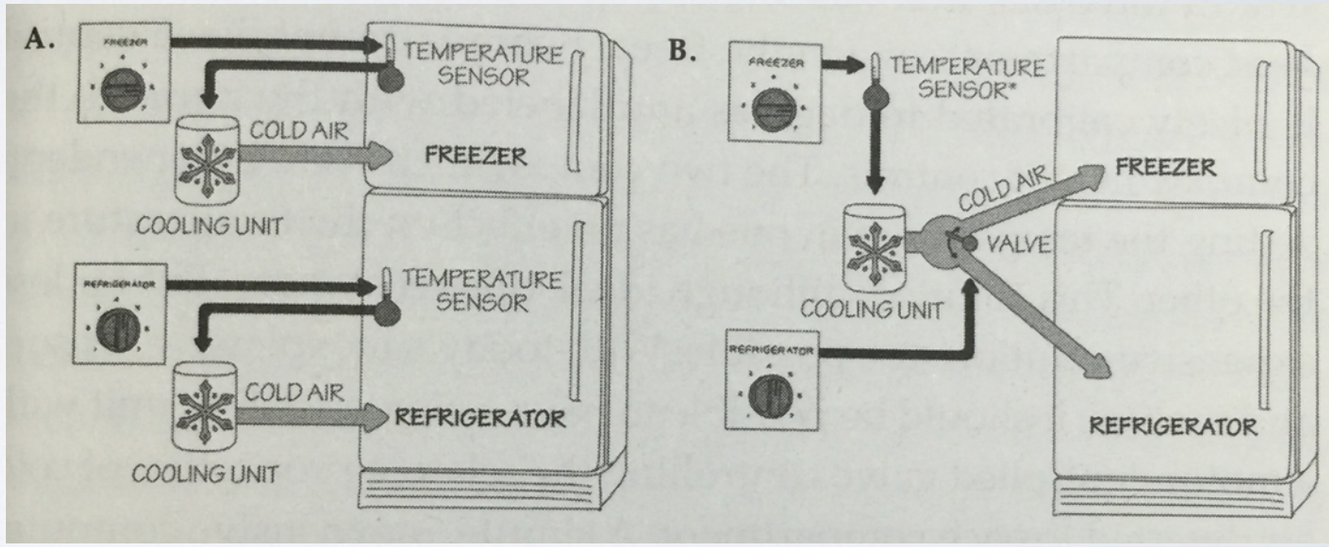
(many details left unspecified)

(more polished & detailed)

Conceptual design

Designer's mental model

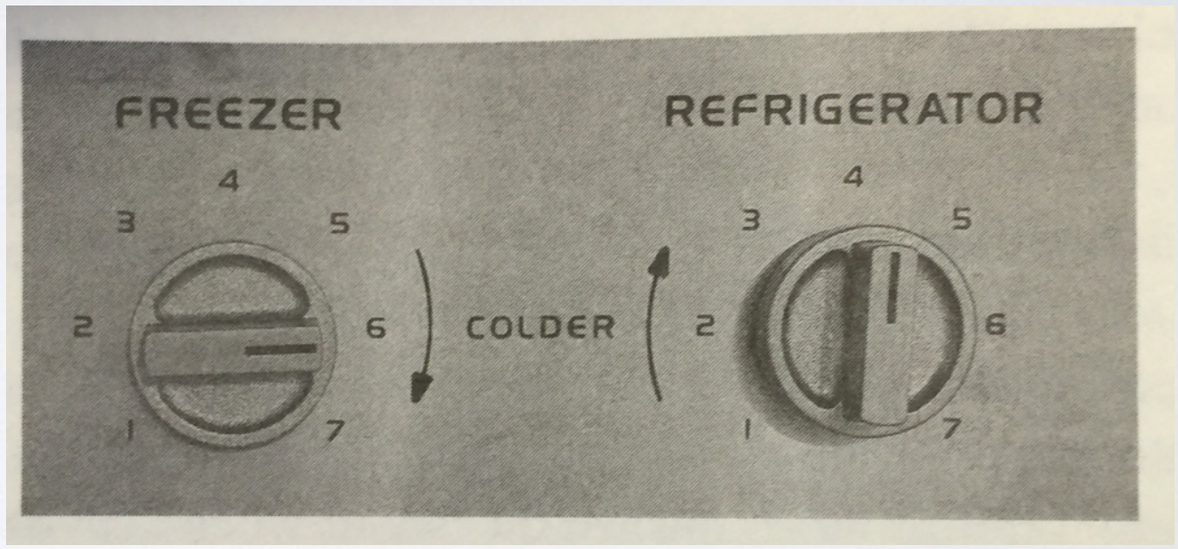
- Conceptualization of the envisioned system
  - what it is
  - how it is organized
  - what it does
  - how it works



User's mental model

- Comes up from existing interactions with systems

- Users form cause & effect relationships to form theories that guide actions

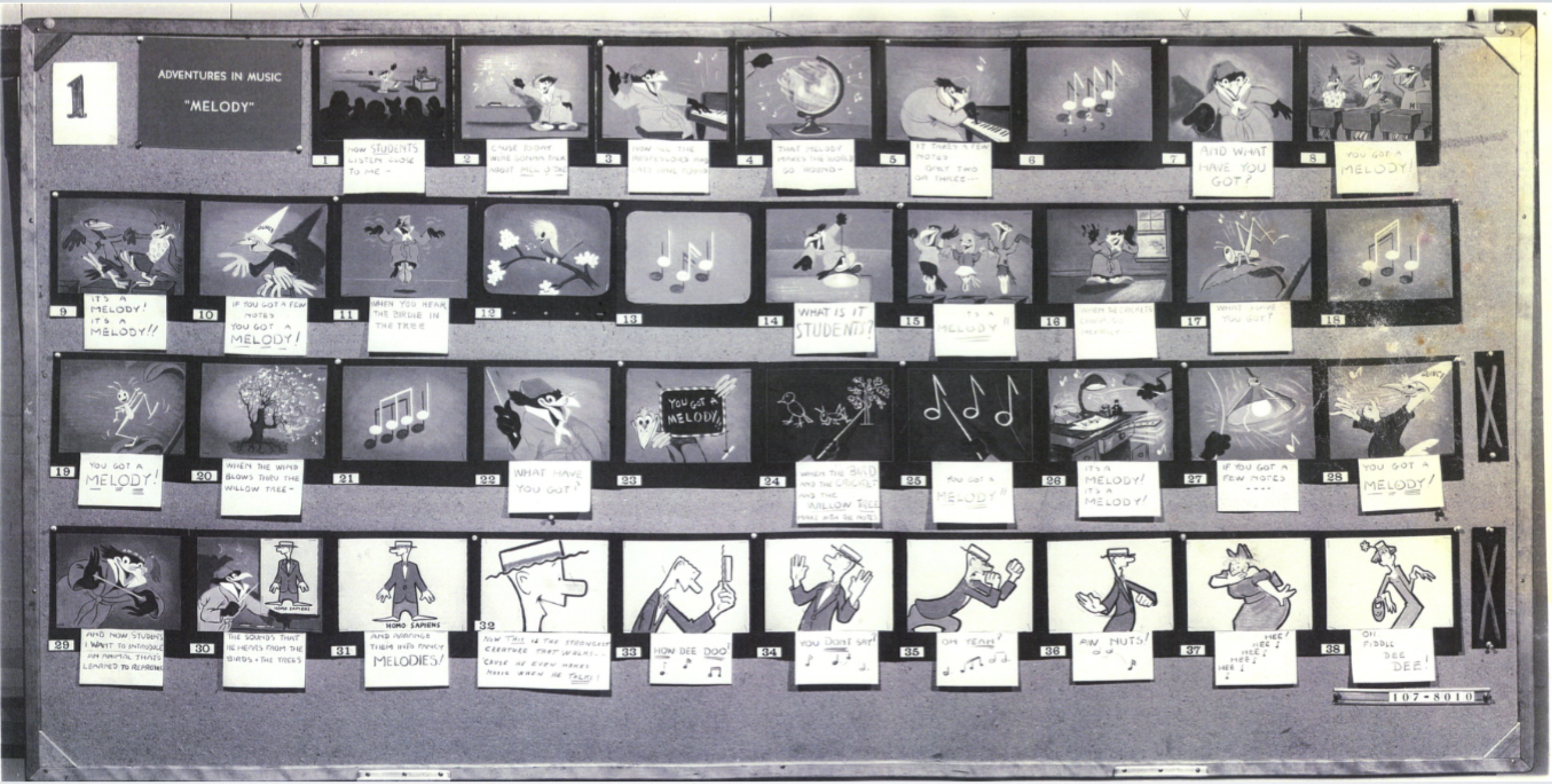


Conceptual design

- Goal: match users' **mental model**
- Tool: Metaphor - analogies from existing system
  - Offers expectations about what system does & what can be done
- Examples
  - Email <—-> physical mail
  - Backup software <—>time machine
  - OS desktop <—> top of a desk

Example: metaphor for a

Storyboards



Storyboard for Disney's Melody: Adventures in Music (1953)

Source: Michael Sporn Animation


1
NOW STUDENTS LISTEN CLOSE TO ME -
2
CAUSE TODAY WERE GONNA TALK ABOUT MEL O-DEE
3
NOW ALL THE PROFESSORS AND CATS HAVE FOUND

Storyboards for UI design

- Sequence of visual "frames" illustrating **interplay** between user & envisioned system

- Explains how app fits into a larger **context** through a single scenario / story

- Bring design to **life** in graphical clips - freeze frame sketches of user interactions

- "Comic-book" style **illustration** of a scenario, with actors, screens, interaction, & dialog

Crafting a storyboard

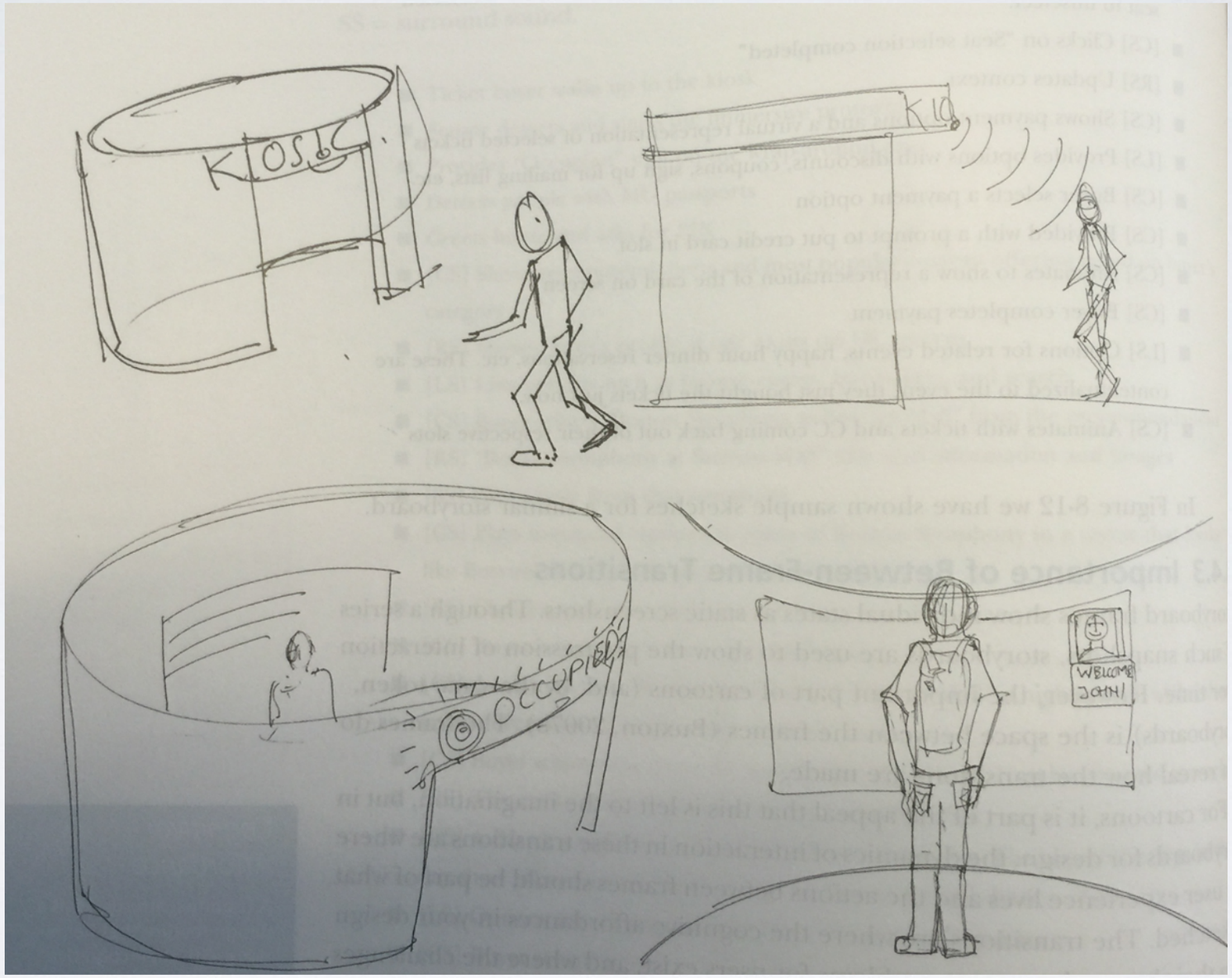
- Set the stage:
  - Who? What Where? Why? When?
- Show key interactions with application
- Show consequences of taking actions
- May also think about errors

Example elements of a UI storyboard

- Hand-sketched pictures annotated with a few words
- Sketch of user activity before or after interacting w/ system
- Sketches of devices & screens
- Connections with system (e.g., database connection)
- Physical user actions
- Cognitive user action in "thought balloons"

Example: ticket kiosk

Ticket buyer walks up to the kiosk



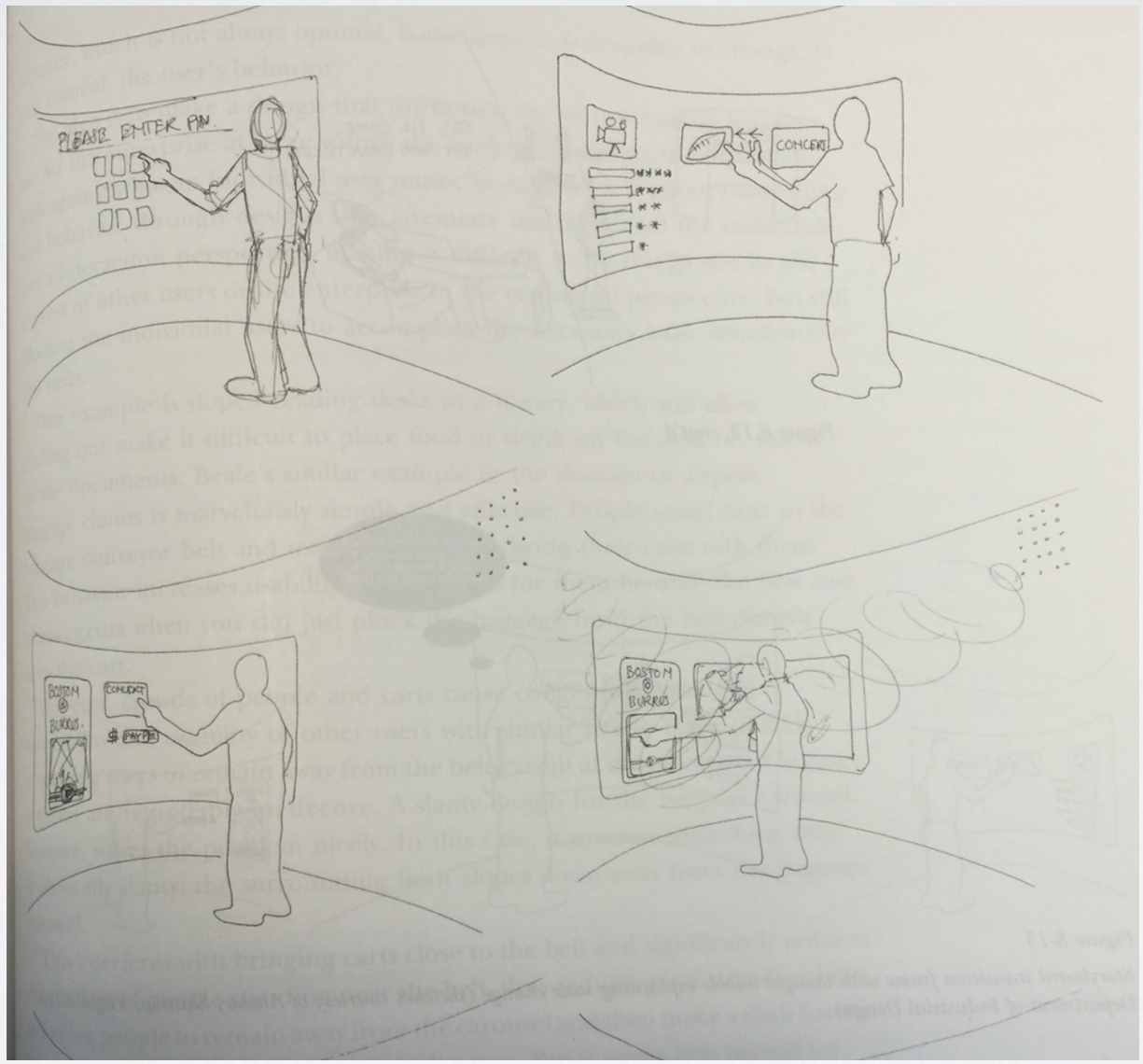
Sensor detects user & starts immersive process

Displays "Occupied" sign on wraparound case

Detects people with ID card

Example: ticket kiosk

Greets buyer and asks for PIN



Shows recommendations & most popular categories

Buyer selects "Boston symphony at Burruss Hall"

Plays music from symphony, shows date & time picker

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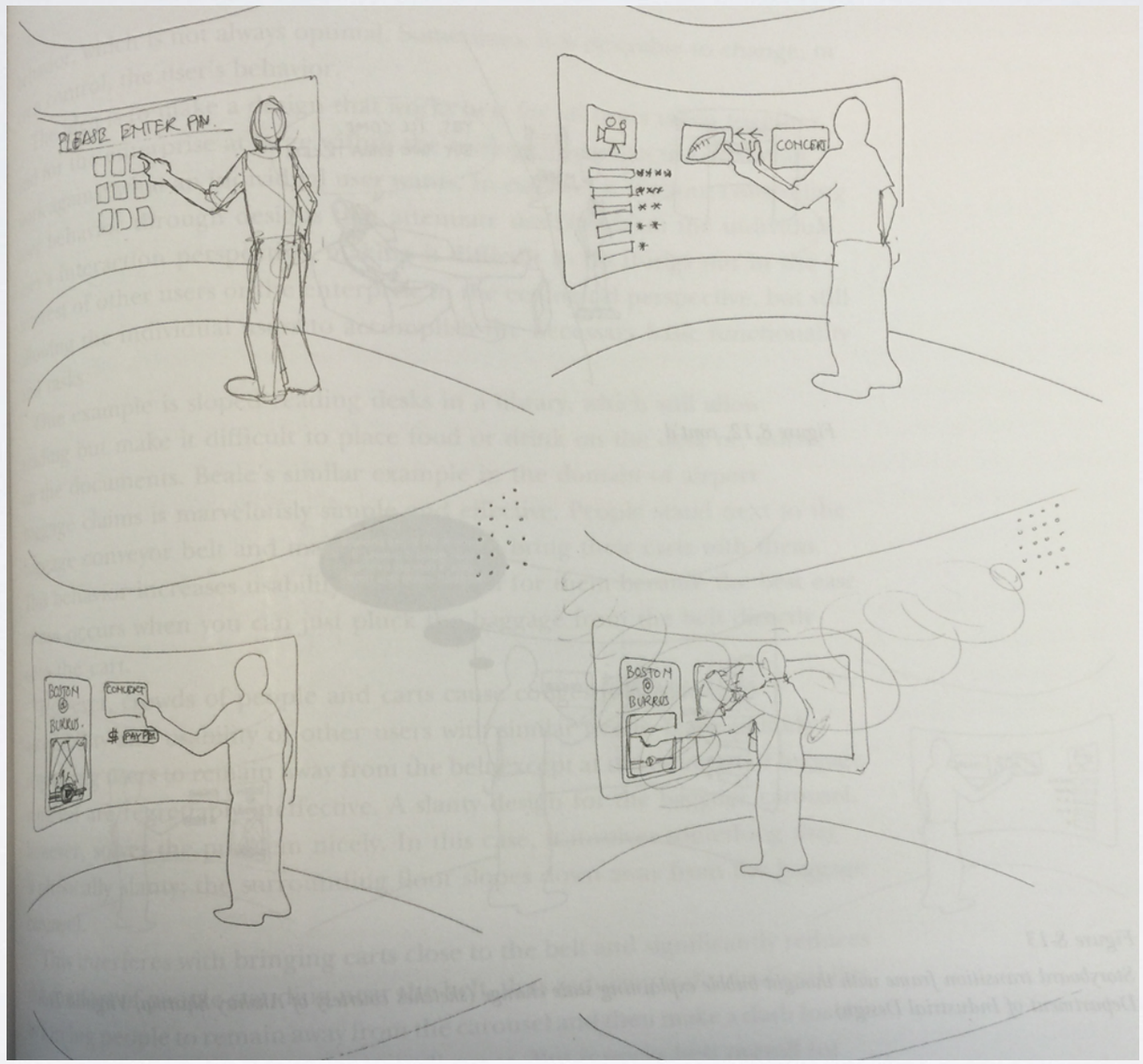

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Frame transitions

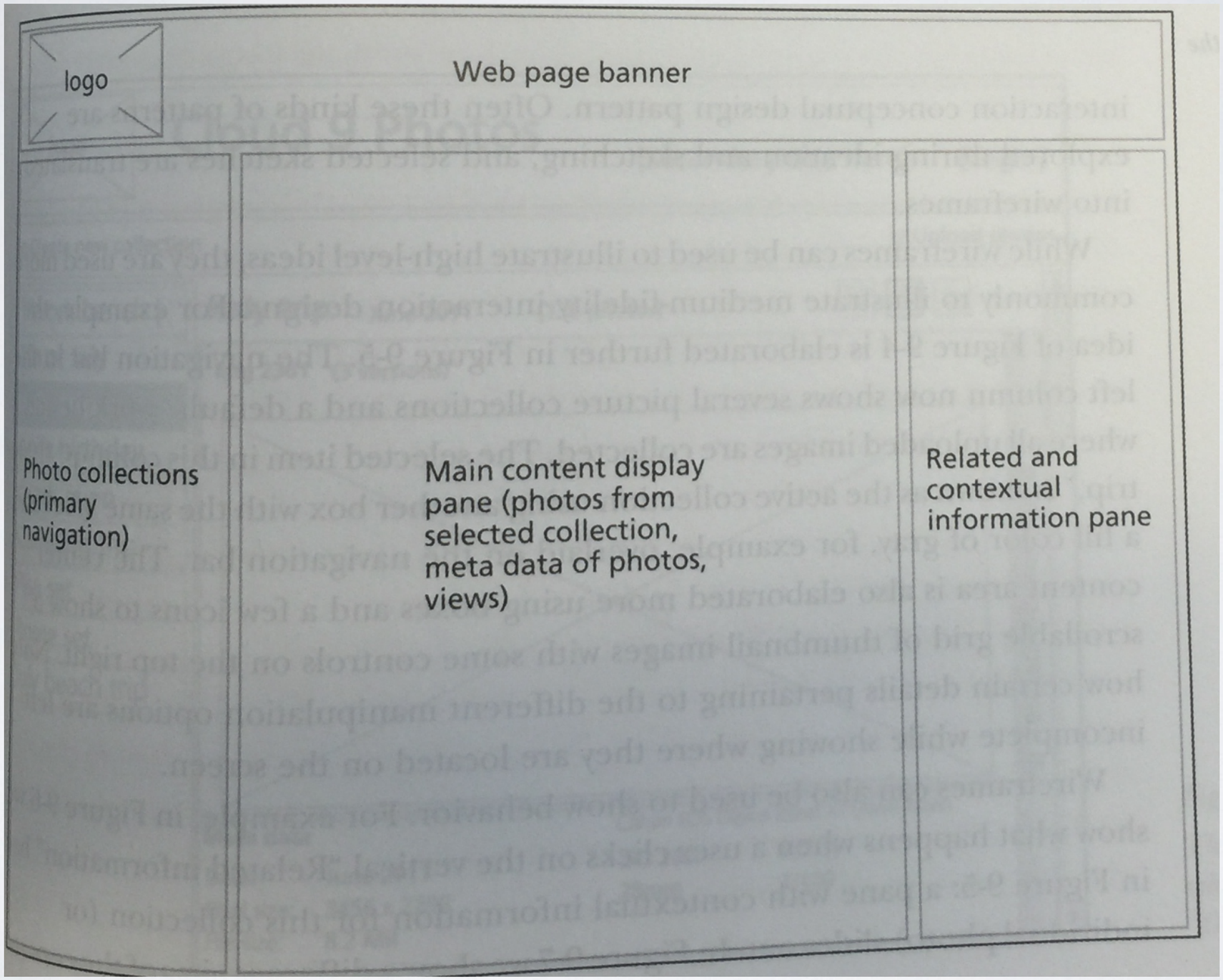
- Transitions between frames particularly important
- What users think, how users choose actions
- Many problems can occur here (e.g., gulfs of execution & evaluation)
- Useful to think about how these work, can add thought bubbles to describe

Wireframes

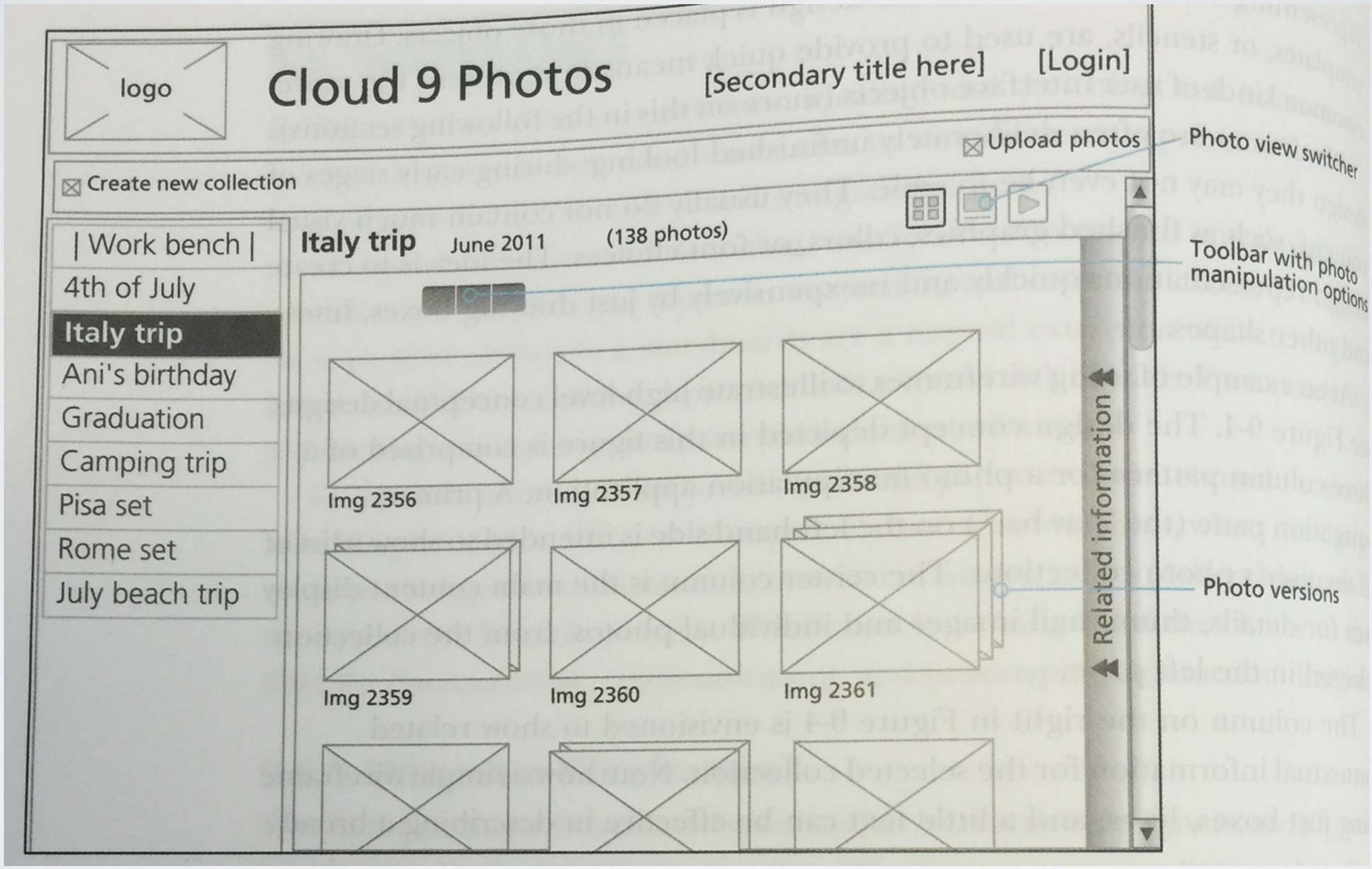
Wireframes

- Lines & outlines ("wireframes") of boxes & other shapes
- Capturing emerging interaction designs
- Schematic designs to define screen content & visual flow
- Illustrate approximate visual layout, behavior, transitions emerging from task flows
- Deliberate unfinished: do not contain finished graphics, colors, or fonts

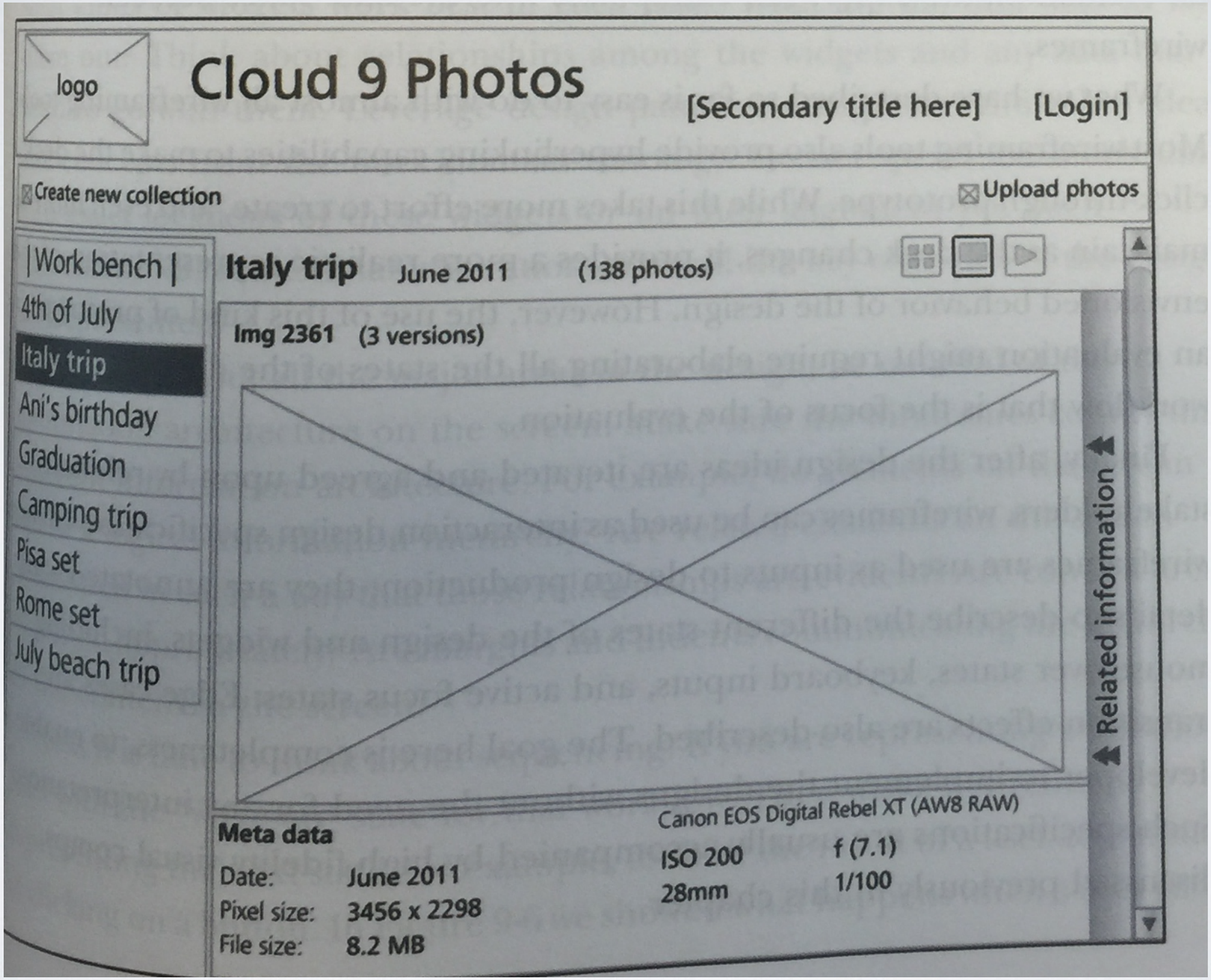
Example


logo
Web page banner
Photo collections (primary navigation)
Main content display pane (photos from selected collection, meta data of photos, views)
Related and contextual information pane

Example


logo
Cloud 9 Photos
[Secondary title here]
[Login]
Upload photos
Create new collection
| Work bench |
4th of July
Italy trip
Ani's birthday
Graduation
Camping trip
Pisa set
Rome set
July beach trip
Italy trip
June 2011
(138 photos)
Img 2356
Img 2357
Img 2358
Img 2359
Img 2360
Img 2361
Related information
Photo view switcher
Toolbar with photo manipulation options
Photo versions

Example


logo
Cloud 9 Photos
[Secondary title here]
[Login]
Create new collection
Upload photos
| Work bench |
4th of July
Italy trip
Ani's birthday
Graduation
Camping trip
Pisa set
Rome set
July beach trip
Italy trip
June 2011
(138 photos)
Img 2361
(3 versions)
Related information
Meta data
Date:
June 2011
Pixel size:
3456 x 2298
File size:
8.2 MB
Canon EOS Digital Rebel XT (AW8 RAW)
ISO 200
f (7.1)
28mm
1/100

Wireframes

- Can be used to step through a particular scenario
- Focus on key screens rather than every screen
- Tools can help
  - Can be made clickable
  - Can use stencils & templates; copy & edit similar screens

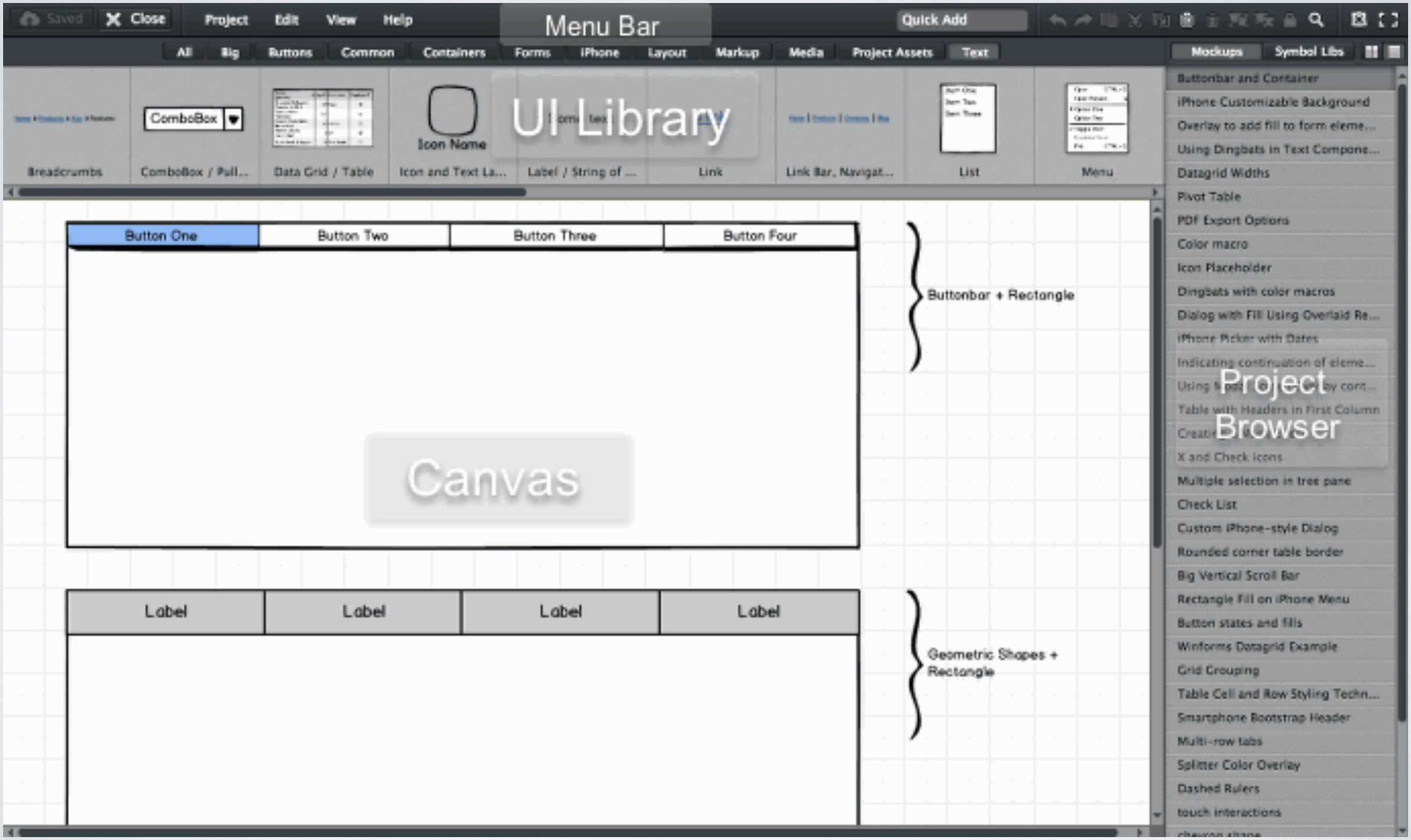
Creating a wireframe - (1)

- What are the key interactions needed to support design?
- What widgets support these interactions?
- What are the best ways to lay them out?
- How do these relate to conceptual design & user's mental model?

Creating a wireframe - (2)

- What are all of the items: toolbars, scrollbars, windows, …?
- Are there too many widgets on the screen?
- What happens when data is larger than available space? Will entire page scroll, or individual panel?
- How much detail of items to show?

Example tool - Balsamiq



Design critiques

Adapted from slides by Bjorn Hartmann

Design critiques

- Stylized meeting for getting feedback on design sketches & prototypes
- Solicit feedback from peers
- History: studio art education

http://www.flickr.com/photos/pjchmiel/2972140234/

Designer: Frame the discussion

- State **explicitly**: What would you like comments on?
  - Overall idea?
  - Usability?
  - Specific interaction design?
  - Visual design?
- Take a **dispassionate** stance (this is hard!)
  - Show alternatives where possible

Critic: How to avoid deaf ears

- Comments about the **design**, not the designer
- Point out positive aspects - be **specific**
  - Not: "I like this, but…"
  - "The layout effectively communicate the hierarchical nature of the data. However…"
- Ask for **alternatives** instead of offering solutions
  - Not: "You should really change X"
  - Instead "Have you considered alternatives for X?"

Prototyping

Prototyping

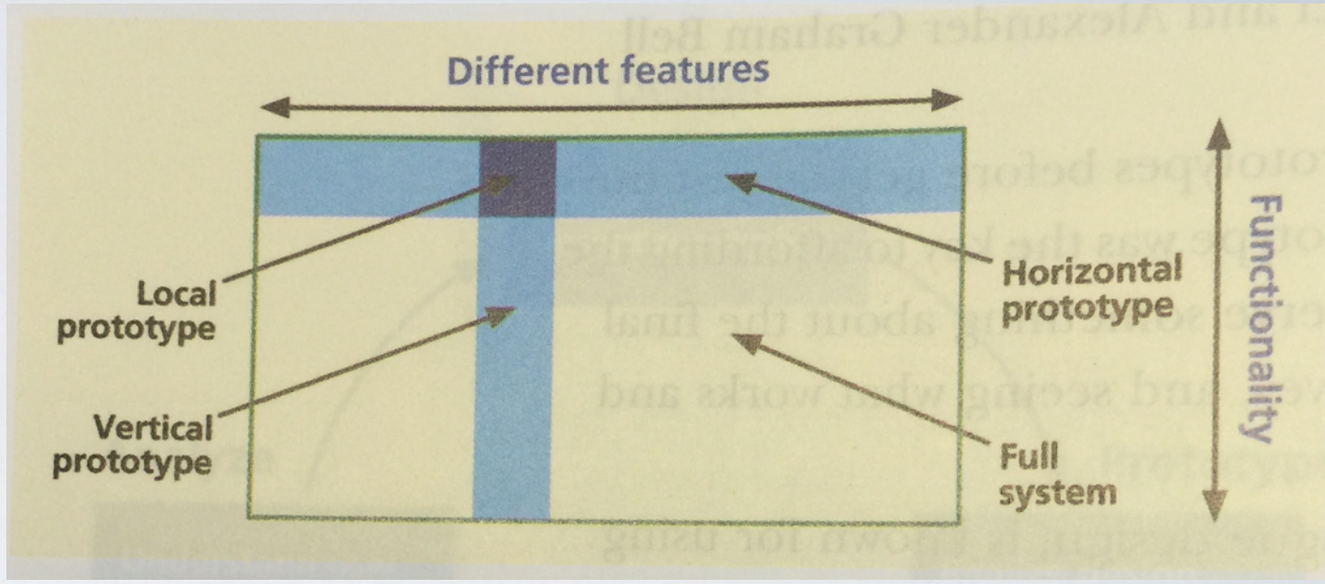
- How do you know your system design is right before you invest the time to build it?

- Answer: prototyping!

  - Evaluation performed **before** investing resources in building finished product

  - Early version of system constructed much **faster** & with less expense used to evaluate & **refine** design ideas

Types of prototypes



- Which details do you leave out?
- **Horizontal**: **broad** in features, less depth
    - Explore overall concept of app, but not specific workflows
- **Vertical**: lots of **depth**, but only for a few features
    - Enables testing limited range of features w/ realistic user evals
- **T**: most of UI realized at low depth, few parts realized in depth
    - Combination of vertical & horizontal
- **Local**: focused prototype on **specific** interaction detail

Fidelity of prototypes

Kind of Iteration	Purpose	Types of Prototypes
Ideation and sketching	To support exploring ideas, brainstorming, and discussion (so design details are inappropriate)	Sketches, fast and disposable mockups, ultralow fidelity
Conceptual design	To support exploration and creation of conceptual design, the high-level system structure, and the overall interaction metaphor	Evolution from hand-drawn paper, computer-printed paper, low-fidelity wireframes, high-fidelity wireframes, to pixel-perfect interactive mockups (to communicate with customer)
Intermediate design	To support interaction design for tasks and task threads	Evolution from paper to wireframes
Detailed design	Support for deciding navigation details, screen design and layout, including pixel-perfect visual comps complete specification for look and feel of the "skin"	Detailed wireframes and/or pixel-perfect interactive mockups
Design refinement	To support evaluation to refine a chosen design by finding and removing as many UX problems as possible	Medium to high fidelity, lots of design detail, possibly a programmed prototype

Interactivity of prototypes

- Scripted, click through prototypes
  - Prototype w/ **clickable** links to move between screens
  - Live action storyboard of screens
    - Simulates real **task flow**, but w/ static content
- Fully-implemented prototypes
  - Usually **expensive** to implement actual system
  - But can build key piece of system first to evaluate

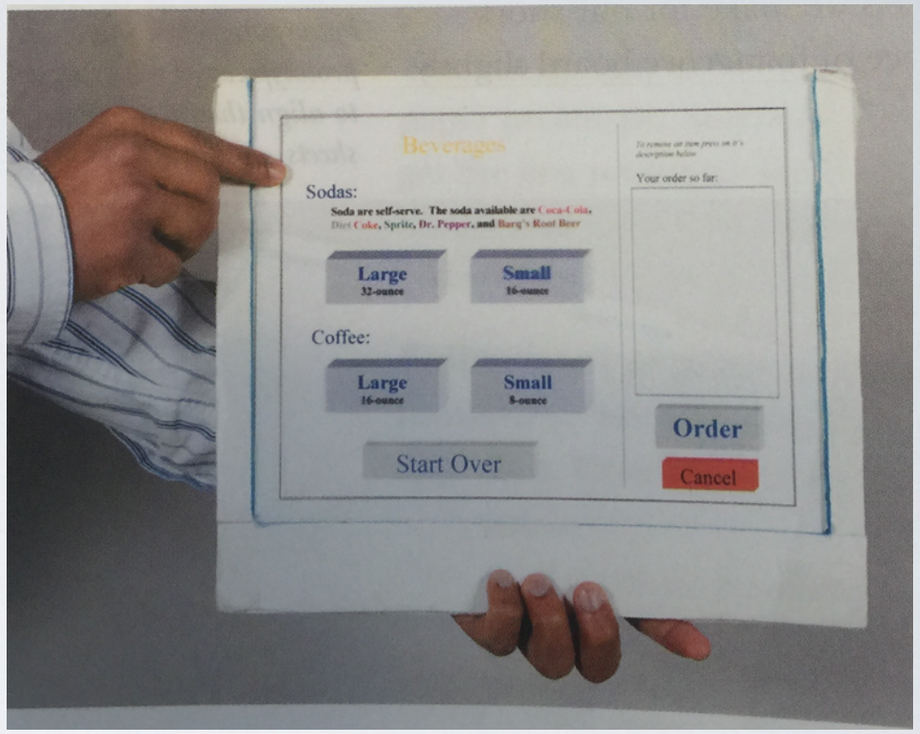
Wizard of Oz

- Goal: **simulate** actual system w/ out building it
  - Want user to interact **as if** they were interacting w/ real system
  - Helps explore how users would interact w/ novel interaction if it were to exist
- Example: natural command line (Good et al 1984)
  - Users typed in commands to interact w/ computer
  - Commands intercepted by hidden human who interpreted commands & executed them

Paper prototypes

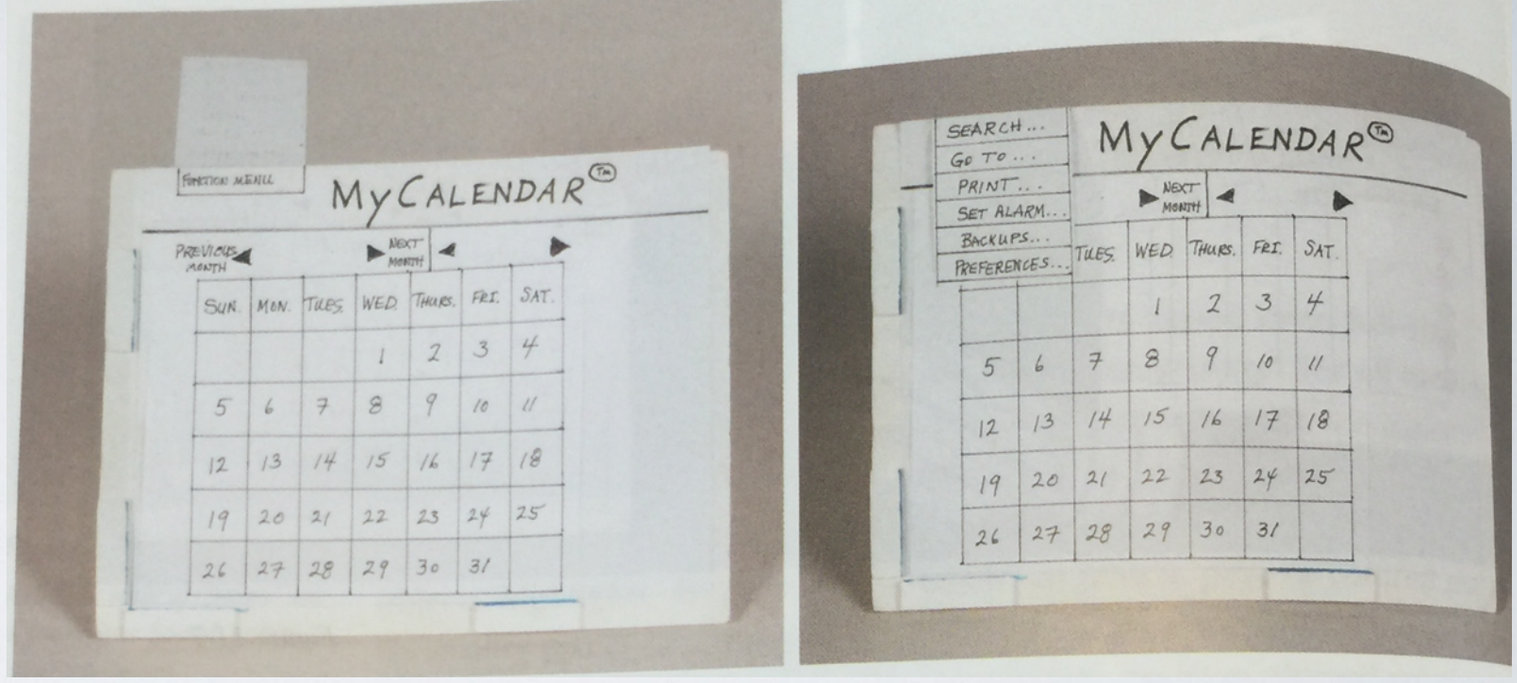
- **Low fidelity** prototype w/ paper mockups
- Goal: get feedback from users early w/ very low cost interactive prototype of envisioned interaction design

Paper prototyping (1)



- Set a realistic deadline
- Gather set of paper prototyping materials
- Work **fast** & do not color within the lines
- Reuse existing sketches & mockups
- Make underlying paper mockups of key screens

Paper prototyping (2)



- Use **paper cutouts** & tape onto full-size transparencies as "interaction sheets" for moving parts, making modular by including only a small amount
- Do not write or mark on interaction sheets
- Be **creative**
- **Reuse** at every level
- Cut corners wherever possible (trade accuracy against efficiency)
- Make a "this feature not implemented" message

Paper prototyping (3)

- Include "**decoy**" user interface objects not needed for expected tasks
- Accommodate data value entry by users w/ blank transparencies
- **Organize** materials to manage complex task threads
- **Pilot** test thoroughly

Advantages of prototyping

- Offers **concrete** baseline for communication between users & designers
- Provides conversation "**prop**" to communicate concepts
- Allows user to "take design for a **spin**"
- Give project visibility & buy-in with customers
- Encourage early user participation and involvement
- Give impression that design is easy to **change**
- Afford designers immediate **observation** of user performance & consequences of design decisions

In class activity

Group activity - Part 1

- In groups of 2 from last time
  - Pick one of the 2 scenarios from last time
- Start with a specific set of user needs identified
- Sketch the design of a new system that better addresses the users' needs
- Build storyboards w/ separate screenshots for at least 2 separate scenarios

Scenario 1

- You work for Yelp. Given the many options and features, your team has become concerned that users are getting overwhelmed and are looking to streamline the process for choosing a restaurant.

- Focus: what is the process by which users identify restaurant choices and what factors influence these decisions

Scenario 2

- You work for ComeToItaly.com, an online travel site sponsored by the Italian government to encourage travel to Italy. The site has become dated, and your team is looking for ideas on how it can better support users in making travel plans.

- Focus: understand the factors that users consider when identifying activities to include in their itinerary

Group Activity - Part 2

- Design critique of storyboards