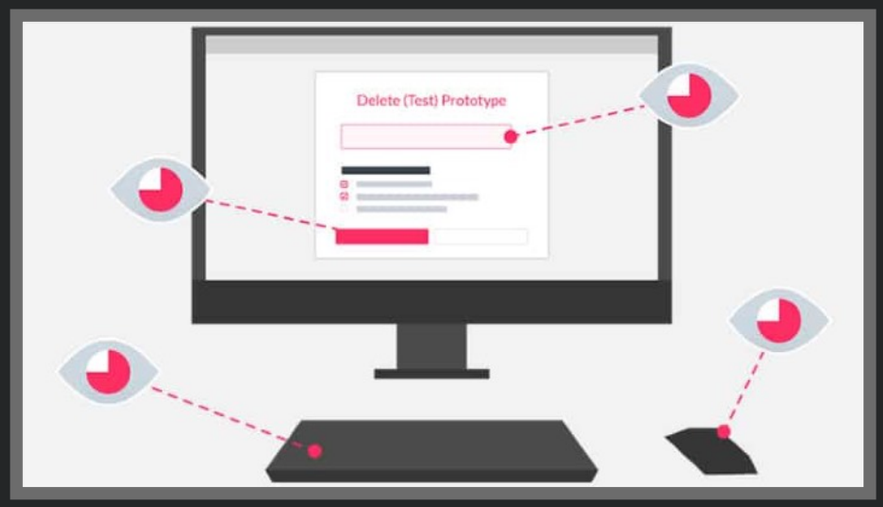
SWE 432 -Web Application Development

Fall 2022

George Mason University

Dr. Kevin Moran

Week 11: Sketching/ Prototyping



Administrivia

- *HW Assignment 3* - Grades and comments will be posted today.
- *HW Assignment 4 -* Out now, Due in two weeks (November 17th) (starter repo coming!)
  - Extra Credit Opportunity!
- *Next Lecture:*
  - Arun Krishna will be substituting, Dr. Moran will be in an all day meeting with a Funding Agency

Class Overview

- Sketching and Prototyping
  - Quick Lecture
  - Hands-on with Heuristic Evaluation and a Prototyping Tool

Iterative Model of User-Centered Design

Observation

(Re)Define the Problem

Understand User Needs

Idea Generation

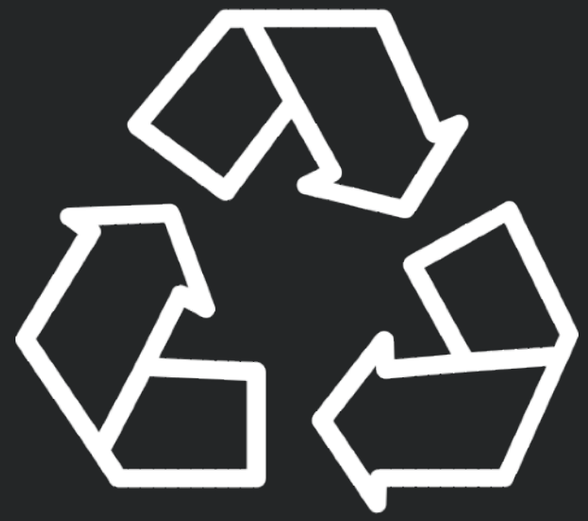
Brainstorm
what to build

Prototype

Build

Test

Evaluate what
you have built



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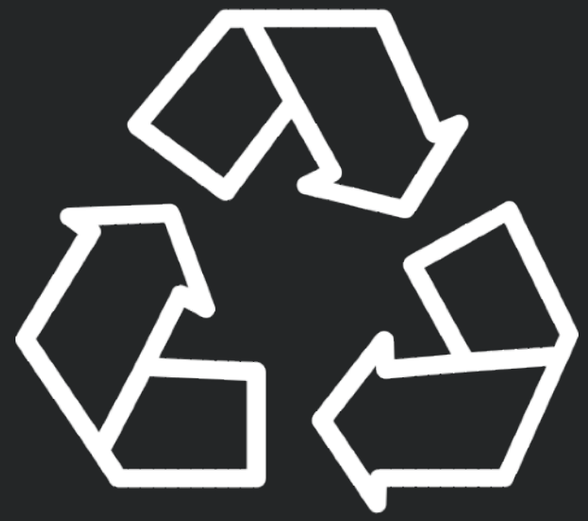


Idea Generation

Brainstorm
what to build

Prototype

Build

Sketching & Storyboards

Based on slides by Bonnie John and Jennifer Mankoff

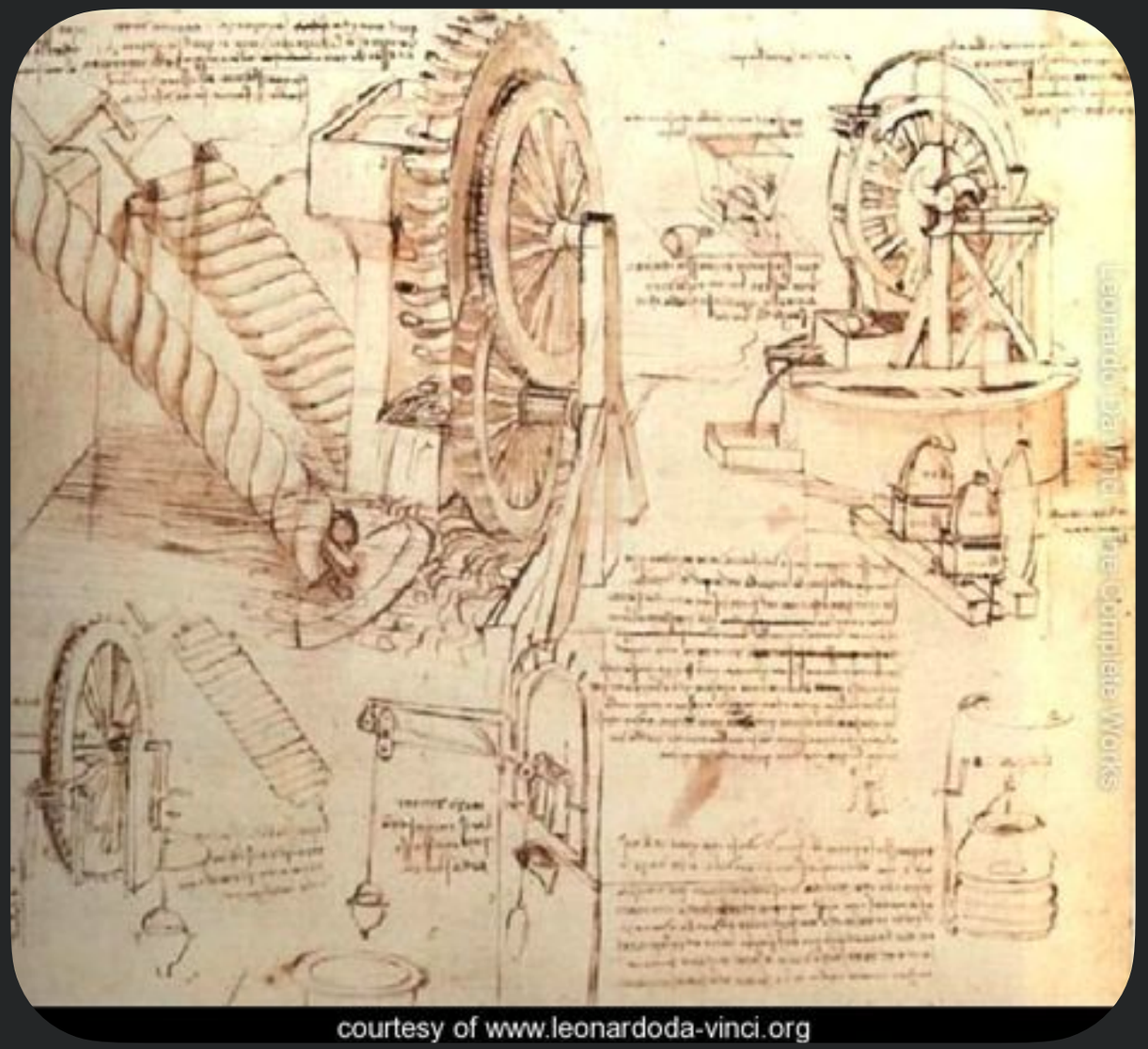
How do You Brainstorm?

What is a Sketch?

"A conversation between the sketcher or designer and the artifact"

Why Sketch?

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

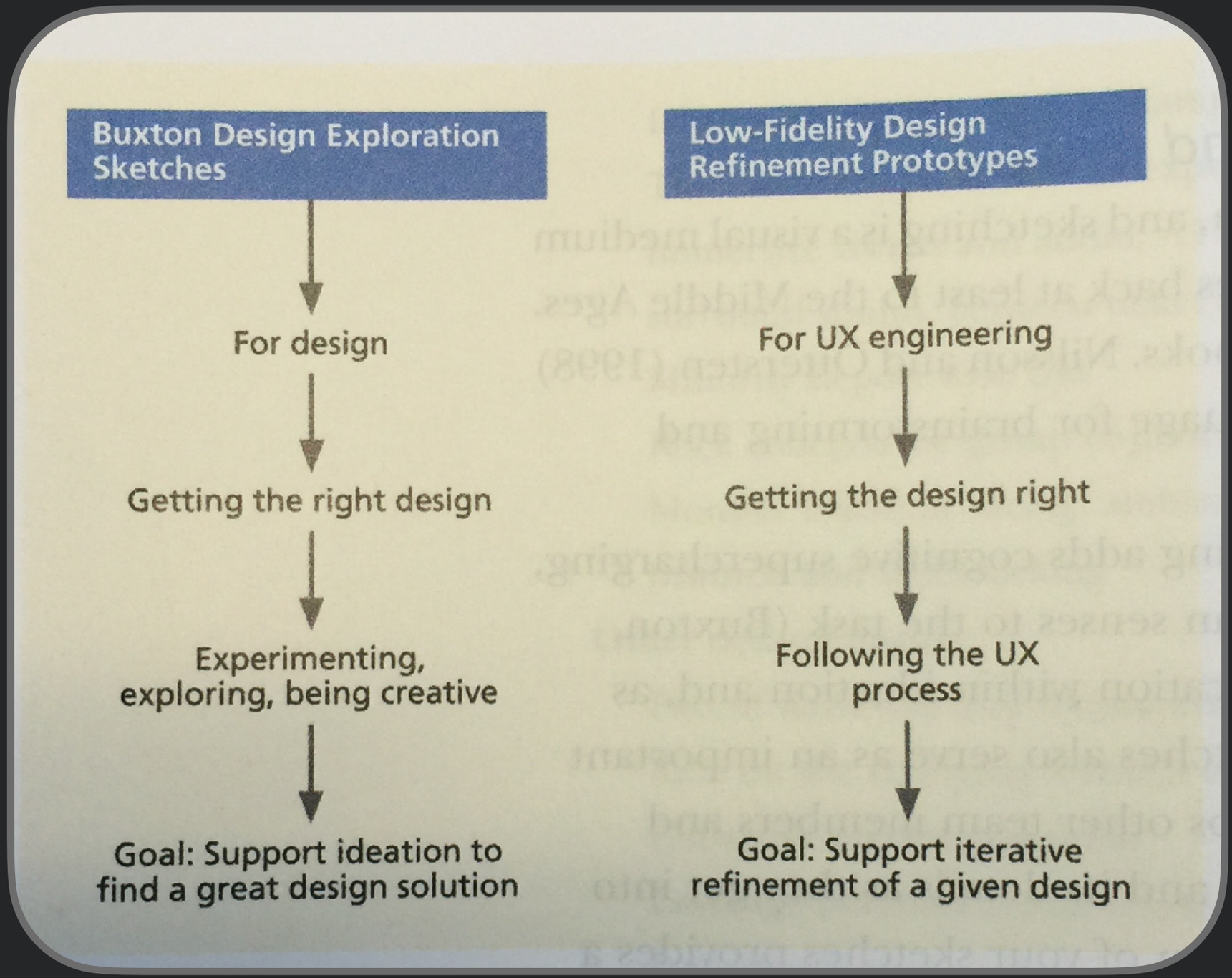


courtesy of www.leonardoda-vinci.org

Being Creative with Sketches

- How do you come up with a great idea?
  - Generate lots of ideas
  - Work through ideas through externalization in sketch
  - Critique the ideas
  - Refine them to make them better
- Sketching offers a low-cost medium for working with early ideas ***before*** committing to one
- Design is process of creation & ***exploration***

Sketching vs. Prototyping



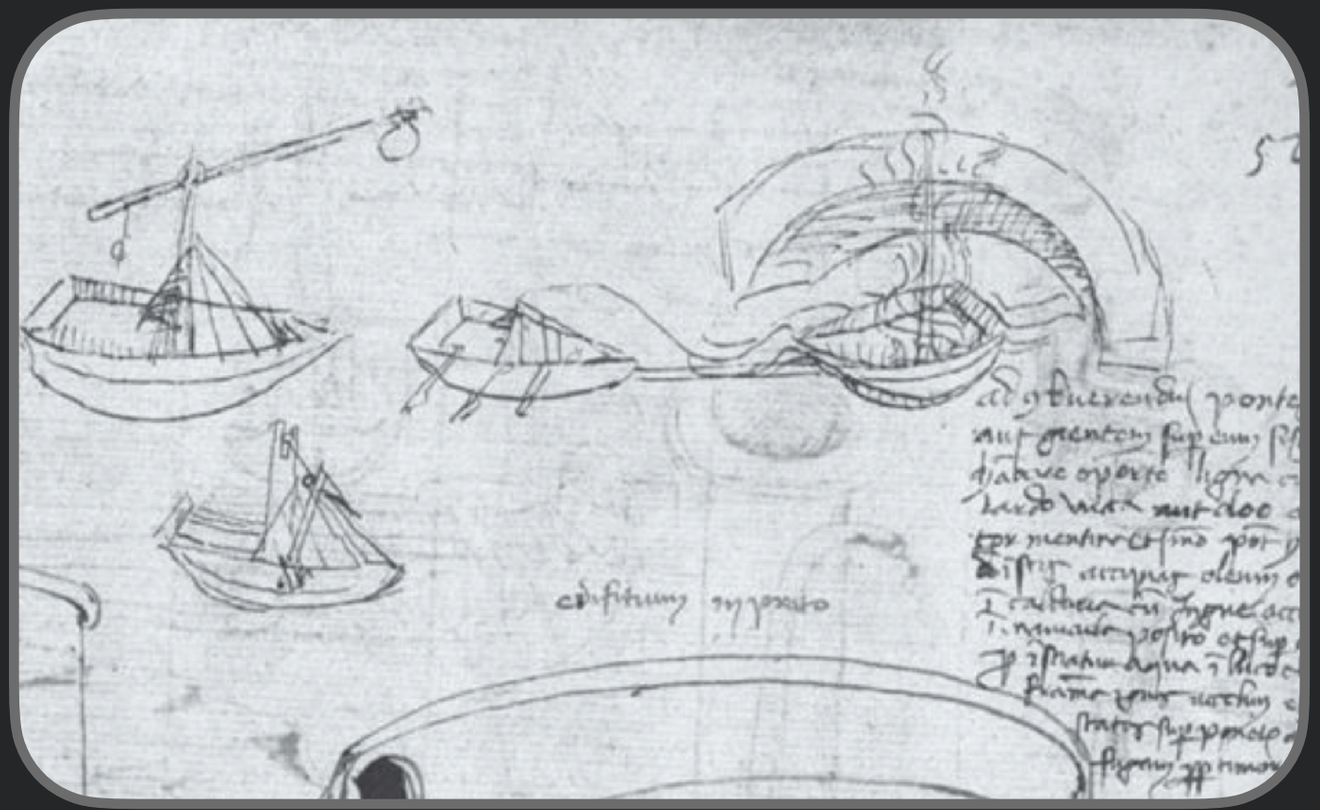
Physical Sketches

- 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 fast access for revisiting and remixing old ideas
- Facilitates group discussion of designs

Sketches are Sketchy



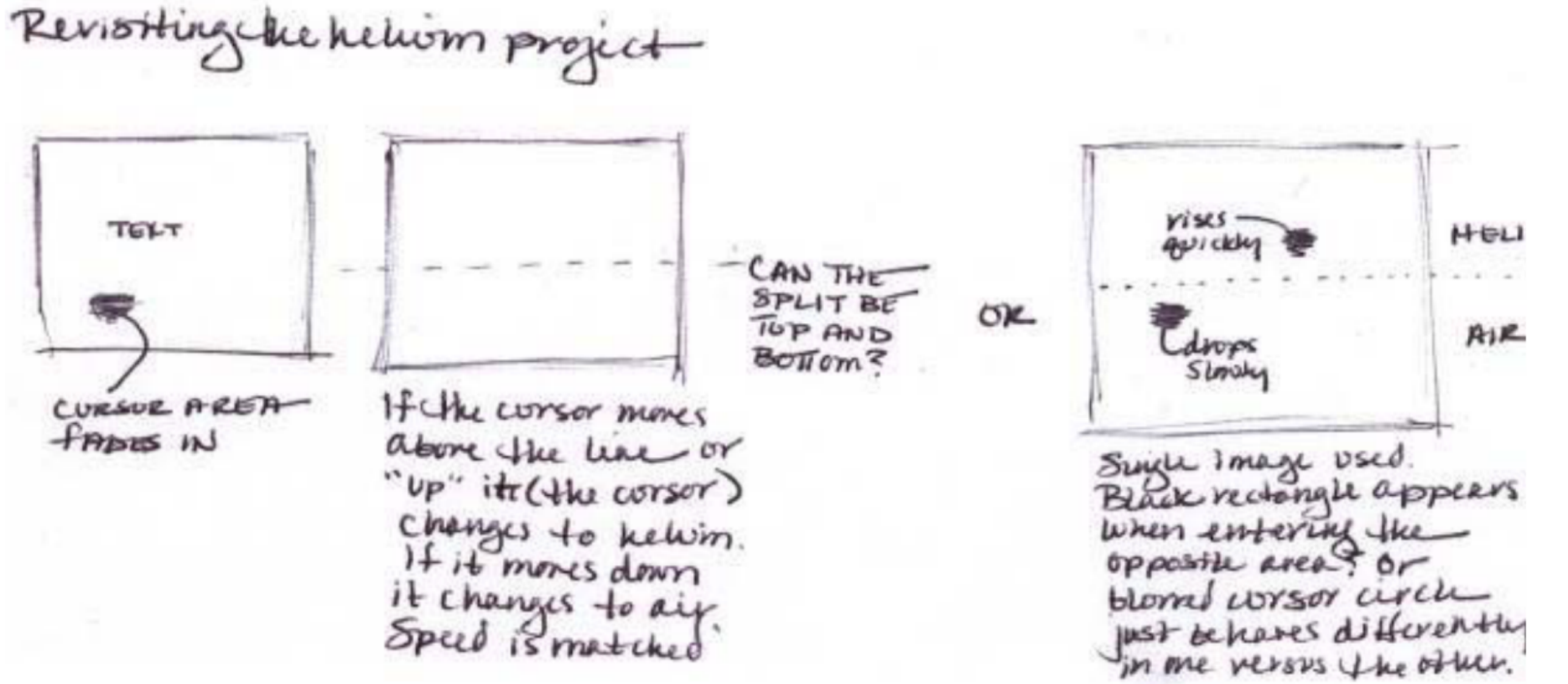
- Not mechanically correct and perfectly straight lines
- ***Freehand***, open gestures
- Strokes may miss connections
- Resolution & detail **low** enough to suggest is concept
- Deliberately ***ambiguous*** & abstract, leaving “holes” for imagination

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

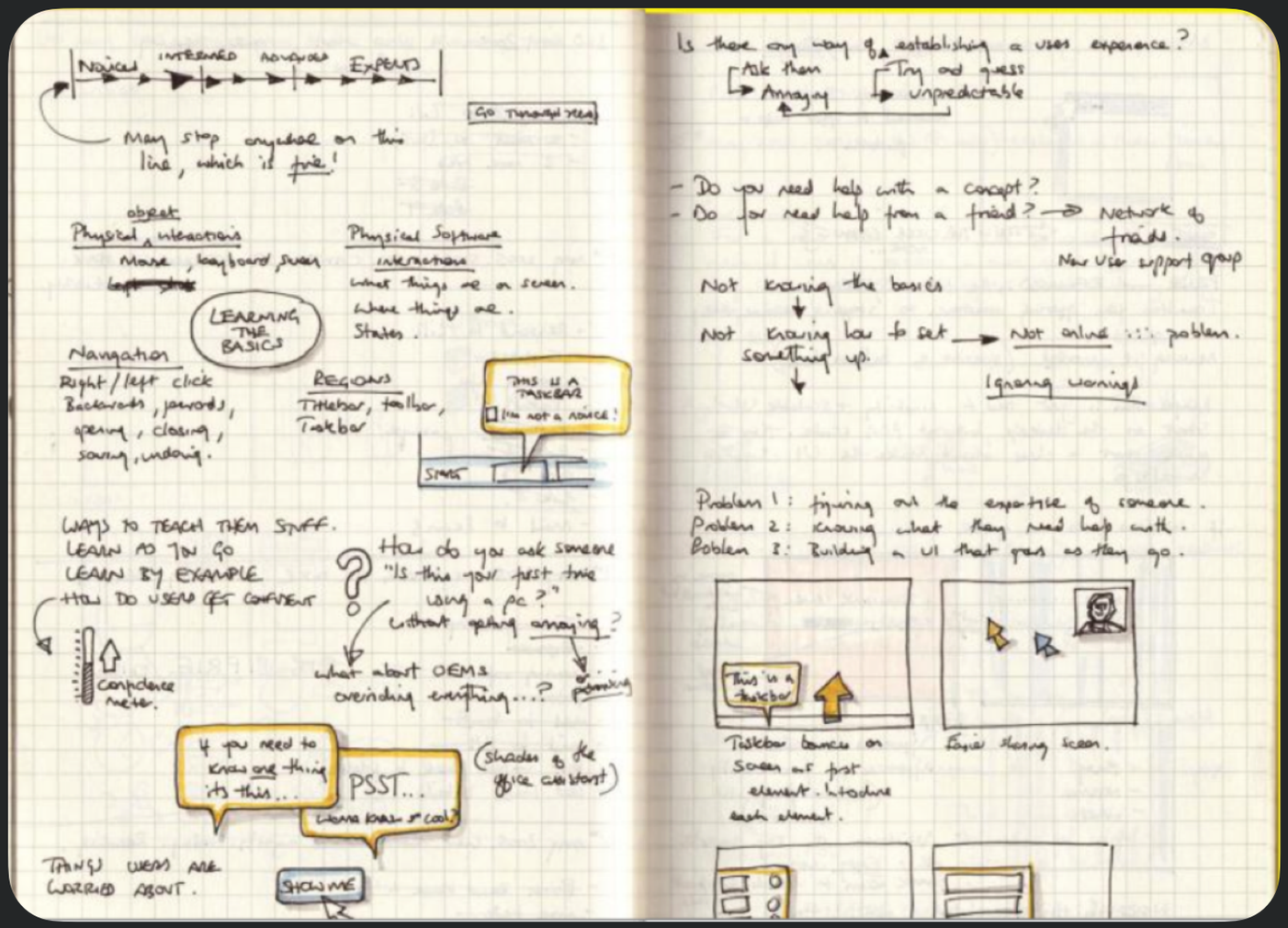
Sketches Include Annotations

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

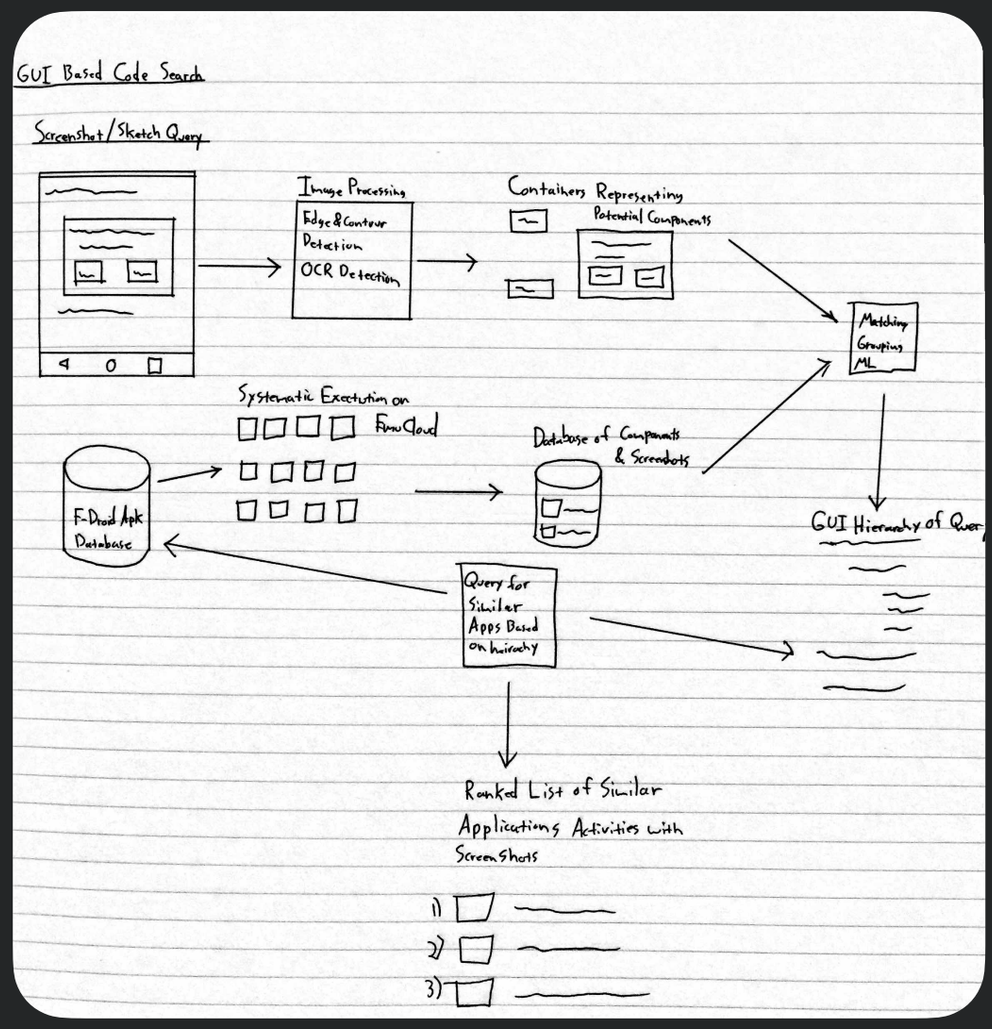


Myers et al. (2008). How Designers Design and Program Interactive Behaviors. VL/HCC 2008.

Sketches are Part of Design Exploration



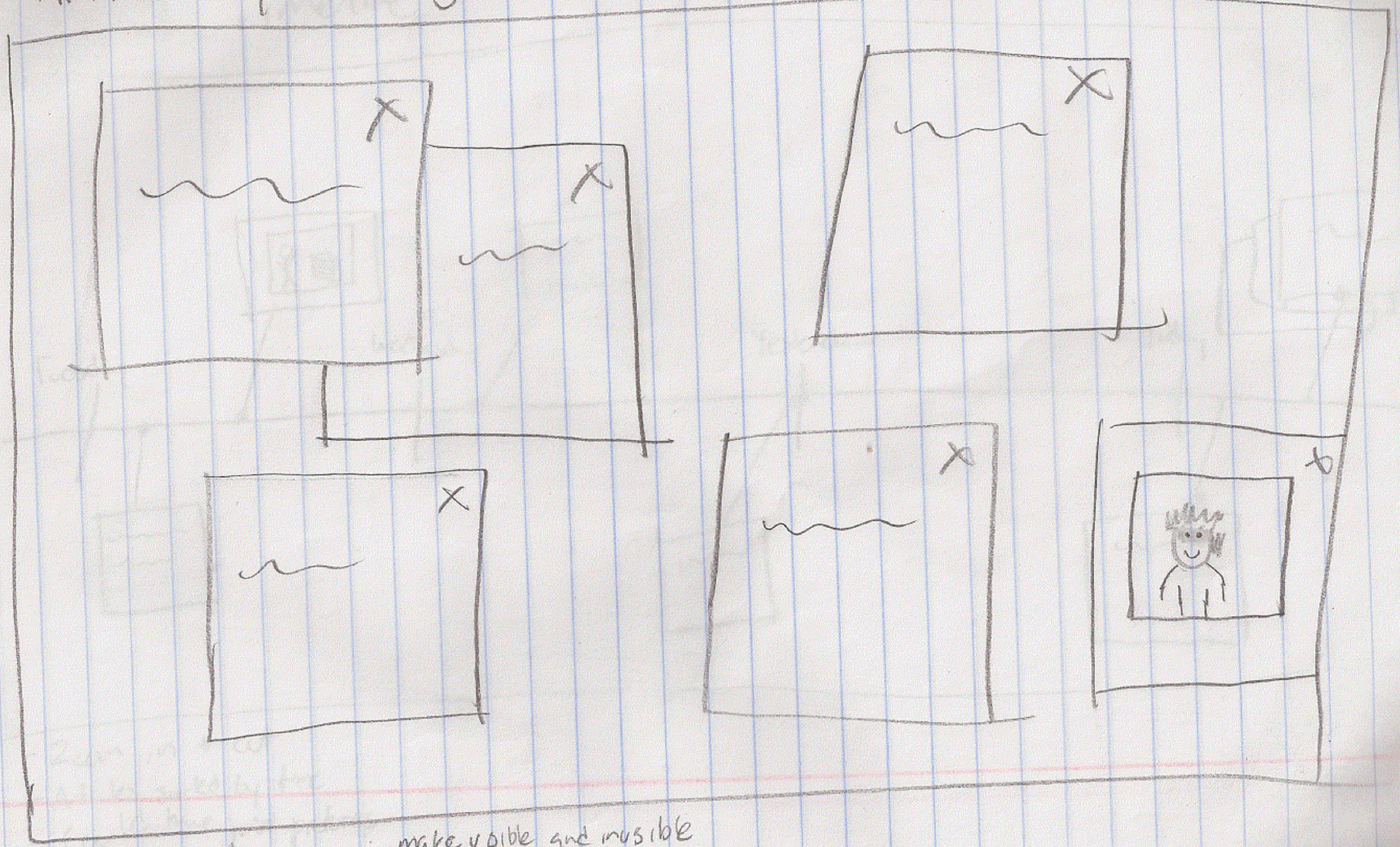
B. Buxton. Sketching User Experiences.



K. Moran, ReDraw Project Sketch

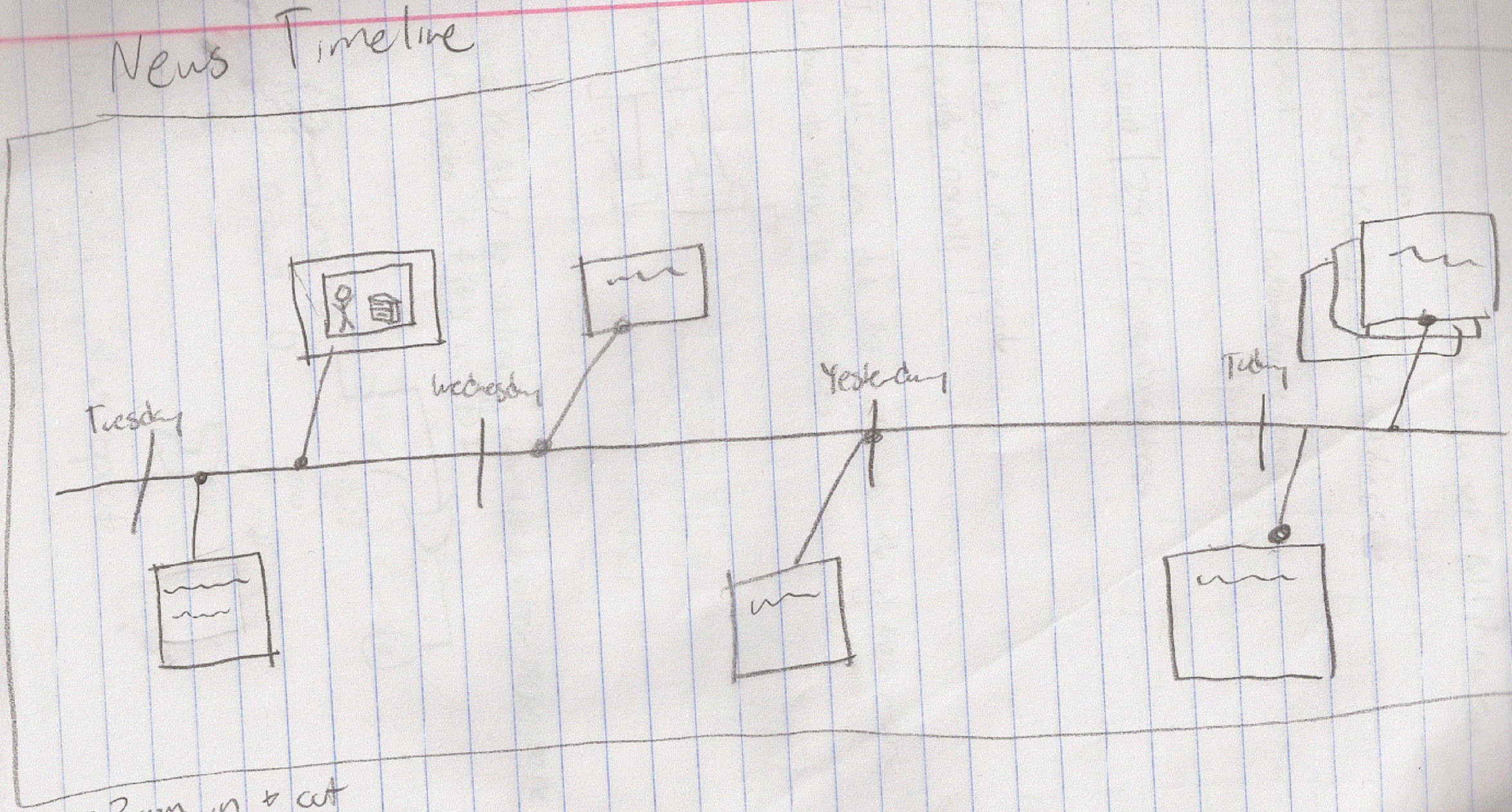
Sketching Example: News Viewer

Article Layout through moveable windows (DADA) - drag and drop articles



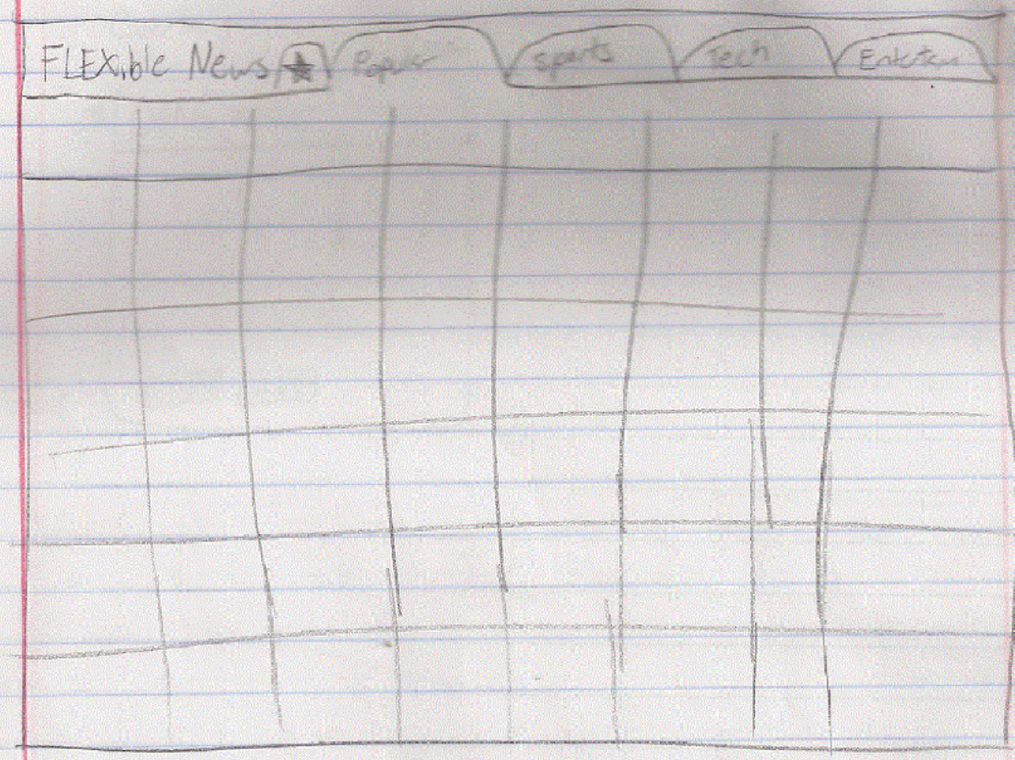
- Moveable windows
- closeable
- Layered by importance
- make visible and invisible

News Timeline

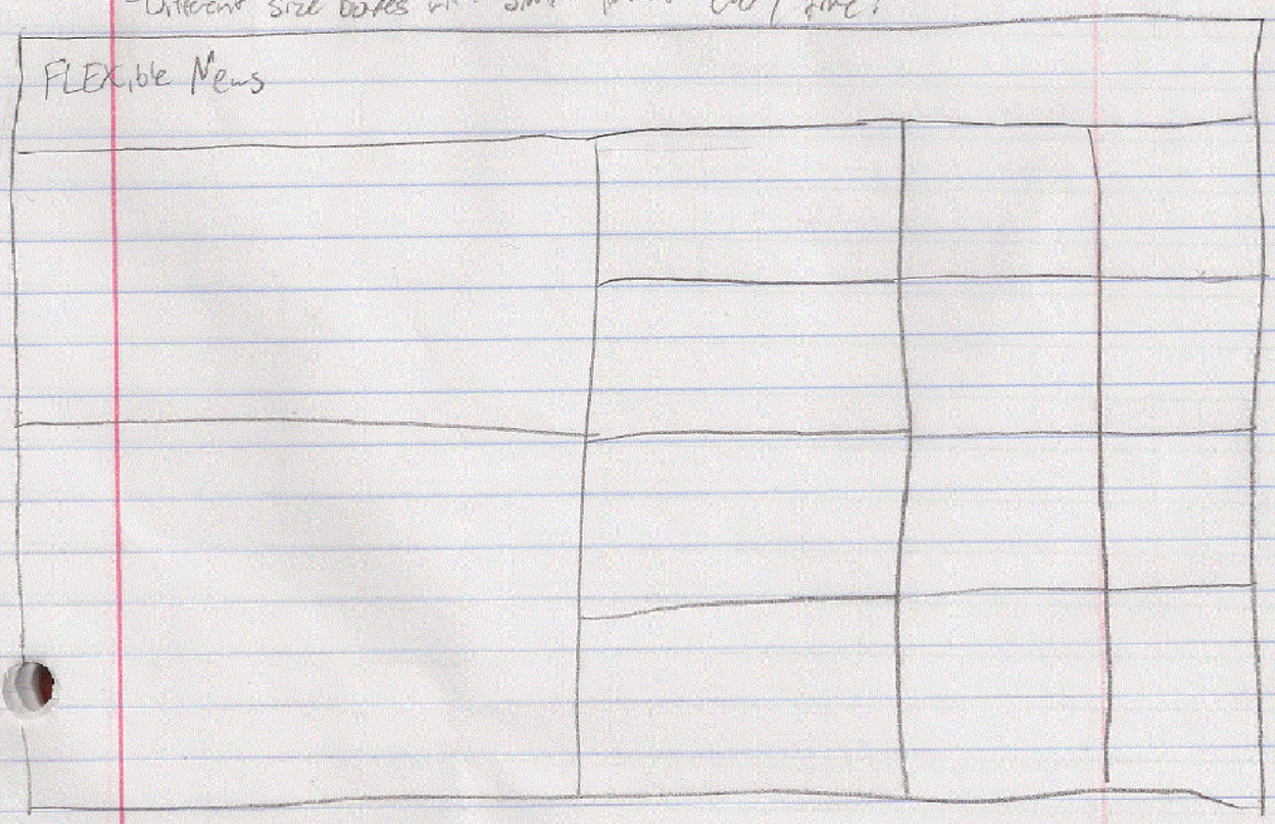


- Zoom in & out
- Articles sorted by time
- Could have just pictures

UID Wireframe



- Even boxes?
- Different size boxes with simple format every time?



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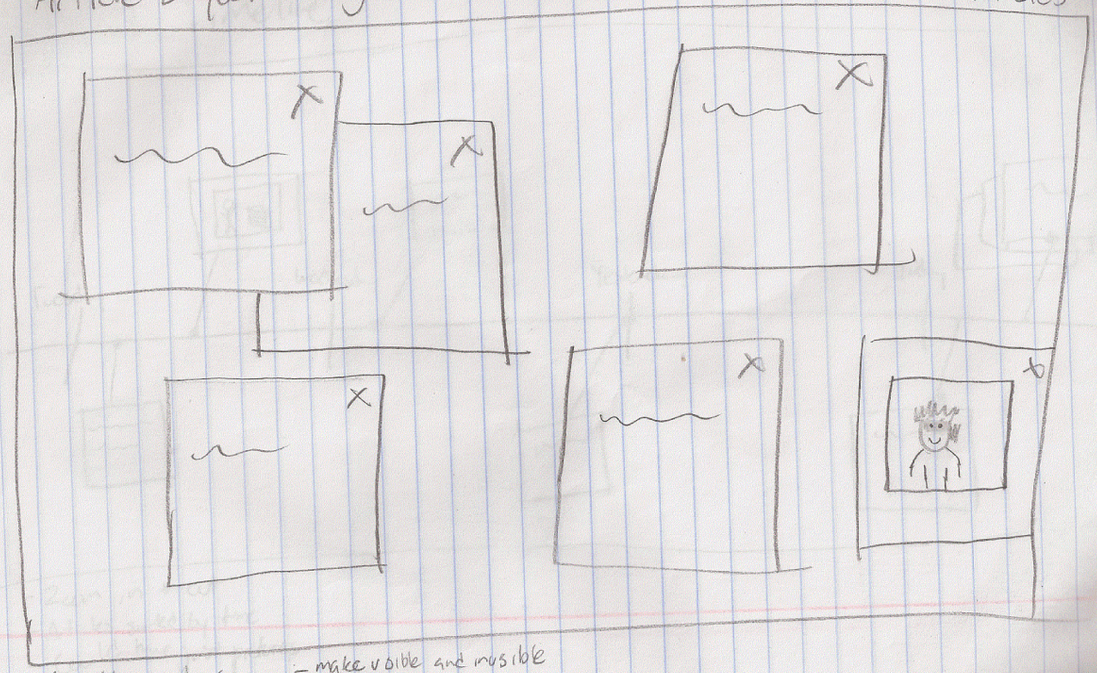

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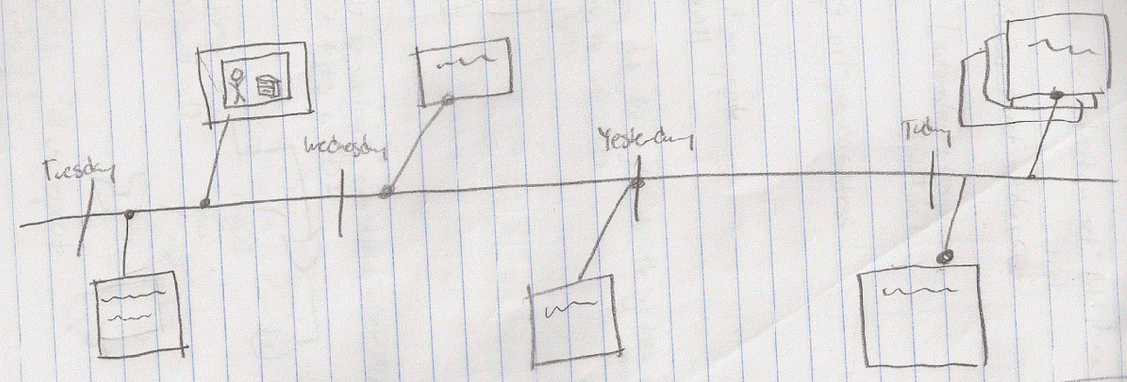

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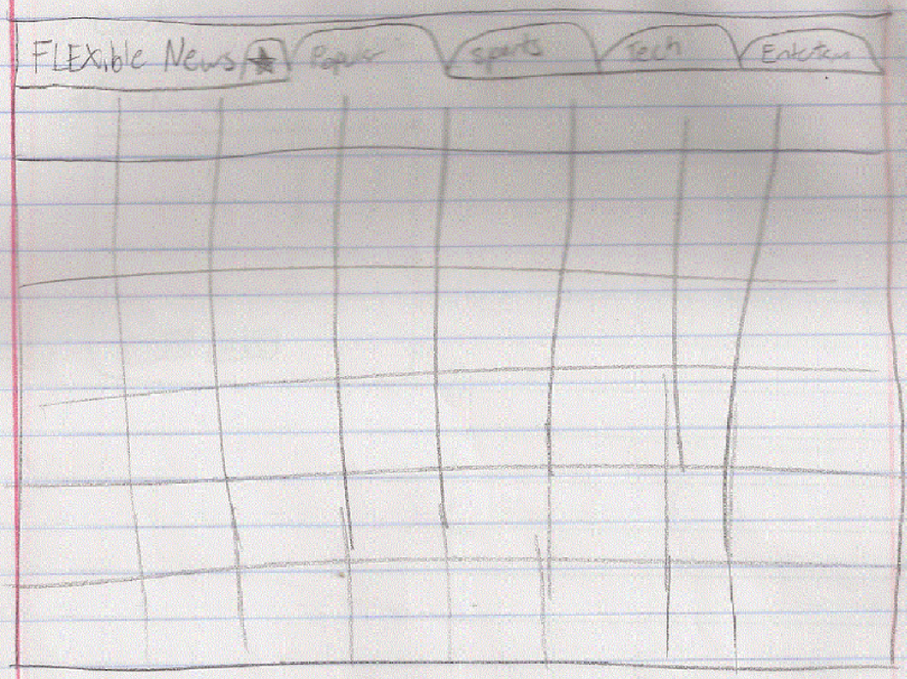
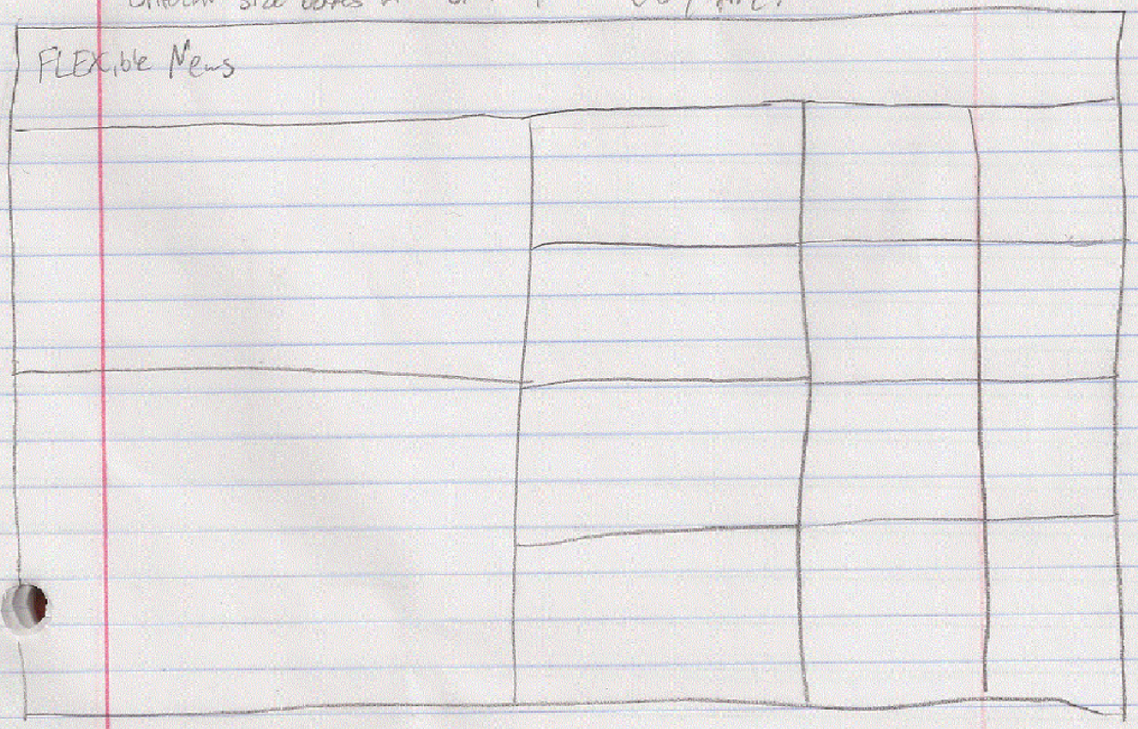
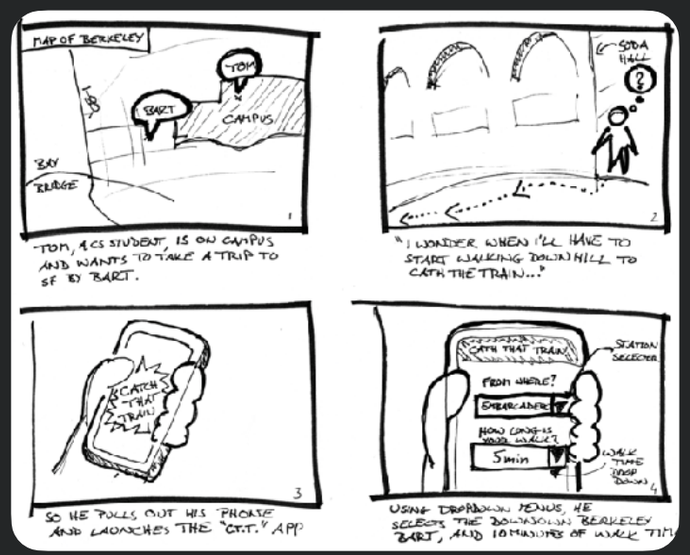


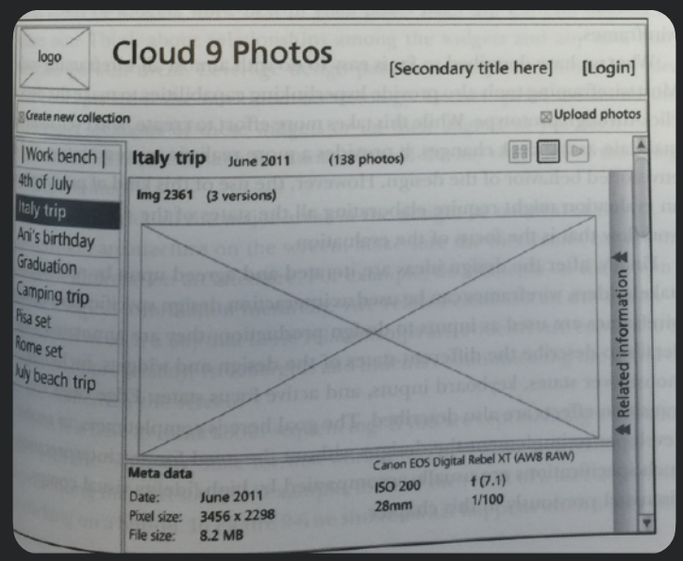
- Even boxes?
- Different size boxes with similar format every time?

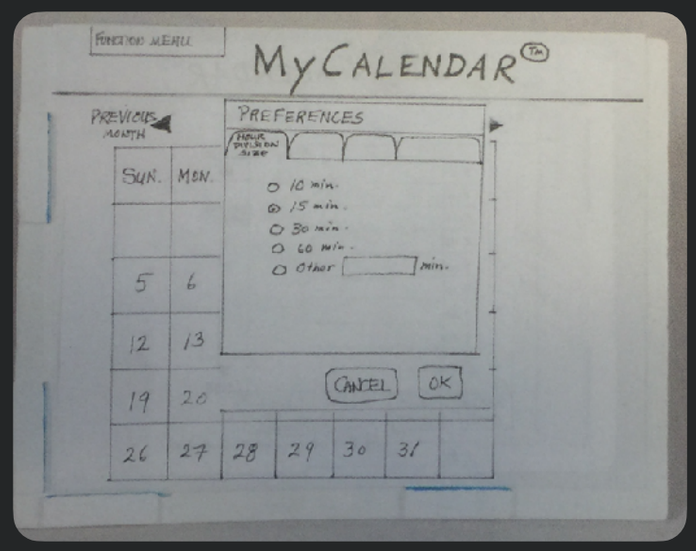


Storyboards

Fidelity of Sketches & Mockups







Storyboard —— Wireframe —— Prototype

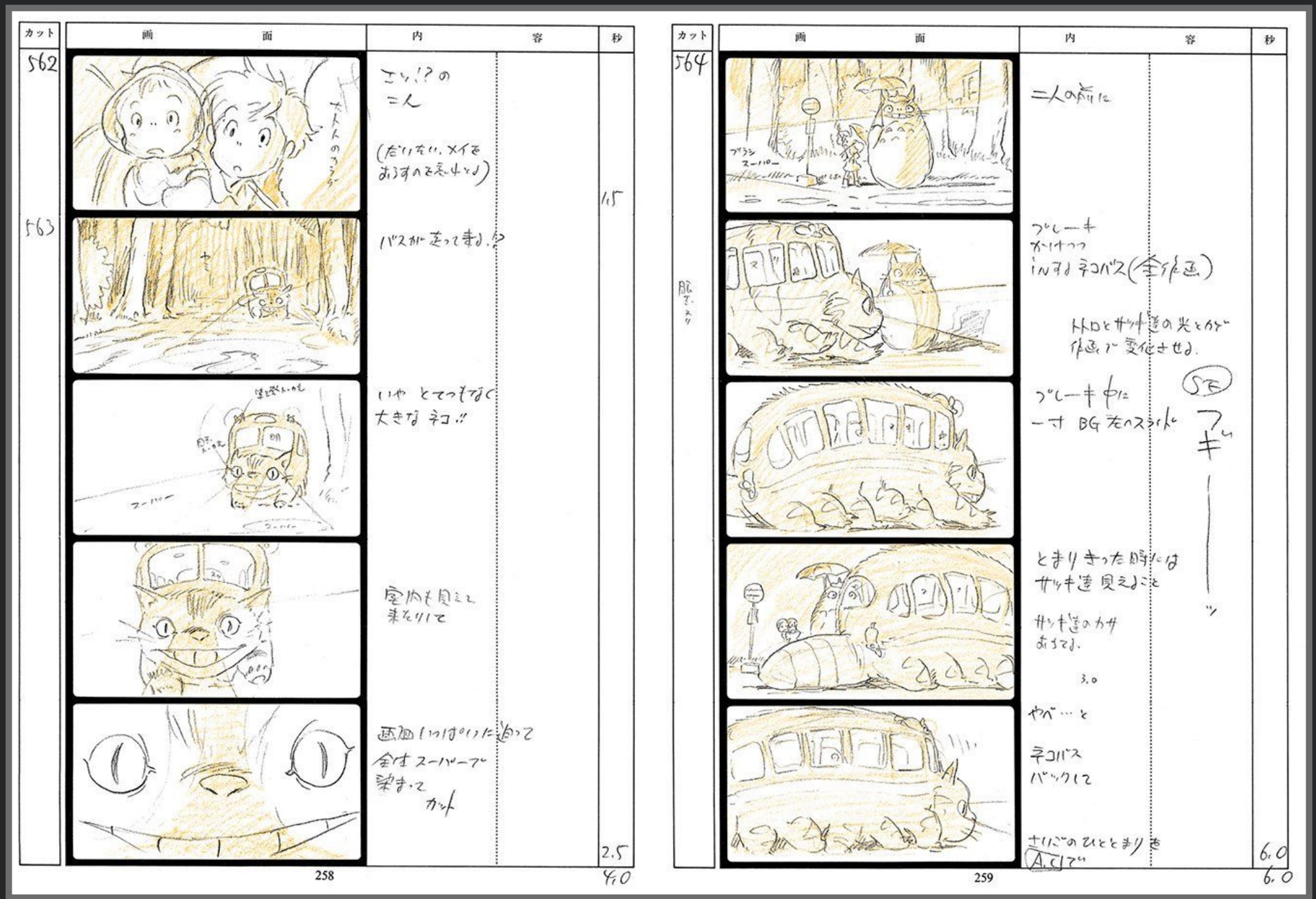
low ← → high

Fidelity

(many details left unspecified)

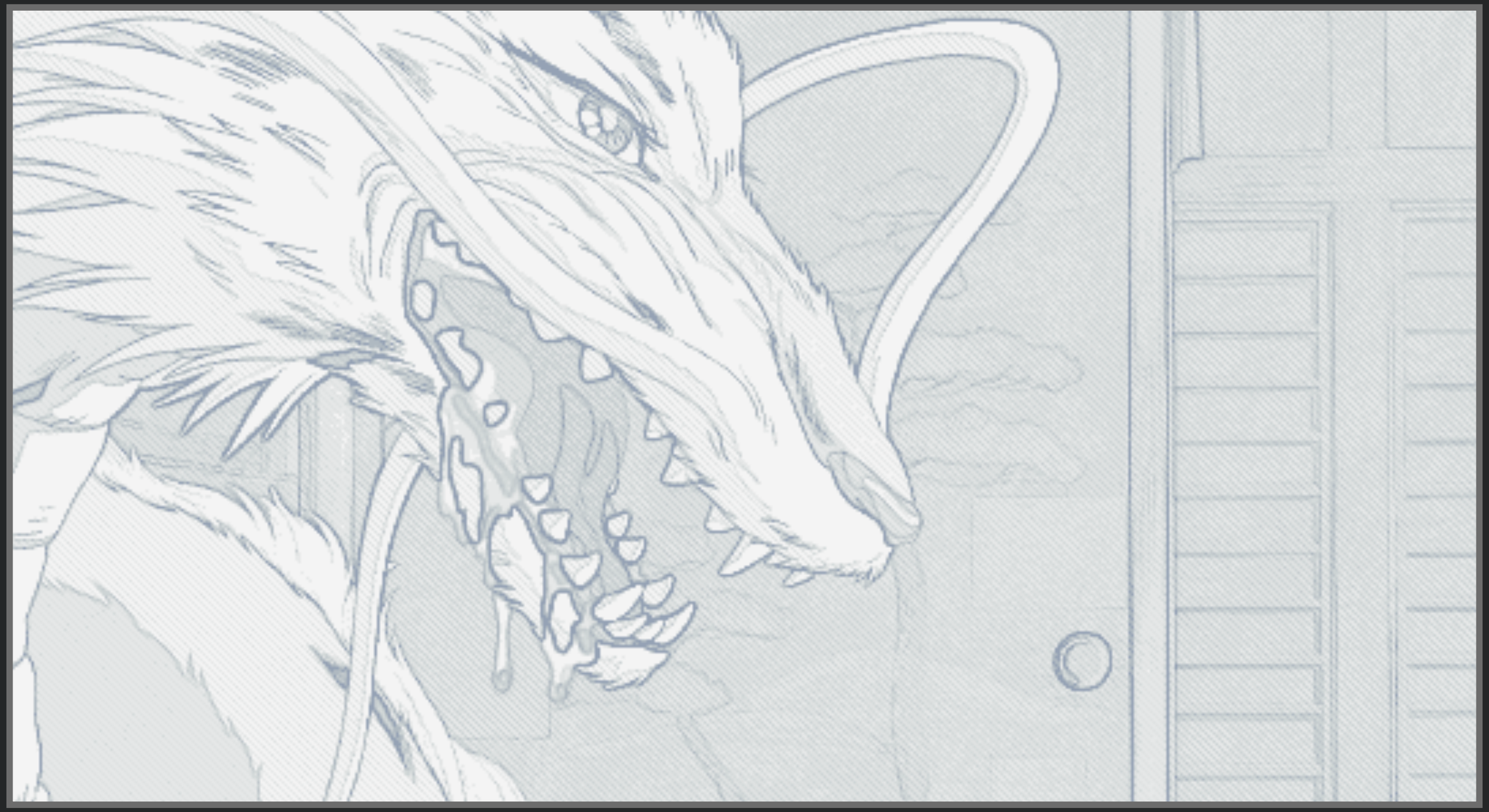
(more polished & detailed)

Classic StoryBoards



Storyboard from Studio Ghibli: *“My Neighbor Totoro”*

Classic Storyboards



Credit Studio Ghibli: *“Spirited Away”*

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

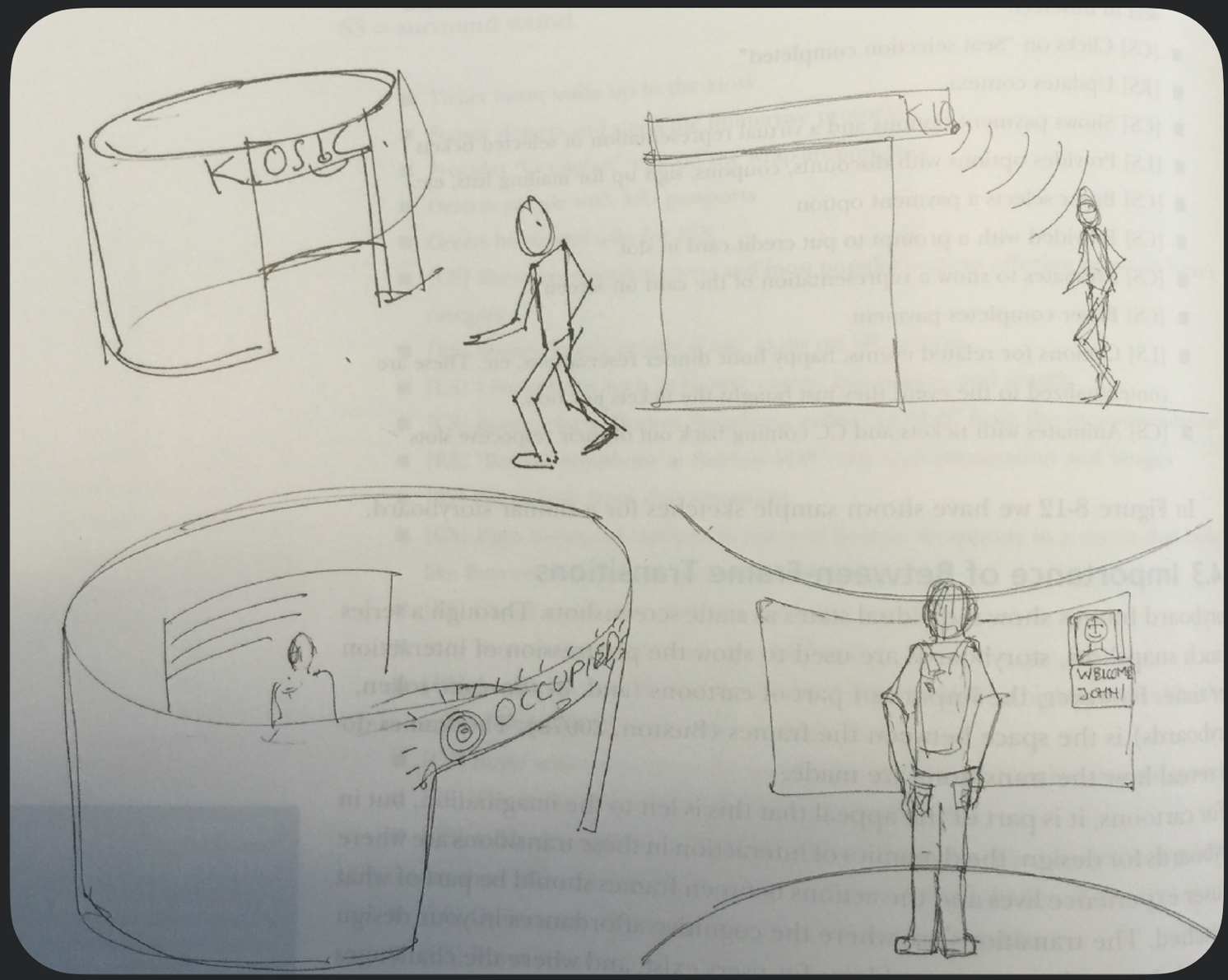
- Set the stage:
  - Who? What Where? Why? When?
- Show key interactions with application
- Show consequences of taking actions
- May also think about errors

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



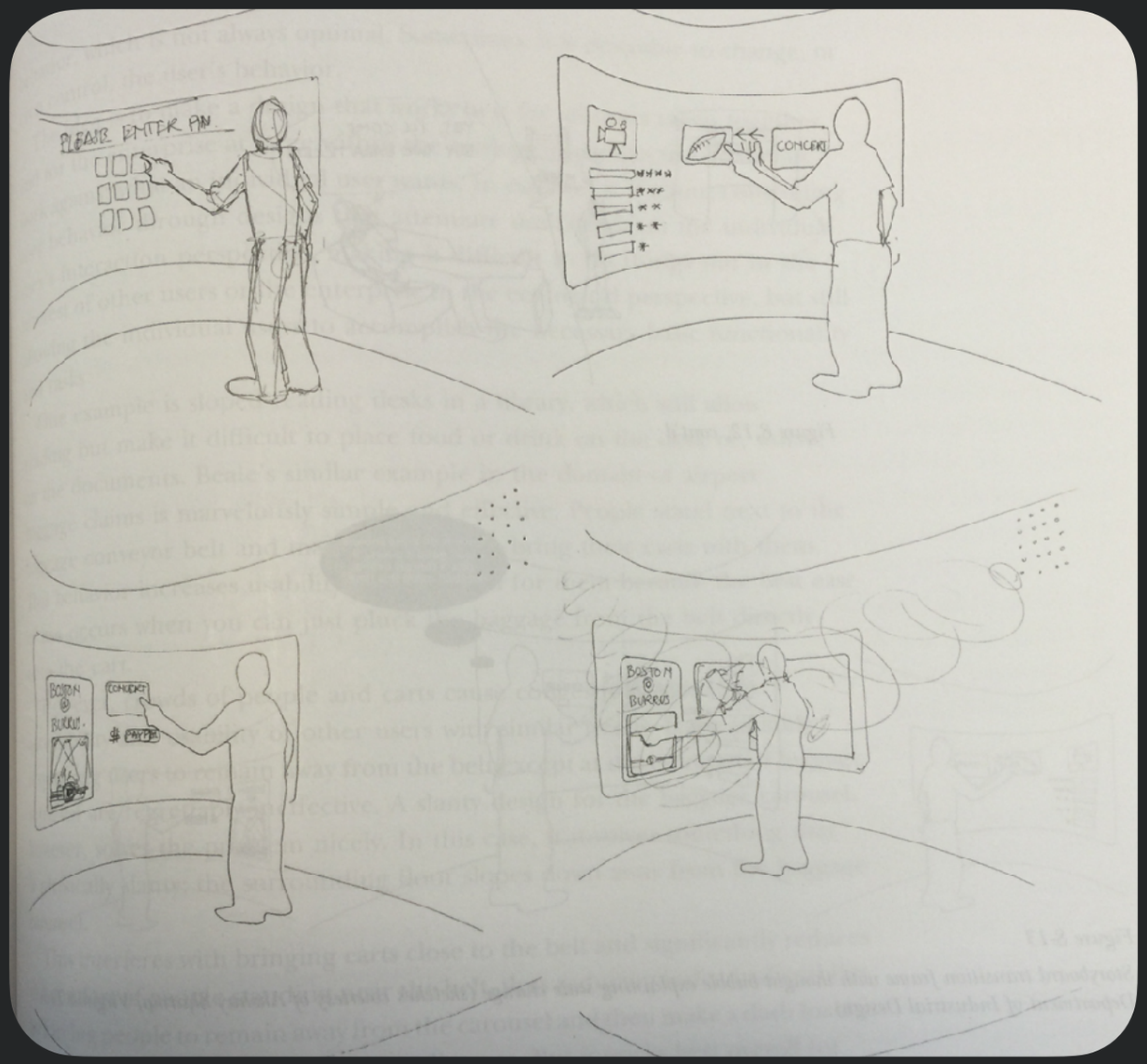
Sensor detects user & starts immersive process

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

Frame Transitions

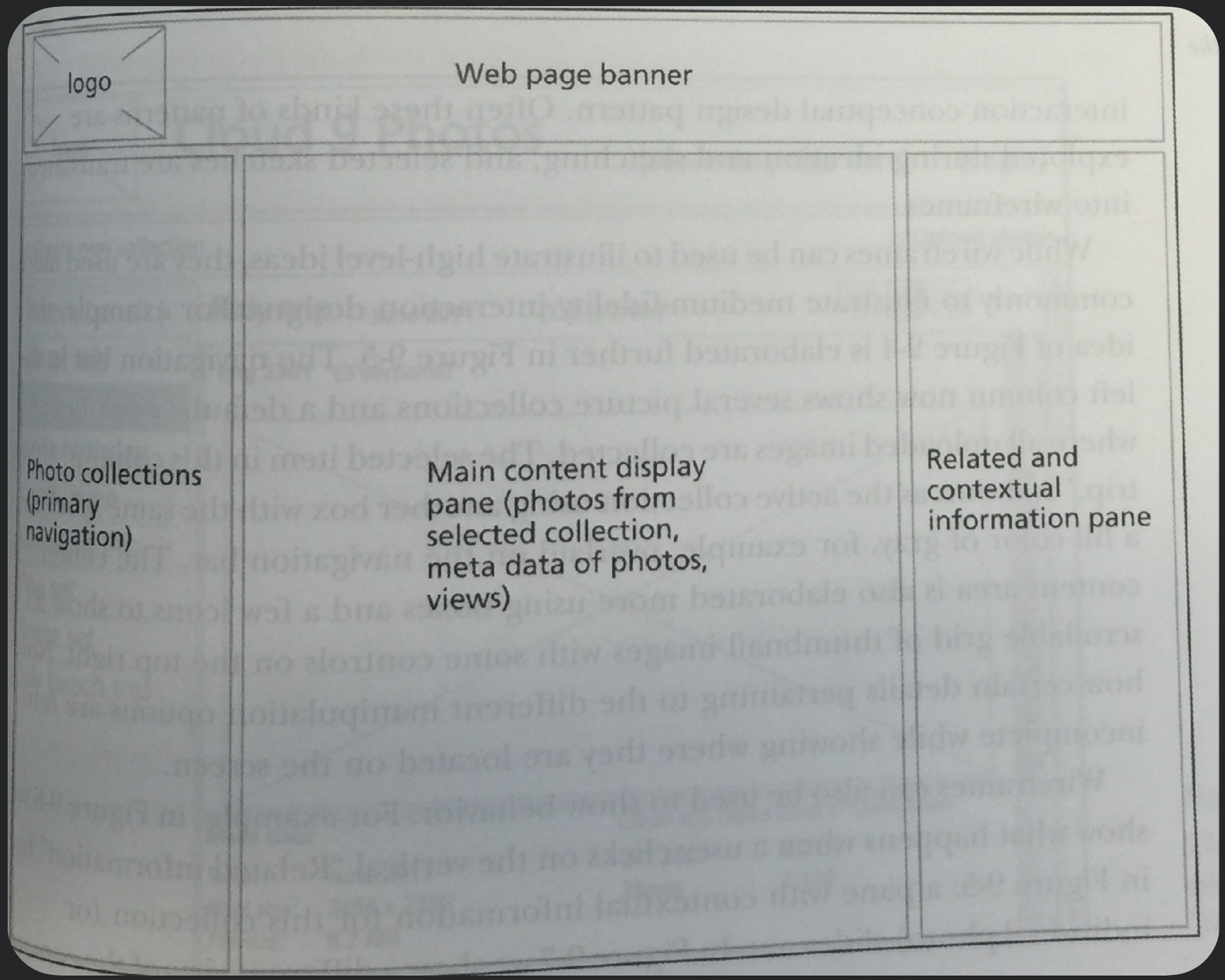
- Transitions between frames particularly important
- What users think, how users choose actions
- Many problems can occur here (e.g., gulfs of execution & evaluation) - we will talk more in a future class!
- Useful to think about how these work, can add thought bubbles to describe

Wireframes & Design Critiques

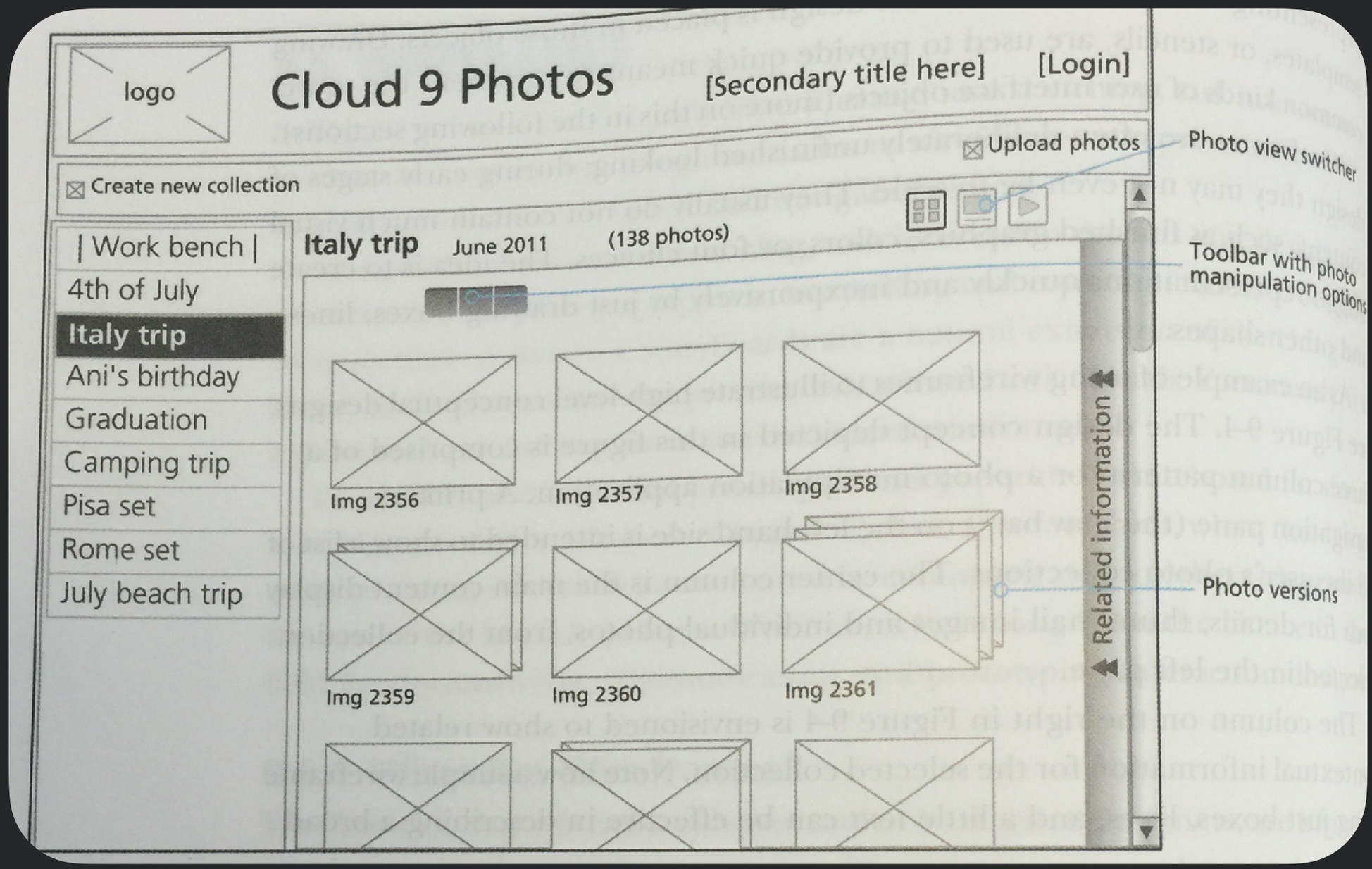
Wireframes

- 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

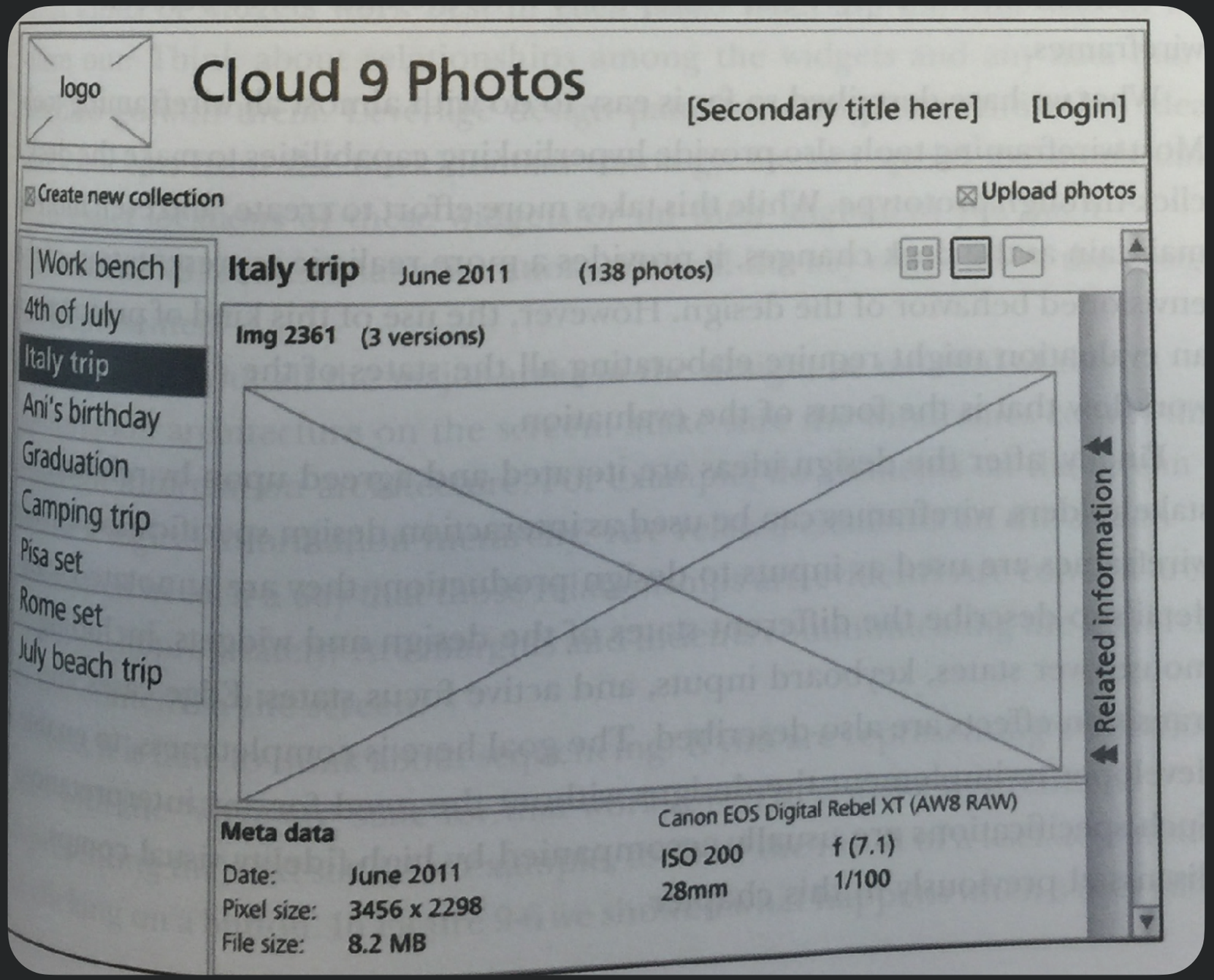
Example


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
Photo view switcher
| 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)
Toolbar with photo manipulation options
Related information
Img 2356
Img 2357
Img 2358
Img 2359
Img 2360
Img 2361
Photo versions

Example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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

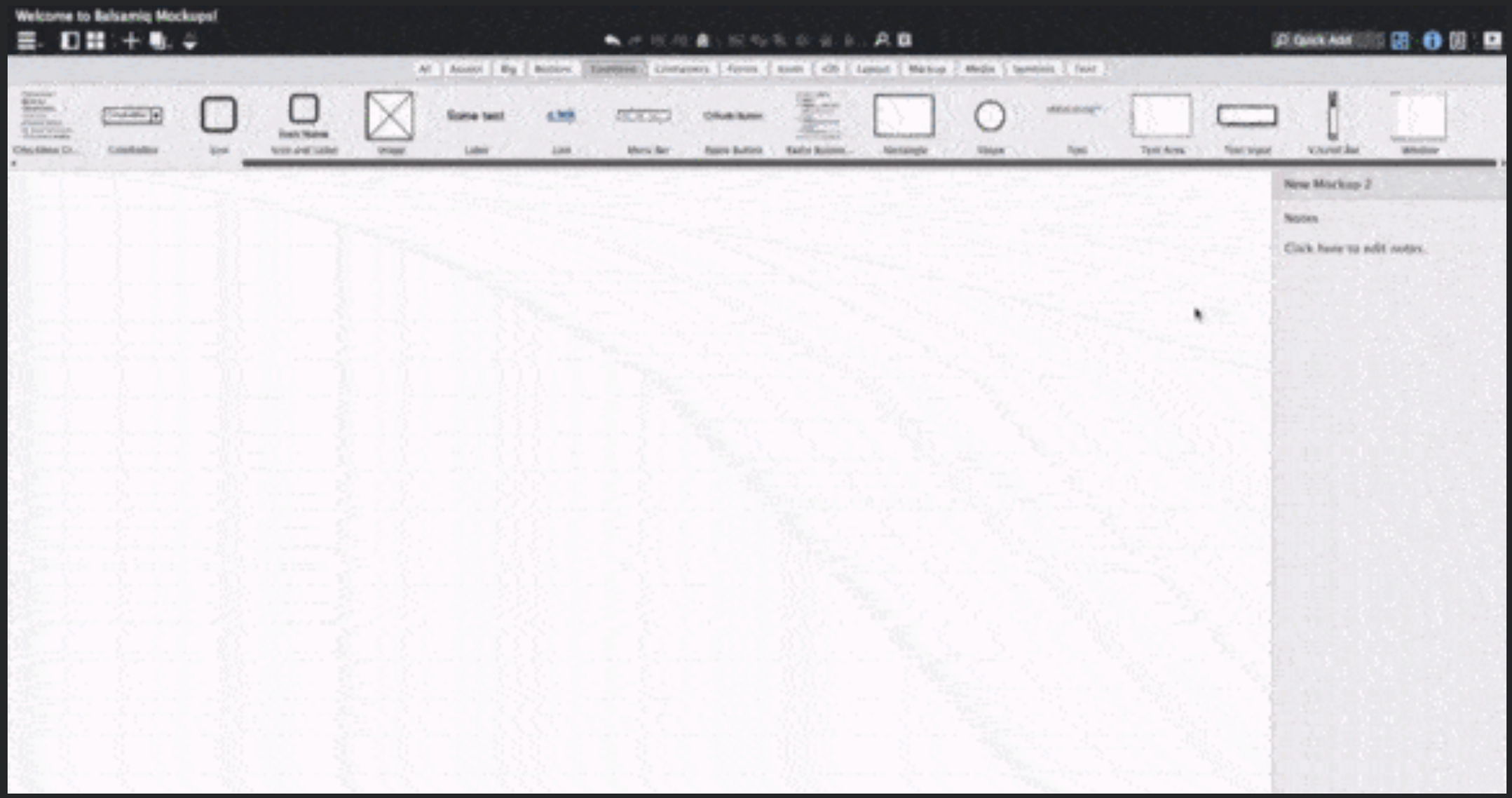
Creating a Wireframe - (1)

- 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

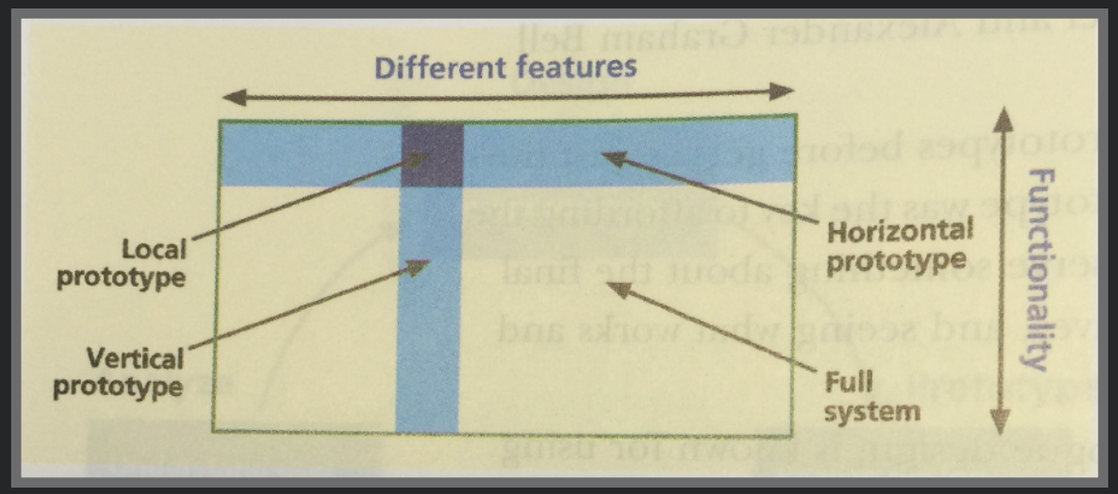


Prototyping

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

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

In Class Activity

Group activity

- In groups of 2/3:
  - *Part 1: Apply Heuristics to a website (e.g., Word, Twitter)*
    - Work individually to identify at least 1 usability issue
    - For each issue, identify the heuristic, identify the functionality in the application, and summarize how the heuristic is violated in a few sentences
    - Use Online Google Document shared on Ed
  - *Part 2: Design an improved version of the site/app you chose*
    - Start with a specific set of user needs identified
    - Create Wireframe design of a new system that addresses the users' needs
    - Build a series of at least 2 wireframe "pages" supporting one scenario for the app.
    - Use draw.io folder shared on Ed.

Acknowledgements

- Slides adapted from Dr. Thomas Latoza's SWE 432 course