Sketching and Prototyping

SWE 432, Fall 2019

Design and Implementation of Software for the Web

GEORGE MASON UNIVERSITY

Review: What usability is not

- Not “dummy proofing”
- Not being “user-friendly”
- Not just “usability testing”
- Not just making software pretty

Review: Heuristics

1. Visibility of system status
2. Match between system and the real world
3. User control and freedom
4. Consistency and standards
5. Error prevention
6. Recognition vs. recall
7. Flexibility and efficiency of use
8. Aesthetic and minimalist design
9. Help users recognize, diagnose, and recover from errors
10. Help and documentation

Review: Heuristic Example

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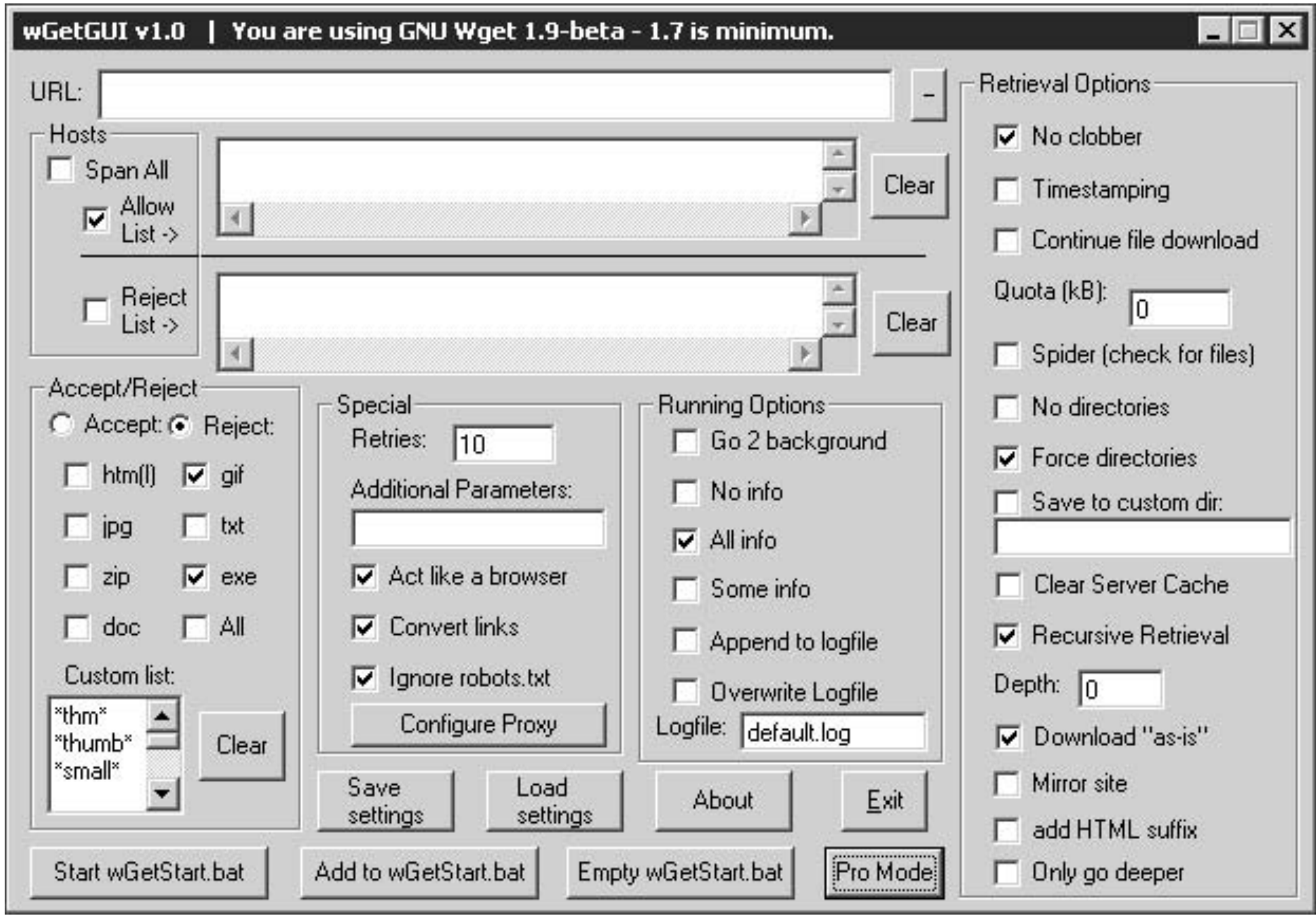

wGetGUI v1.0 | You are using GNU Wget 1.9-beta - 1.7 is minimum.

URL:

Hosts
[ ] Span All
[✓] Allow List ->
[ ] Reject List ->

Accept/Reject
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thm
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Special
Retries: 10
Additional Parameters:
[✓] Act like a browser
[✓] Convert links
[✓] Ignore robots.txt

Running Options
[ ] Go 2 background
[ ] No info
[✓] All info
[ ] Some info
[ ] Append to logfile
[ ] Overwrite Logfile
Logfile: default.log

Retrieval Options
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[ ] Timestamping
[ ] Continue file download
Quota (kB): 0
[ ] Spider (check for files)
[ ] No directories
[✓] Force directories
[ ] Save to custom dir:
[ ] Clear Server Cache
[✓] Recursive Retrieval
Depth: 0
[✓] Download "as-is"
[ ] Mirror site
[ ] add HTML suffix
[ ] Only go deeper

Today

- More on heuristic evaluation
- How do we set ourselves up to build good interfaces from the start?
- What is the iterative process by which we start out with a lot of ideas, and end up with some good, end result interface?

For further reading on the case study:
https://dl.acm.org/citation.cfm?id=143055

Example

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2. Match between system and the real world
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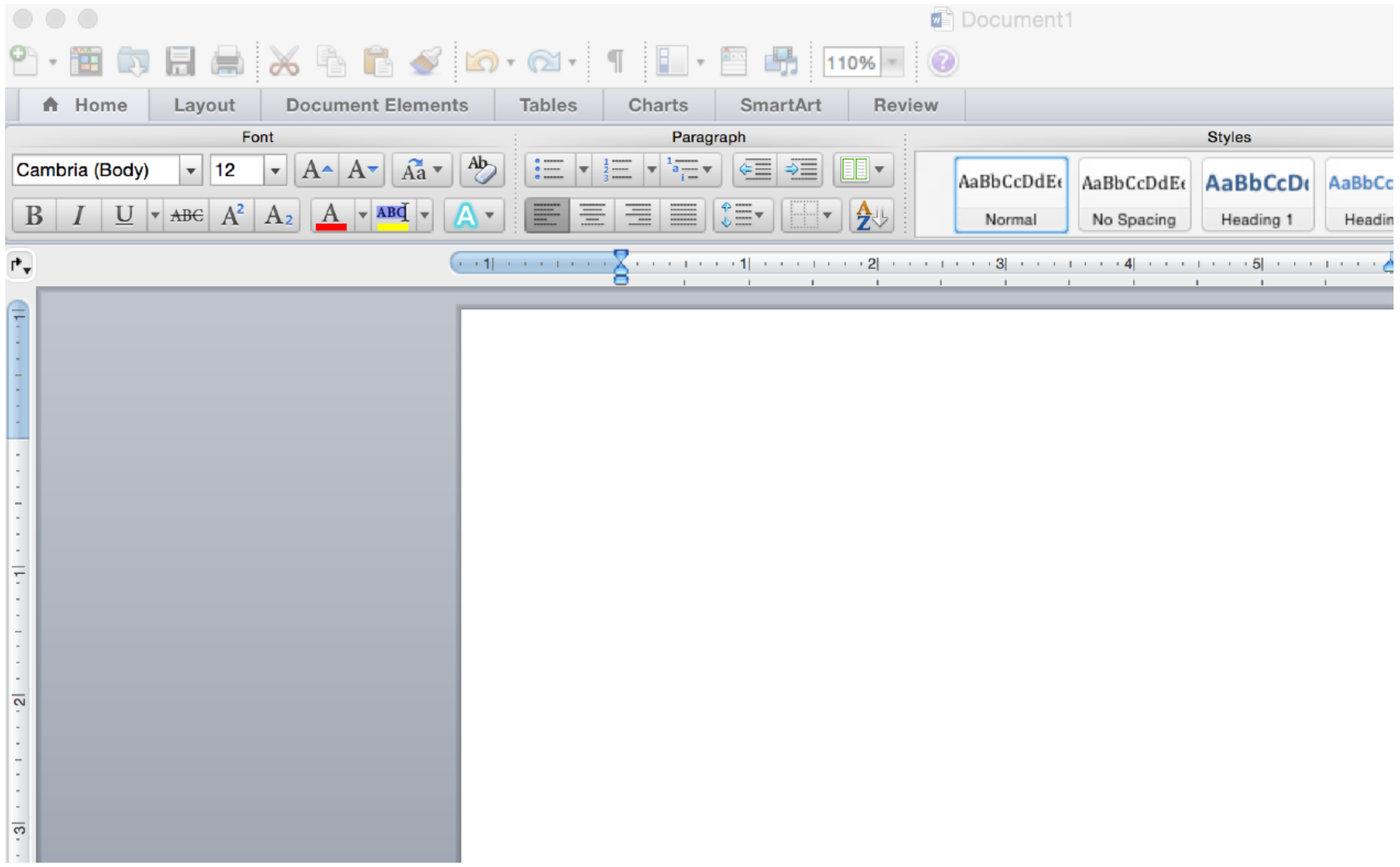

In class activity

- Form groups of 2
- Together select an application or website (e.g., Word, Twitter)
- Work individually identify at least 3 usability issues
- For each issue, identify the heuristic, identify the functionality in the application, and summarize how the heuristic is violated.

Heuristics

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Using heuristic evaluation

- Can be used informally to identify issues in a website
- Can be used as a more formal usability inspection method
- Evaluators each first separately identify issues
- Issues then combined from each evaluator

Heuristic evaluation in groups

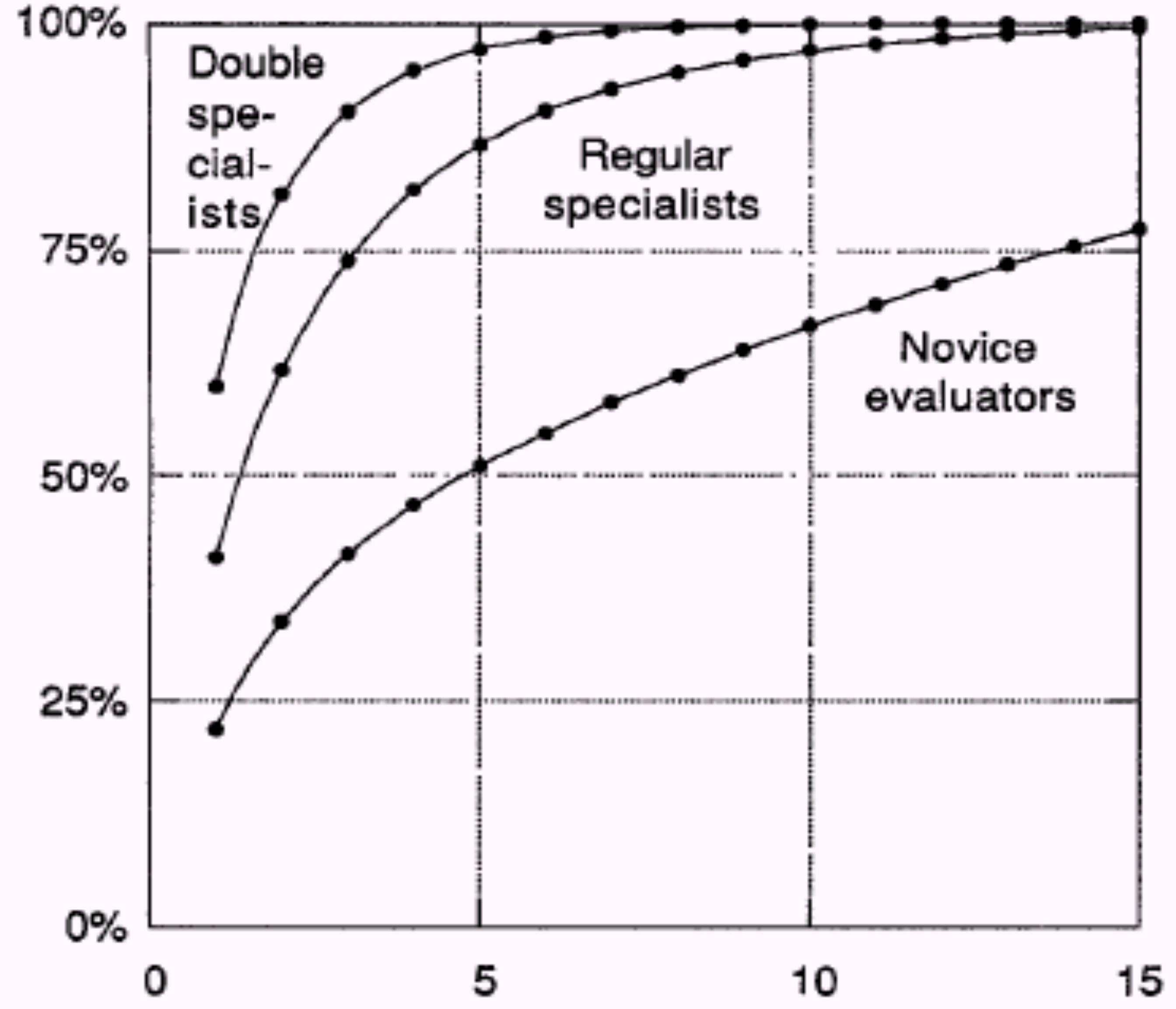


Figure 2 *Average proportion of usability problems found as a function of number of evaluators in a group performing the heuristic evaluation.*

Advantages of HE

- "Discount usability engineering" - Intimidation low
- Don't need to identify tasks, activities
- Can identify some fairly obvious fixes
- Can expose problems user testing doesn't expose
- Provides a language for justifying usability recommendations

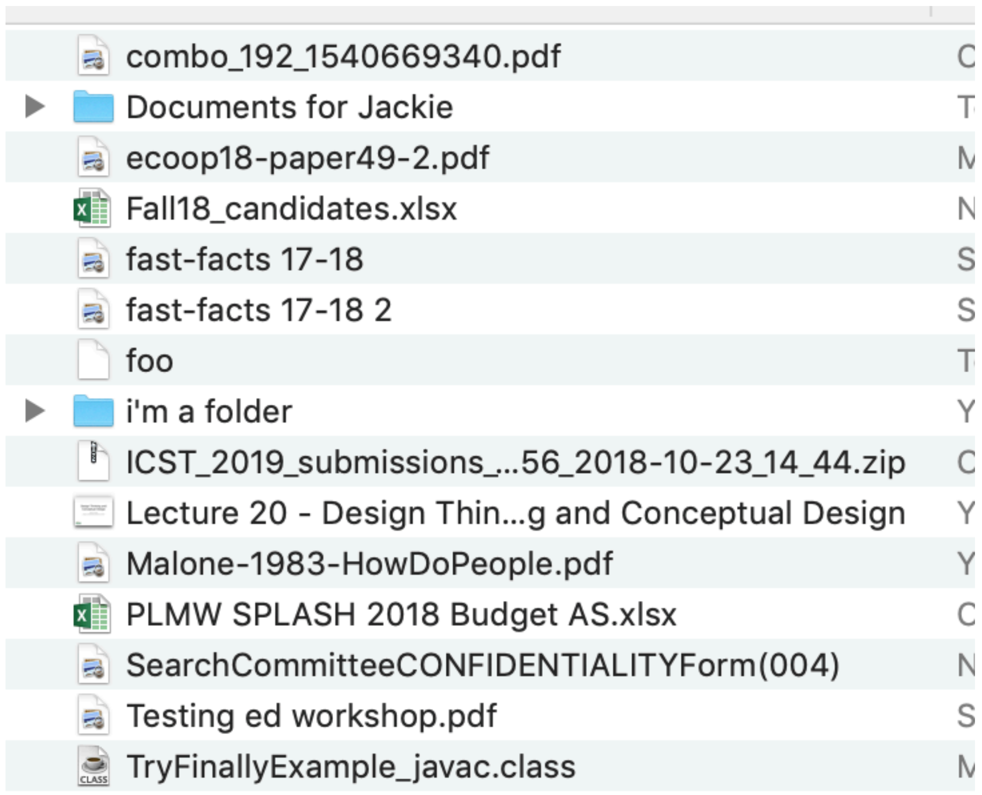
Disadvantages of HE

- Un-validated
- Do not employ real users
- Can be error prone
- Better to use usability experts
- Problems unconnected with tasks
- Heuristics may be hard to apply to new technology

Ways to use HE

- Early in design process to catch major issues
- When time or resources are not available for empirical usability evaluation

Different designs for the same problem



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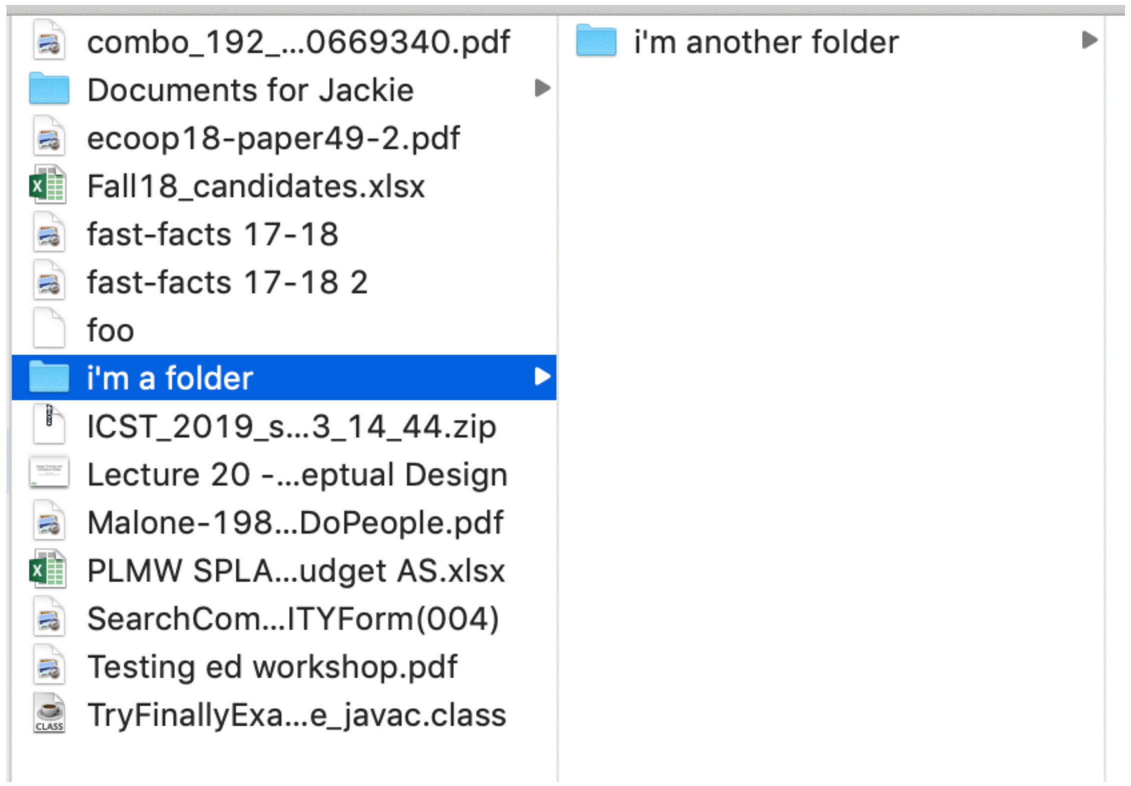
Testing ed workshop.pdf	S
TryFinallyExample_javac.class	M



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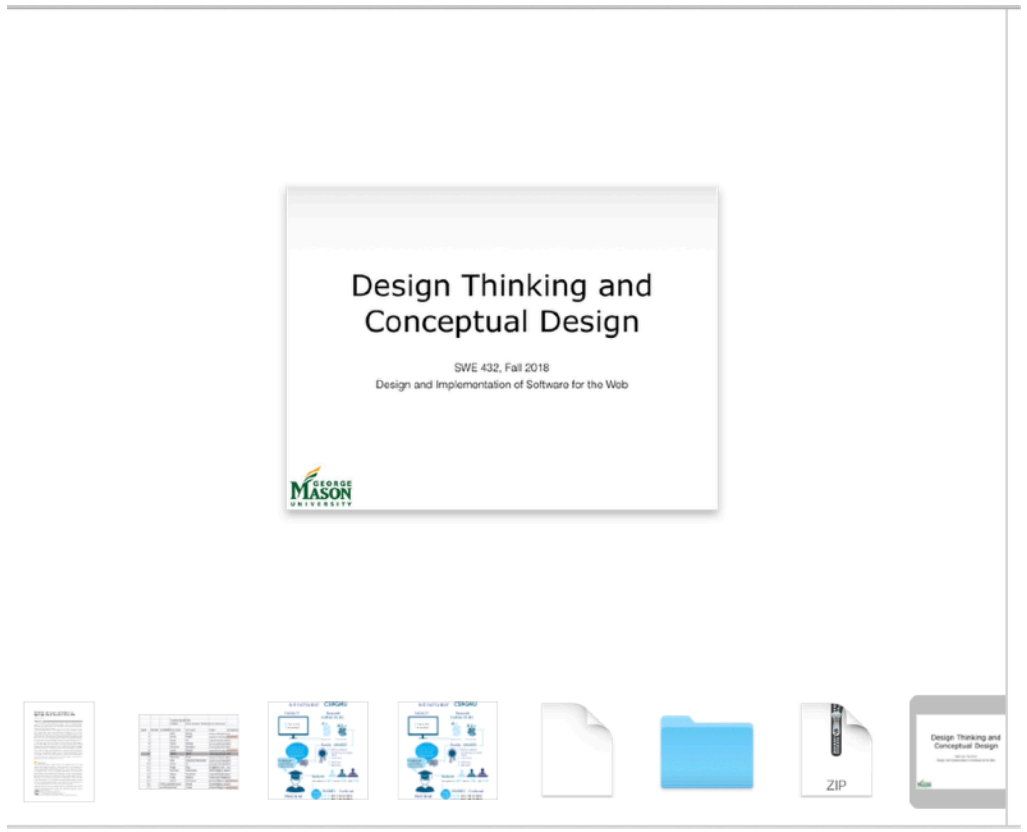

Design Thinking and Conceptual Design

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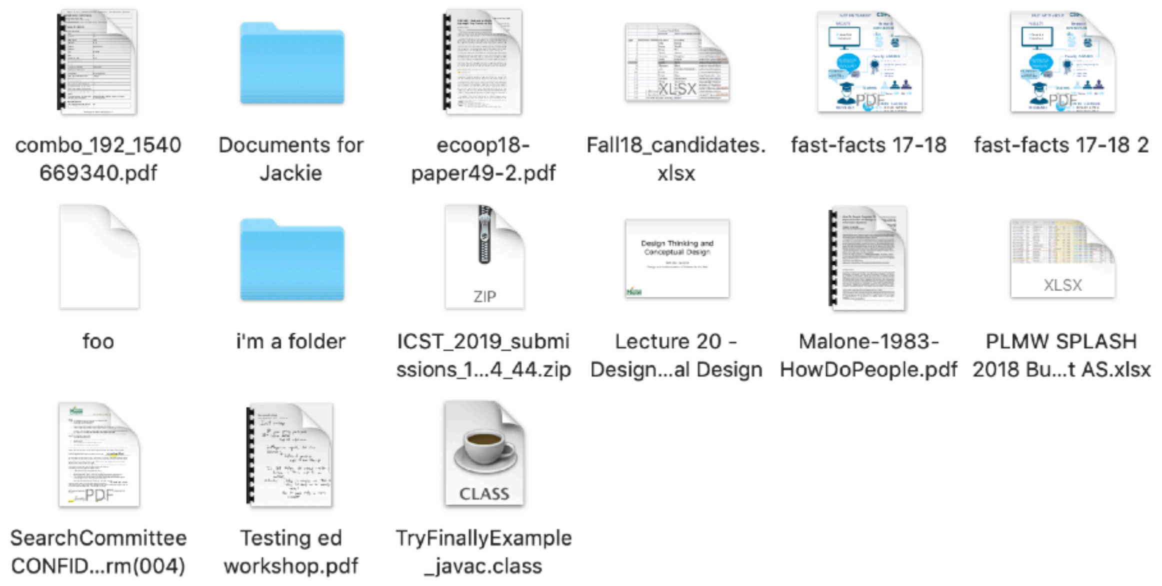

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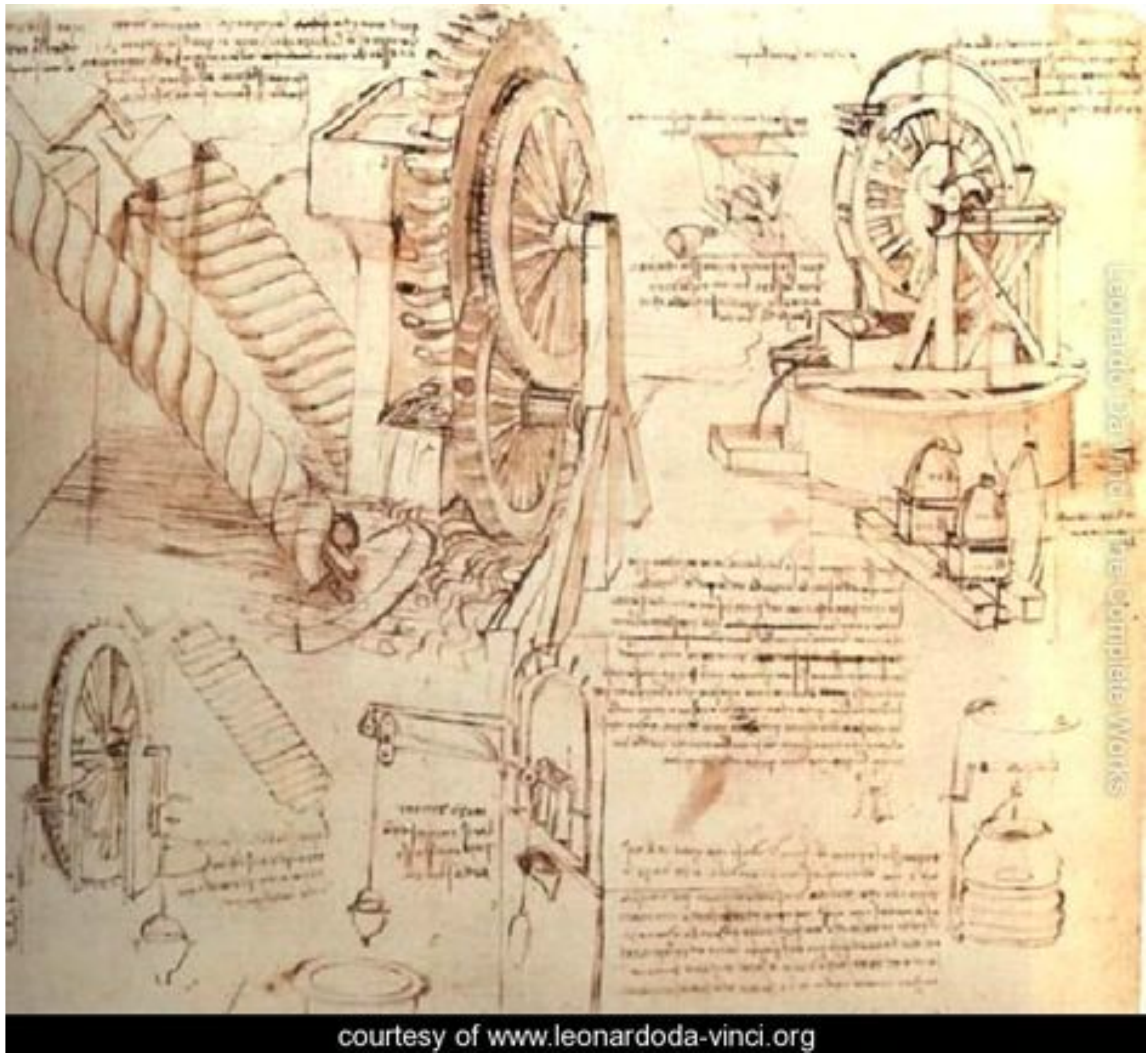
TryFinallyExample_javac.class

Why sketch?

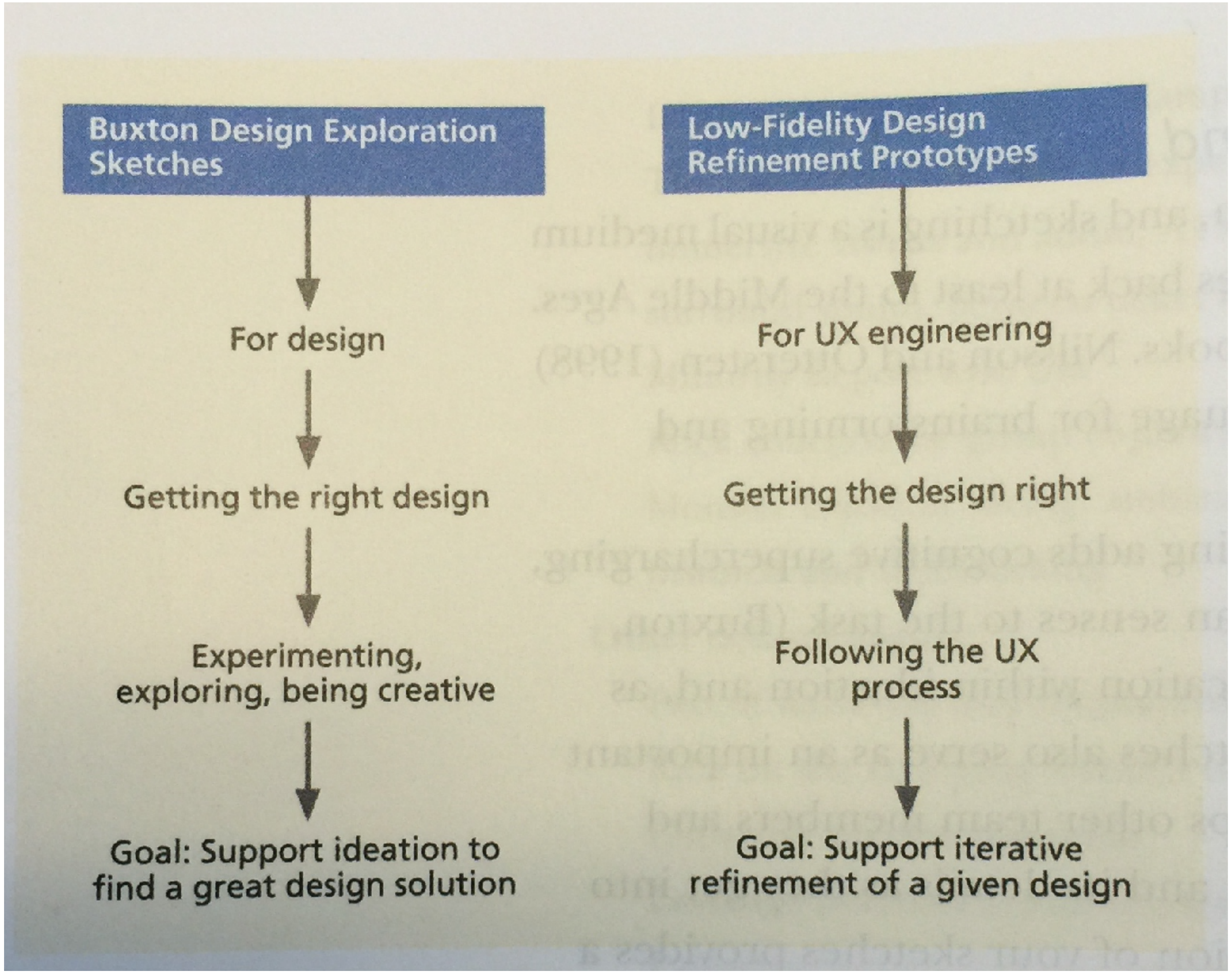
- Design is process of creation & **exploration**
- Sketching offers **visual** medium for exploration, offering cognitive scaffolding to externalize cognition
- Sketches let us explore many alternative designs


courtesy of www.leonardoda-vinci.org
Leonardo da Vinci the Complete Works

Why alternatives?

- Important to think broadly about a wide range of possible designs
  - What are the different ways in which user might do *x?*
- Rather than reimplement the status quo, alternatives offer options for doing things differently, enabling analysis of which is best
  - Important to challenge preconceptions and think deeper
- Rather than develop a single idea, sketching enables exploration and consideration of multiple designs, allowing examination of pros and cons
- Expert designers often create **many** alternatives
  - 10, 50, 100 alternative designs

Sketching vs. Prototyping

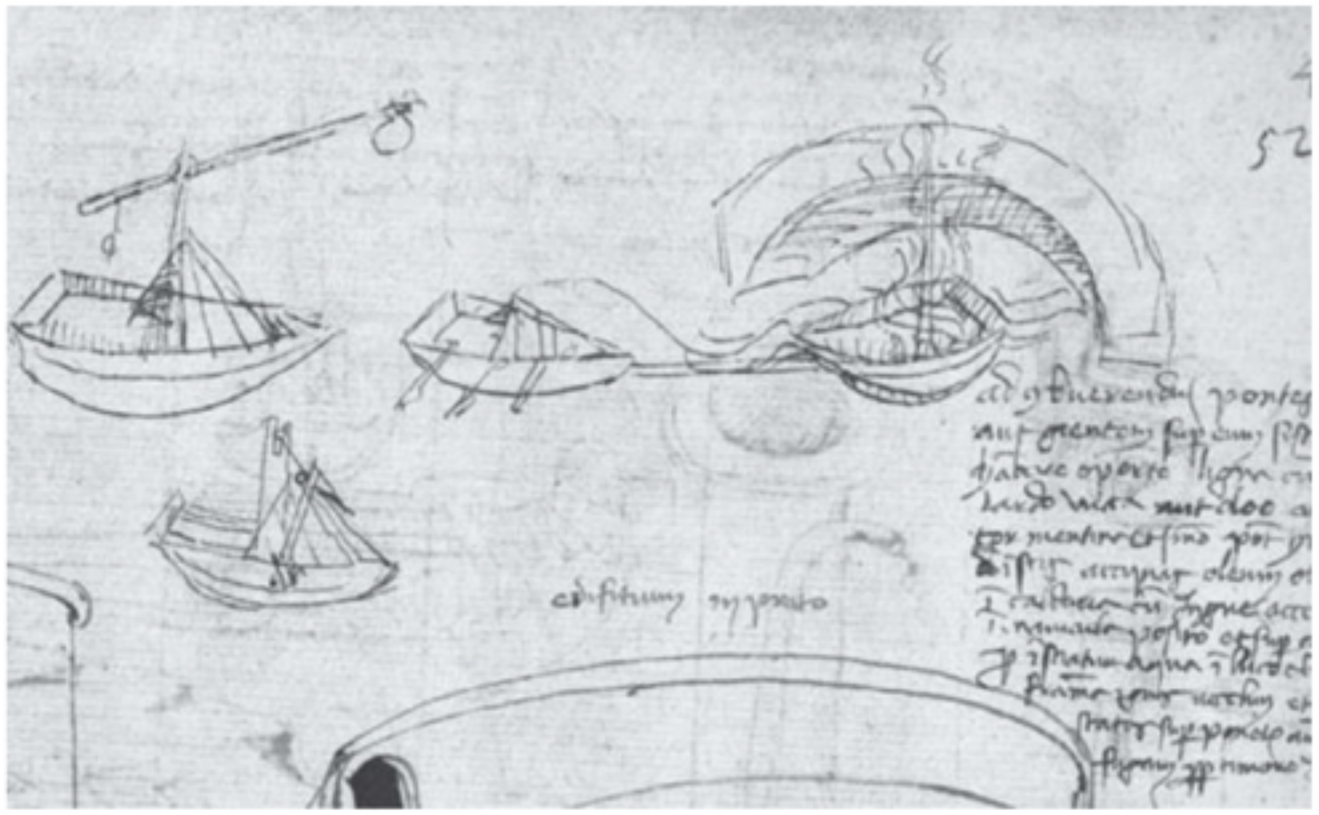

Buxton Design Exploration Sketches
For design
Getting the right design
Experimenting, exploring, being creative
Goal: Support ideation to find a great design solution
Low-Fidelity Design Refinement Prototypes
For UX engineering
Getting the design right
Following the UX process
Goal: Support iterative refinement of a given design

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

Sketches are Sketchy

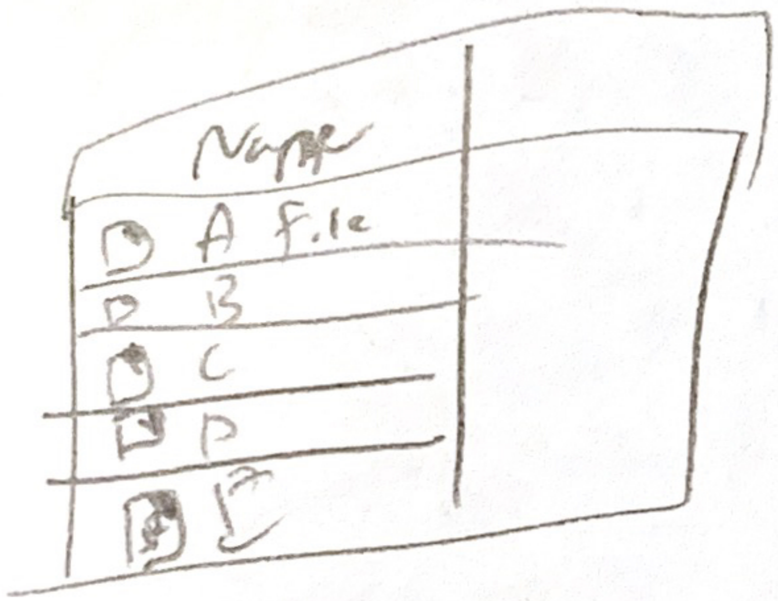
- Not mechanically correct and perfectly straight lines
- **Freehand**, open gestures
- Strokes may miss connections
- Resolution & detail **low** enough to suggest is concept
- Deliberately **ambiguous** & abstract, leaving "holes" for imagination



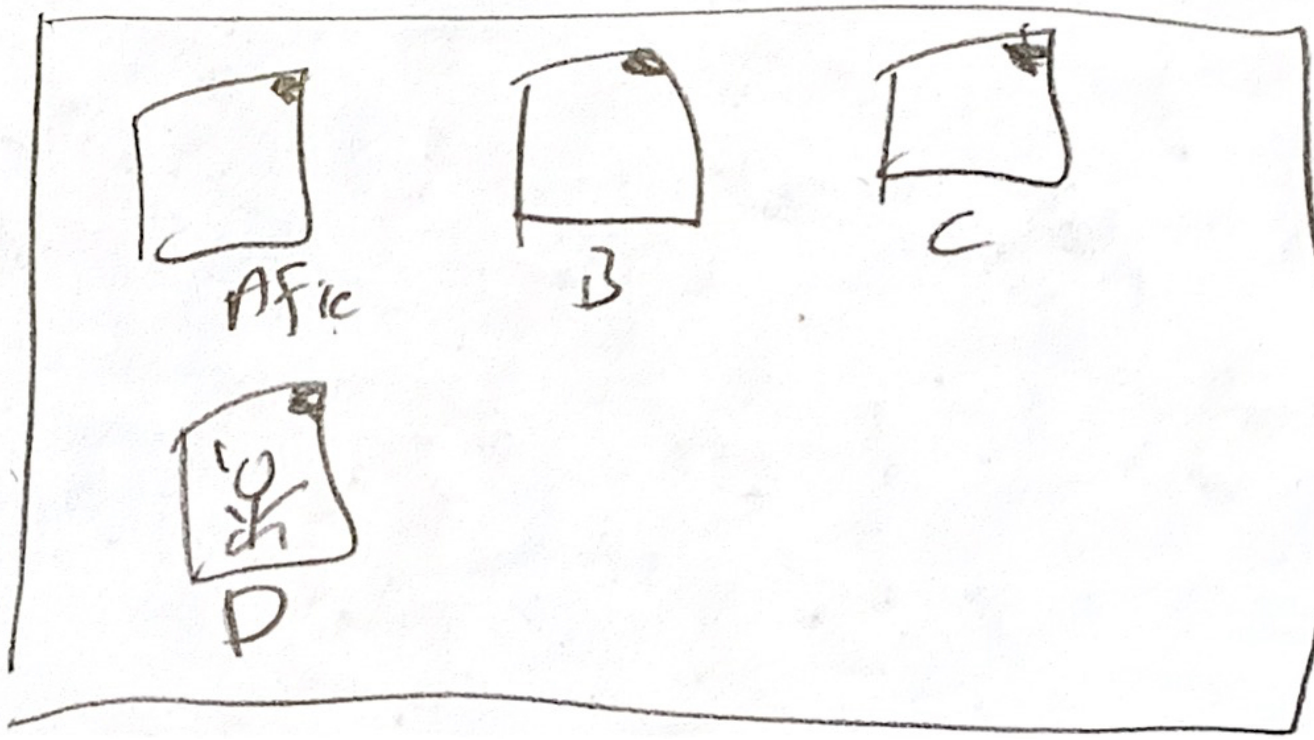
Benefits of Sketching

- No "programming" needed!   Fast turnaround
  - Costs less
  - Allows more iterations
- Human computer
  - Can be (re)programmed quickly
  - Cannot crash
  - Changes can be made on the fly
- Developers feel less affection for status quo because changes are easy
- Rough "sketchy" appearance
  - Emphasizes content instead of appearance
  - Avoids low-level critiques of visual detail
  - Users are more willing to criticize high-level problems and less willing to blame themselves if something doesn't work

Sketch Example



Sketch: List

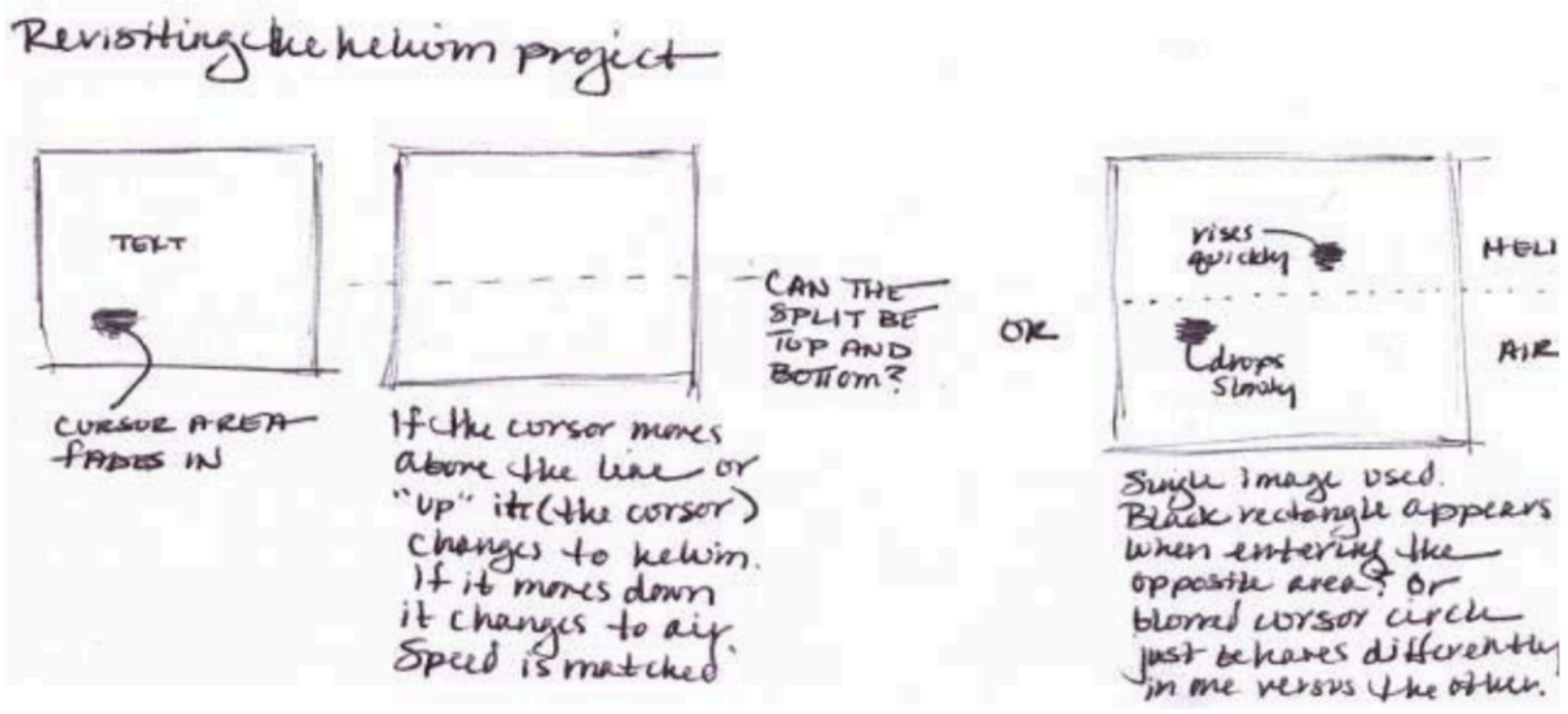


Sketch: Icons

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

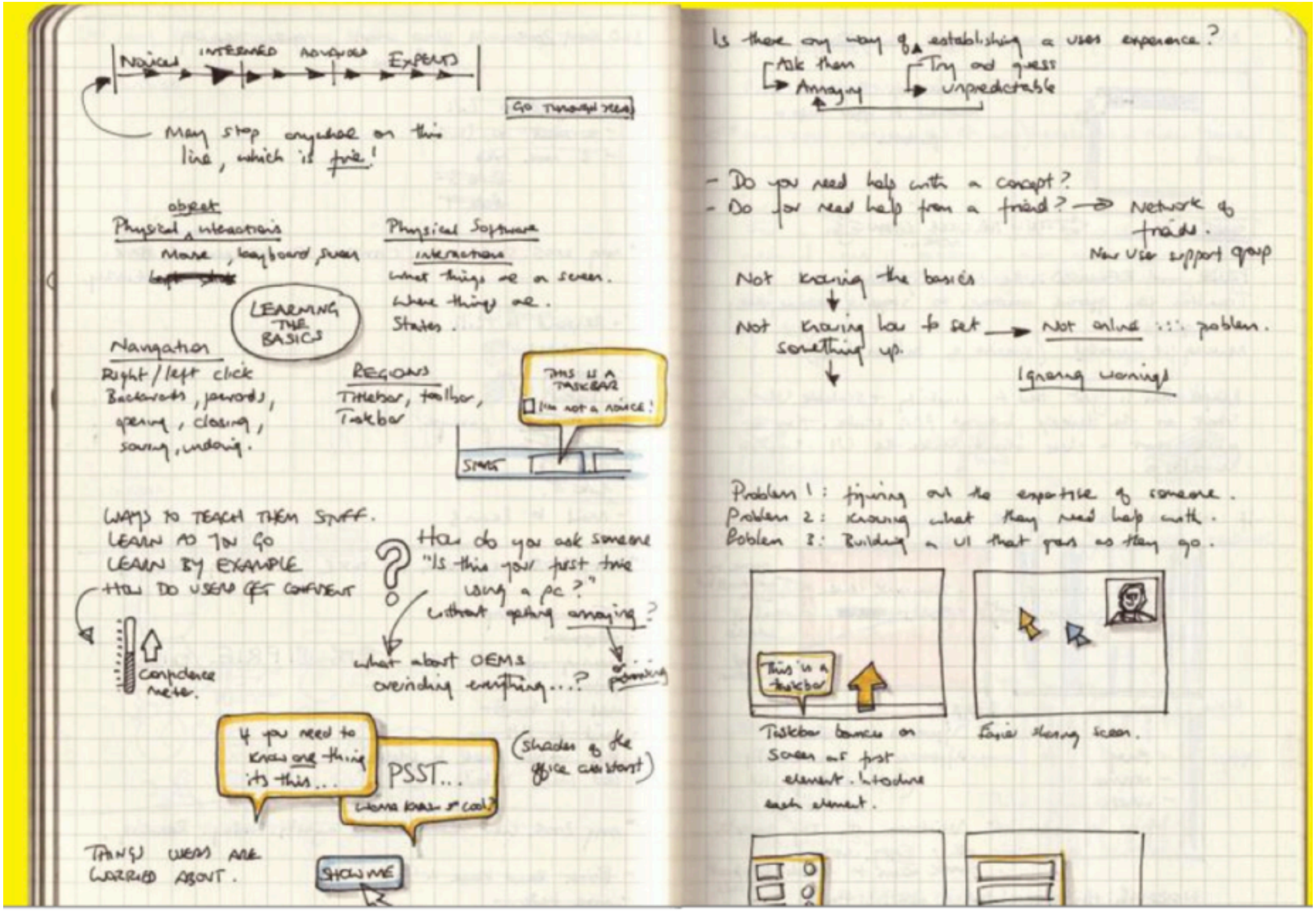


Revisiting the helium project
TEXT
CURSOR AREA FADES IN
If the cursor moves above the line or "up" it (the cursor) changes to helium. If it moves down it changes to air. Speed is matched.
CAN THE SPLIT BE TOP AND BOTTOM?
OR
rises quickly
drops slowly
HELI
AIR
Single image used. Black rectangle appears when entering the opposite area? Or blurred cursor circle just behaves differently in one versus the other.

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 support design exploration



NOVICE INTERMED ADVANCED EXPERTS

GO THROUGH THESE

May stop anywhere on this line, which is fine!

object
Physical interactions
Mouse, keyboard, screen
~~[illegible]~~

Physical Software interactions
what things are on screen.
where things are.
States.

LEARNING THE BASICS

Navigation
Right / left click
Backwards, forwards,
opening, closing,
saving, undoing.

REGIONS
Titlebar, toolbar,
Taskbar

THIS IS A TASKBAR
☐ I'm not a novice!

START

WAYS TO TEACH THEM STUFF.
LEARN AS YOU GO
LEARN BY EXAMPLE
HOW DO USERS GET CONFIDENT

Confidence meter.

How do you ask someone "Is this your first time using a pc?" without getting annoying?

what about OEMs overriding everything...?

patronising

If you need to know one thing its this...

PSST...

Wanna know a cool

(shades of the office assistant)

THINGS USERS ARE WORRIED ABOUT.

SHOW ME

Is there any way of establishing a users experience?
Ask them → Annoying
Try and guess → unpredictable

- Do you need help with a concept?
- Do you need help from a friend? → Network of friends.
New User support group

Not knowing the basics
↓
Not knowing how to set something up. → Not online ∴ problem.
↓
Ignoring warnings

Problem 1: figuring out the expertise of someone.
Problem 2: Knowing what they need help with.
Problem 3: Building a UI that grows as they go.

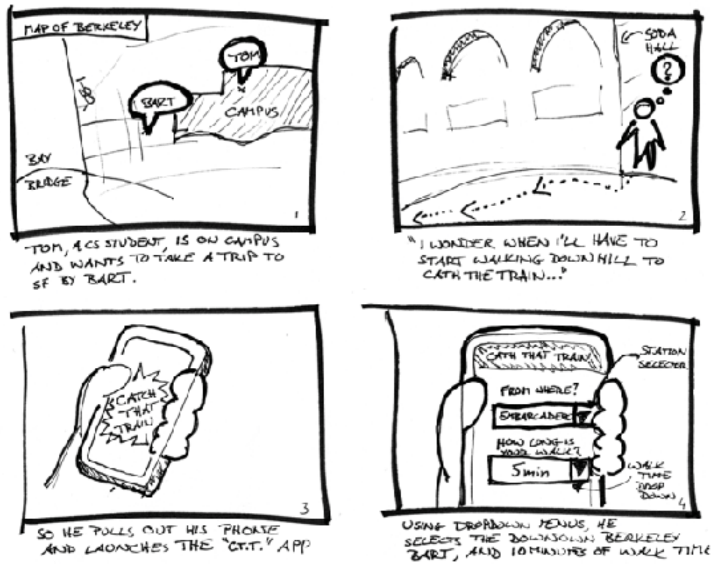
This is a taskbar

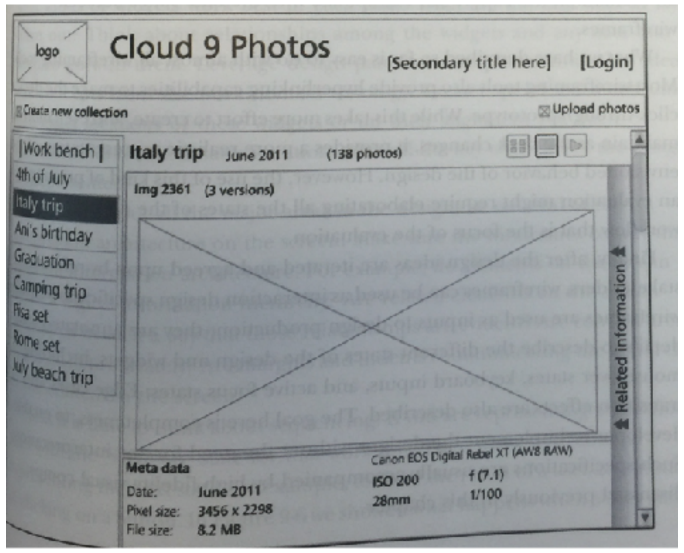
Taskbar bounces on screen at first element. Introduce each element.

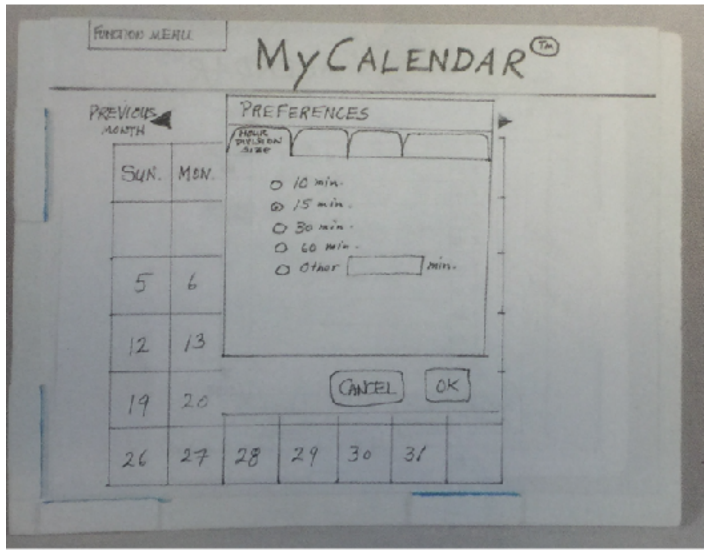
Buddies sharing screen.

B. Buxton. Sketching User Experiences.

Fidelity of sketches & mockups


MAP OF BERKELEY
TOM
BART
CAMPUS
BAY BRIDGE
SODA HALL
"TOM, A CS STUDENT, IS ON CAMPUS AND WANTS TO TAKE A TRIP TO SF BY BART.
"I WONDER WHEN I'LL HAVE TO START WALKING DOWN HILL TO CATCH THE TRAIN..."
CATCH THAT TRAIN
SO HE PULLS OUT HIS PHONE AND LAUNCHES THE "C.T.T." APP
STATION SELECTOR
FROM WHERE?
EMBARCADERO
HOW LONG IS YOUR WALK?
5min
WALK TIME DROP DOWN
USING DROPDOWN MENUS, HE SELECTS THE DOWNTOWN BERKELEY BART, AND 10 MINUTES OF WALK TIME





storyboard | wireframe | prototype

low ⟷ high

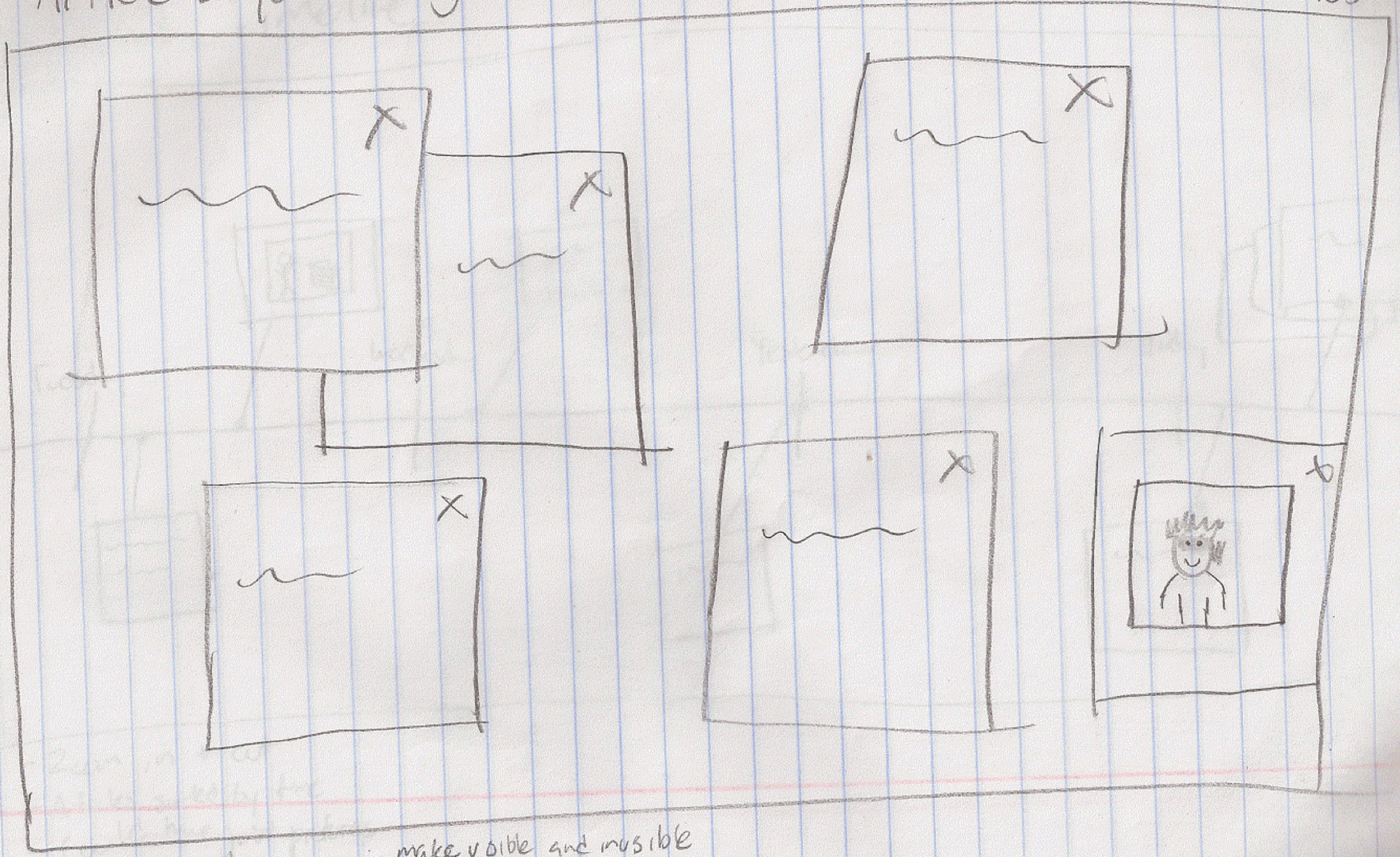
fidelity

(many details left unspecified)

(more polished & detailed)

Sketching Example: News Viewer

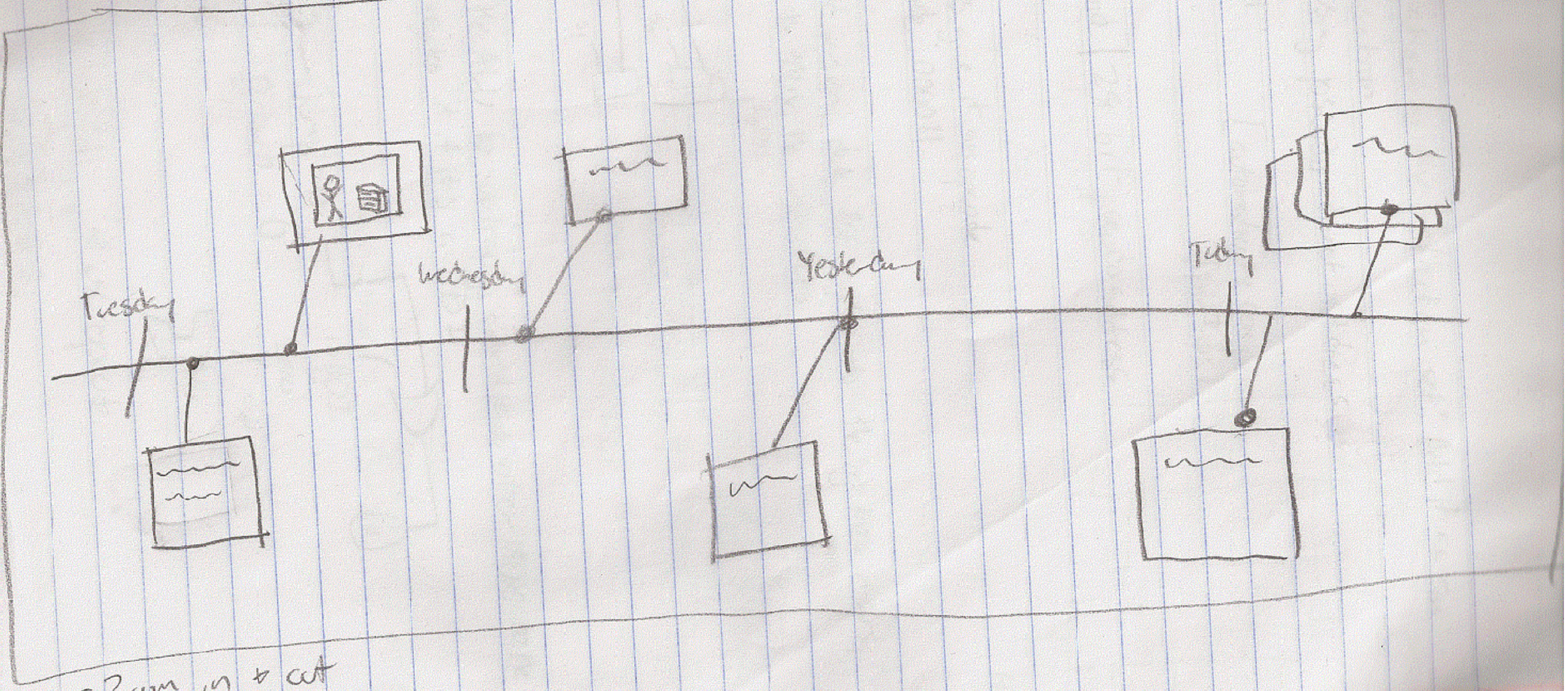
Article Layout through moveable windows (DADA) - drag and drop articles



- make visible and invisible

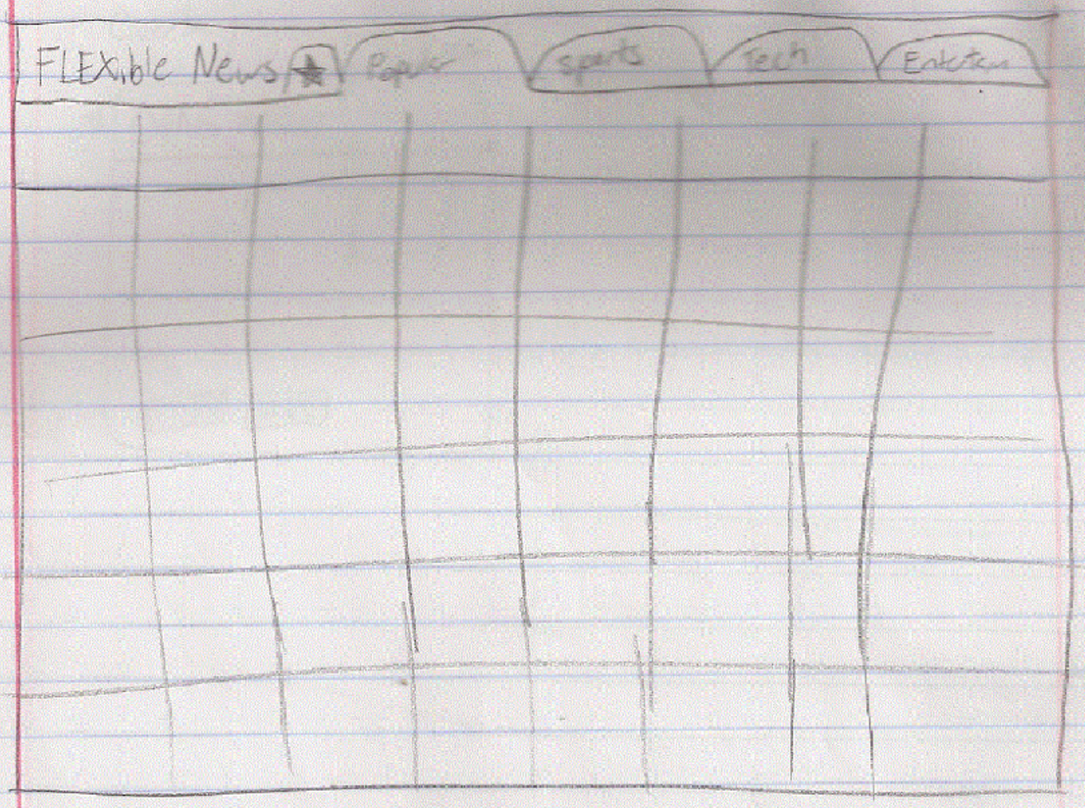
- Moveable windows
- closeable
- Layered by importance

News Timeline

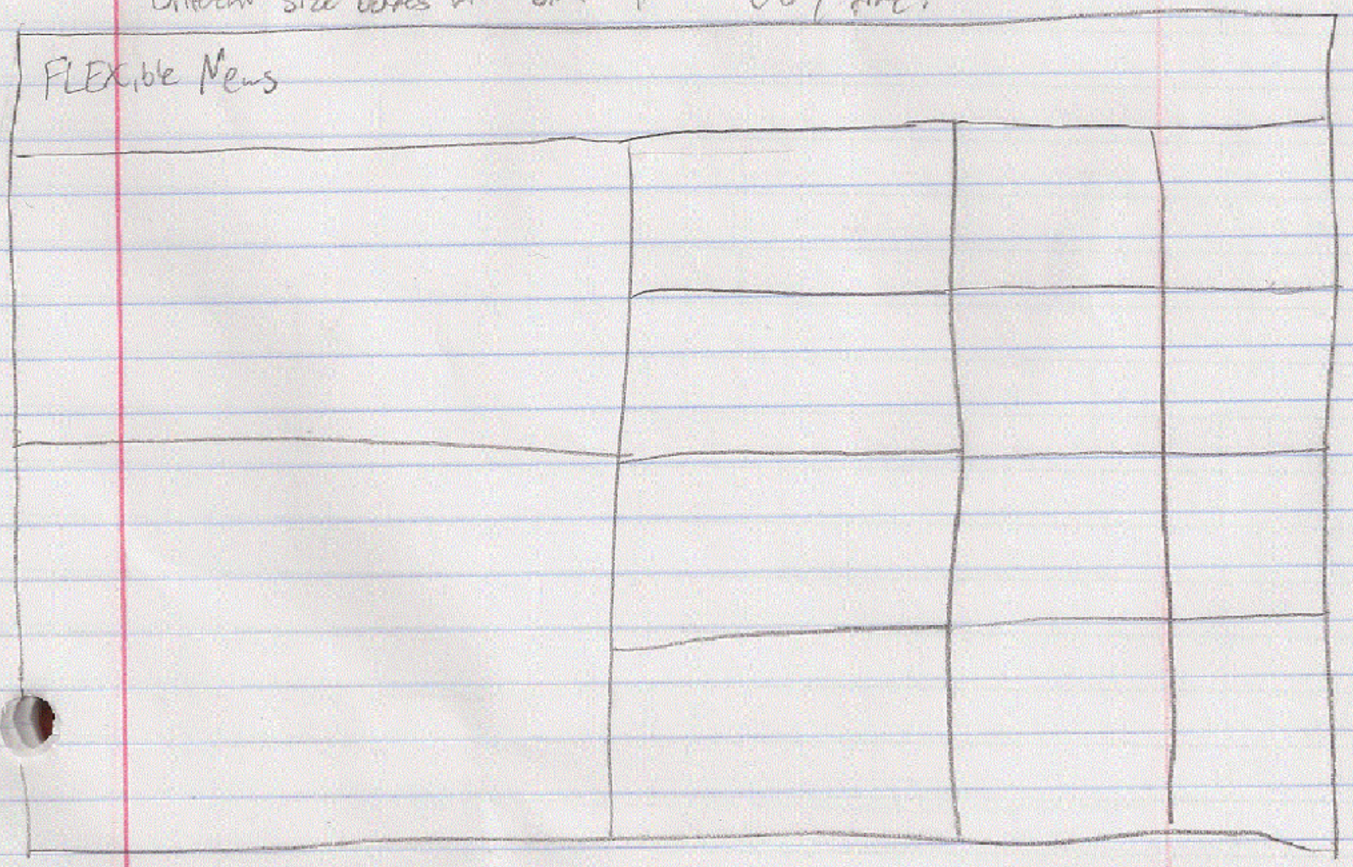


- Zoom in + out
- Articles sorted by time
- Could have just pictures

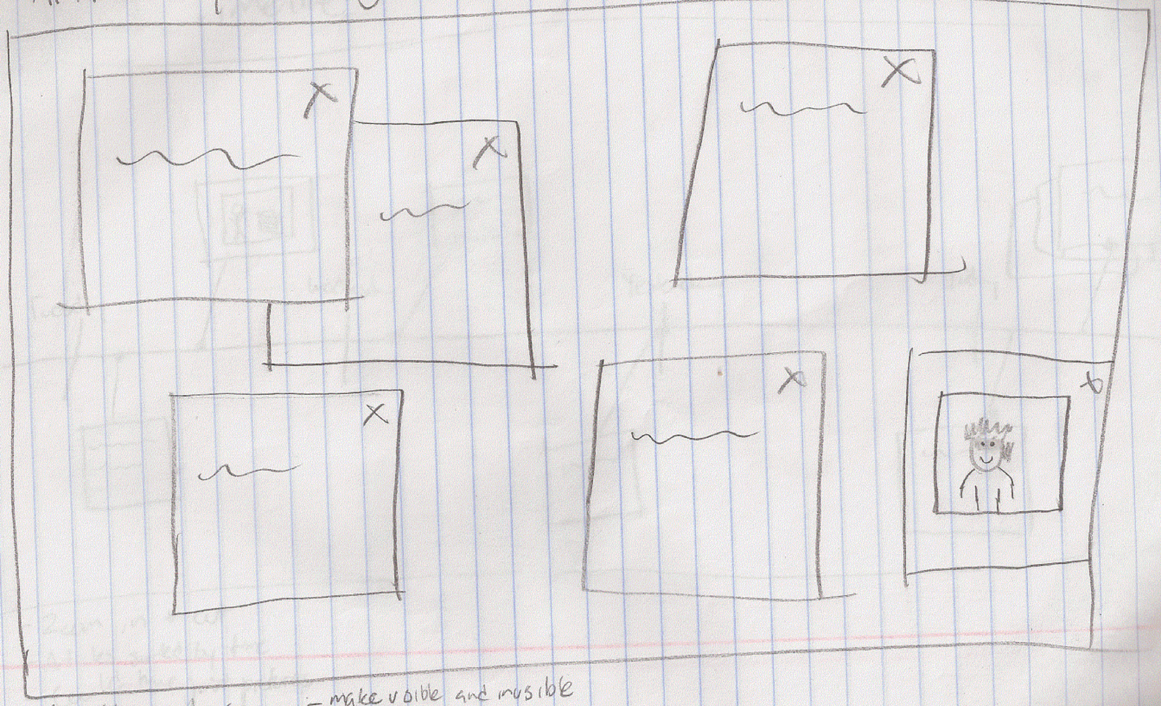
UID Wireframe



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

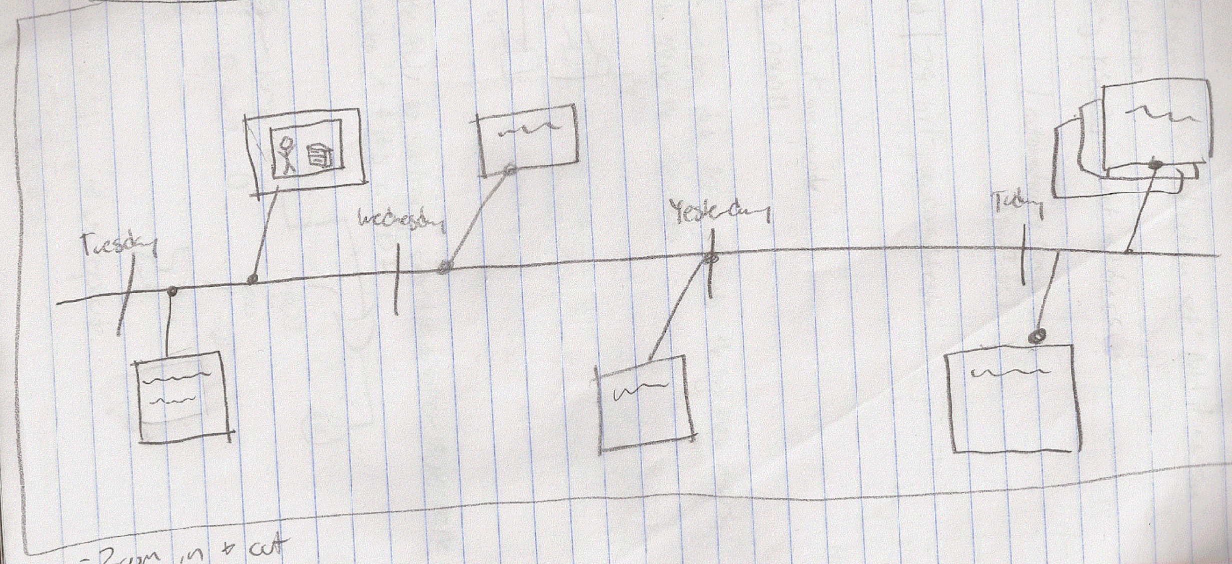


Article Layout through movable windows (DADA) - drag and drop articles



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

News Timeline



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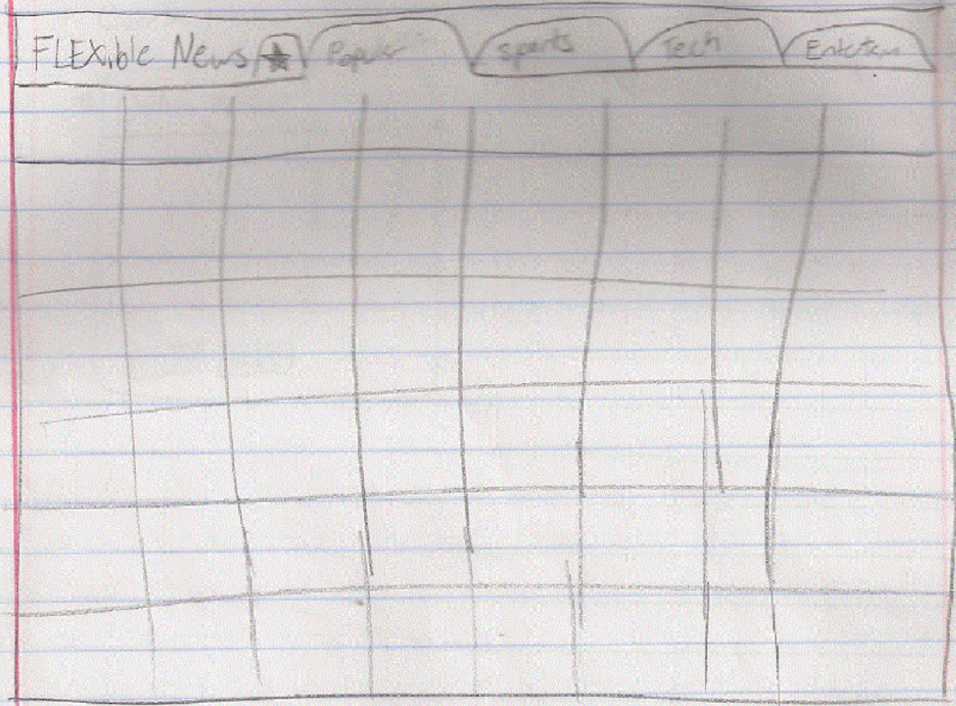

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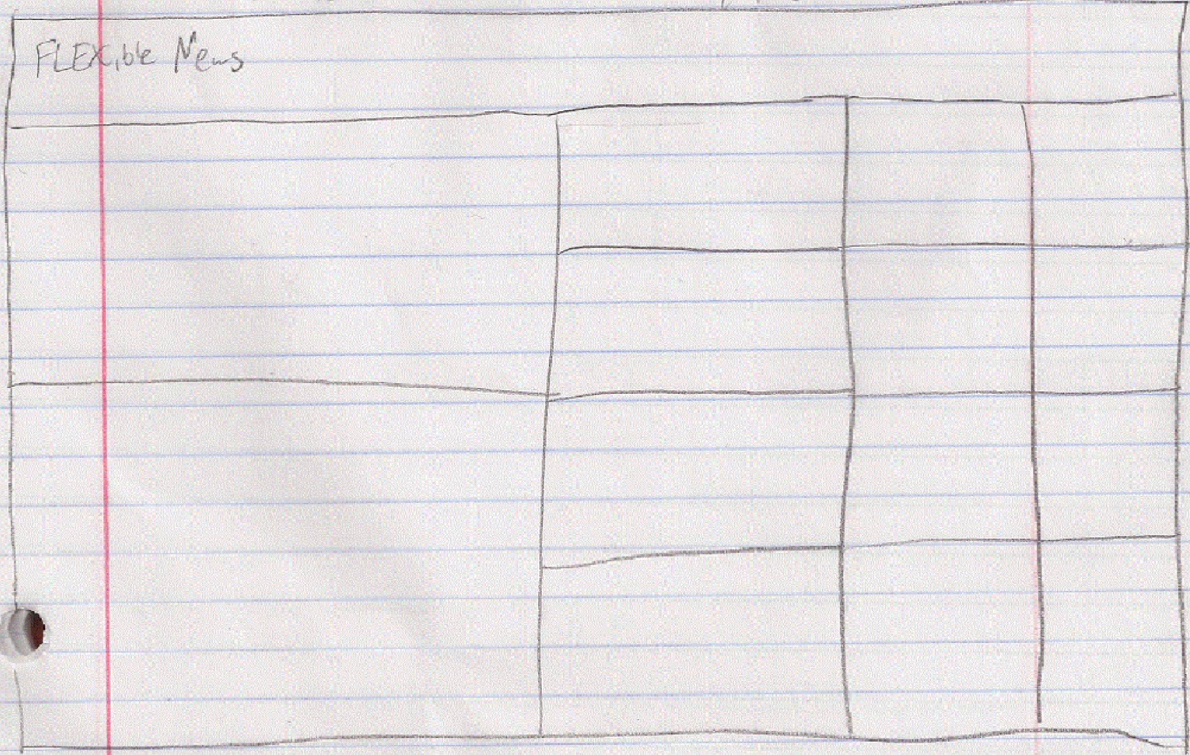
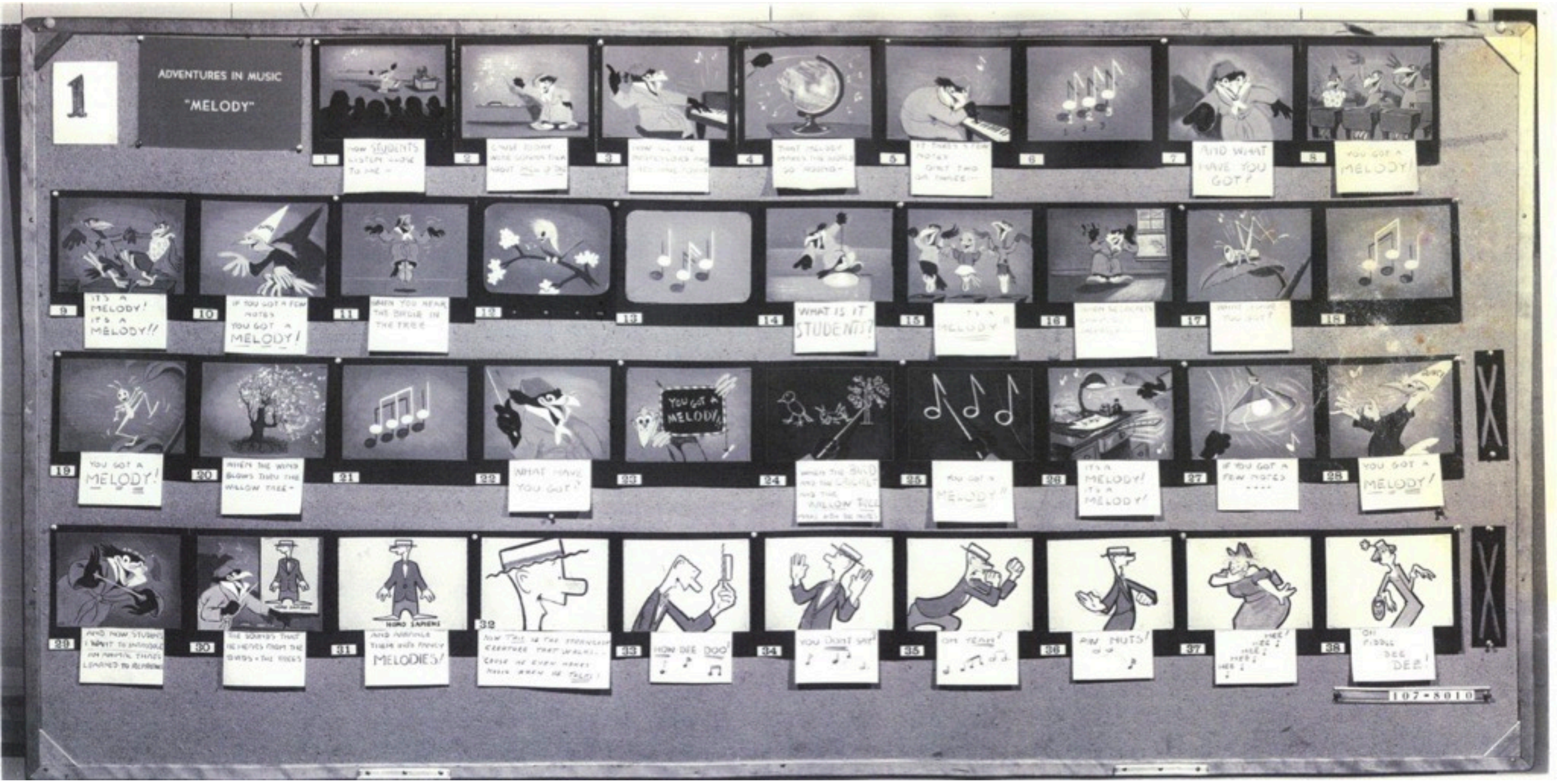
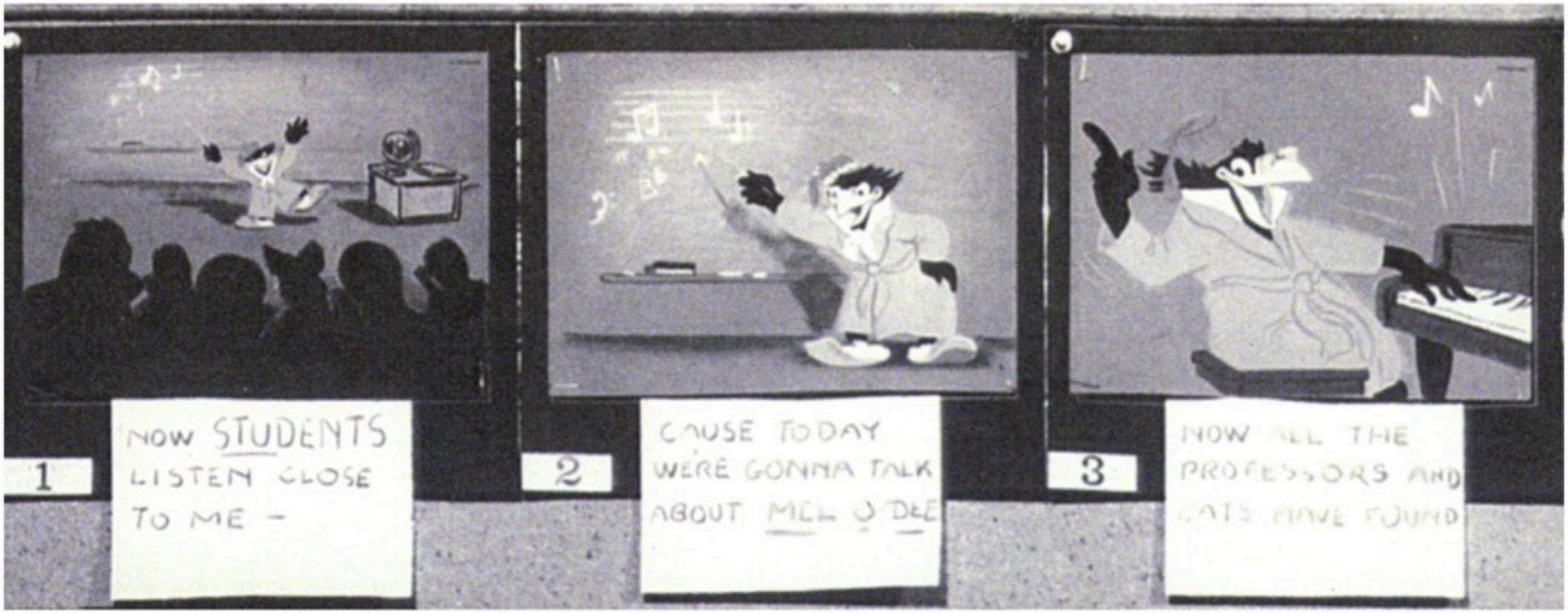


Storyboards



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

Source: Michael Sporn Animation


1
NOW STUDENTS LISTEN CLOSE TO ME -
2
CAUSE TODAY WE'RE 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

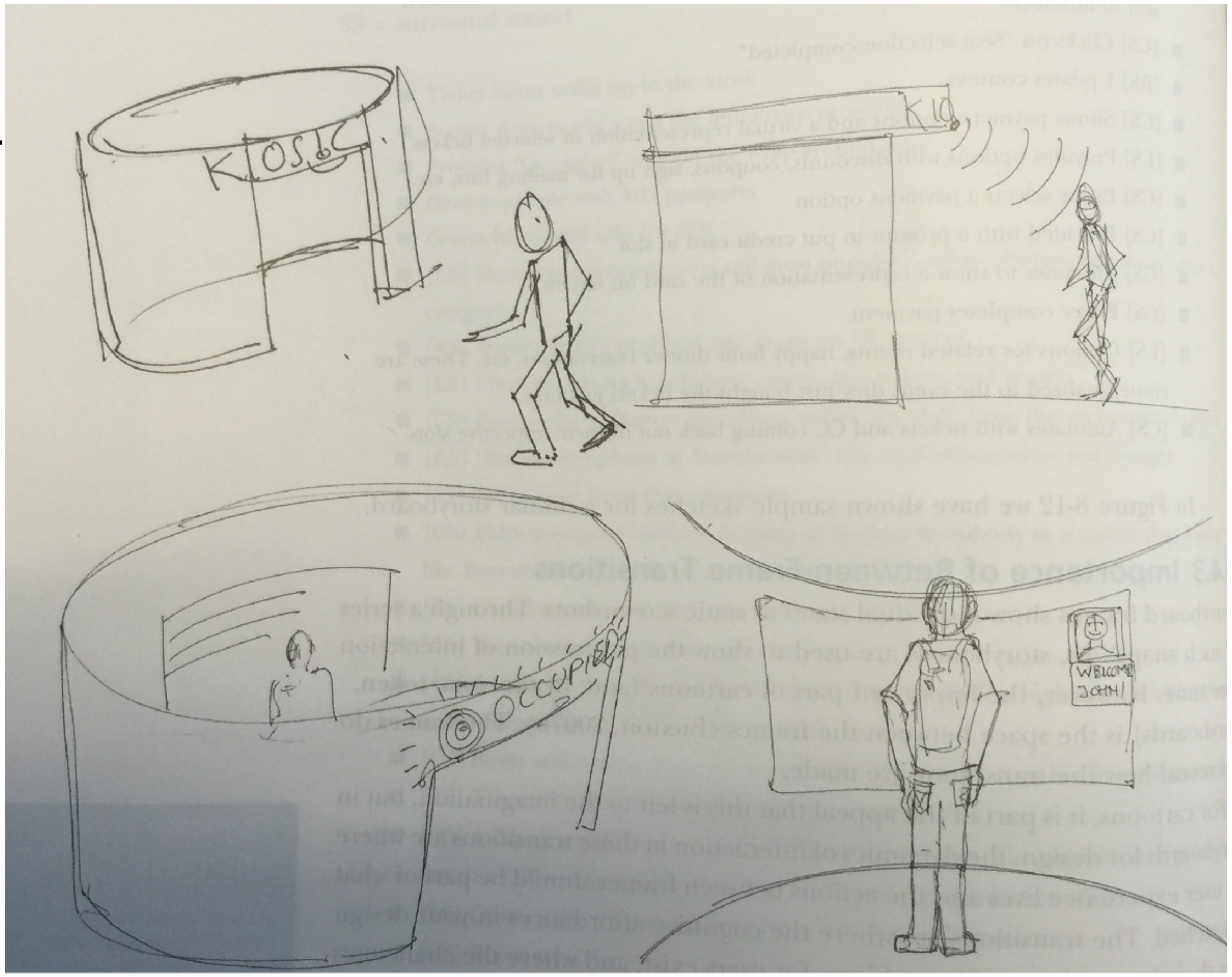
Example elements of a UI storyboard

- 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



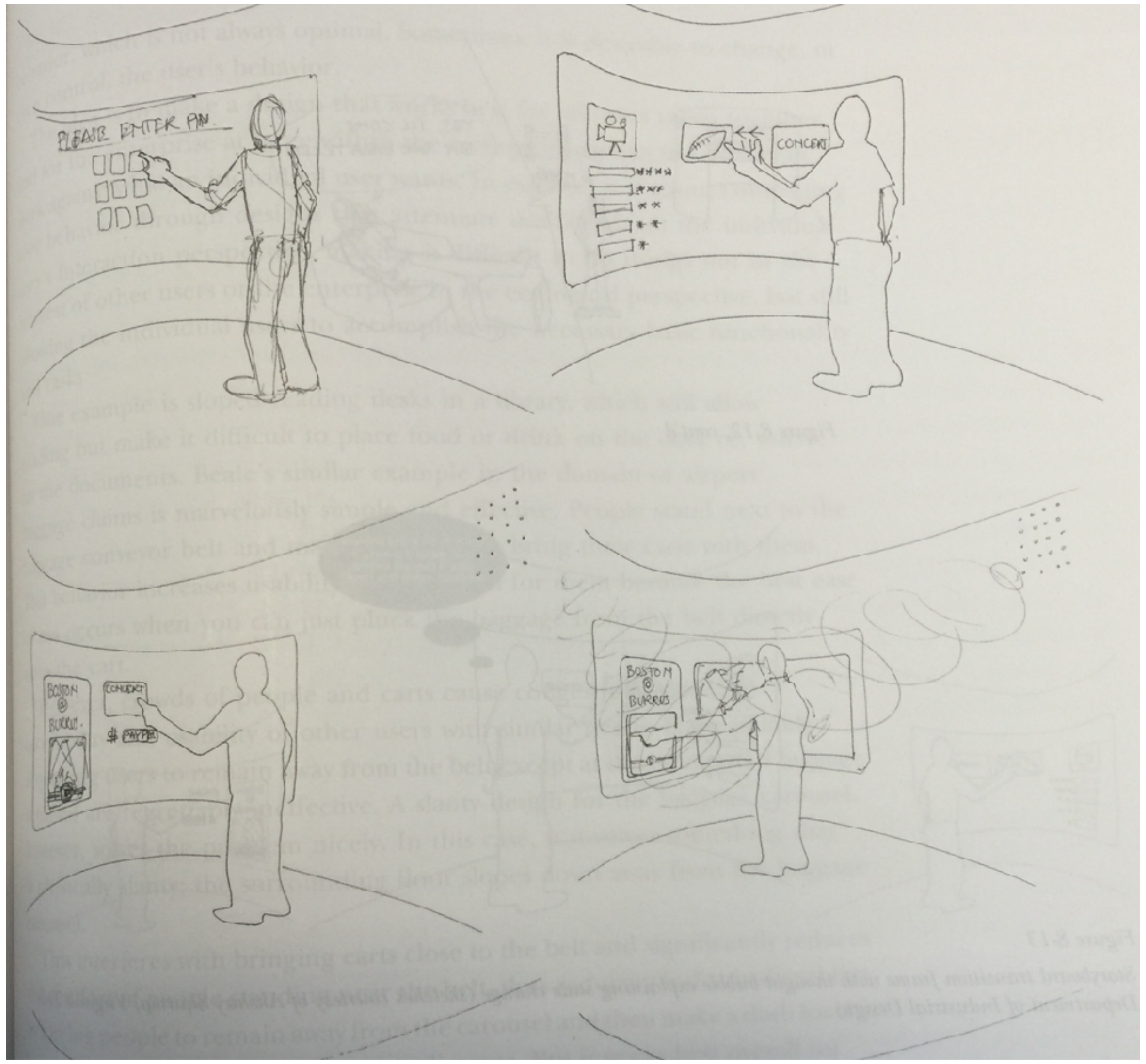
Displays "Occupied" sign on wraparound case

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"

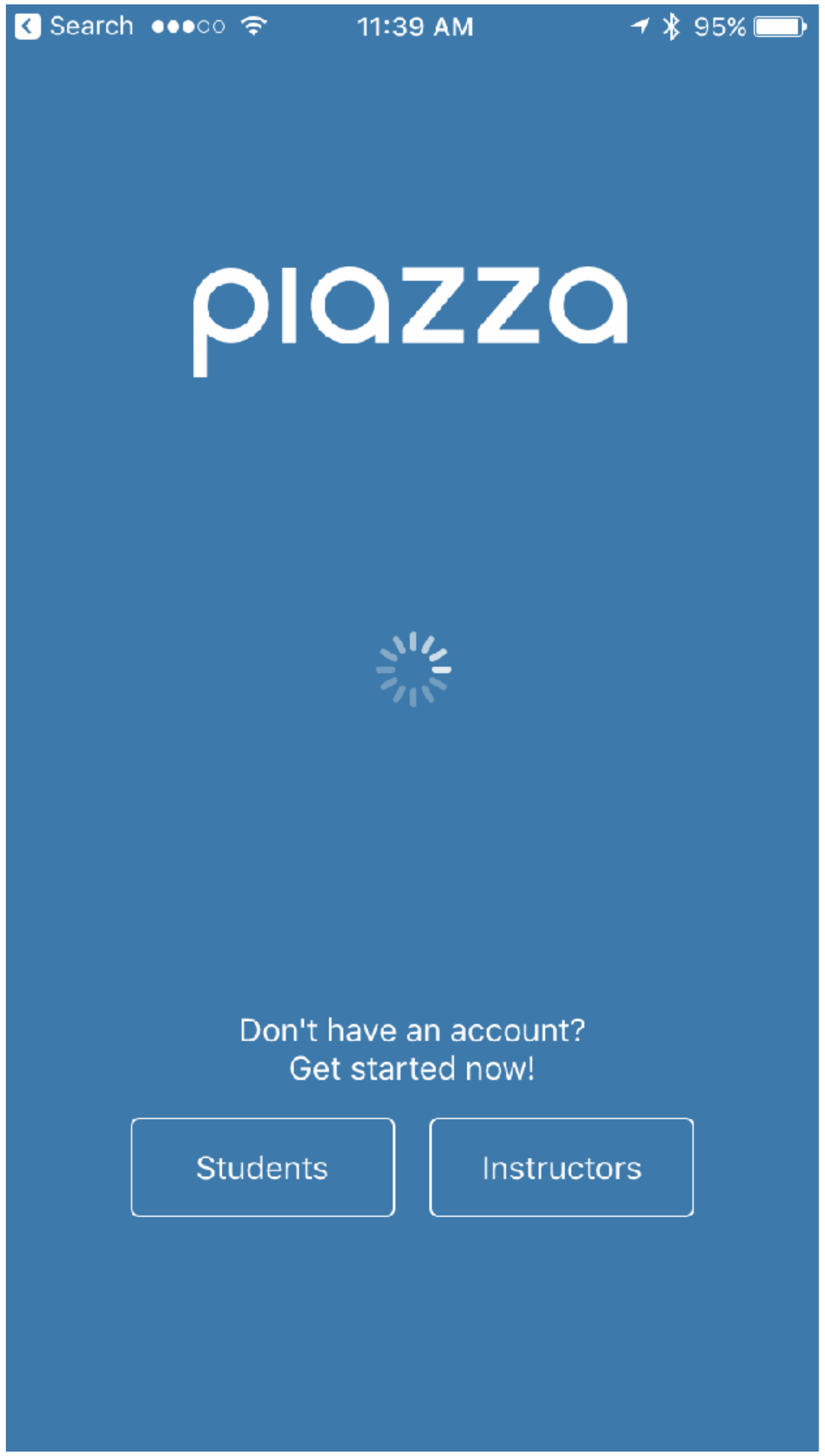
Plays music from symphony, shows date & time picker

Frame transitions

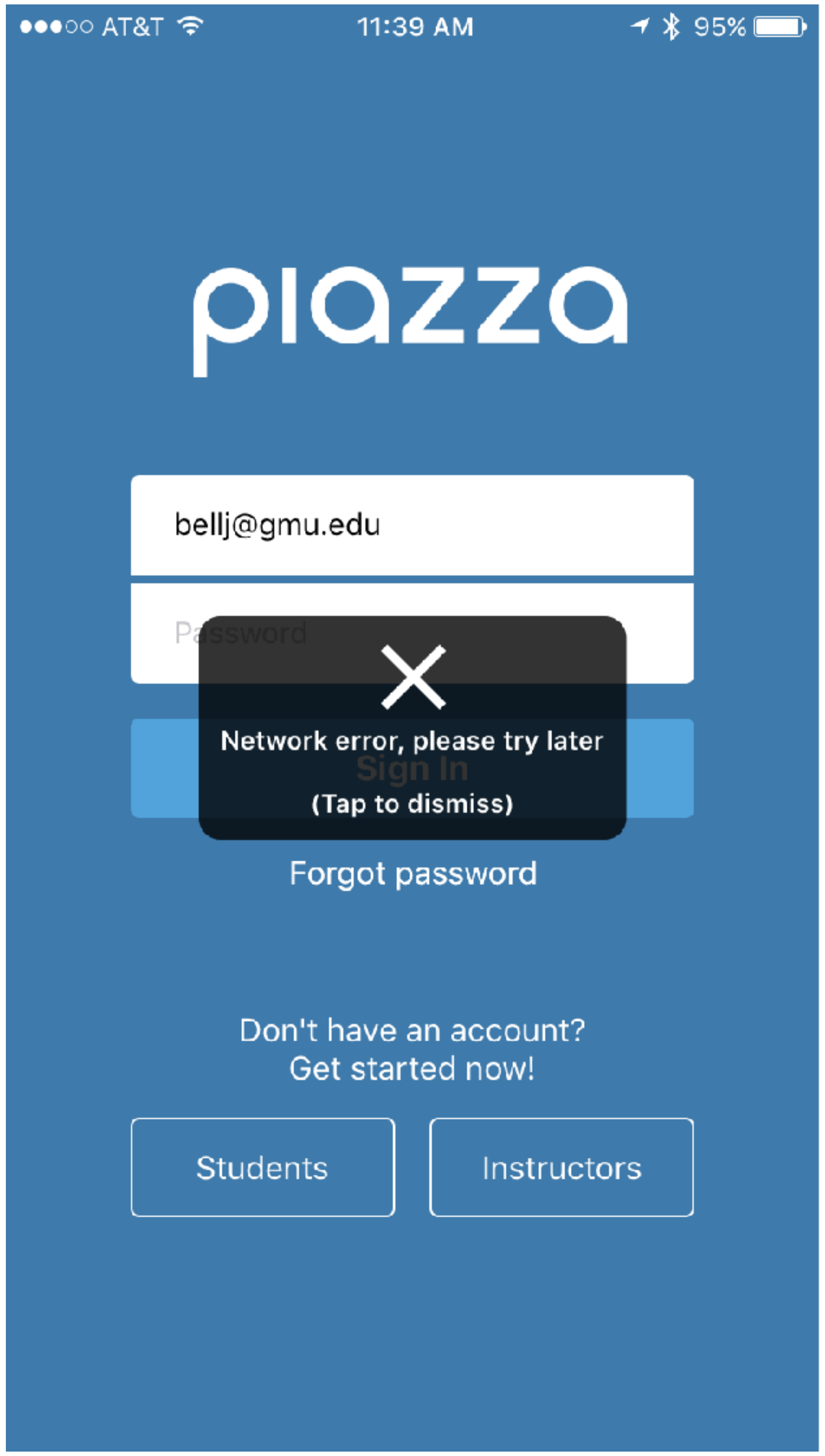
- Transitions between frames particularly important
- What users think, how users choose actions
- Many problems can occur here (e.g., gulfs of execution & evaluation)
- Useful to think about how these work, can add thought bubbles to describe

Design Fail

1: Auto-login to Piazza app

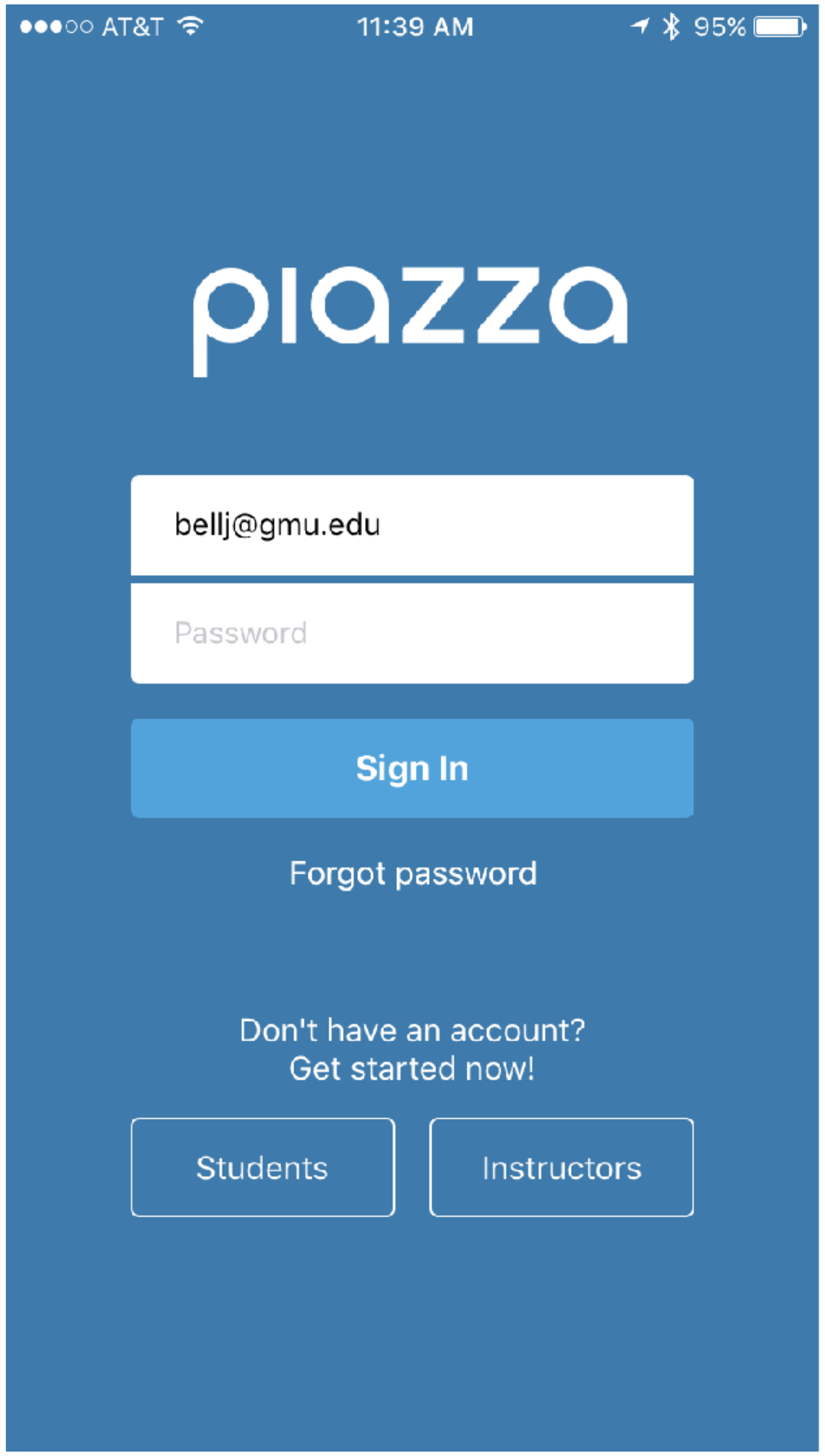


2: Network error



Network error, please try later
(Tap to dismiss)

3: Asked for password

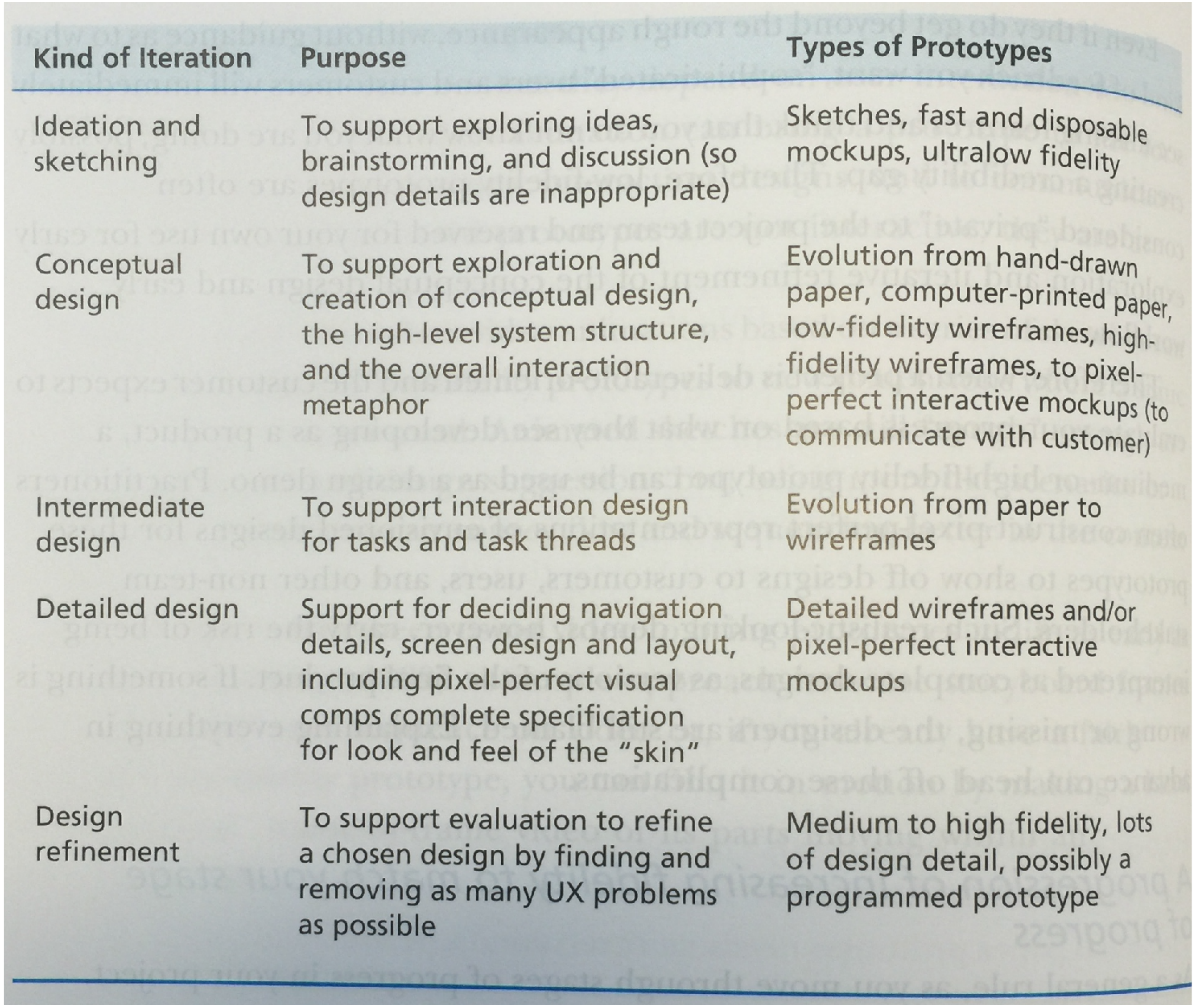


Prototyping

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

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

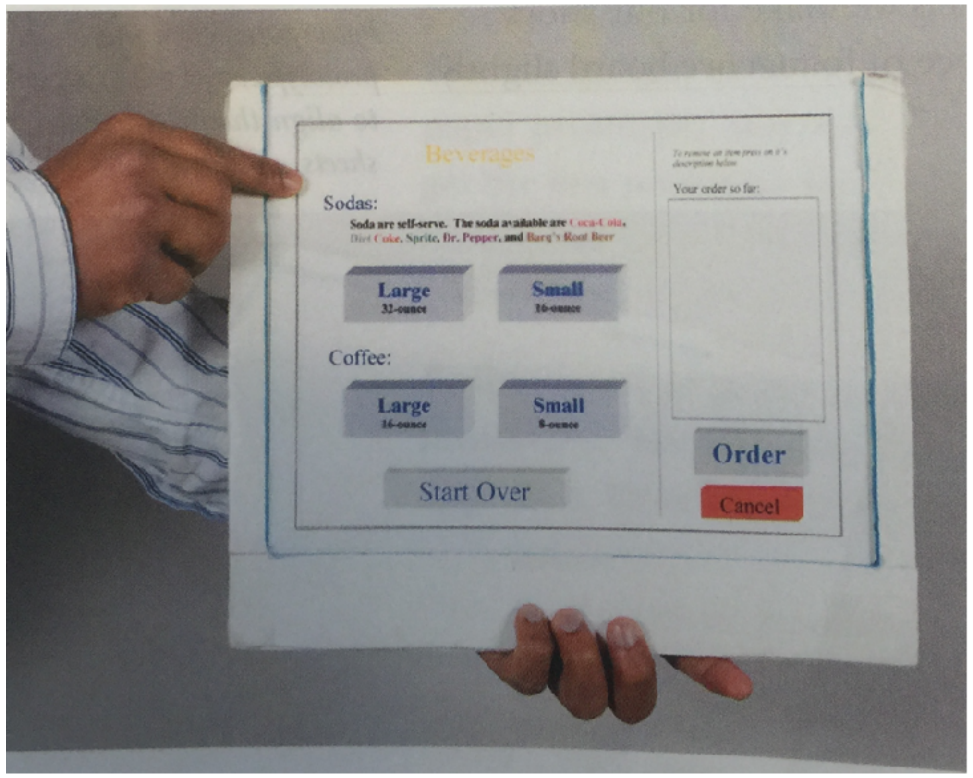
Wizard of Oz

- 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