

Interaction Design

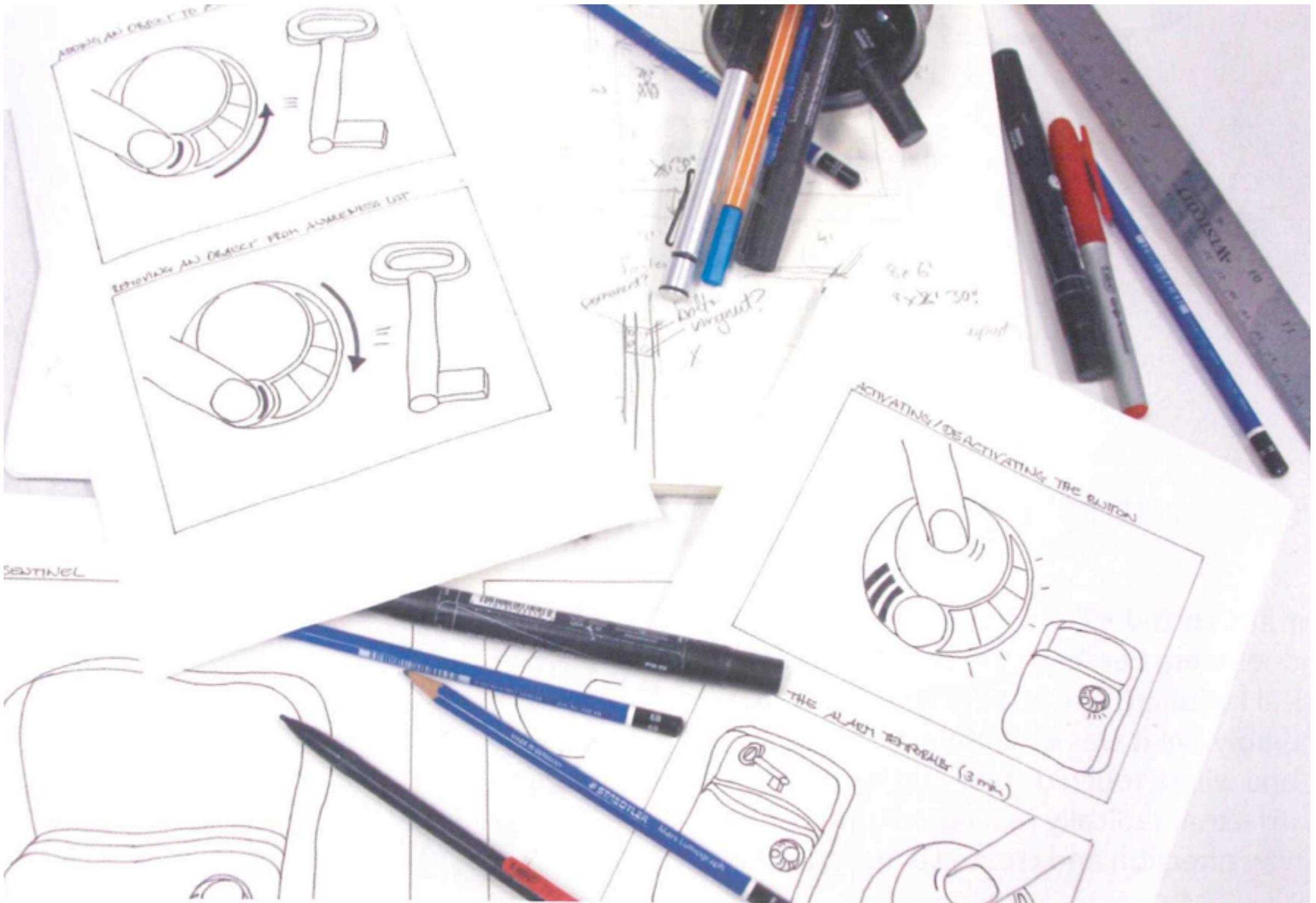
Sketching Interaction

Guest lecture: Nicolai Marquardt, University of Calgary

LMU München – Medieninformatik
Alexander Wiethoff + Heinrich Hussmann
Interaction Design – SS2012

Sketching Interaction

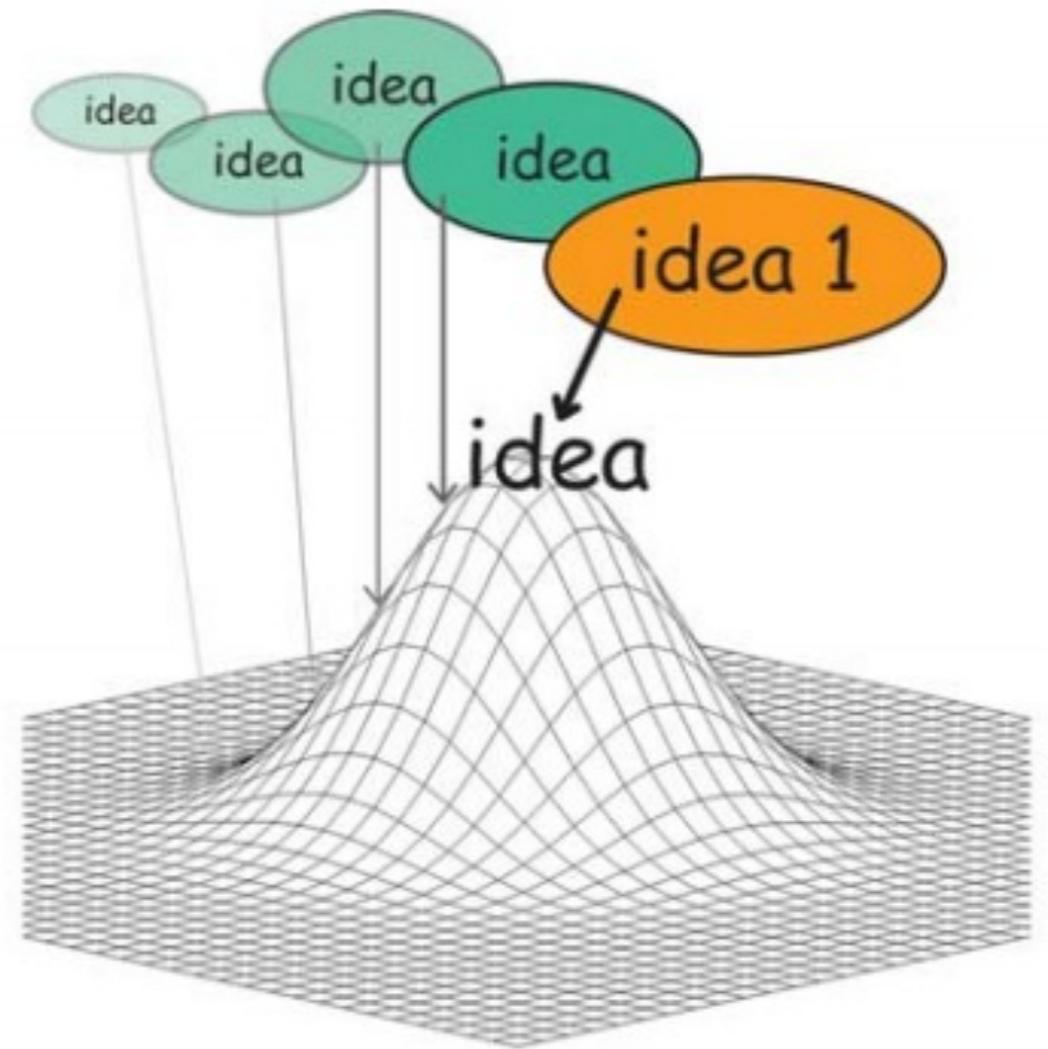
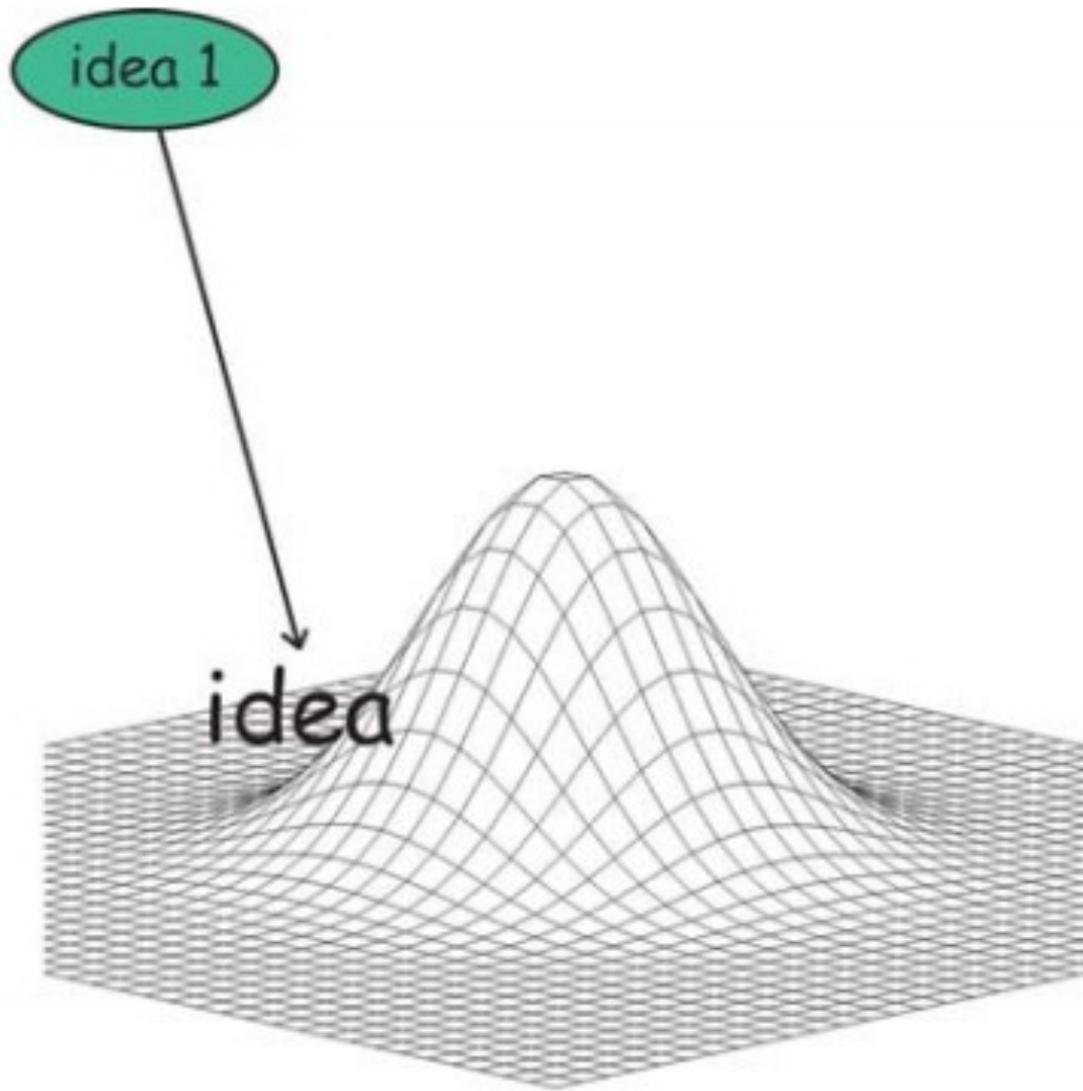
- The Definition of Sketching
- Characteristics of Sketches and Sketching
- Sketches and Prototypes
- Is it a Sketch ?
- Sketching Techniques
- Storyboarding



Sketching is about Design

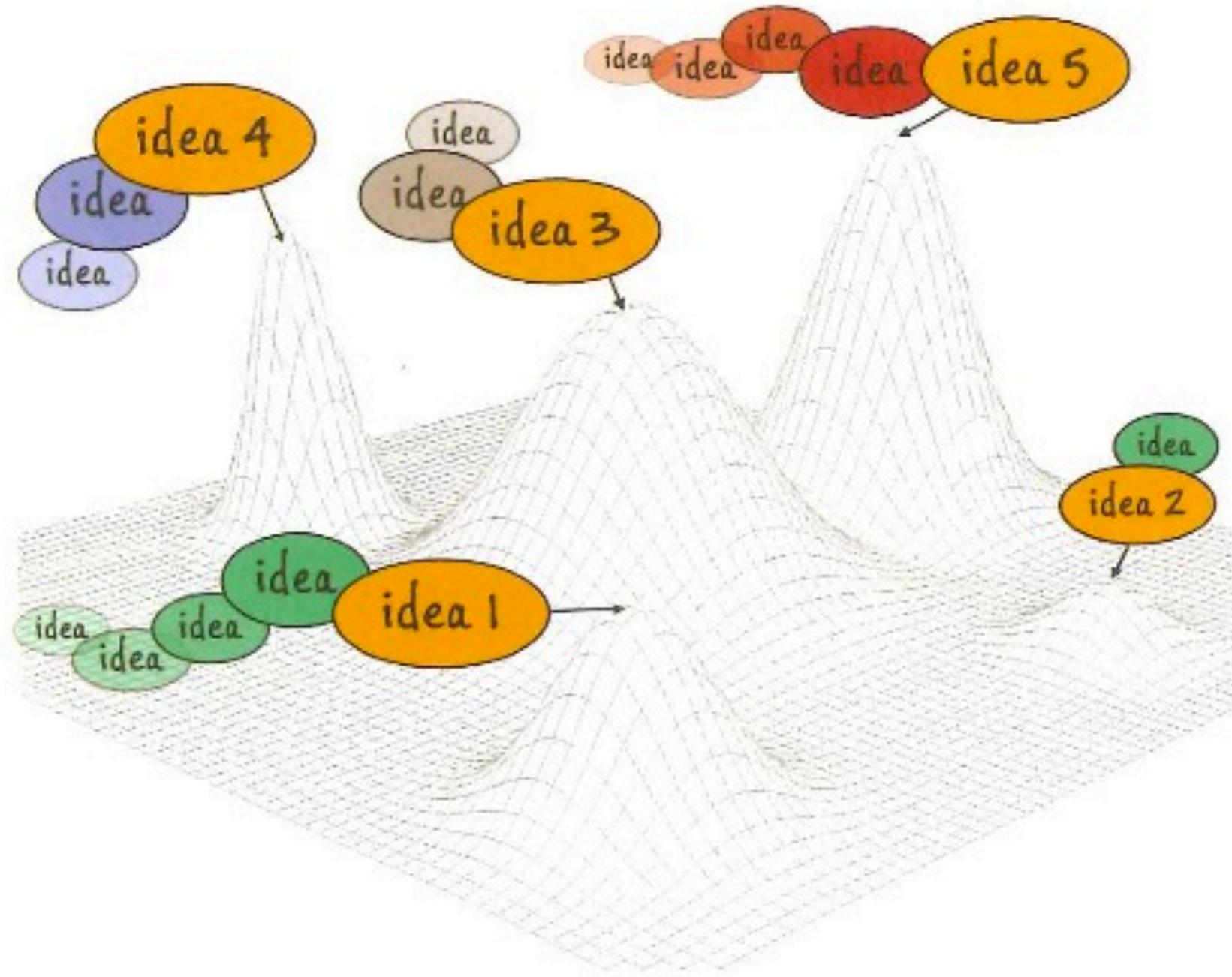
source: [2]

Getting the **design right** vs. Getting the **right design**



source: [2]

Problem: Local Hill Climbing



source: [2]

Why Sketches

Getting the Right Design:

Design in **wicked situations**:

not just define a solution, but also define design space is part of the game

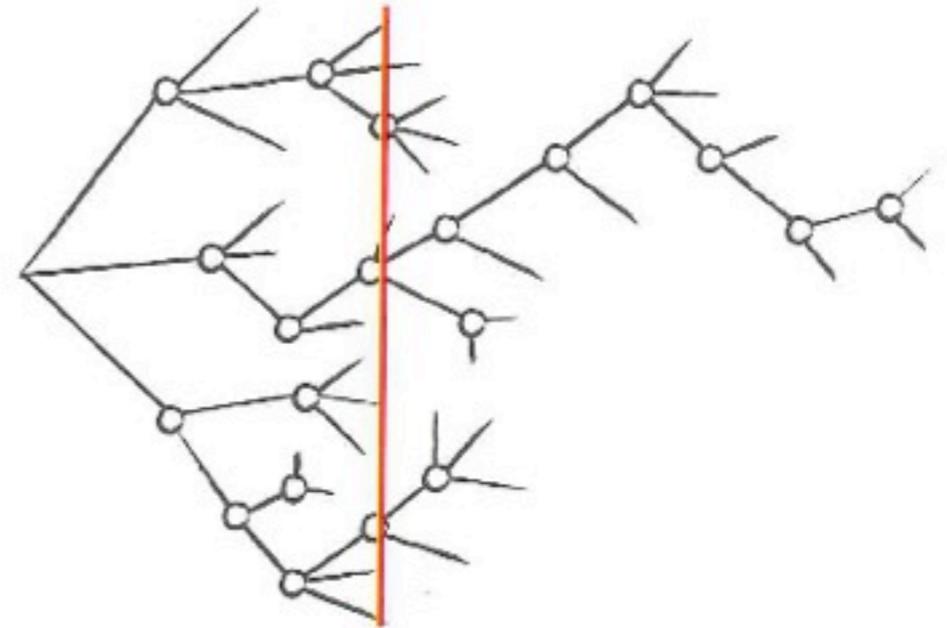
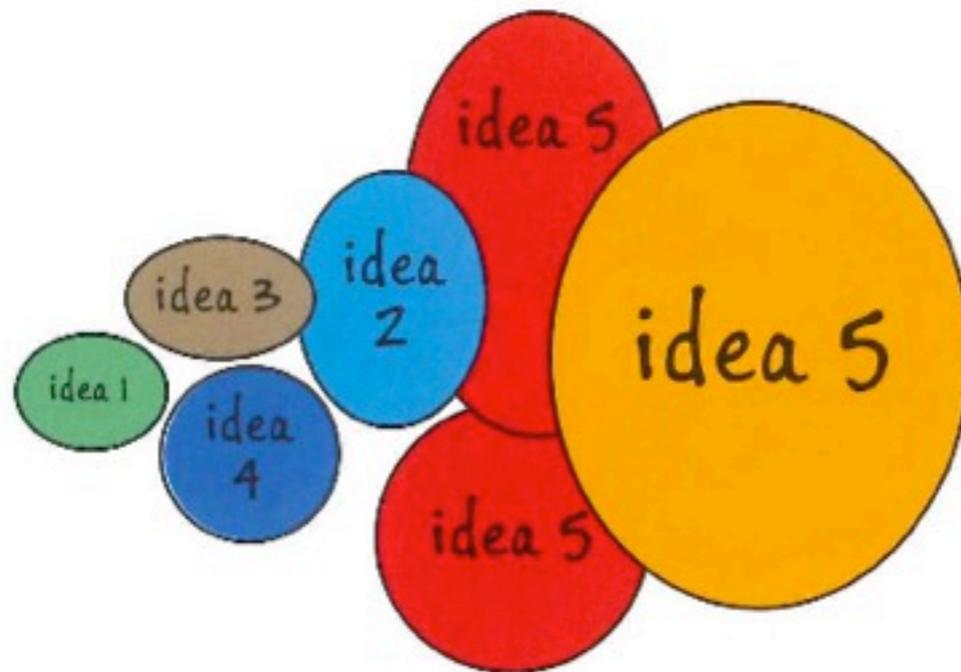
Typically, we tend to fixate on first idea:

Sketching is a strategy, **not making premature commits**, but exploring the design space:

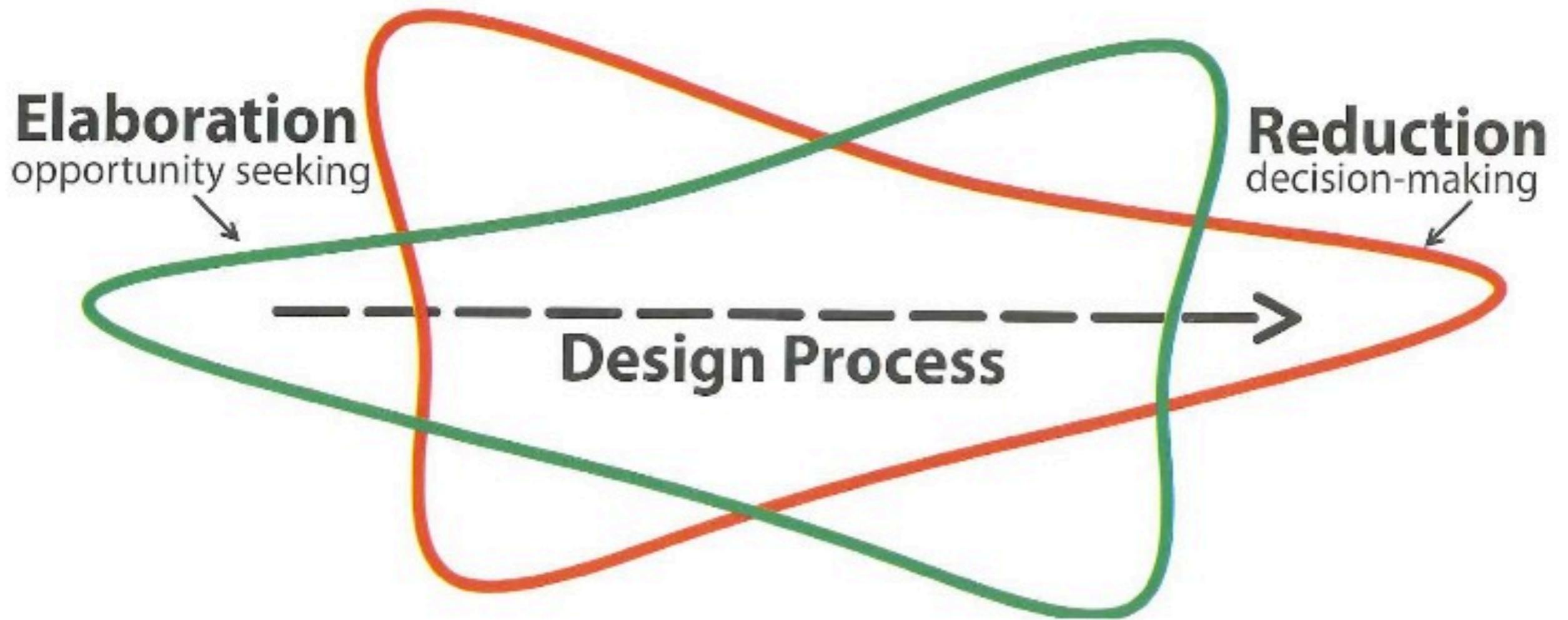
- (1) generate many **ideas and variations**
- (2) **reflect** and choose
- (3) then **iterate and develop** your choice

Getting the **RIGHT DESIGN**

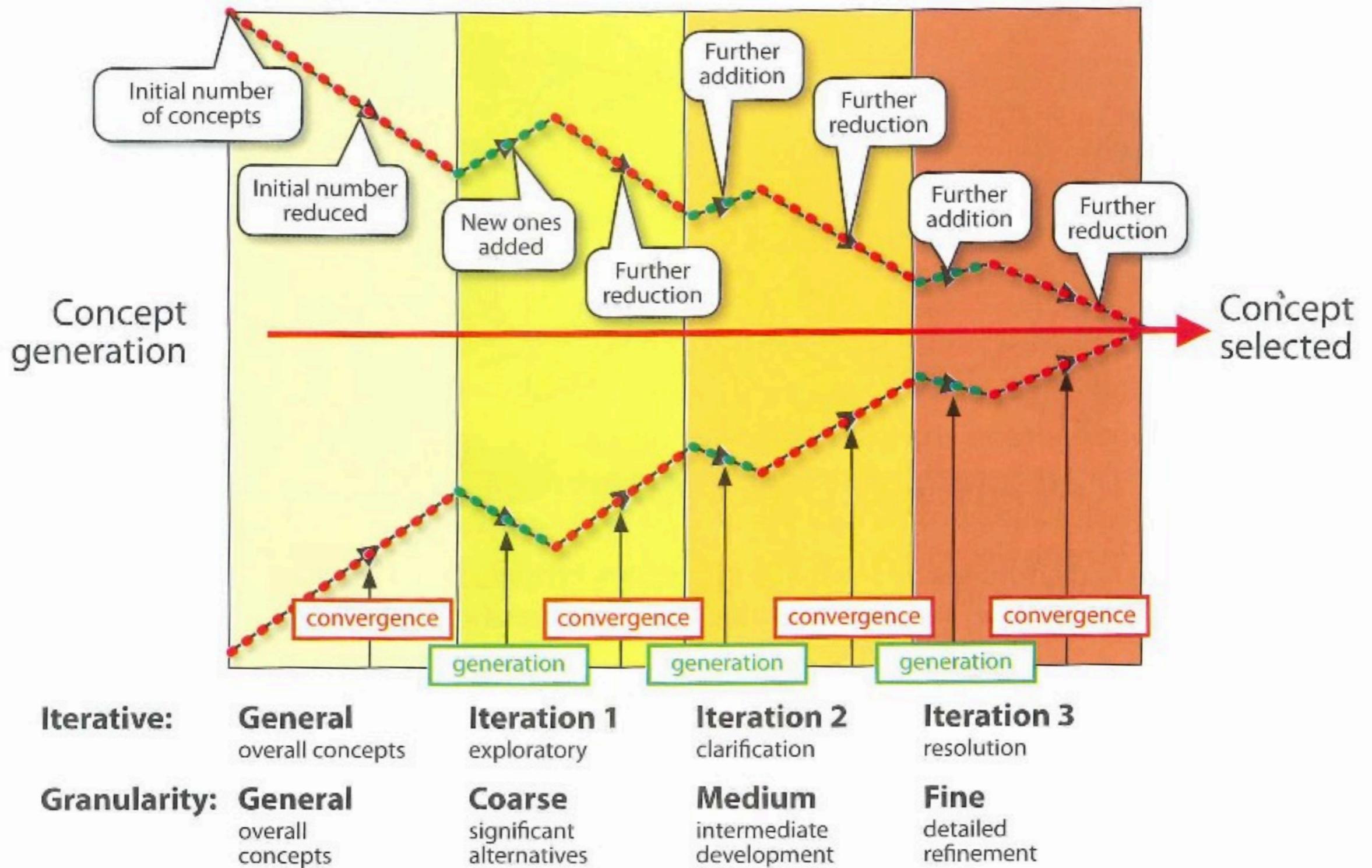
- **Generate many ideas**
- **Reflect on your ideas**
- **Choose the promising ones and develop those in parallel**
- **Add new ideas as they come up**



source: [2]



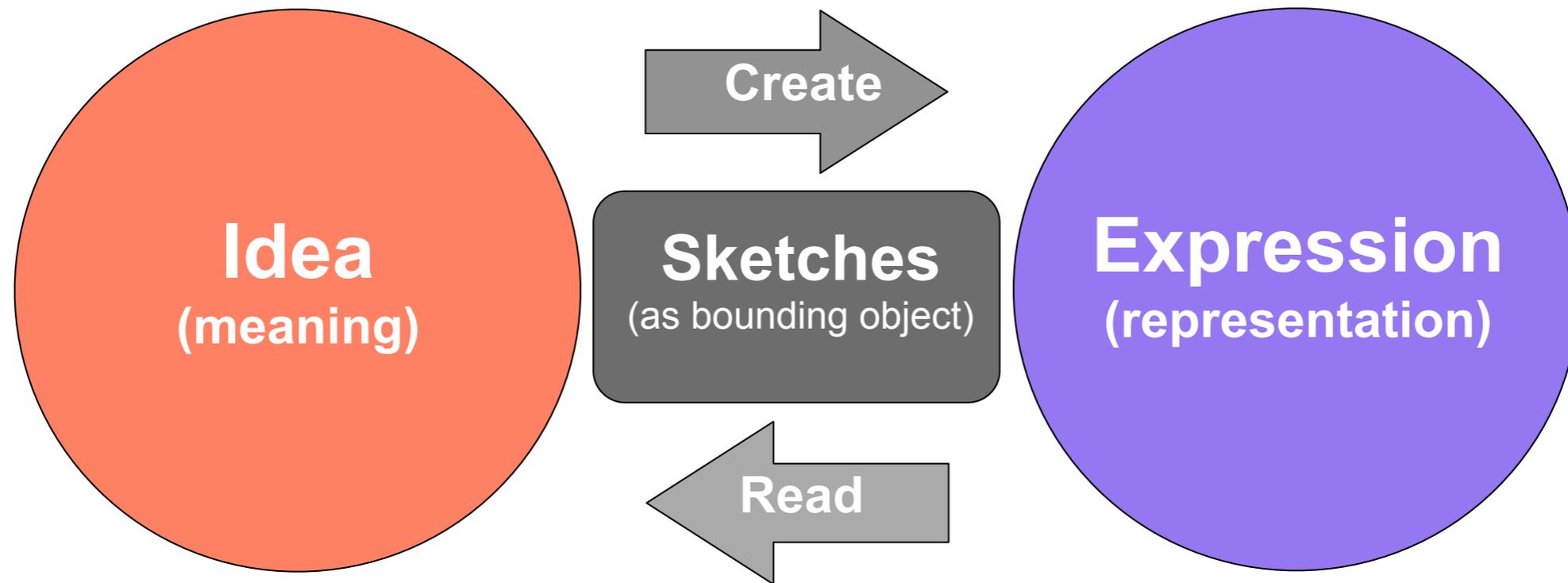
source: [2]



source: [2]

Why is sketching useful?

- **Early** ideation
- **Think** through ideas
- **Force** you to visualize how things come together
- **Communicate** ideas to others to inspire new designs
- **Active** brainstorming



Sketching is an activity, where design ideas arise from action in the dialog (personal as well as collective) with the situation at hand

In this **dialectic process** the coupling between design idea and design expression will be established and transformed

Sketching Interaction

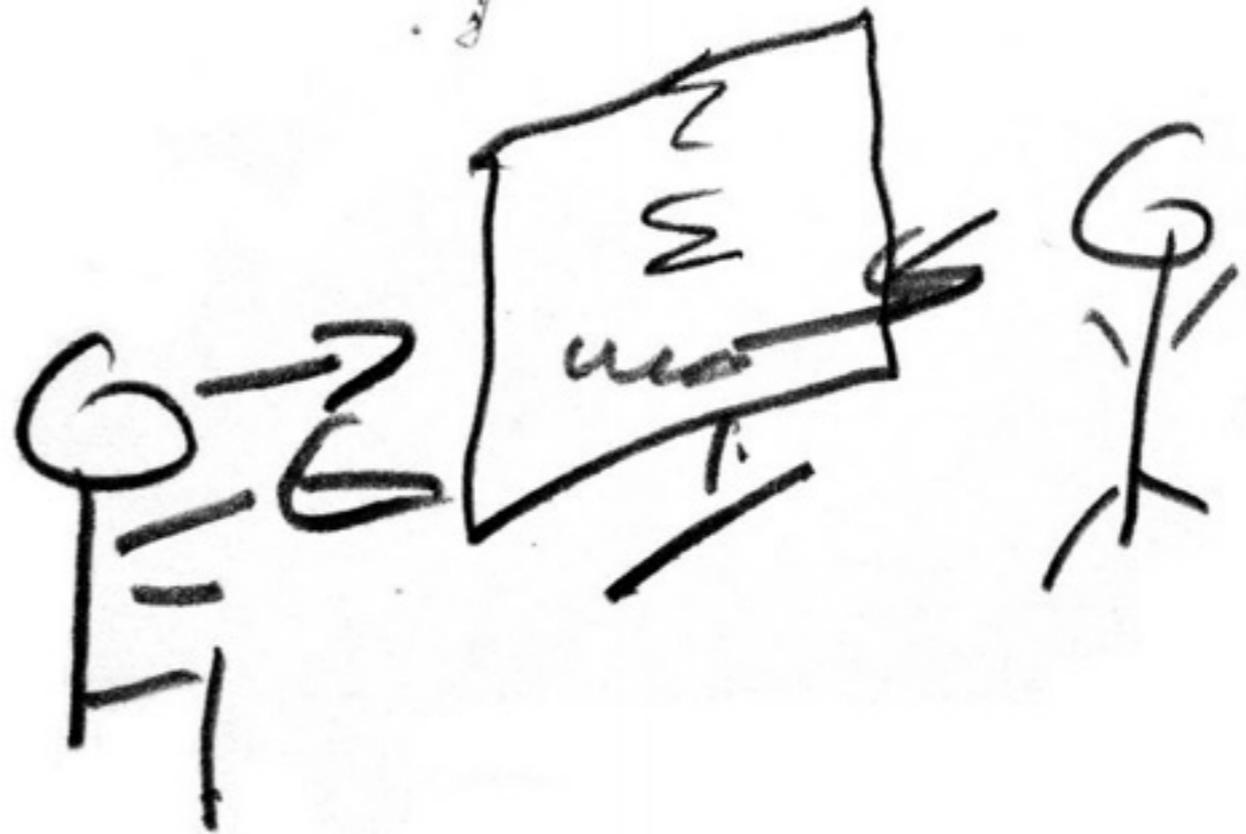
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Buxton's Sketch Properties

- Quick
- Timely
- Inexpensive
- Disposable
- Plentiful
- Clear vocabulary
- Distinct gesture
- Minimal detail
- Appropriate degree of refinement
- Suggest and explore rather than confirm
- Ambiguity

Quick

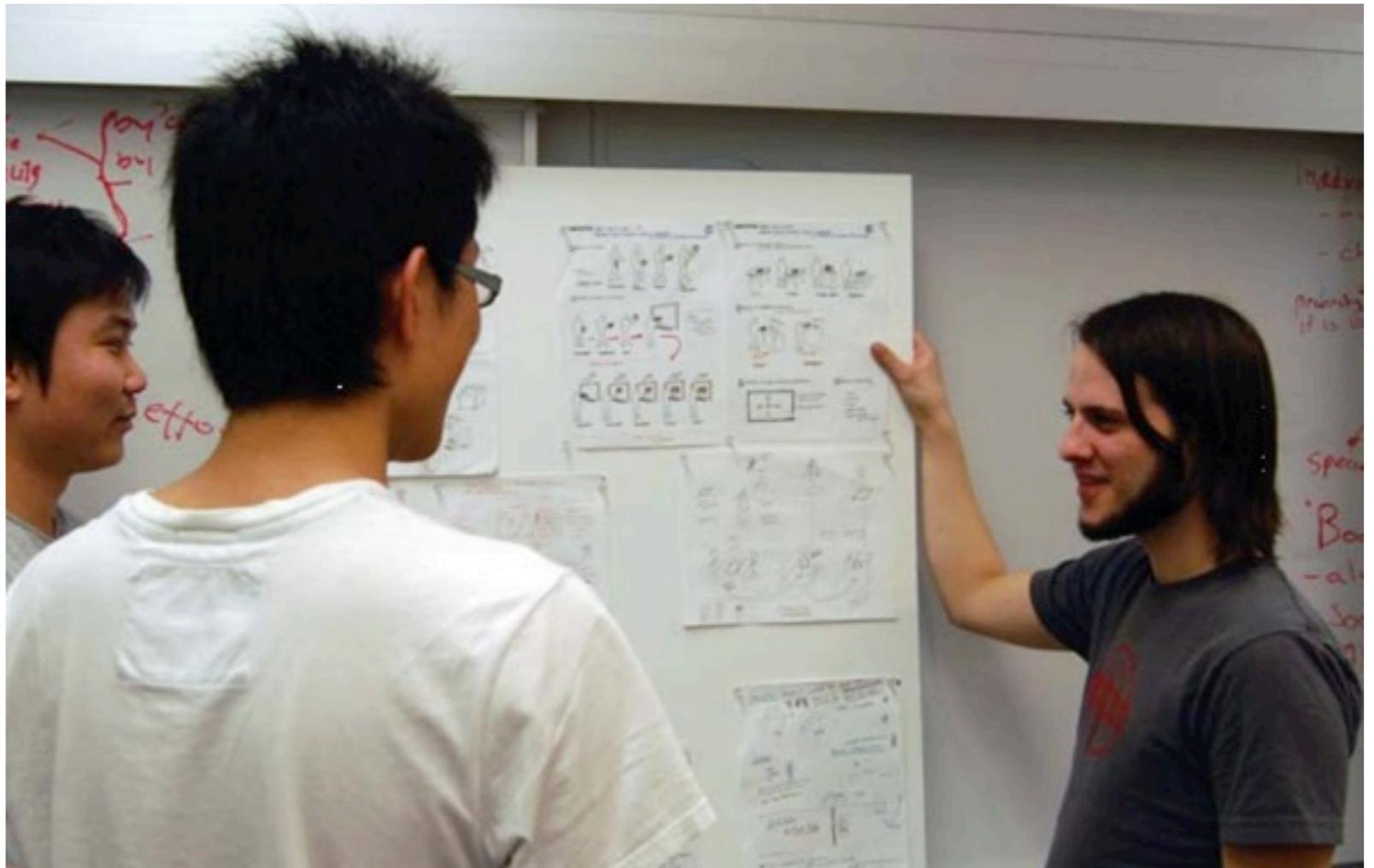
- A sketch is **quick to make**, or at least gives that impression



source: [1]

Timely

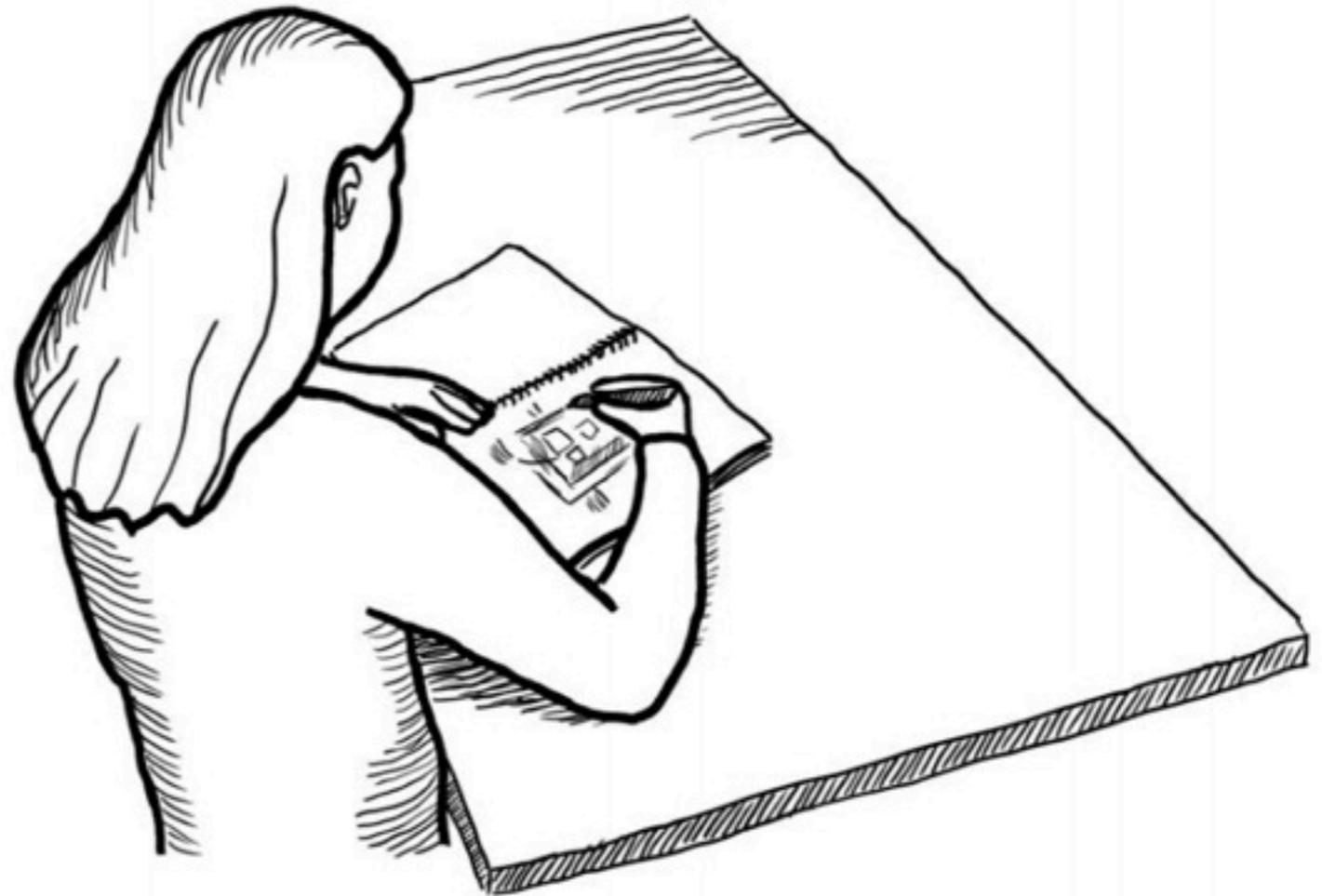
- A sketch can be **provided when needed**



source: [1]

Inexpensive

- Cost must not inhibit the **ability to explore a concept**, especially early in design



source: [1]

Disposable

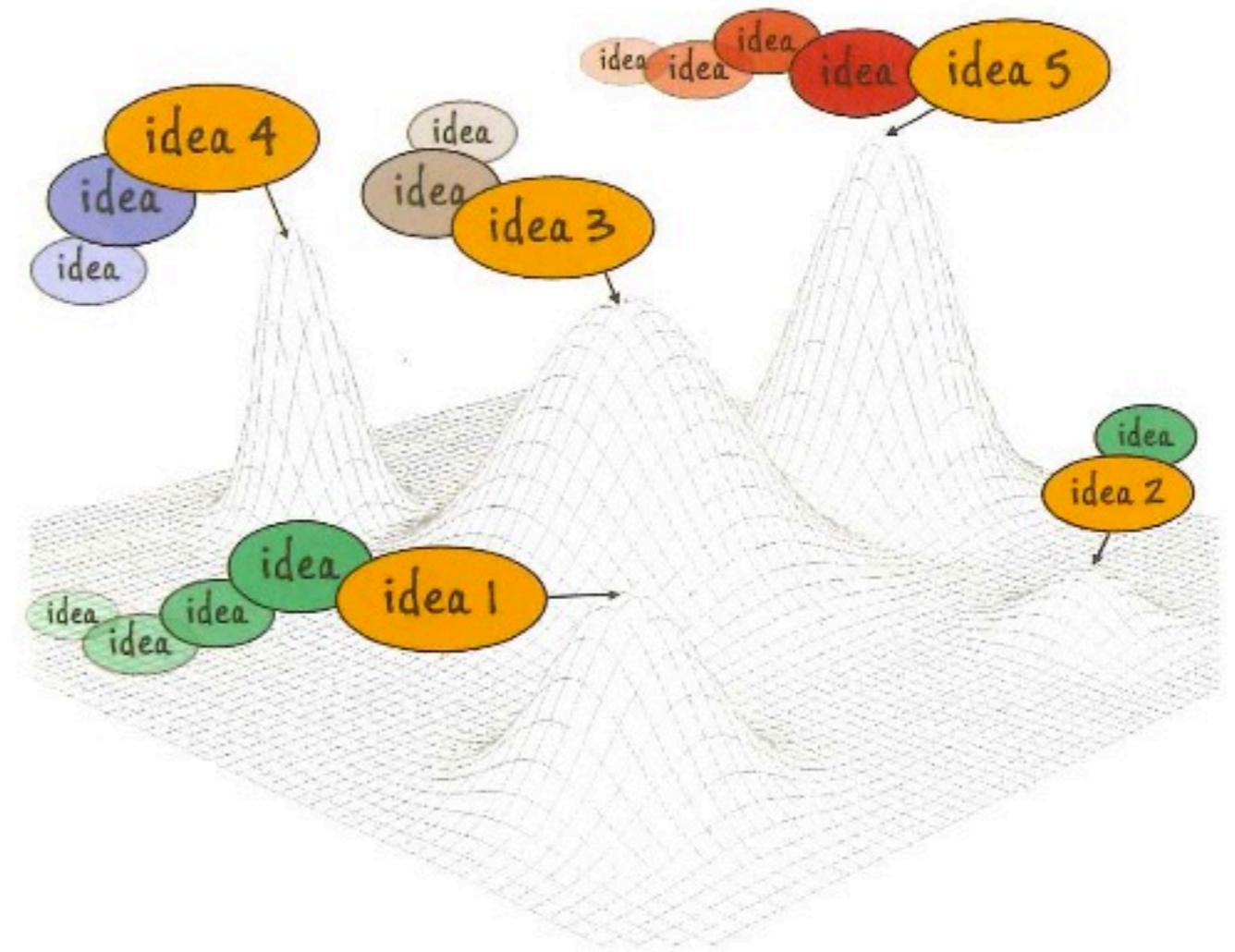
- If you can't afford to **throw it away**, it's not a sketch
- **Investment is in the process**, not the physical sketch
- However, **not “worthless”**



source: [1]

Plentiful

- They don't exist in isolation
- **Meaning & relevance** is in the context of a collection or series

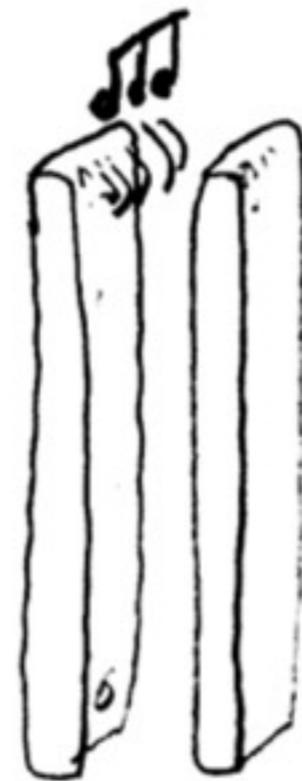


source: [1]

Clear vocabulary

- The way it's rendered (e.g., style, form, signals) makes it **distinctive** that it is a sketch

(This matter is also responsible for receiving different feedback from the indented user in early tests)



Faint musical
sound played
on one device
picked up by
the other
device

source: [1]

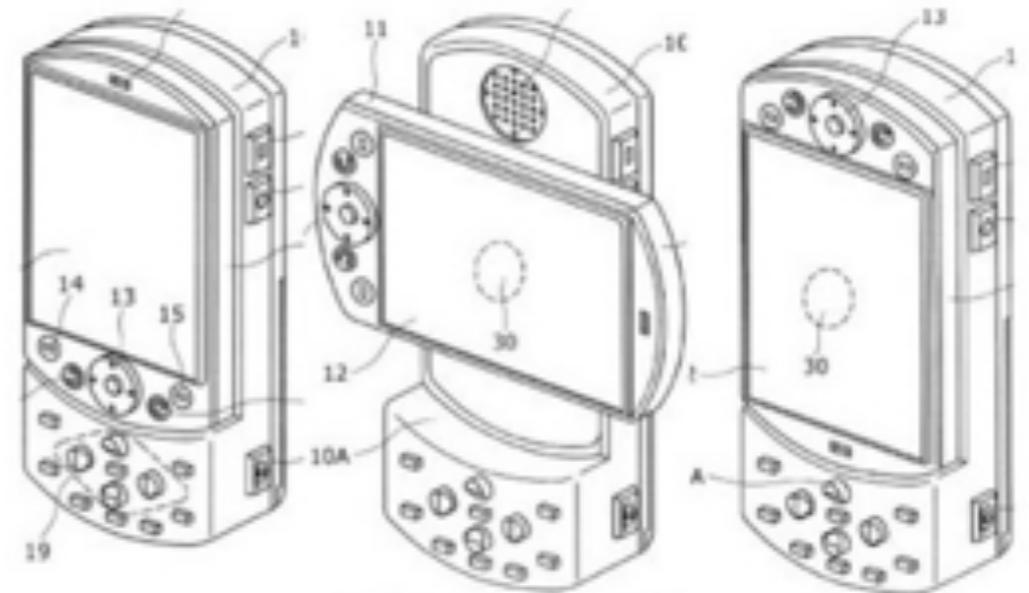
Distinct Gesture

- Fluidity of sketches gives them a **sense of openness and freedom**

(Opposite of engineering drawing, which is tight and precise)



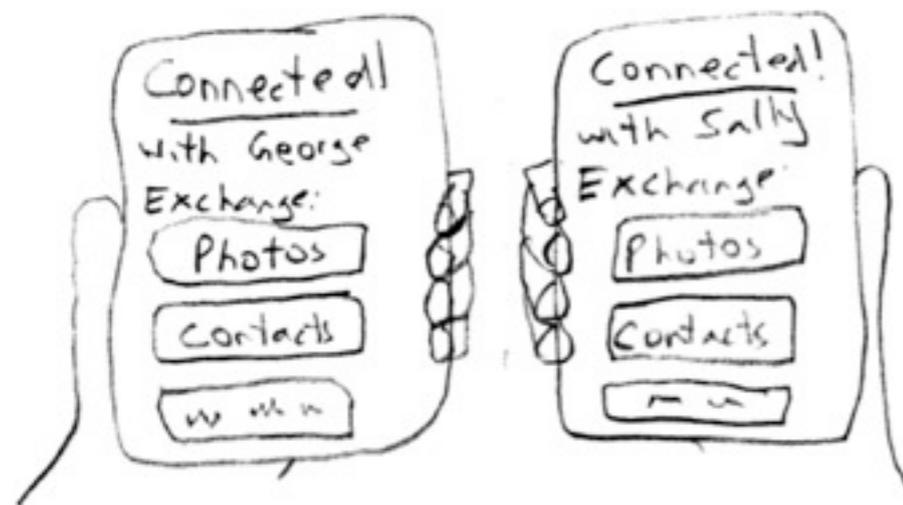
3 simultaneous
taps on both
phones



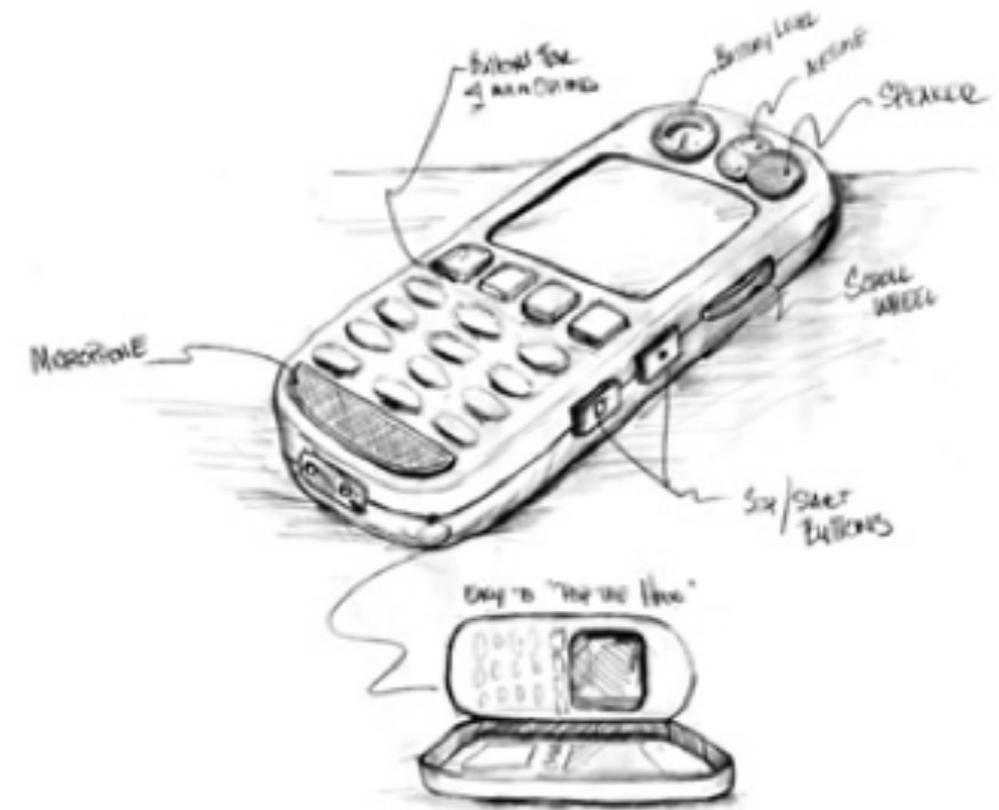
source: [1]

Minimal Detail

- Include **only what is required** to render the intended purpose or concept



Once connected, people can then exchange various things on their phone



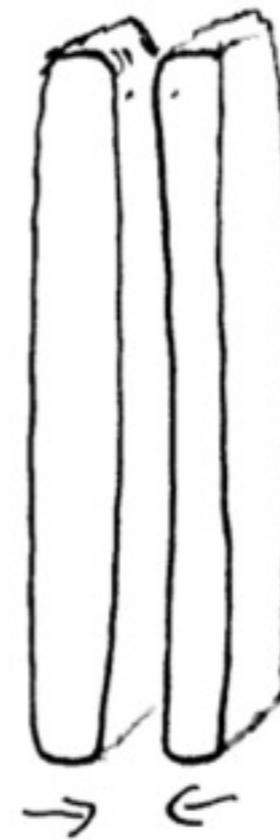
source: [1]

Appropriate Degree of Refinement

- Make the sketch be as refined as the idea:

(a) If you have a **solid idea**, make the sketch look **more defined**

(b) If you have a **hazy idea**, the sketch will look much **rougher and less defined**

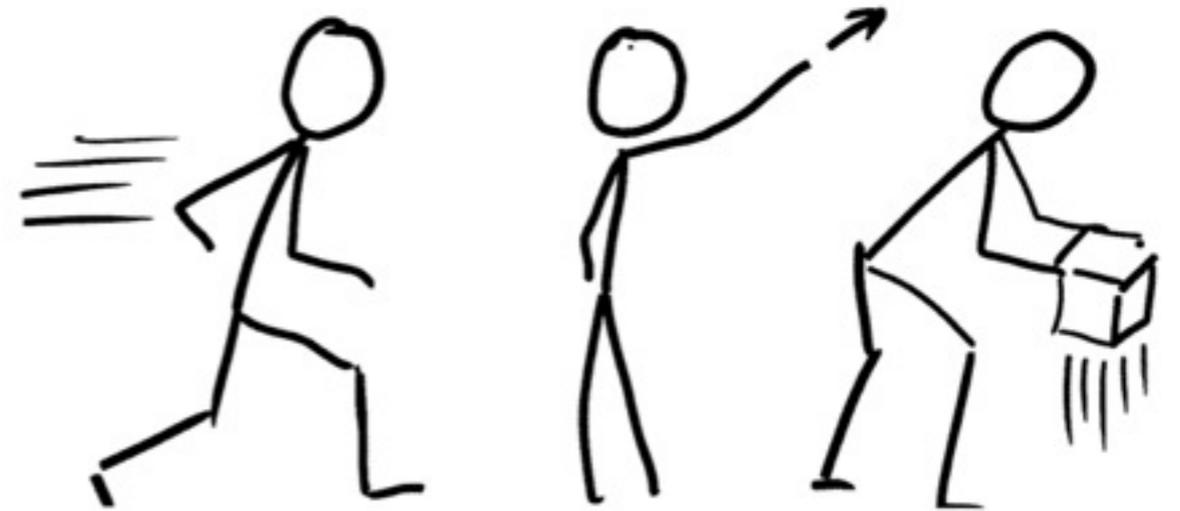


Ambient
light
sensor
Touch
surfaces
together
in a pattern;
Both detect
same light/
dark pattern

source: [1]

Suggest and explore rather than confirm

- Sketch should act as a **catalyst** to the desired and appropriate **behaviors, conversations, and interactions**



source: [1]

Ambiguity

- Intentionally **ambiguous**
- Value comes from being able to be **interpreted in different ways**, even by the person who created them



source: [1]

Sketching Interaction

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Sketching vs. Prototyping

Sketches

- Invite
- Suggest
- Explore
- Question
- Propose
- Provoke



Prototypes

- Attend
- Describe
- Refine
- Answer
- Test
- Resolve

source: [1]

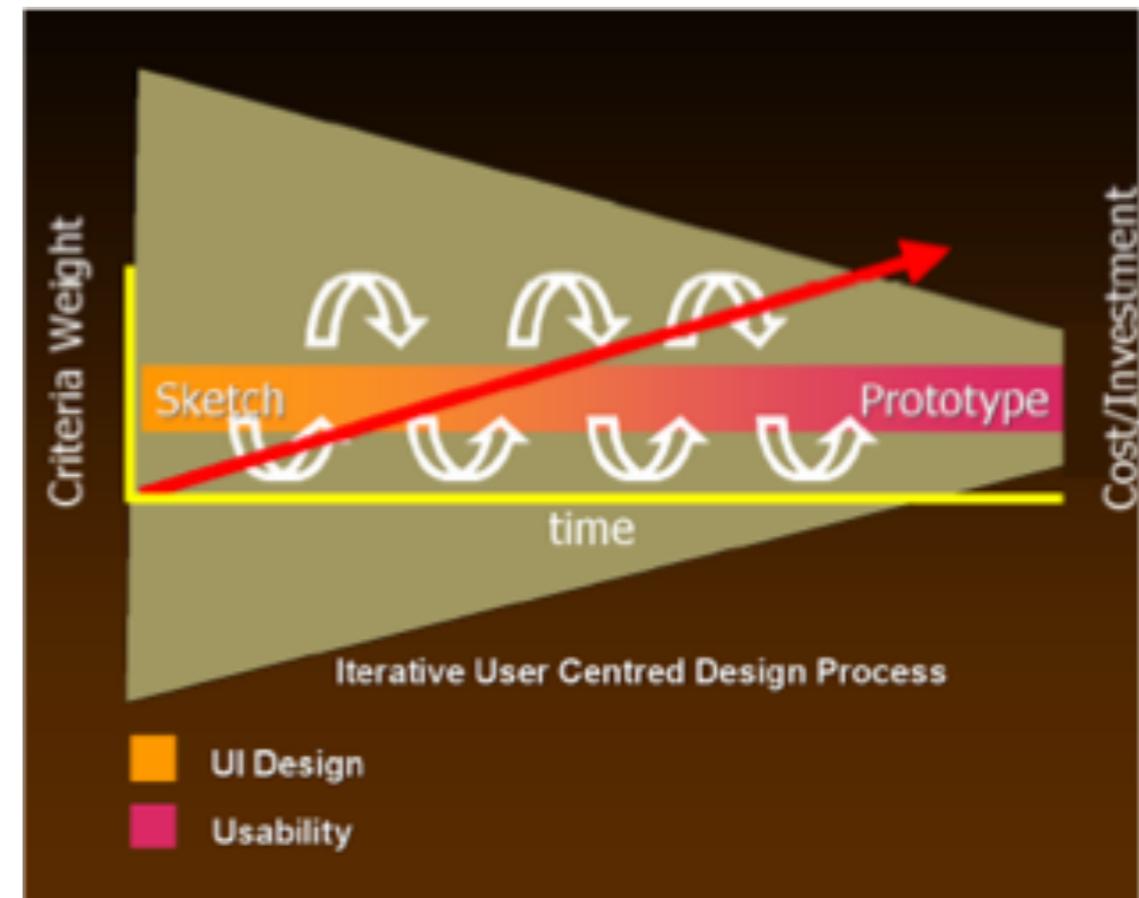
Sketching and Prototyping

Low cost sketches

as investment in design increases (red arrow), exploring the design space from the **user interaction point of view**

From design to evaluation

similarly, interface design (idea generation) progresses to usability testing (evaluate a design idea)



source: [1]

Forms of sketching

Buxton properties don't mention anything about form factor

- Can be pencil/pen drawing on paper
- Something scraped together in Photoshop
- Quick-and-dirty prototyping
- Magazine cut-outs
- Modifications to existing objects

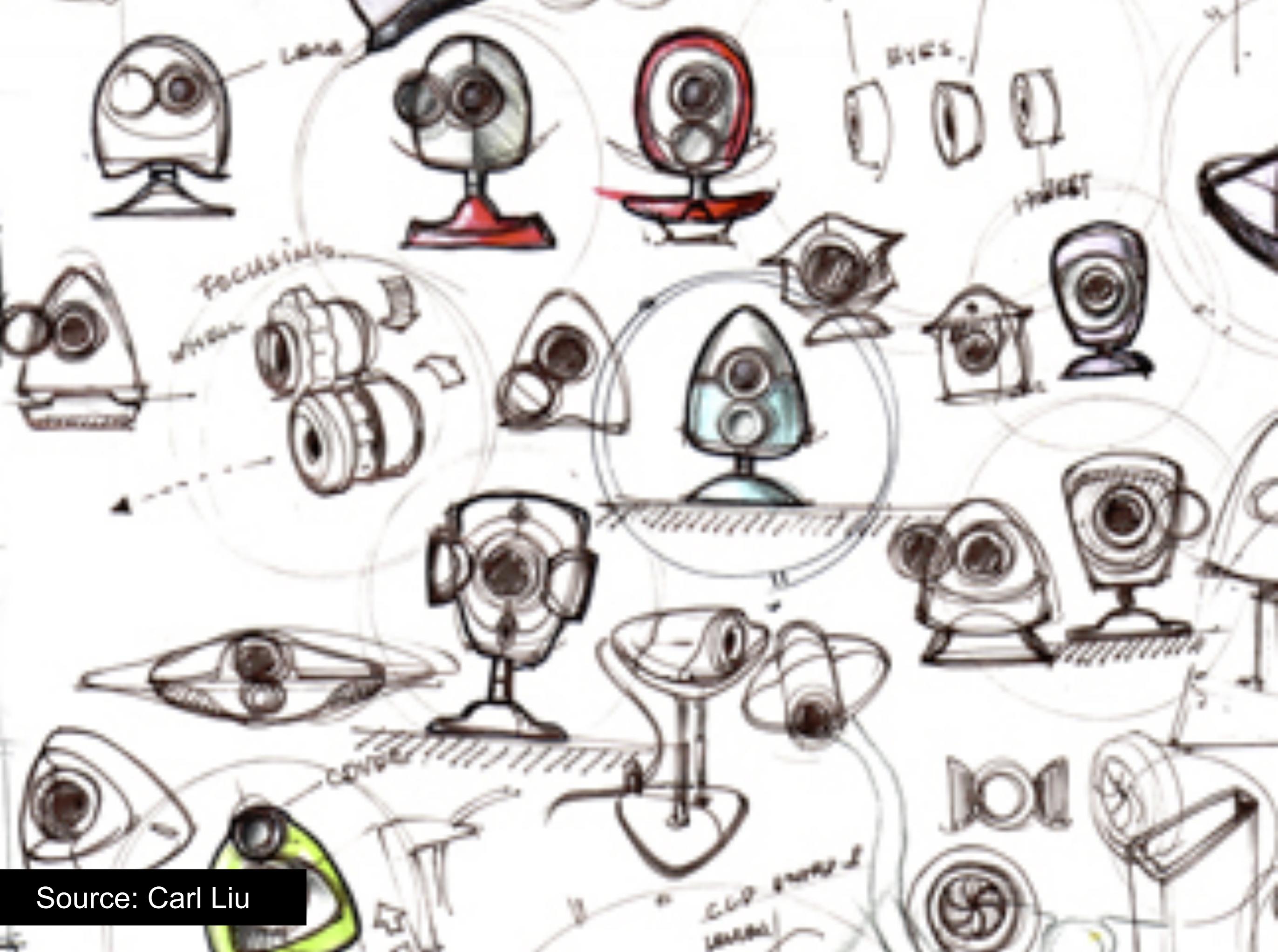
The Sketchbook

Why a sketchbook?

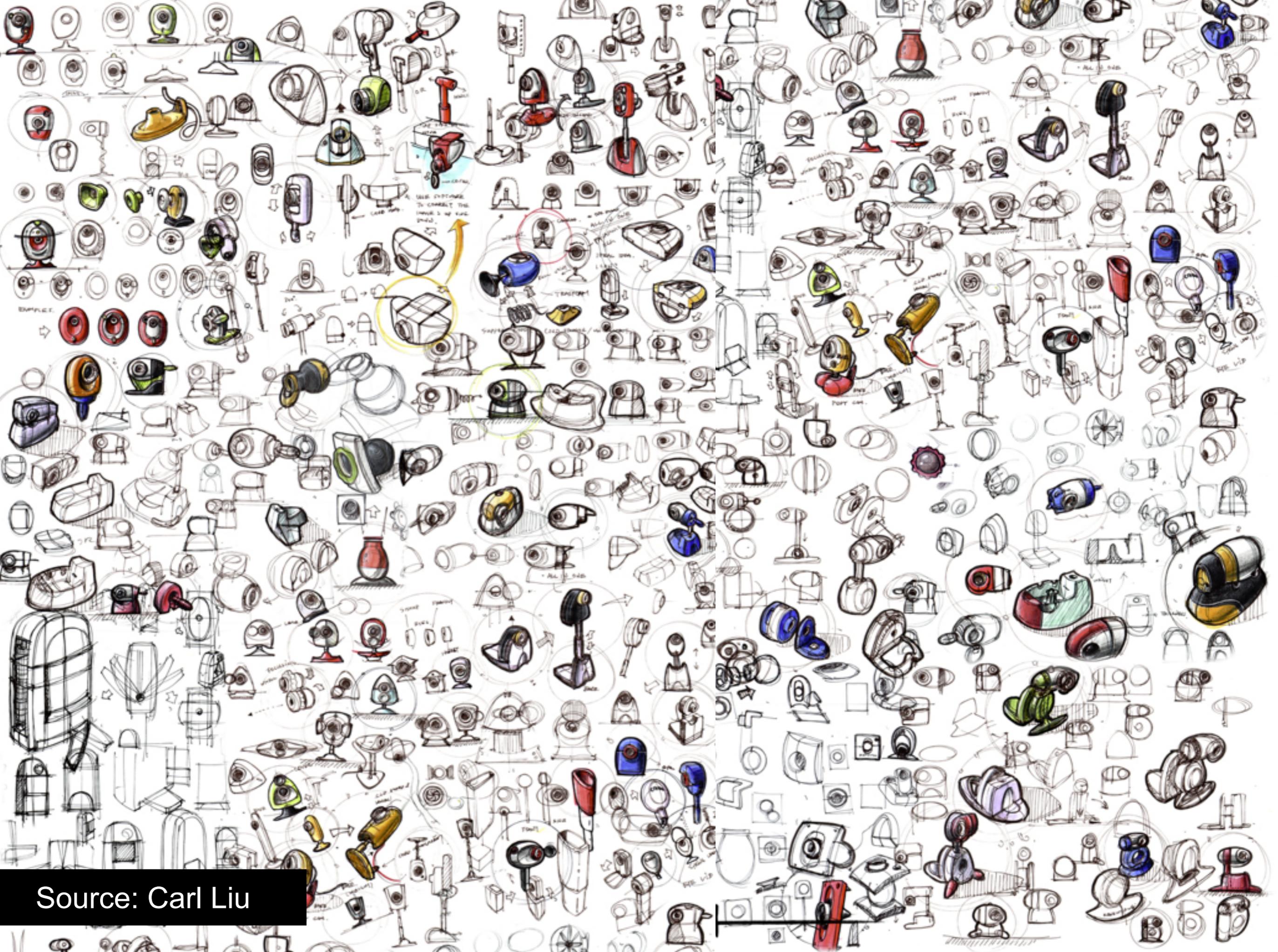
- capture many initial ideas – **both good and bad**
- **explore & refine** ideas both in the large and in the small
- **develop variations**, alternatives, details
- **keep a record** of your ideas
- **reflect** on changing thought processes over time
- **communicate ideas** to others by showing
- **choose** ones worth developing
- capture good ideas you **see elsewhere**
- **collect** photos, tape them into your book



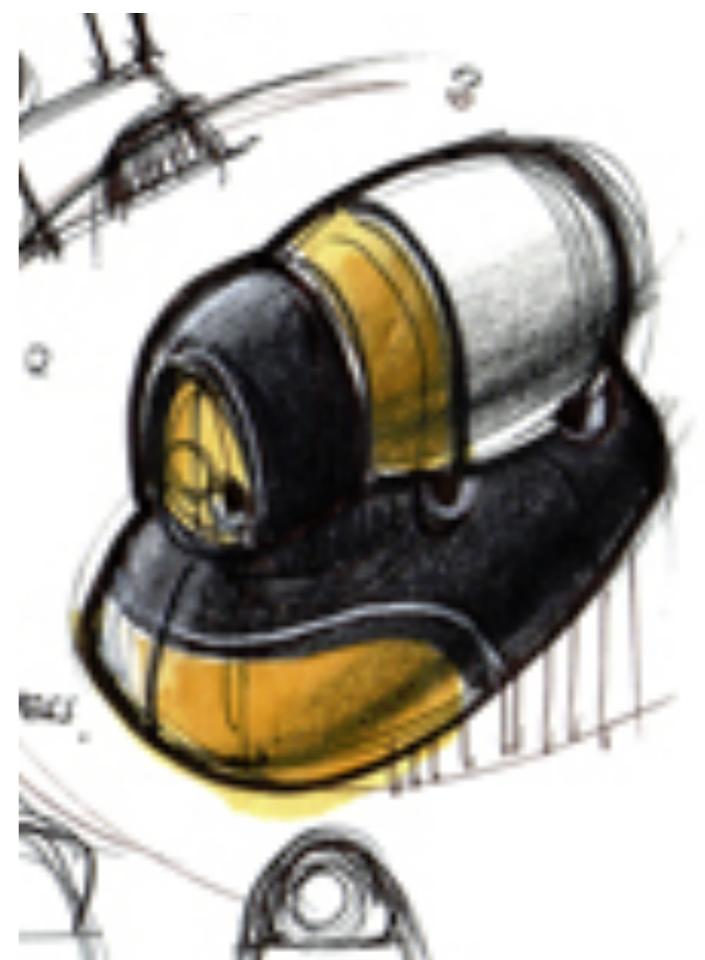
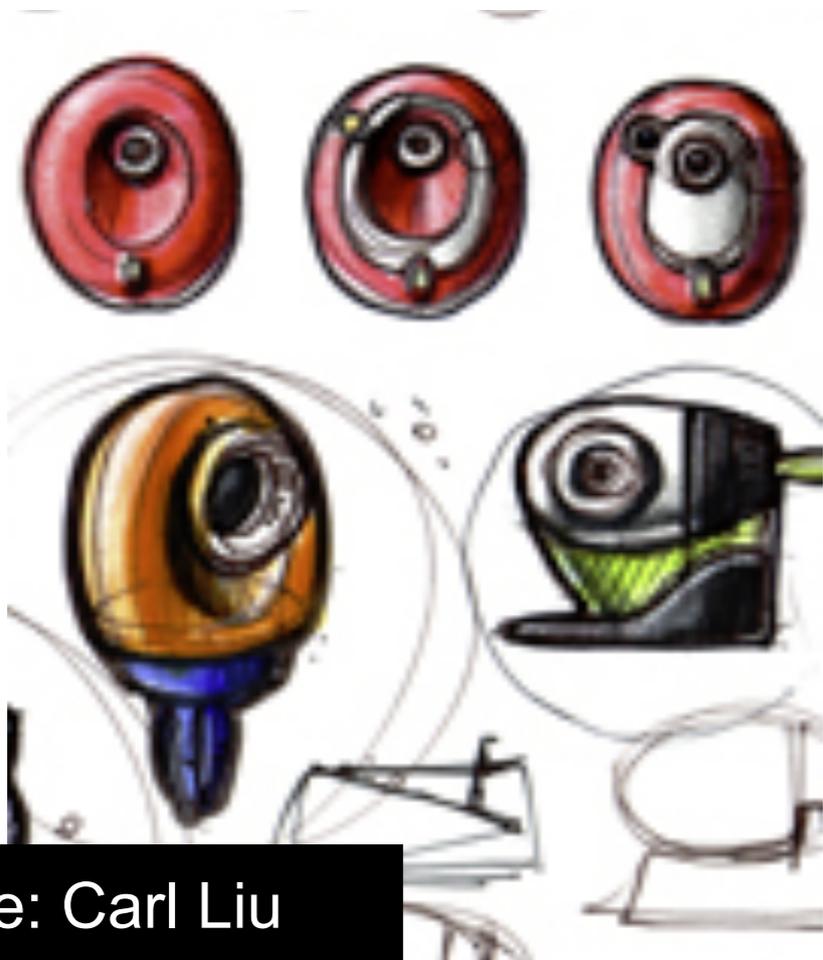
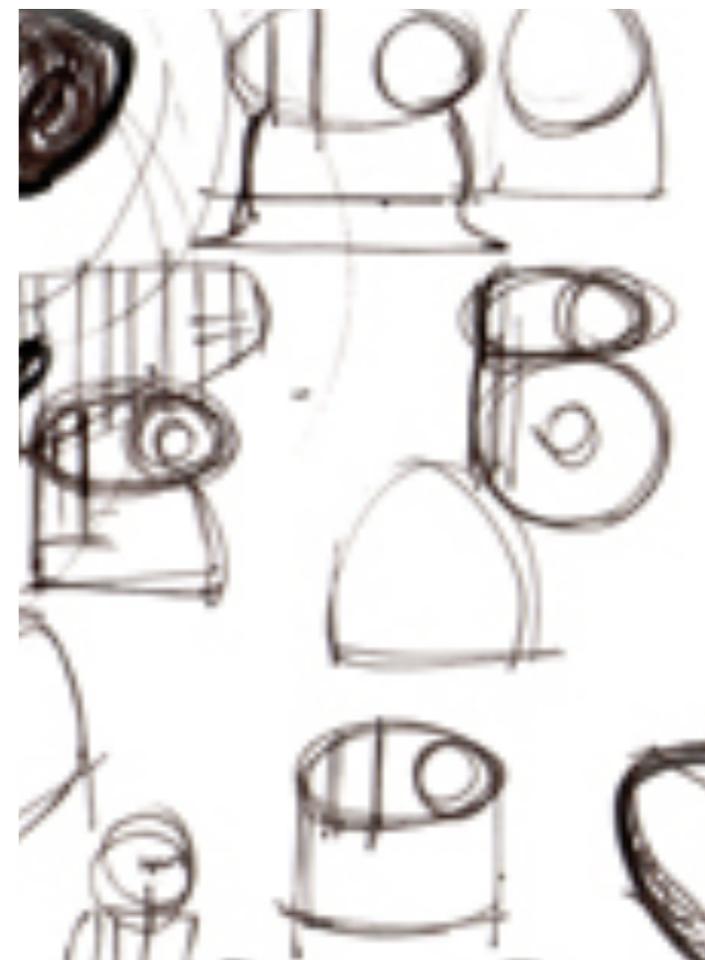
Sketchbook Examples: Industrial and product design



Source: Carl Liu



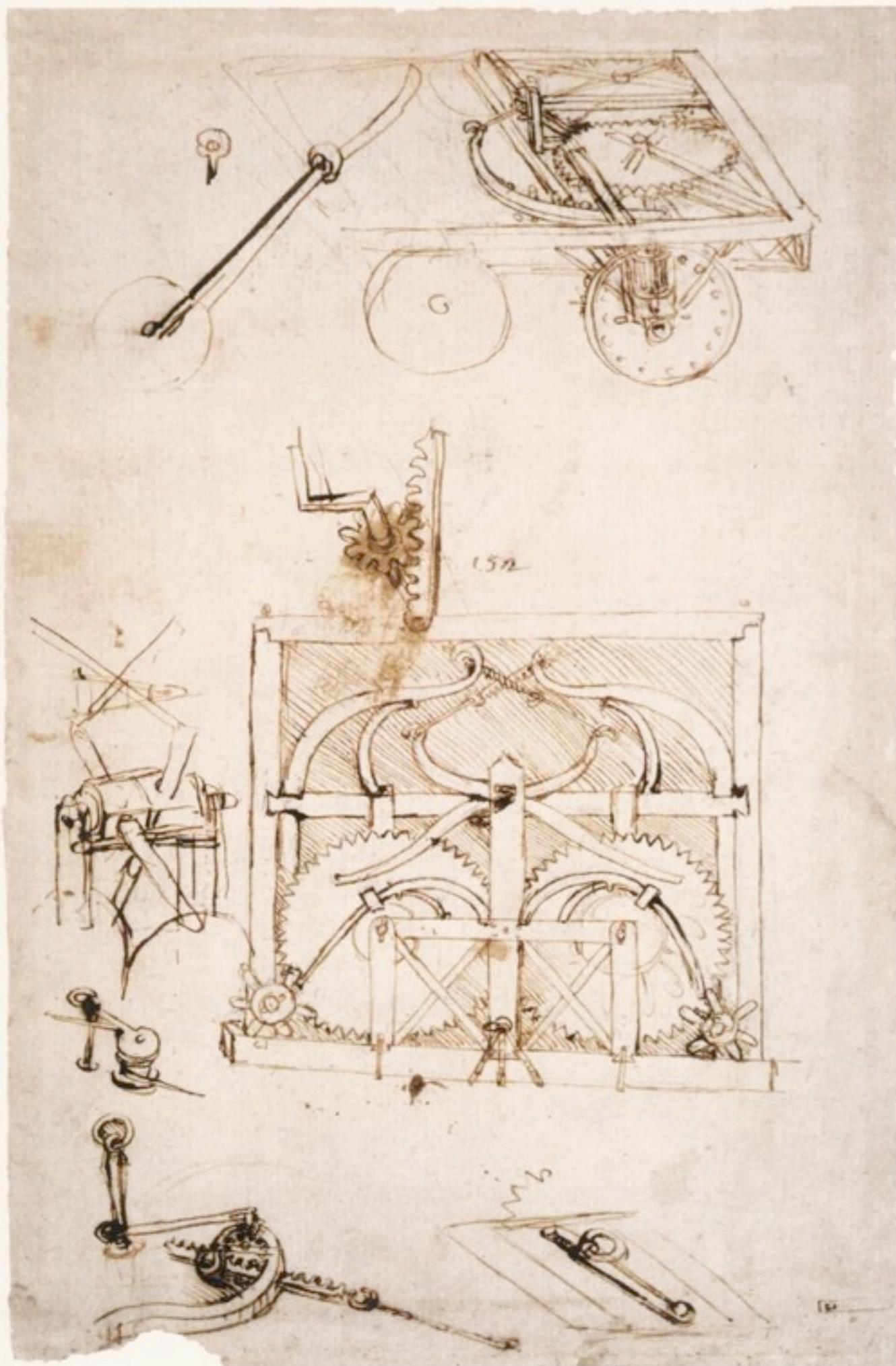
Source: Carl Liu



Source: Carl Liu

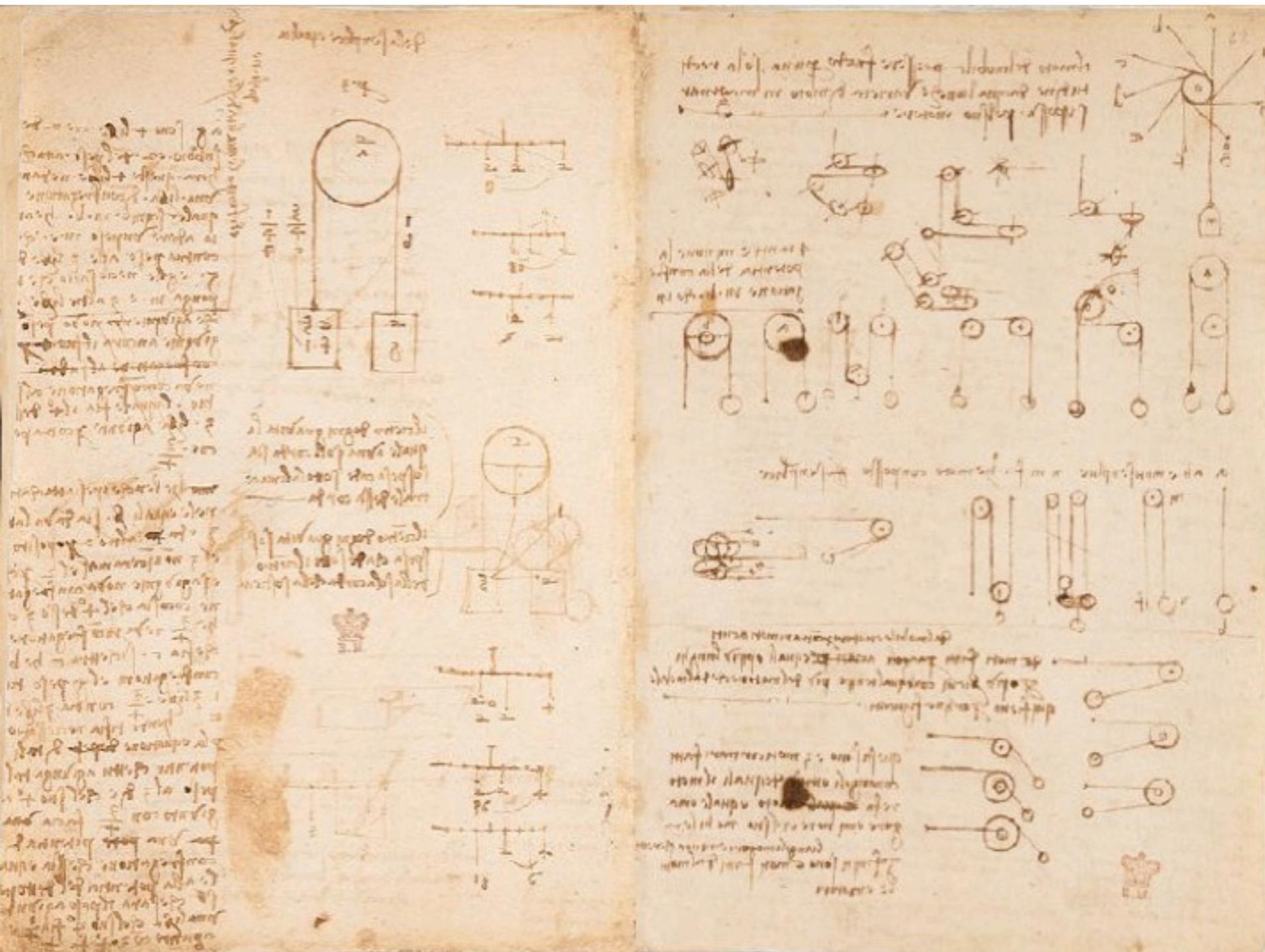
Sketchbook Examples: Science and engineering

Leonardo da Vinci

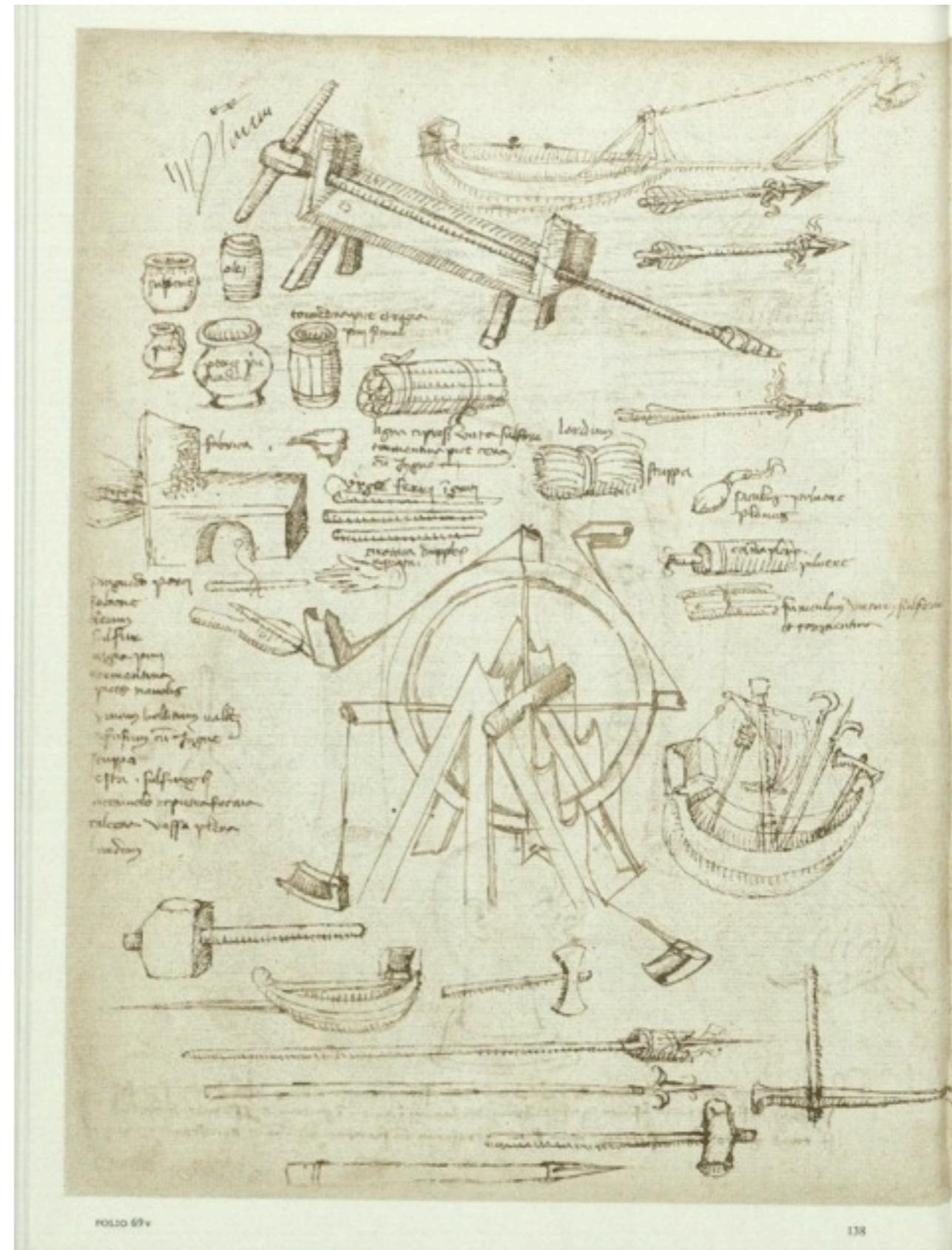
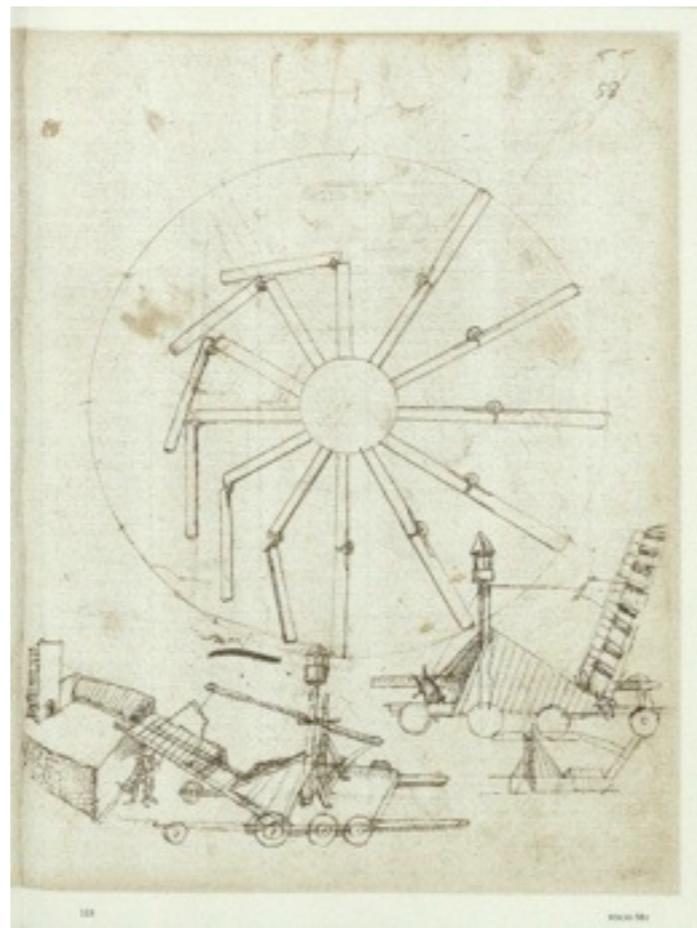
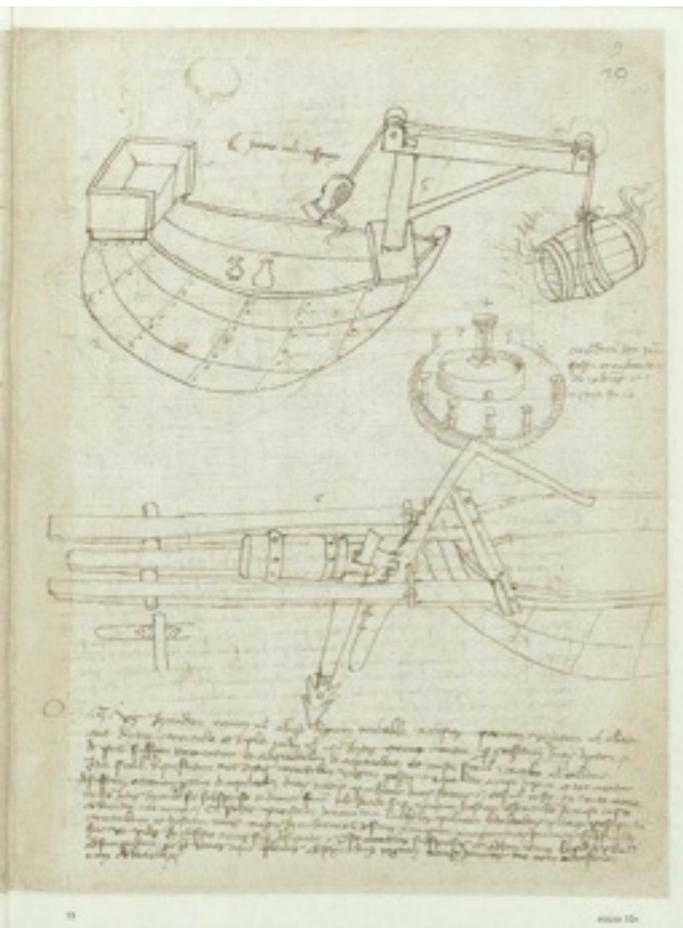


Source: British Library
<http://www.bl.uk/onlinegallery/ttp/ttpbooks.html>

Leonardo da Vinci

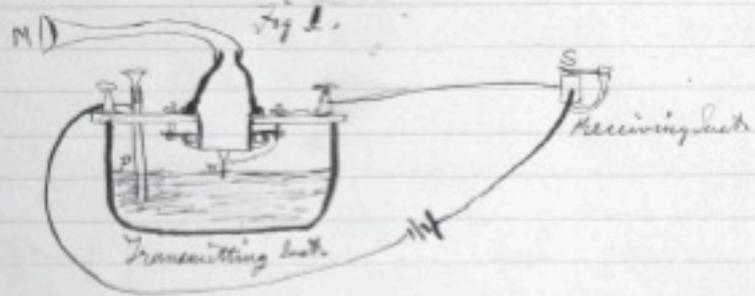


Mariano Taccola



Source: Kinematic models
for design digital library
<http://kmoddl.library.cornell.edu/>

March 10th 1876



1. The improved instrument shown in Fig. 1 was constructed this morning and tried this evening. P is a brass pipe and W the platinum wire M the mouth piece and S the armature of the Receiving Instrument.

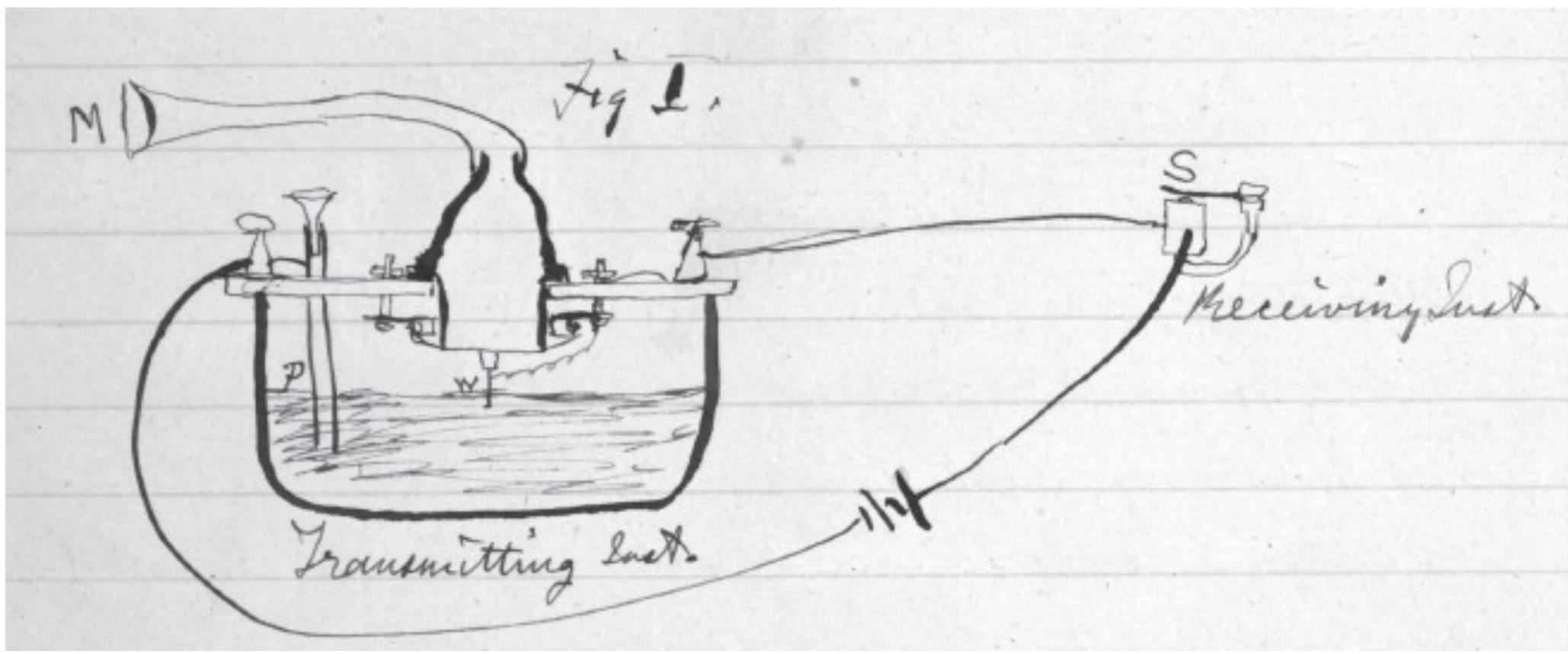
Mr. Watson was stationed in one room with the Receiving Instrument. He pressed one ear closely against S and closed his other ear with his hand. The Transmitting Instrument was placed in another room and the doors of both rooms were closed.

I then shouted into M the following sentence: "Mr. Watson - come here - I want to

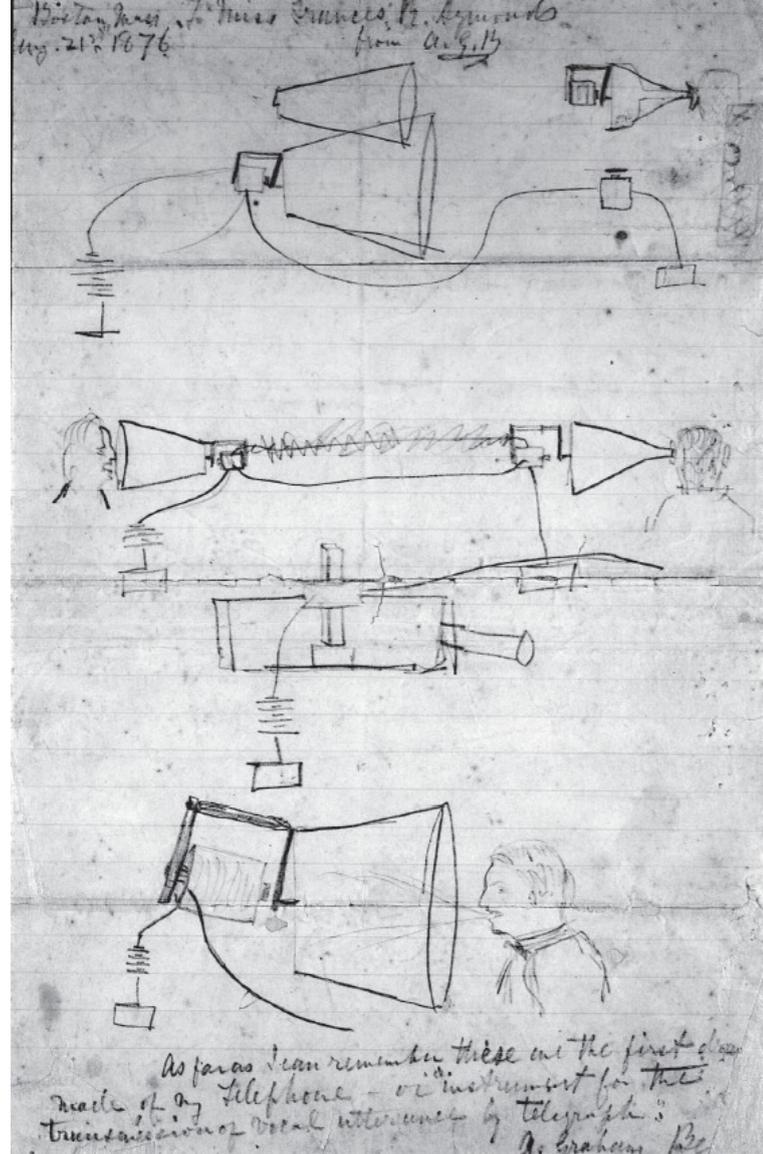
see you". To my delight he came and declared that he had heard and understood what I said. I asked him to repeat the words - He said - He amended "You said 'Mr. Watson - come here - I want to see you'." He then changed places and I listened at S while Mr. Watson read a few passages from a book into the mouth piece M. It was certainly the case that articulate sounds proceeded from S. The effect was loud but indistinct and muffled. If I had read beforehand the passage given by Mr. Watson I should have recognized every word. As it was I could not make out the sense - but an occasional word here and there was quite distinct. I made out "to" and "out" and "further", and finally the sentence "Mr. Bell do you understand what I say? Do-You-Under-stand-what-I-say" came quite clearly and intelligibly. No sound was audible when the armature S was removed.

Alexander Graham Bell

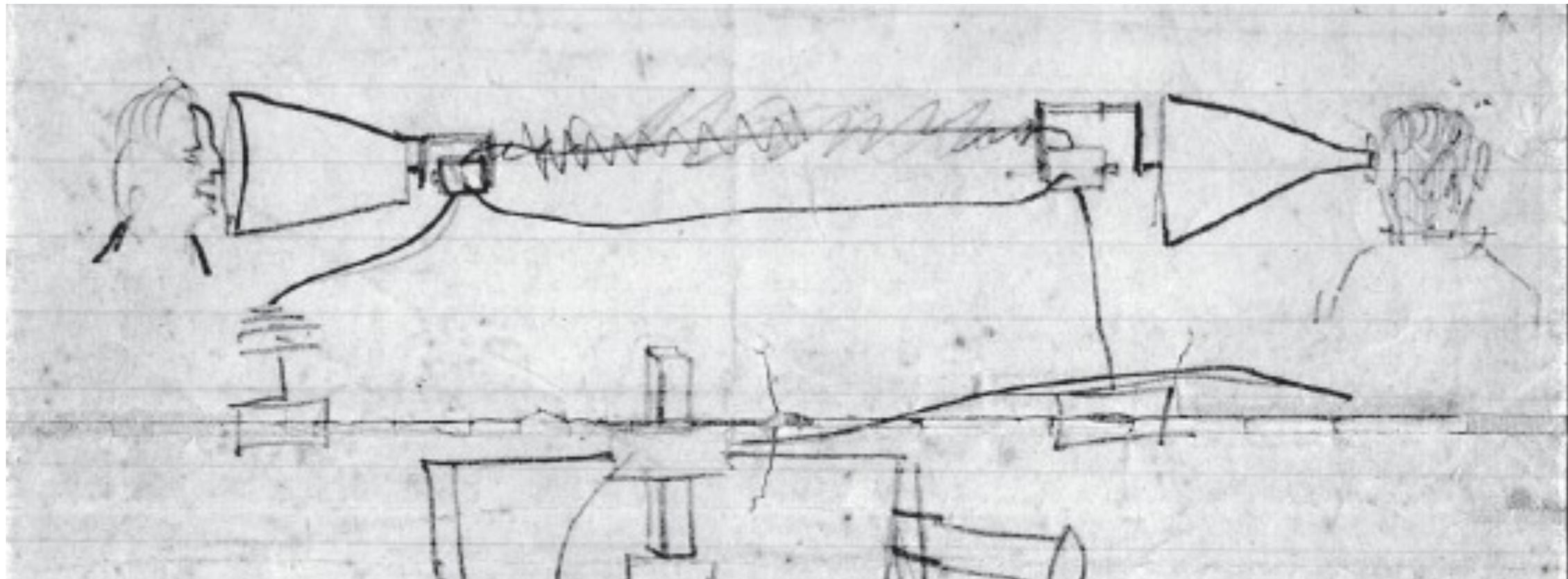
Source: The Library of Congress
<http://memory.loc.gov/ammem/bellhtml/bellhome.html/>



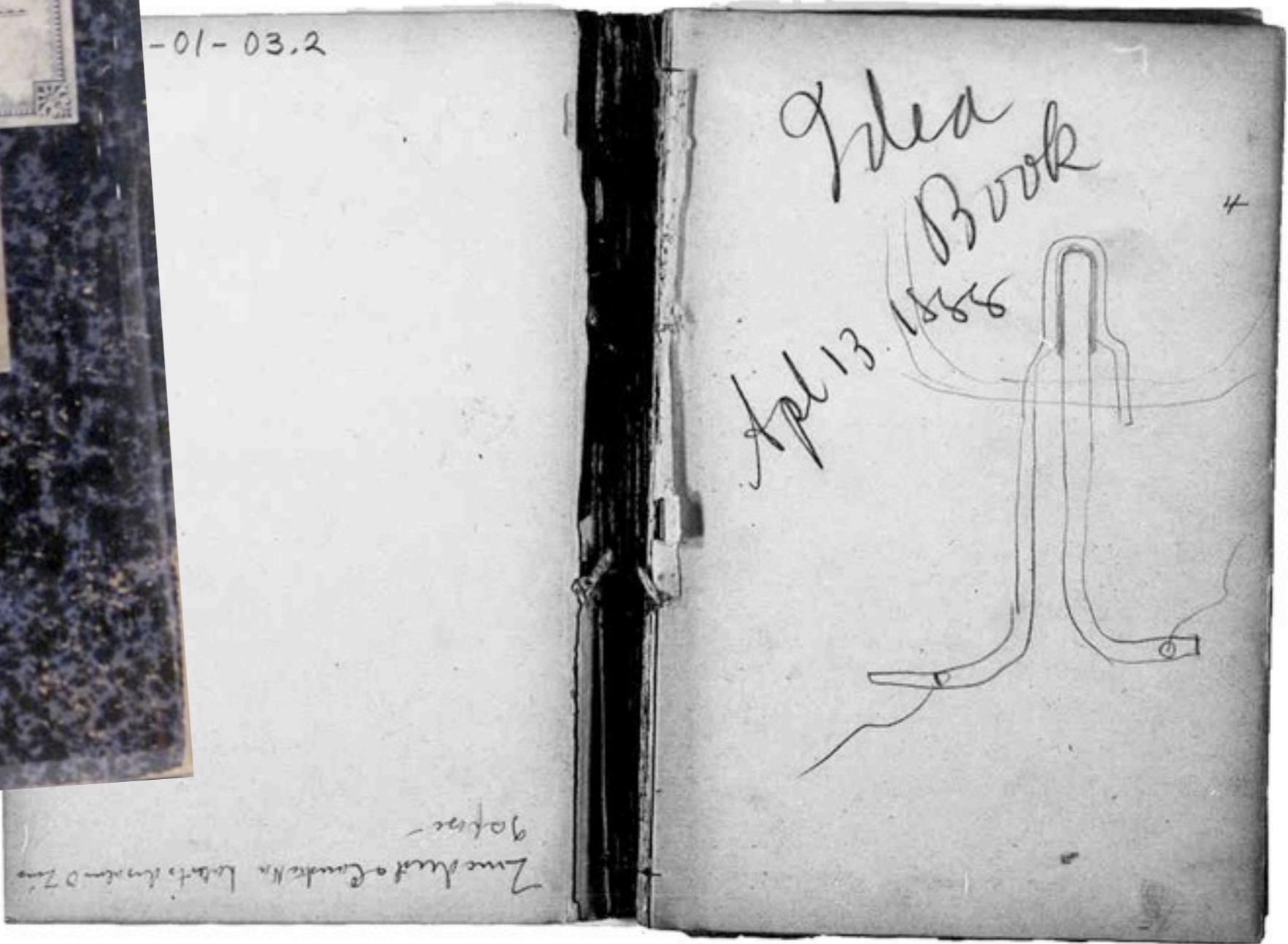
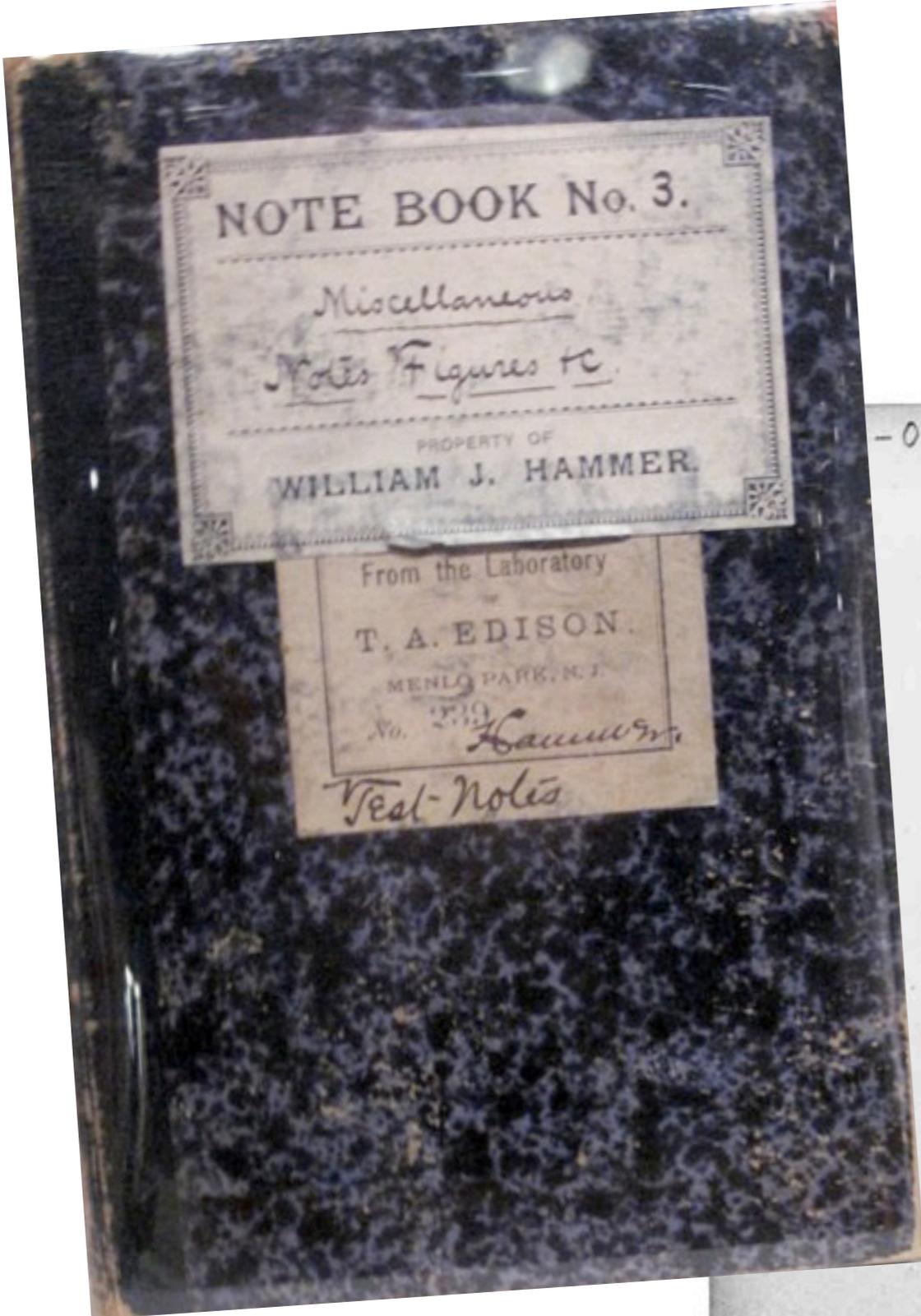
Alexander Graham Bell



Source: The Library of Congress
<http://memory.loc.gov/ammem/bellhtml/bellhome.html/>

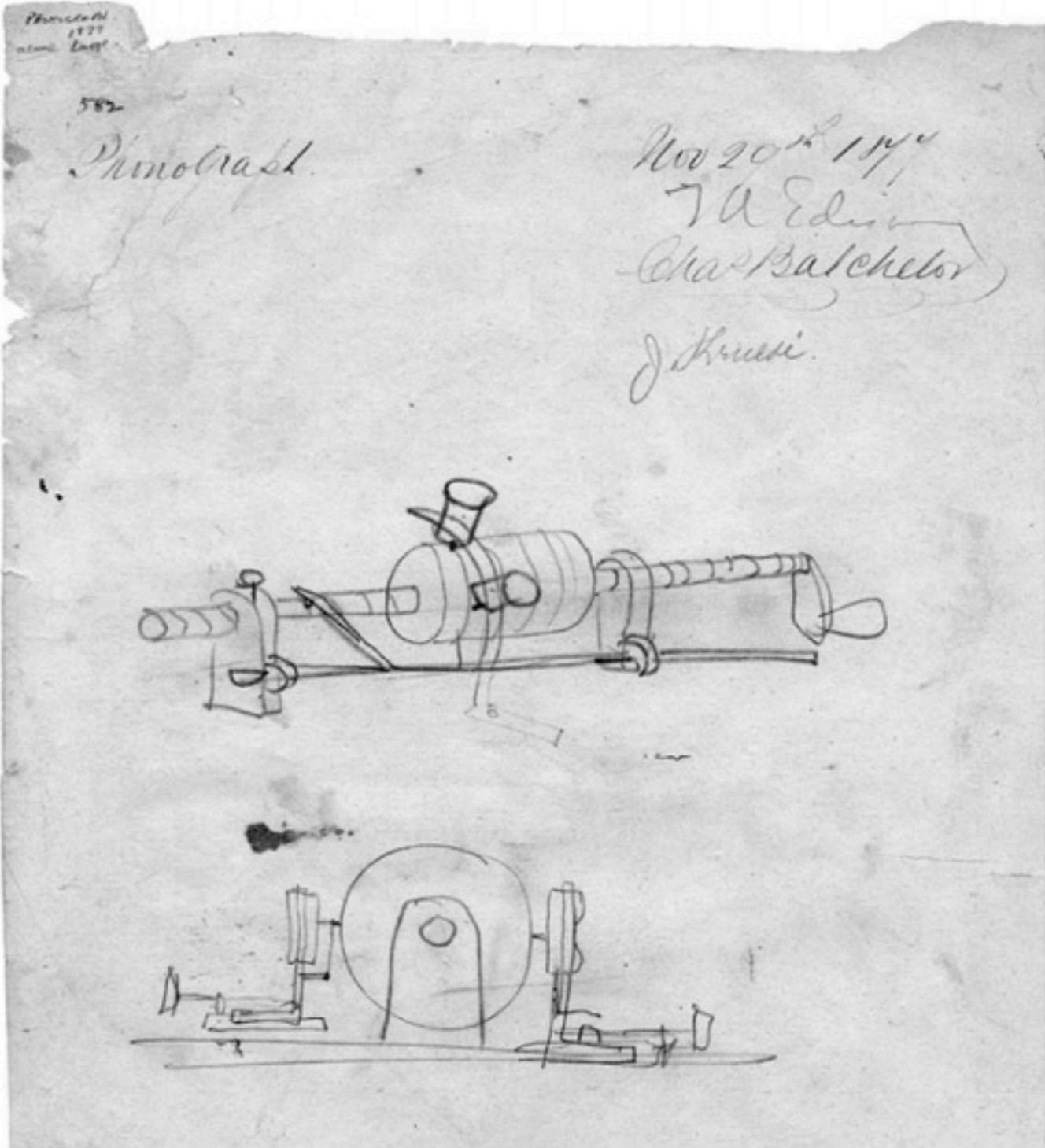
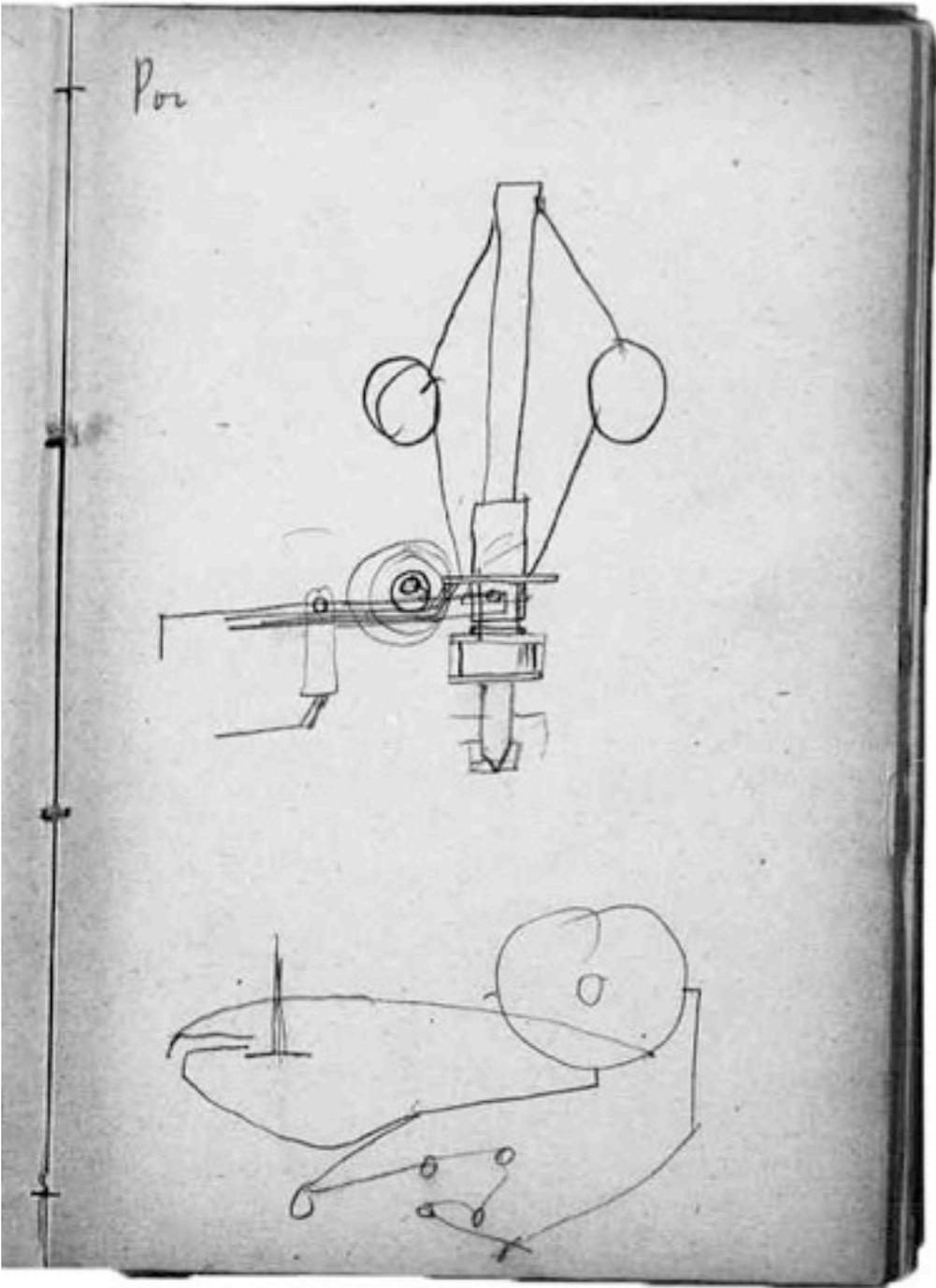


Thomas Alva Edison



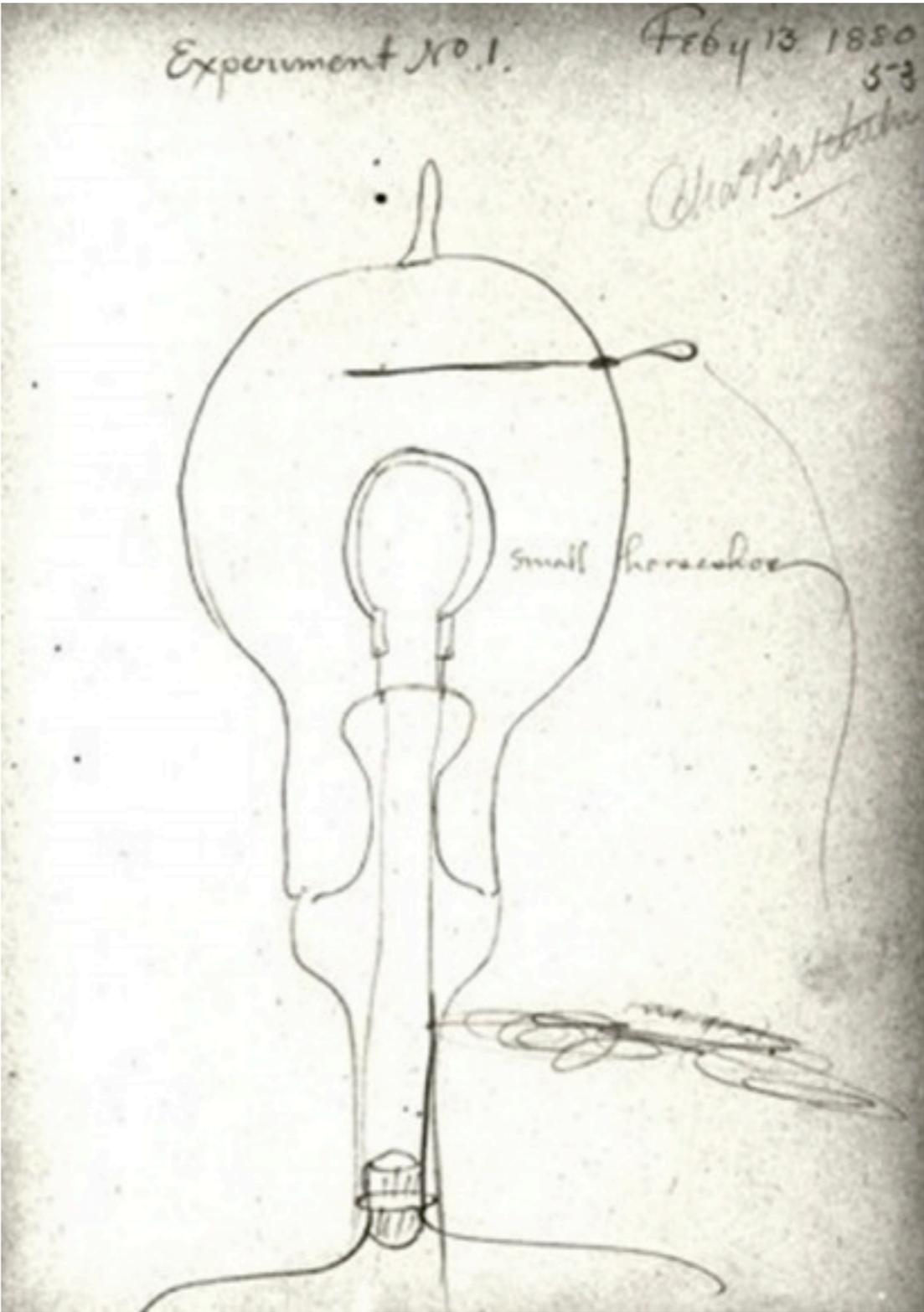
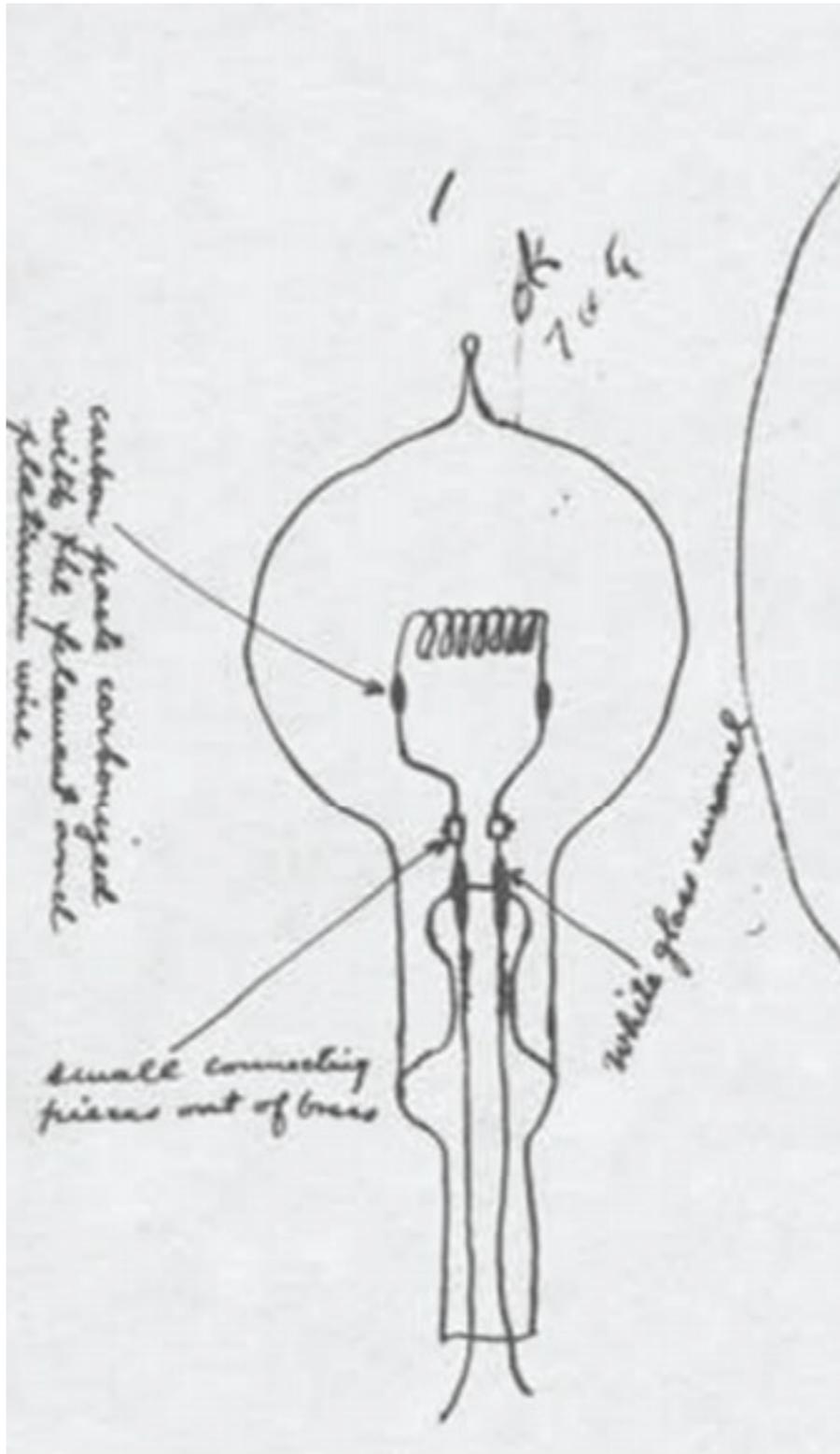
Source: The Thomas Edison Papers, Rutgers University
<http://edison.rutgers.edu/>

Thomas Alva Edison



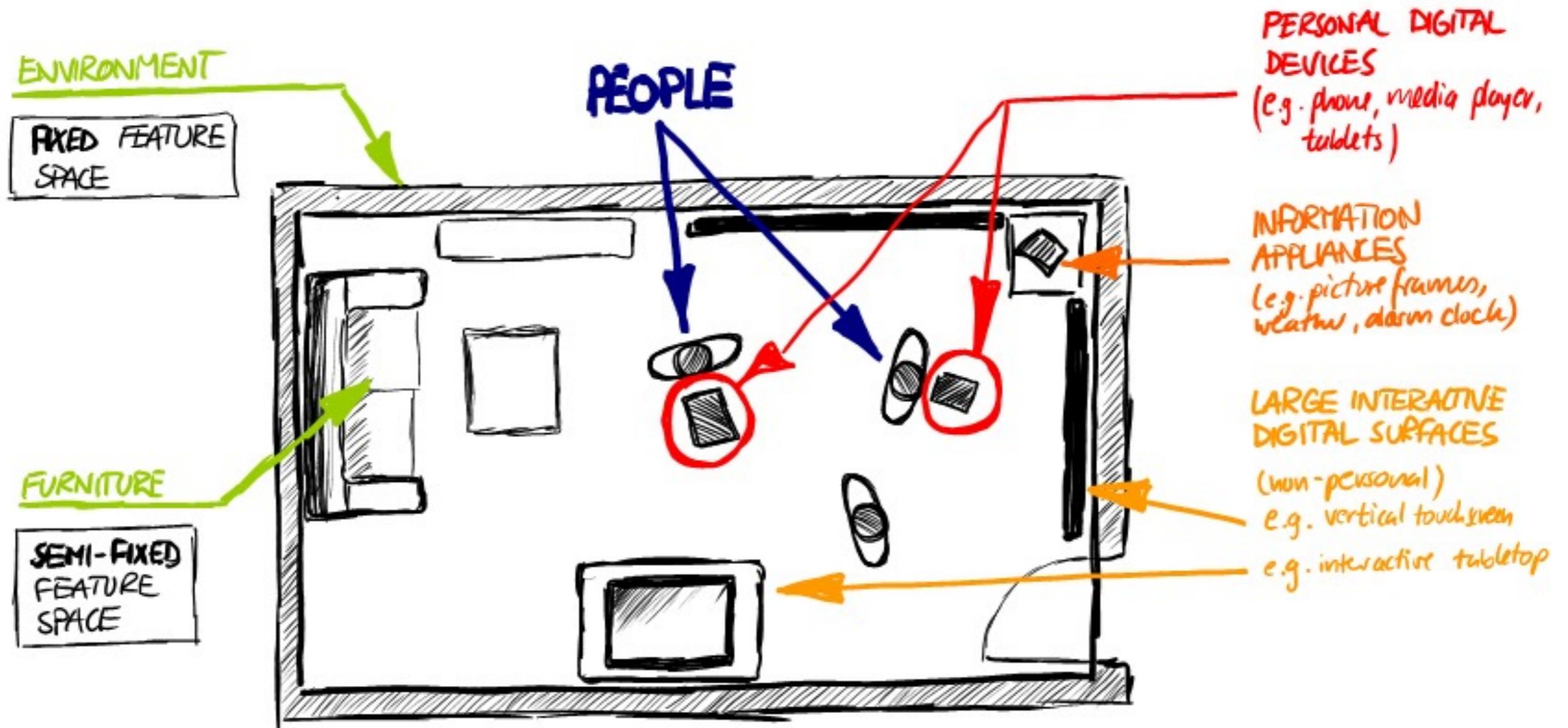
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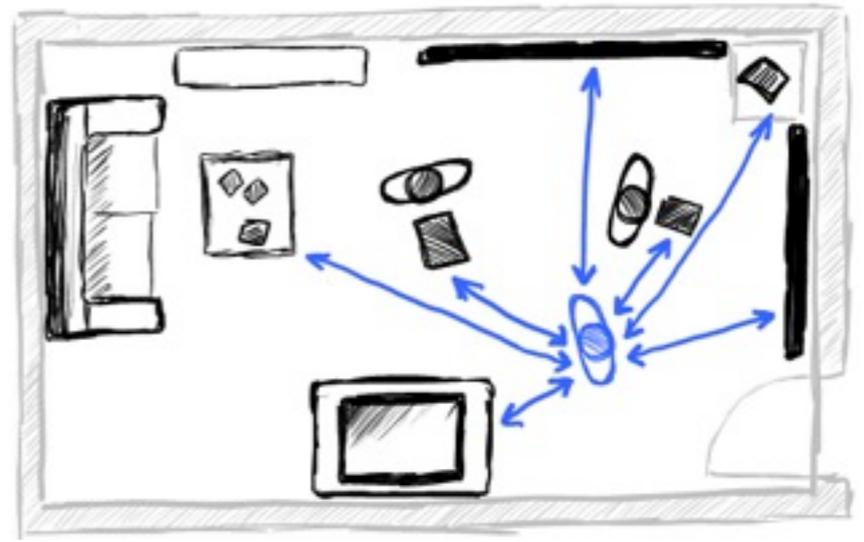
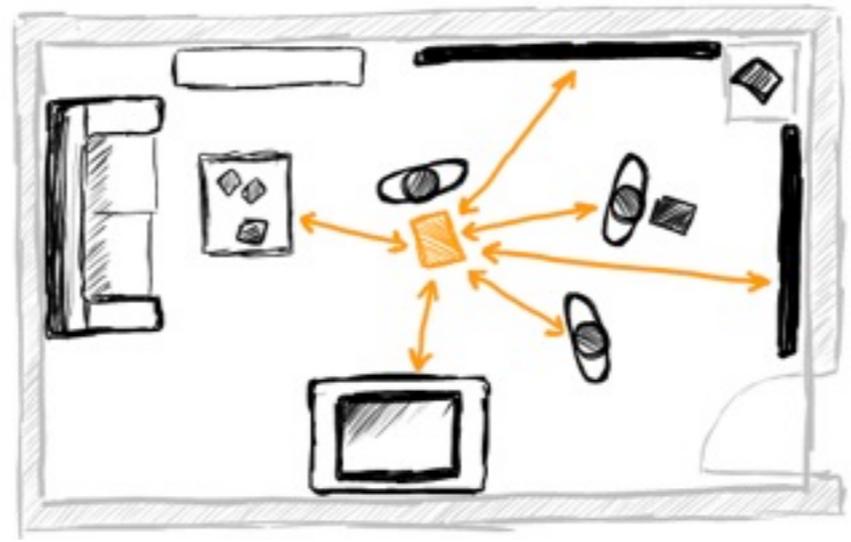
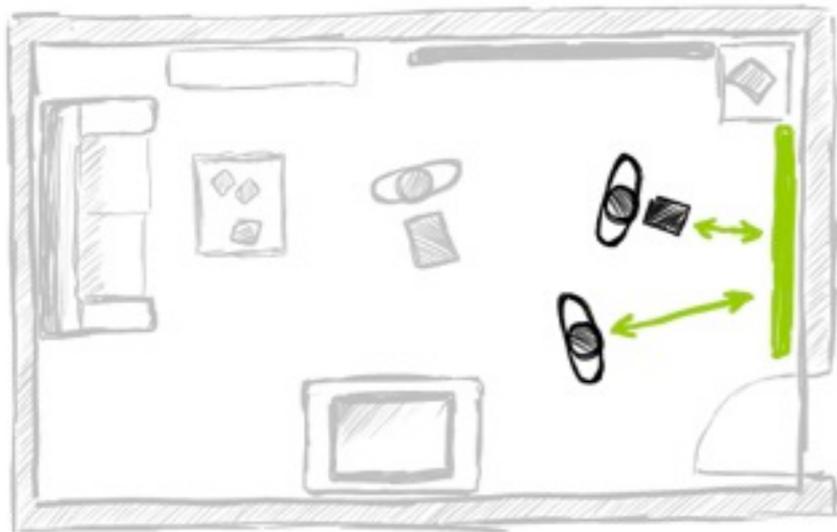
Thomas Alva Edison



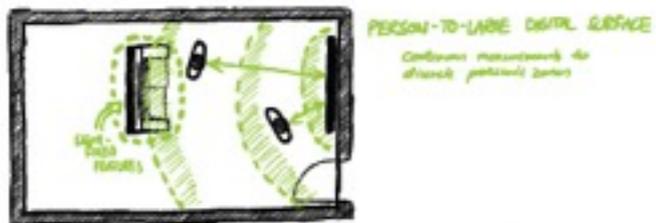
Source: The Thomas Edison Papers, Rutgers University
<http://edison.rutgers.edu/>

Sketchbook Examples: Human-Computer Interaction

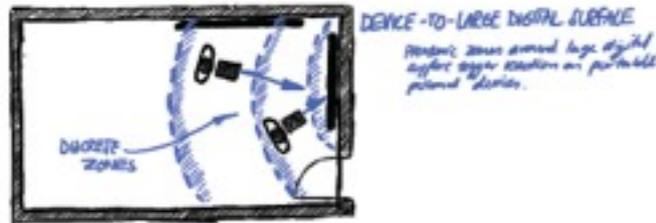




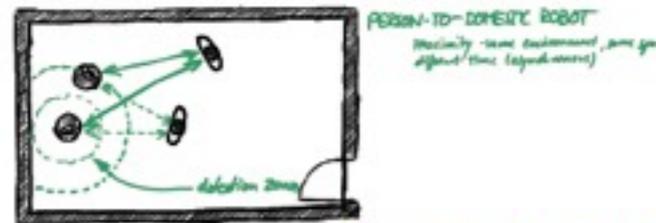
Source: Nicolai Marquardt



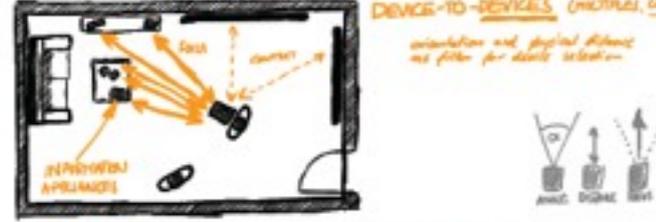
PERSON-TO-LARGE DIGITAL SURFACE
Continuous measurement of distance, personal zones



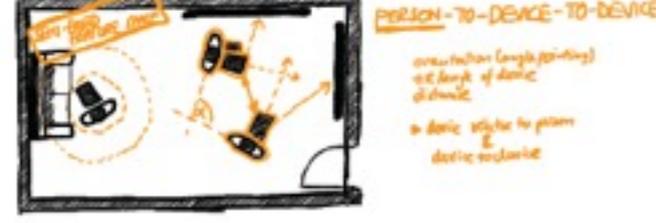
DEVICE-TO-LARGE DIGITAL SURFACE
Personal zones around large digital surface trigger reactions on portable personal devices



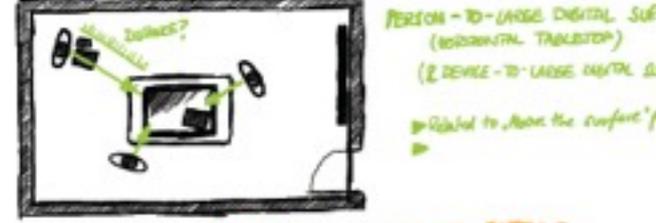
PERSON-TO-DOMESTIC ROBOT
Proximity - voice, touch, gesture, object, time (spatial awareness)



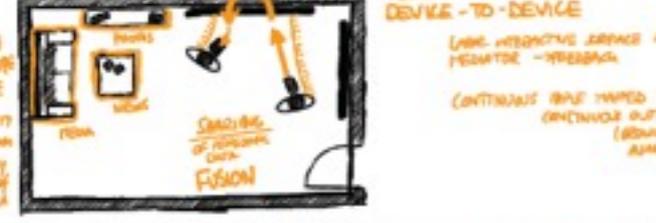
DEVICE-TO-DEVICES (MULTIPLE, LARGE DEVICES)
orientation and physical distance not filter for device selection



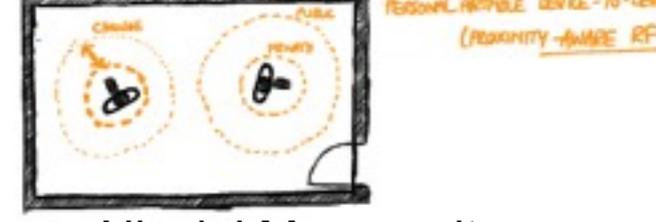
PERSON-TO-DEVICE-TO-DEVICE
orientation (long pointing) & length of device distance



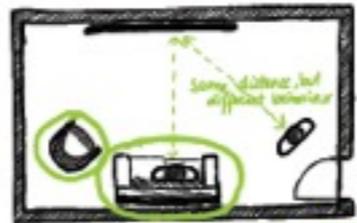
PERSON-TO-LARGE DIGITAL SURFACE (HORIZONTAL TABLETOP)
(DEVICE-TO-LARGE DIGITAL SURFACE)



PERSONAL PORTABLE DEVICE-TO-DEVICE
LINE INTERACTIVE SURFACE AS MEDIATE - MEDIATE

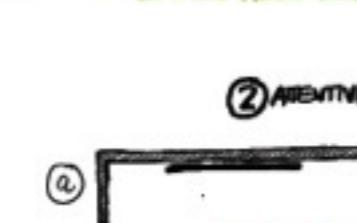


PERSONAL PORTABLE DEVICE-TO-DEVICE (PROXIMITY-BASED RFo TAGS)

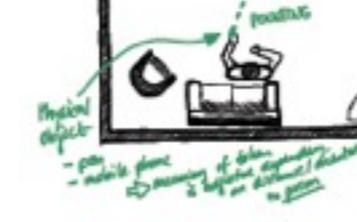
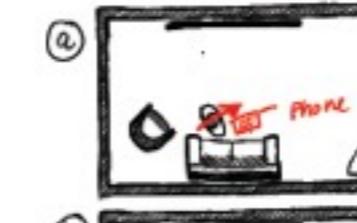


1 SEMIFIXED FEATURE SPACE

Different from:
- David Hyatt: identify 'y's options when distance but not angle is essential

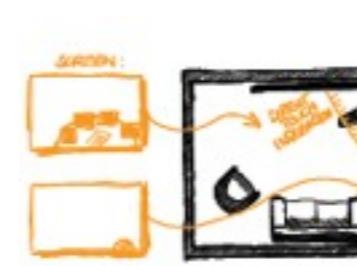


2 ADAPTIVE USER INTERFACE



3 PHYSICAL TOKENS TO MEDIATE EXPLICIT INTERACTION

Different from:
- pointing device
- touch screen
- gesture interface
Push to pop up data in physical window and distance to person

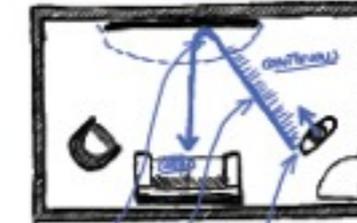


4 AWARENESS TO INTERACTION

CONTINUOUS: + size of user representation
+ location on screen
DISCRETE: ONCE IN CLOSE DISTANCE TO SCREEN, FIXED SIZE

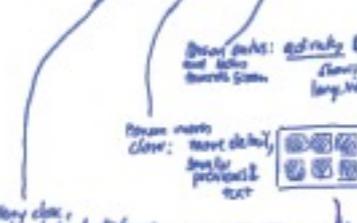


Different from:
- Golan's PRIVATE gateway
→ Dynamic size, increasing information
→ from awareness to interaction

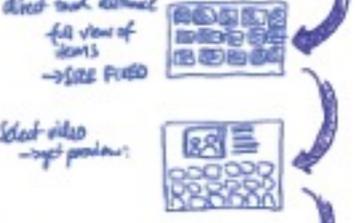


5 CONTINUOUS KNOWLEDGE OF...

- a) DISTANCE
- b) ORIENTATION
- c) IDENTITY
- d) VELOCITY



to a) Distance
Continuous:
- size of personal
- awareness level of device
Check:
- direct touch interaction
- early / late
- small / large feature



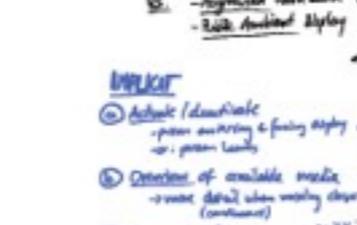
to b) Orientation
Check:
- facing away from display
- facing towards another person
Check (continuous):
- fine pointing
- tactile orientation



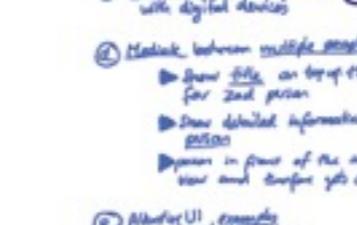
to c) Identity
Check:
- history
- sharing past physical state
- performance
- show selected media library
- adapt volume
- security / access
- children
- adjustment



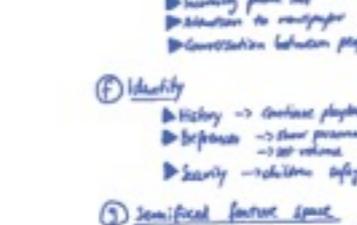
to d) Velocity
Check:
- motion?
- tactile / object
- pointing & selection



6 HOME MEDIA PLAYER APPLICATION
vs. - Augmented Dashboard (A) - Rich Ambient Display (RAD)
+ personal information for explicit touch, implicit and explicit interaction



IMPLICIT
1. Detect / deactivate
- pass over screen & facing away
- pass touch
2. Detection of available media
- more detail when nearby close (continuous)
3. Awareness of access possibilities with digital devices



EXPLICIT
4. Check touch interaction in front of it
5. Make change when device & person close to the screen
6. Printing from a distance



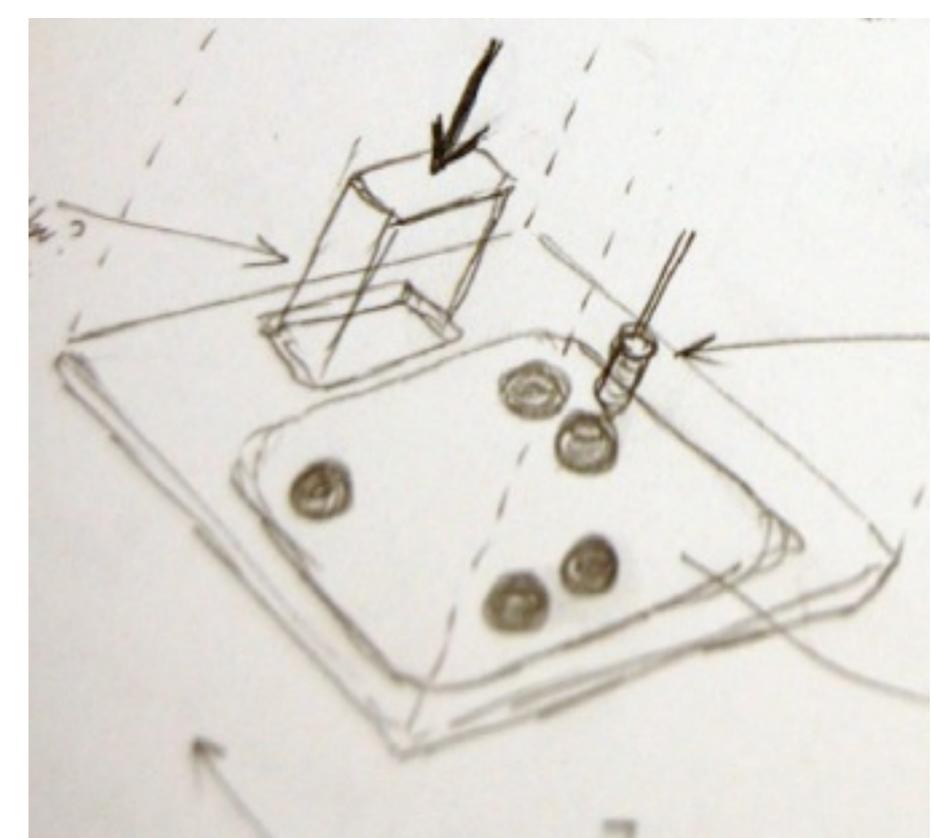
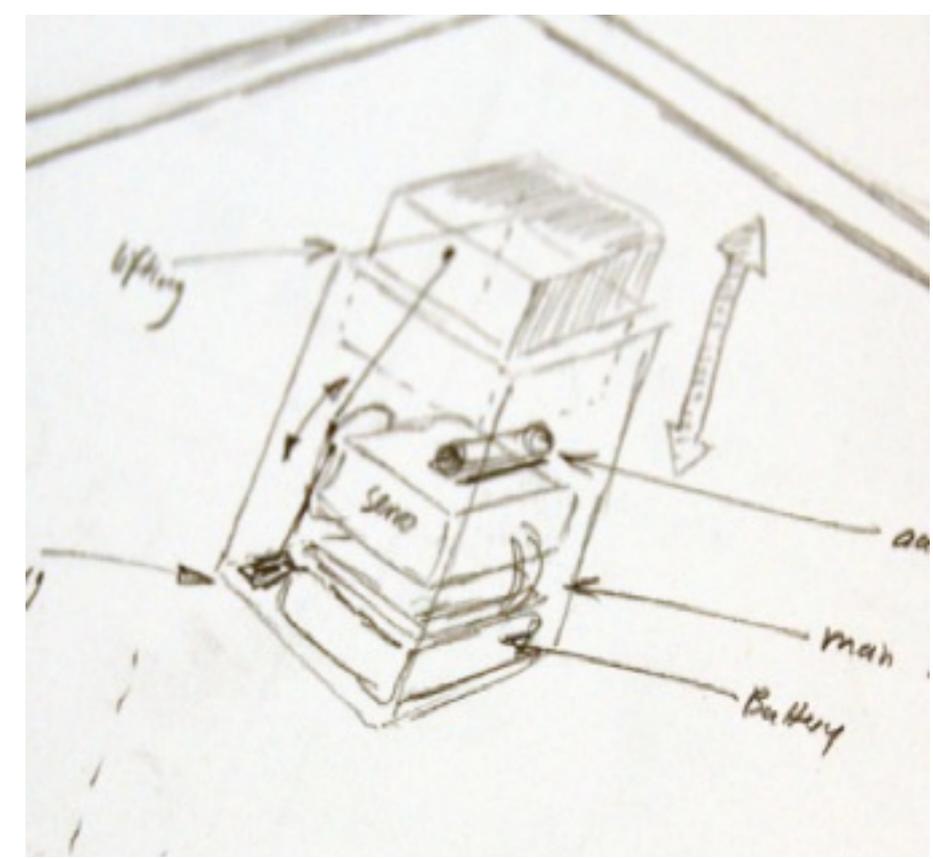
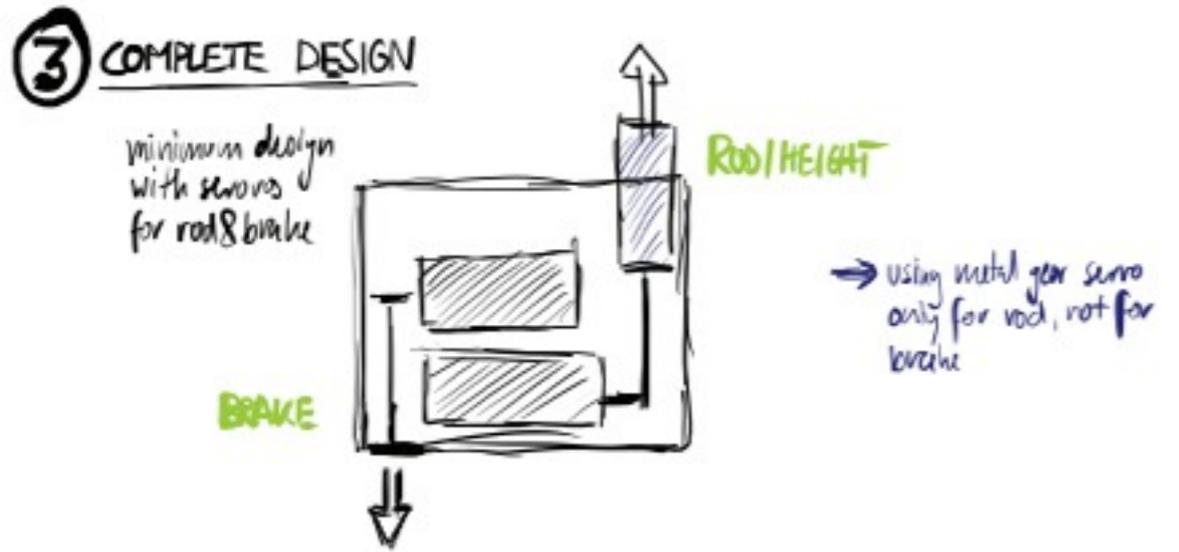
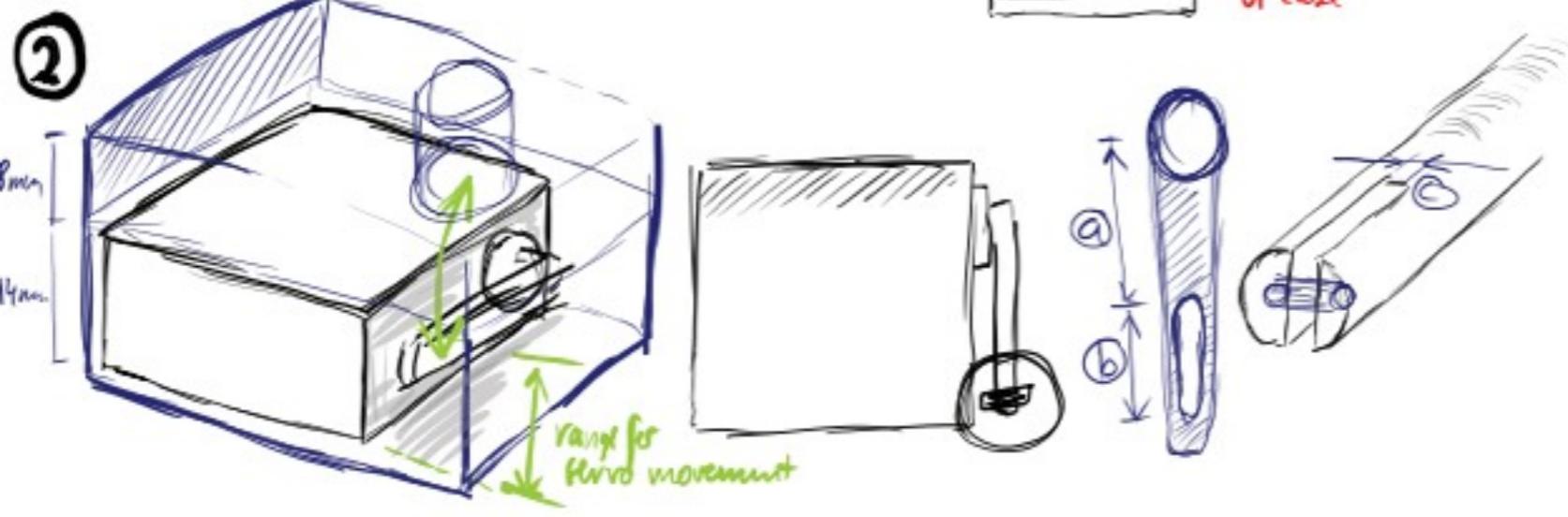
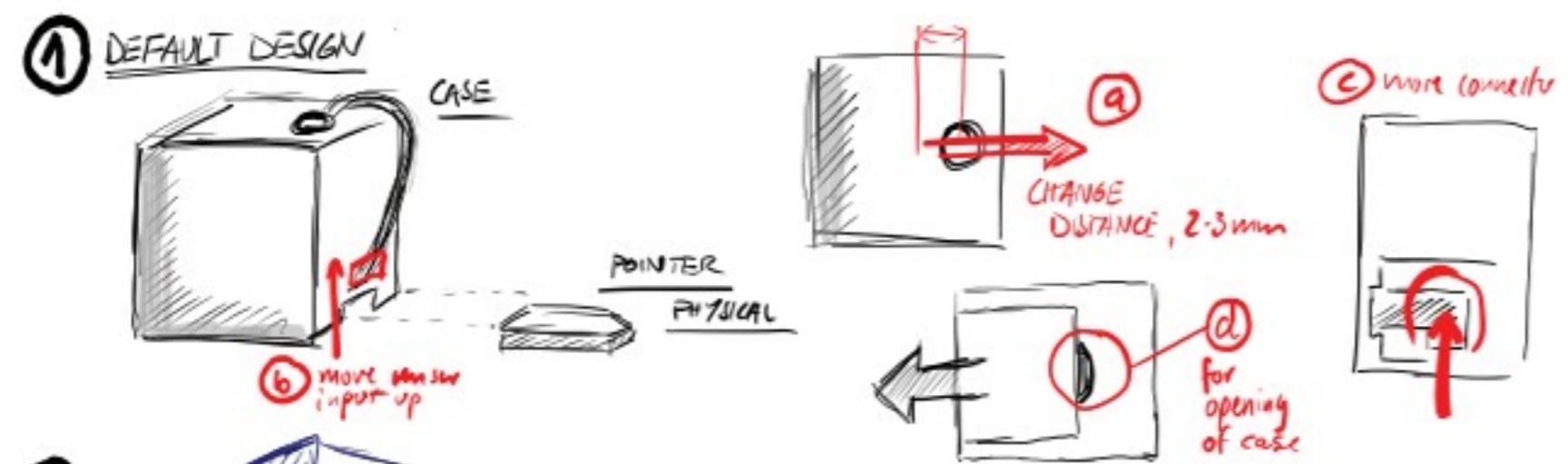
2. Mediate between multiple people
- Show file on top of the screen for 2nd person
- Show detailed information for 2nd person
- Person in front of the screen is looking, view and surface get detailed content & full information

3. Ambient UI, examples
- Learning from all interaction to newspaper
- Conversation between people

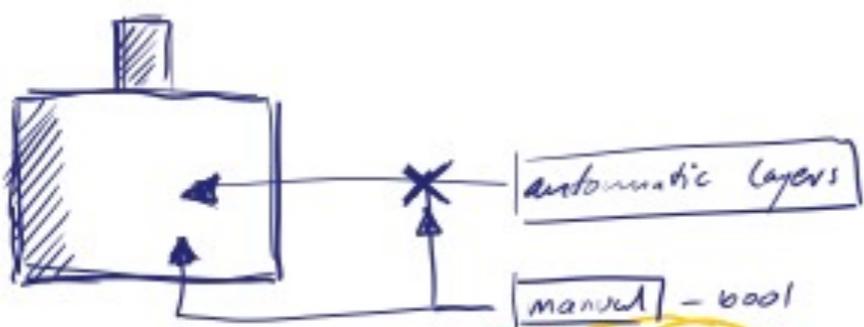
4. Identity
- History -> continue playback
- Preferences -> show personal media library
- Security -> relative signature

5. Semifixed feature space
- some distance, but standing vs sitting on couch / chair

OVERRIDE MECHANISMS
1. Skip back, increase distance
2. Time travel
3. Explicit gesture (with touch device)
4. Timeout ("gone")
5. Double command
6. Settings
7. "Blocked" for device



HIP PROPERTIES



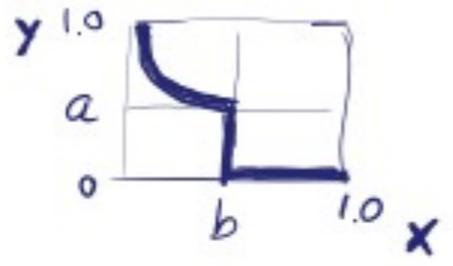
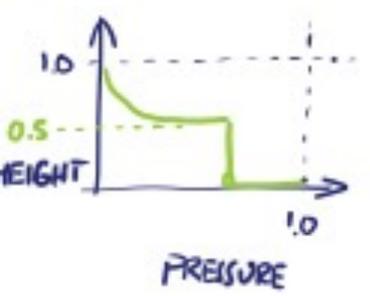
- amplitude
- oscillation freq.
- material (Mudic response)
- height

get the methods!

TIMING:

Set Oscillation (amp, osc, time) - OR - Set Oscillation (percent. x)

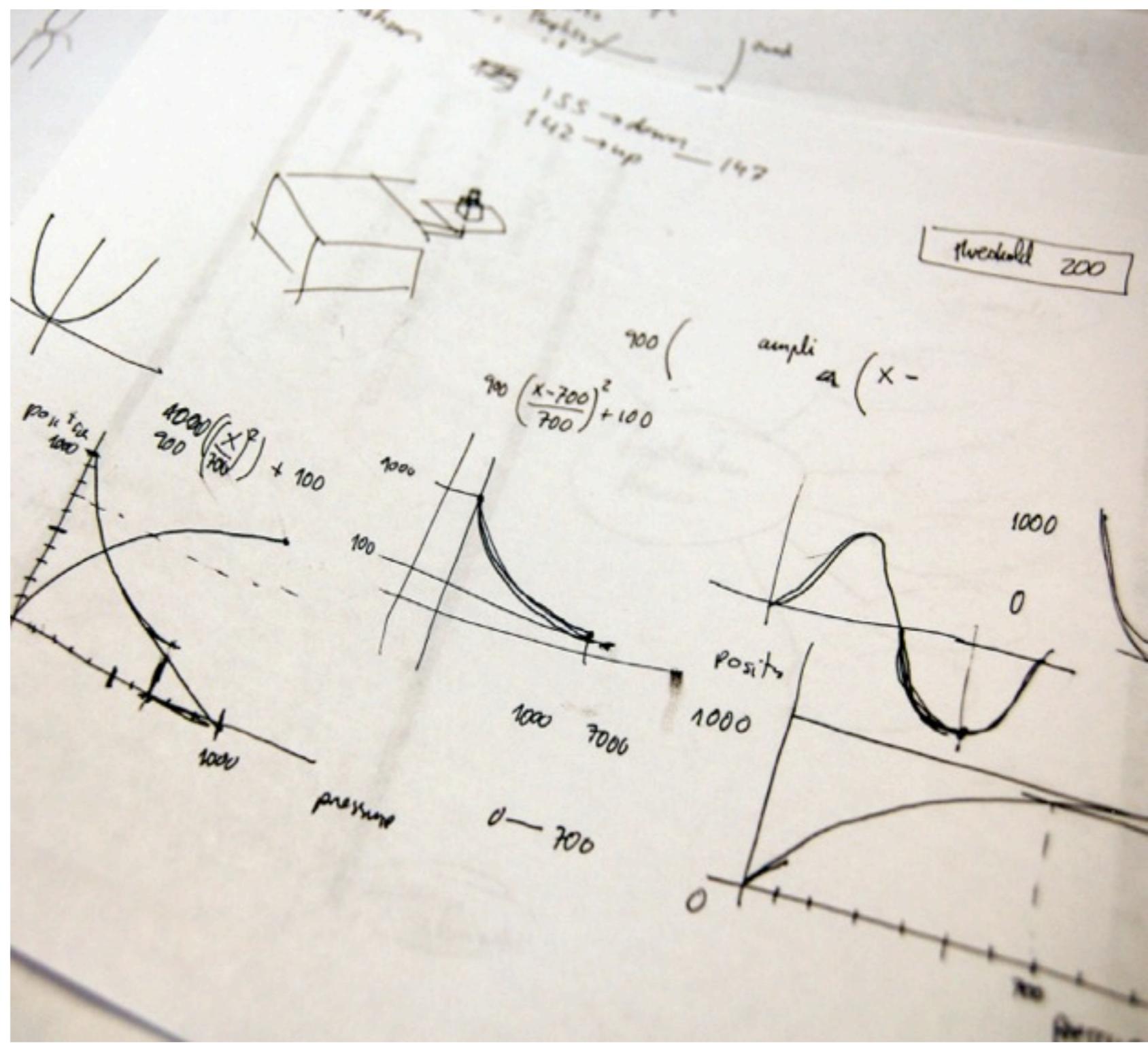
RESPONSE FUNCTION

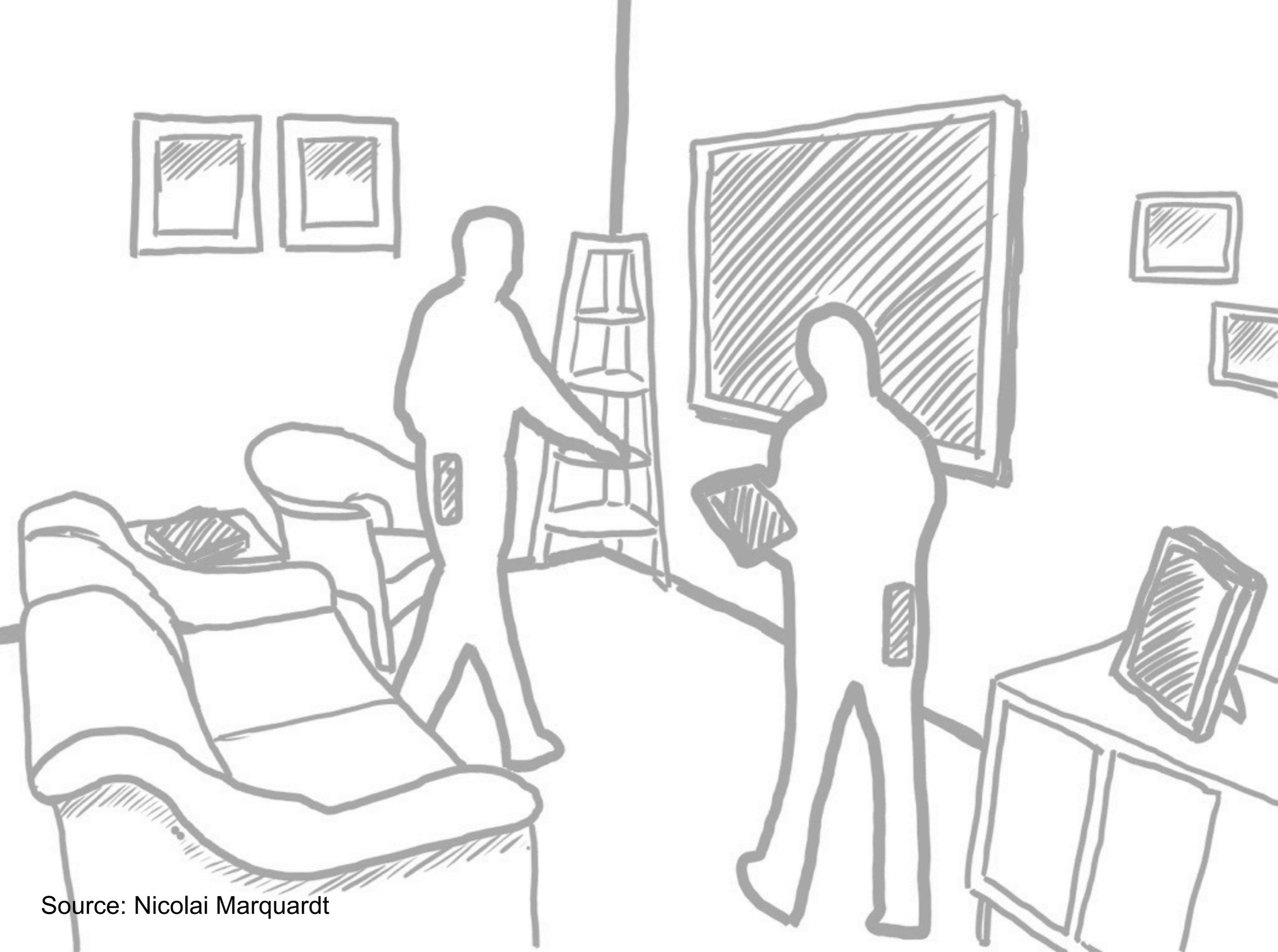


$$y = \alpha \cdot x^2 + \beta x + 1$$

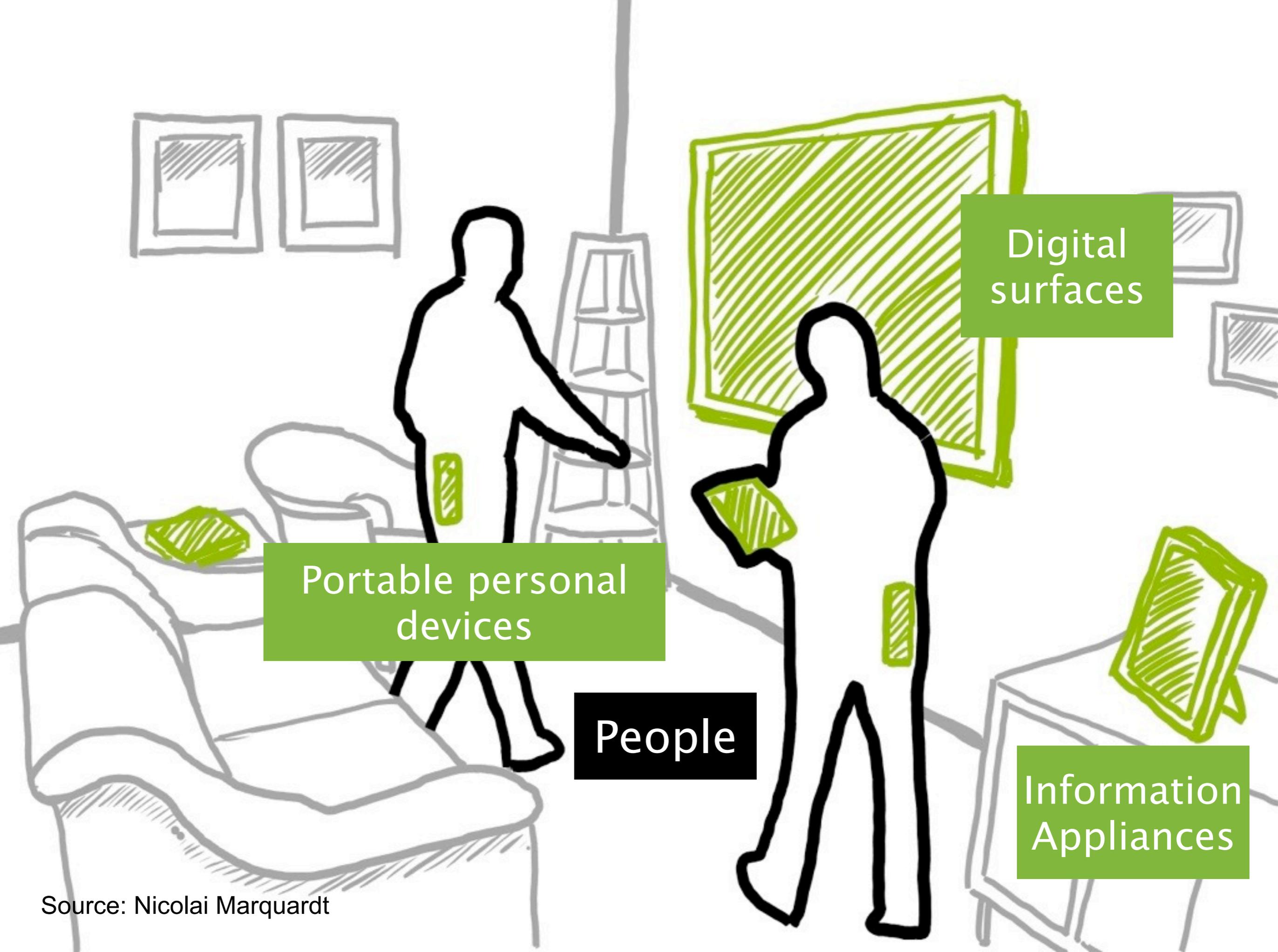
$$\alpha = -4(a-1) / (4 \cdot b^2)$$

$$\beta = -\alpha \cdot 2 \cdot b$$





Source: Nicolai Marquardt



Digital surfaces

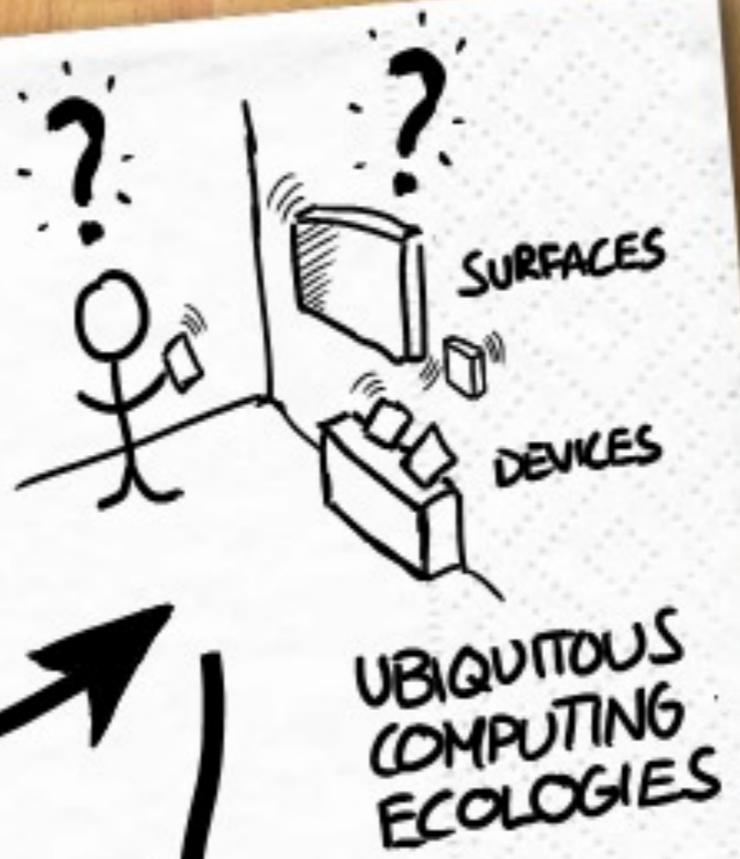
Portable personal devices

People

Information Appliances



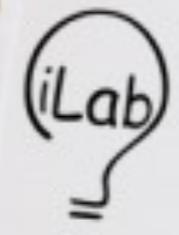
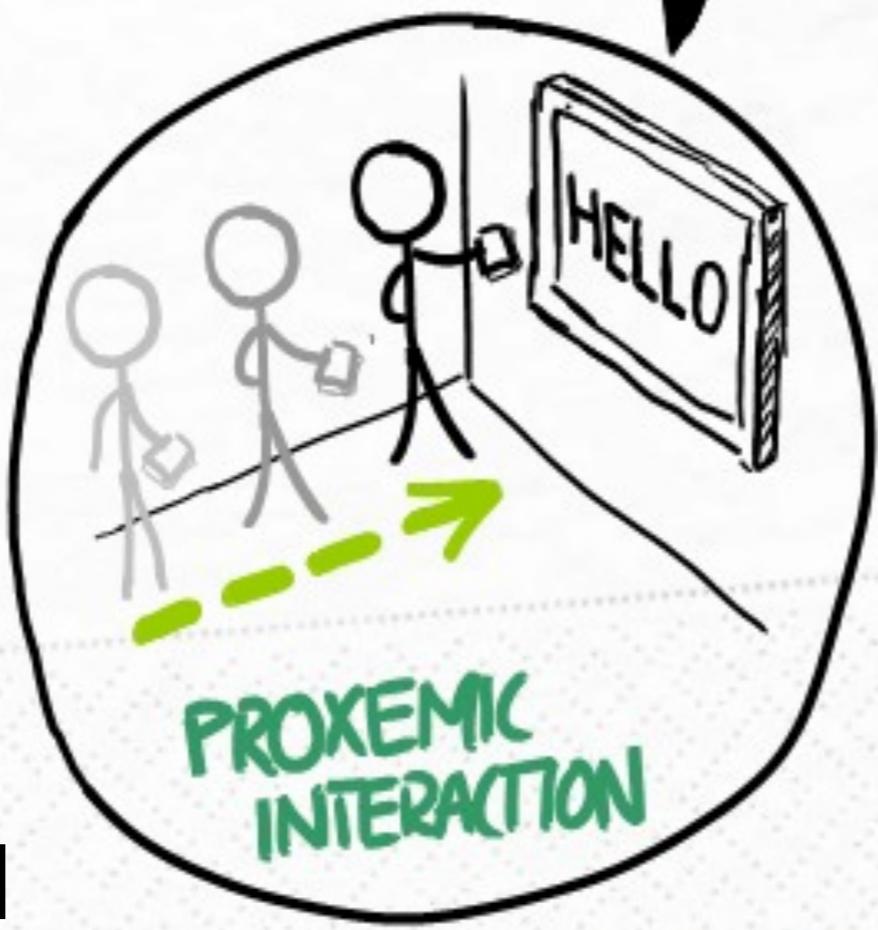
VS.



PROXEMICS

An oval containing an icon of an open book and the word 'PROXEMICS' in bold.

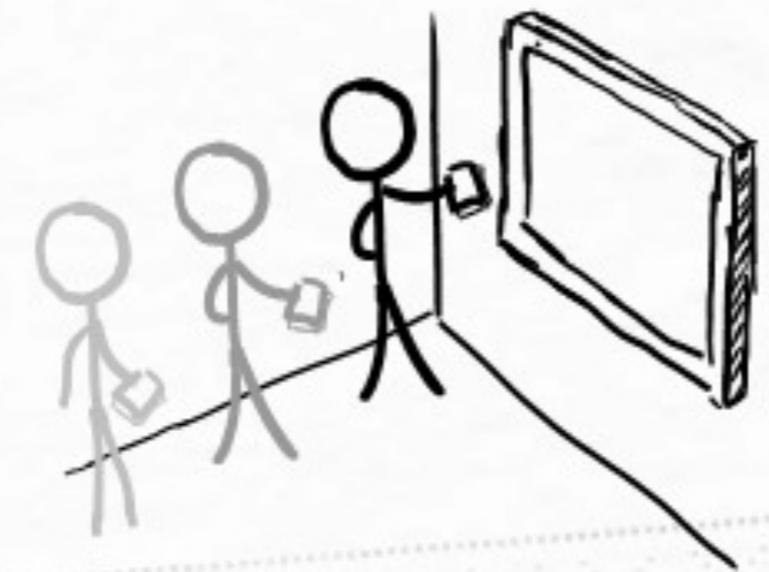
- DISTANCE $\frac{1}{\text{feet} \times \text{meters}}$
- ORIENTATION α
- MOVEMENT \rightarrow
- IDENTITY $\{A, B, C\}$



UNIVERSITY OF CALGARY

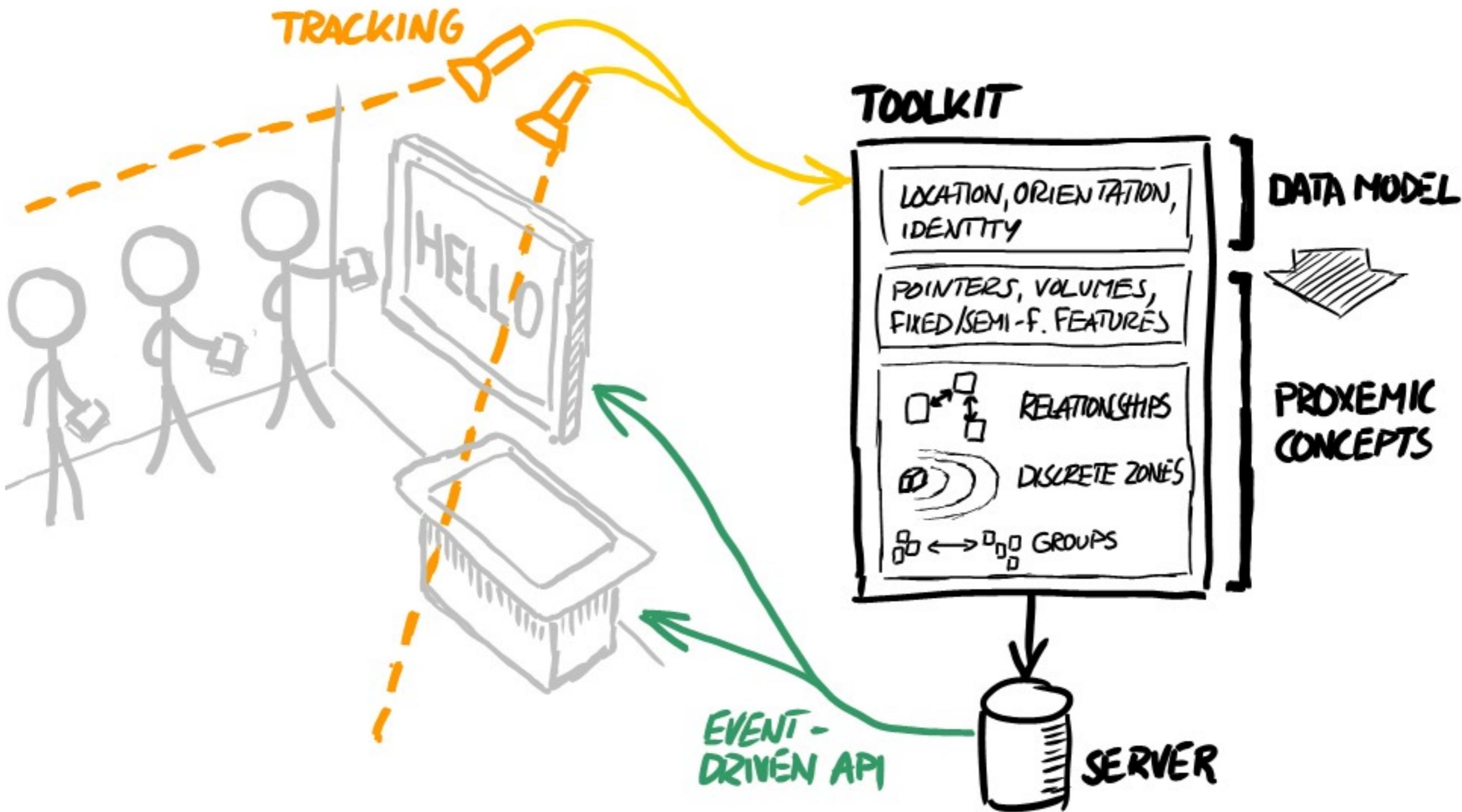
NICOLAI MARQUARDT

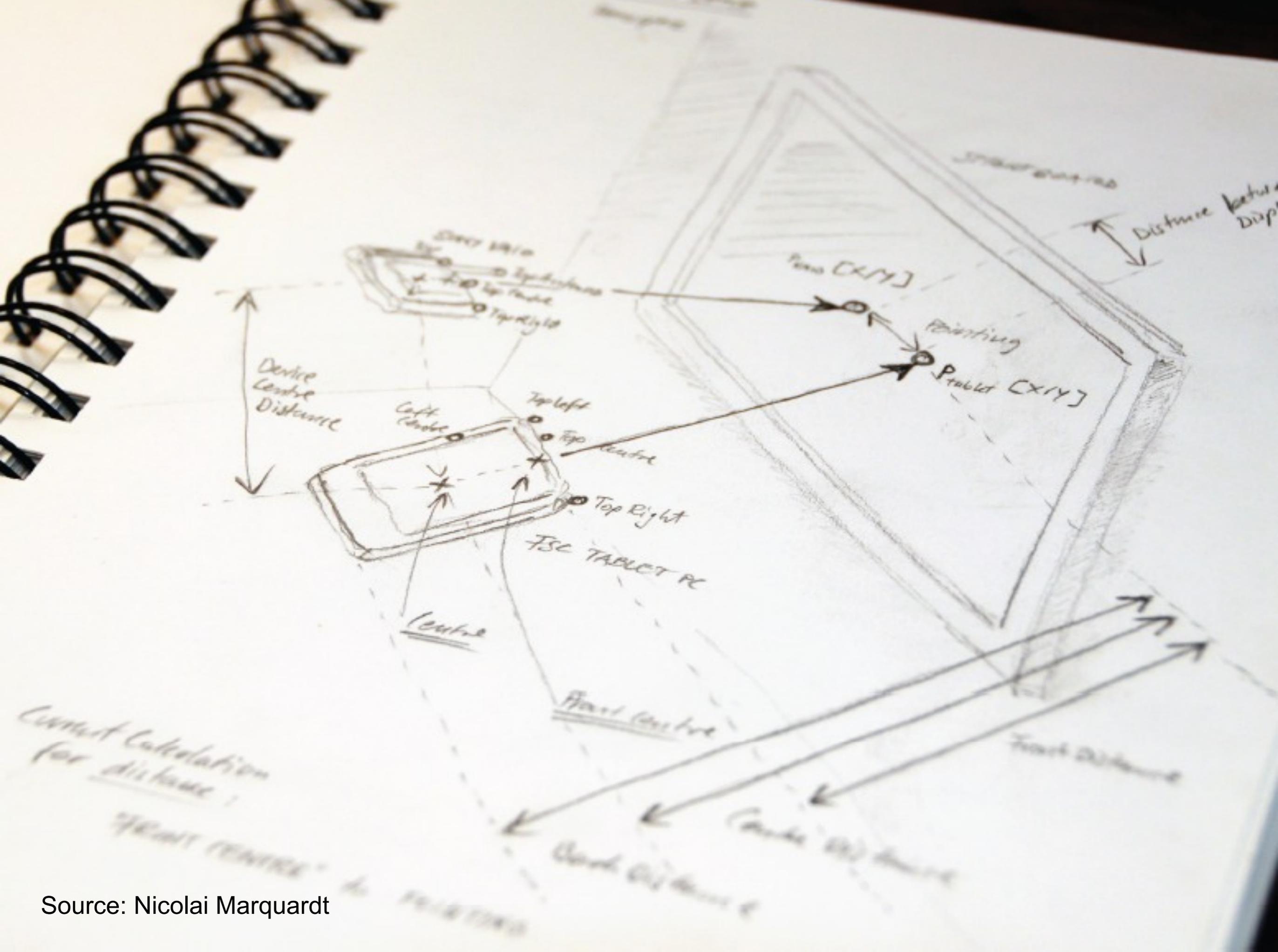
Source: Nicolai Marquardt



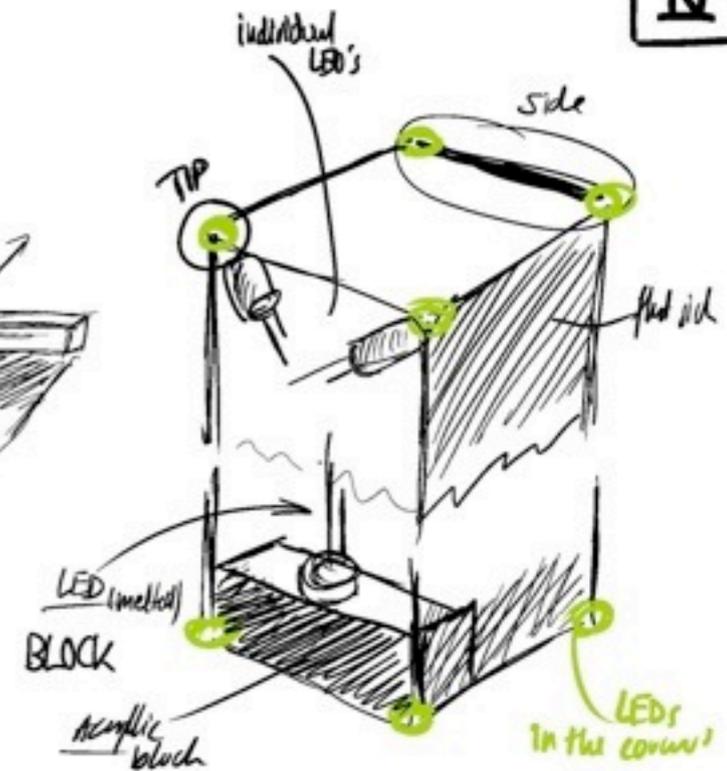
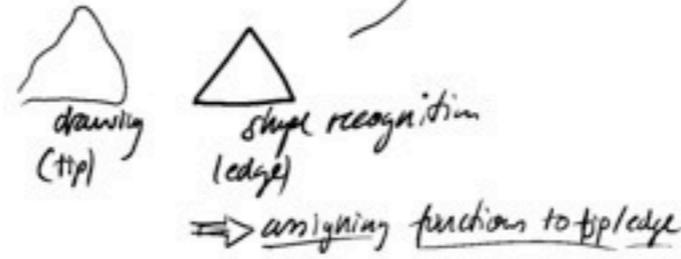
UNIVERSITY OF CALGARY

Source: Nicolai Marquardt

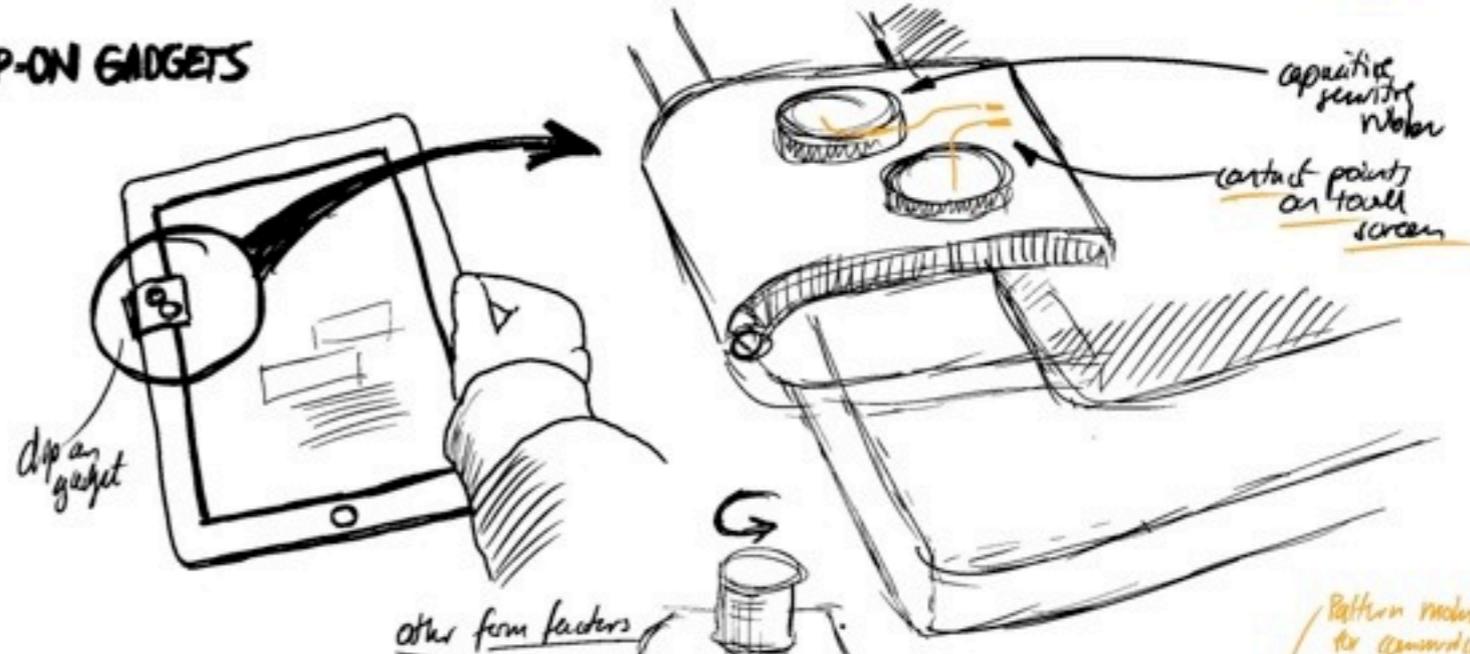




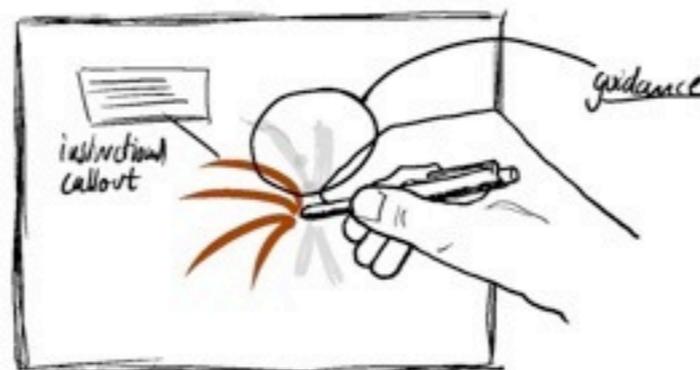
CONTÉ (Daniel Vogel)



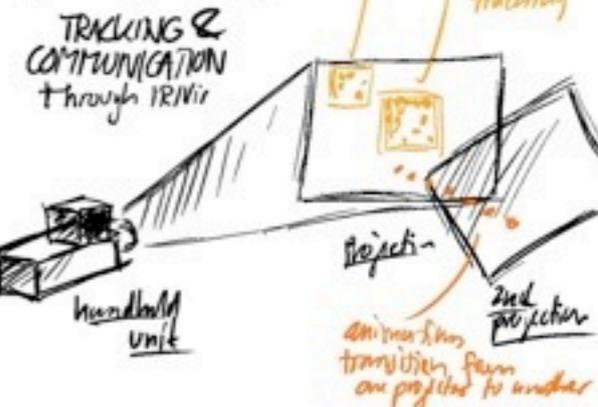
CLIP-ON GADGETS



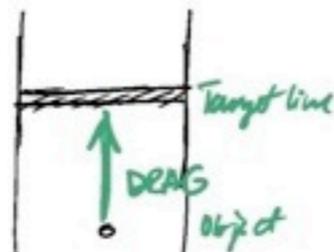
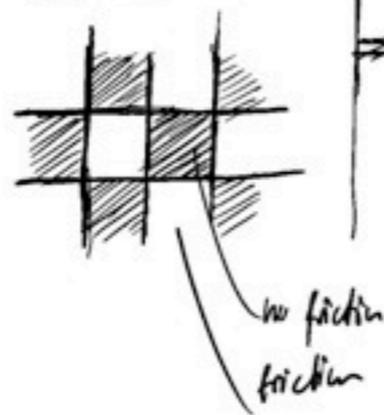
SKETCH-SKETCH REVOLUTION



SIDE BY SIDE



CHI NOTES



3 conditions

- constant high friction
- " low friction
- variable friction

uses high-frequency vibration to give the impression of increased or decreased friction.

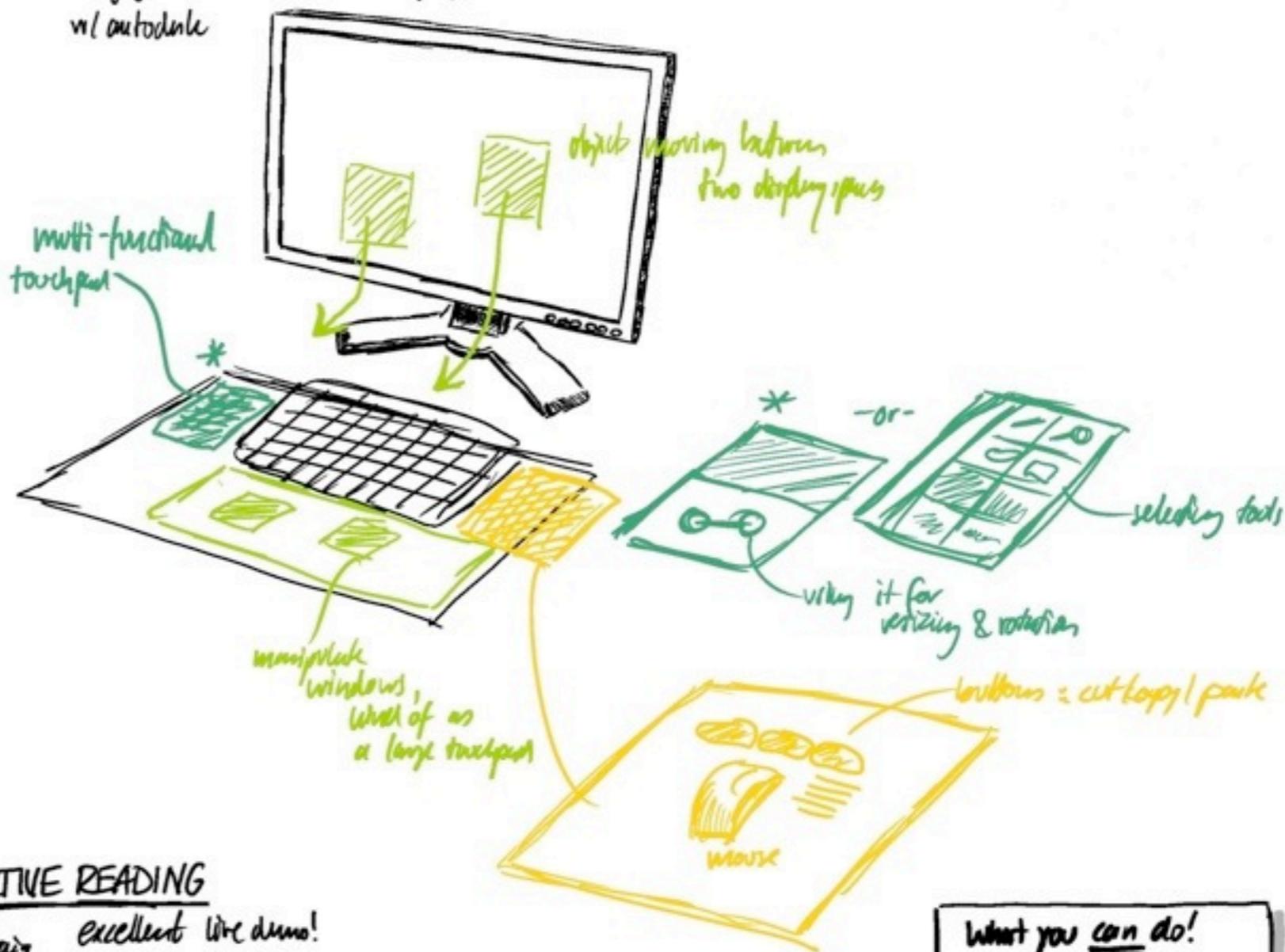
3 studies overall
+ User engagement study

Future work

- Taxonomy of sensations
- Mapping to widgets

MAGIC DESK

Bringing touch interaction to desktop applications w/ auto-rotate



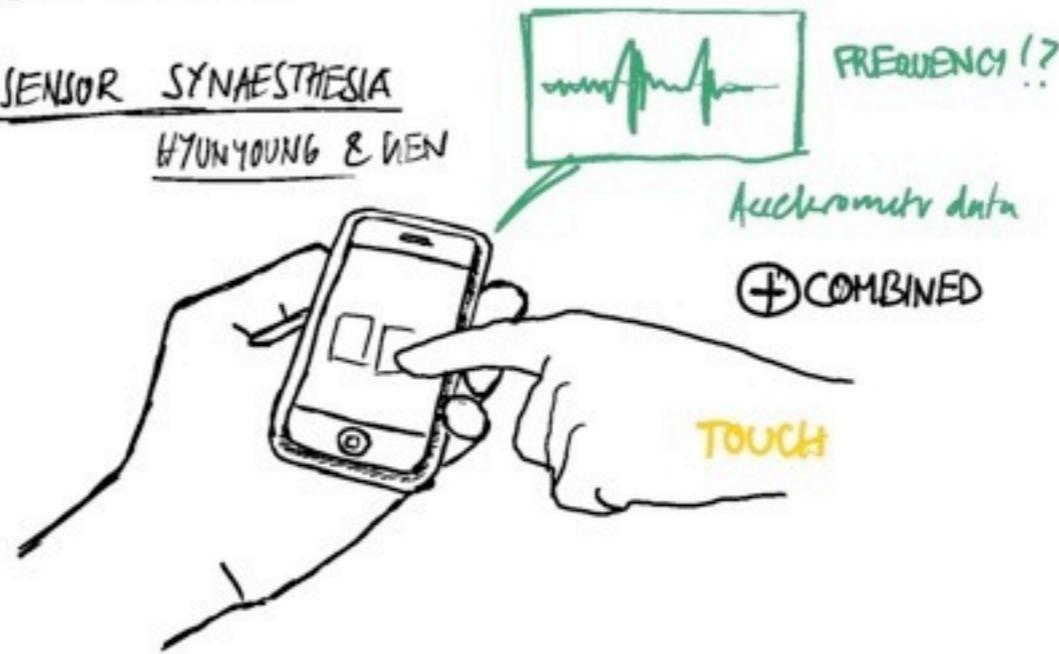
ACTIVE READING

Craig Tashman
GATECH excellent live demo!

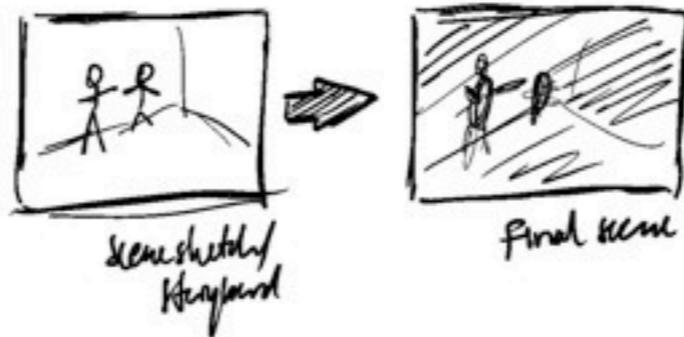
What you can do!
vs.
What you should do!

CHI NOTES

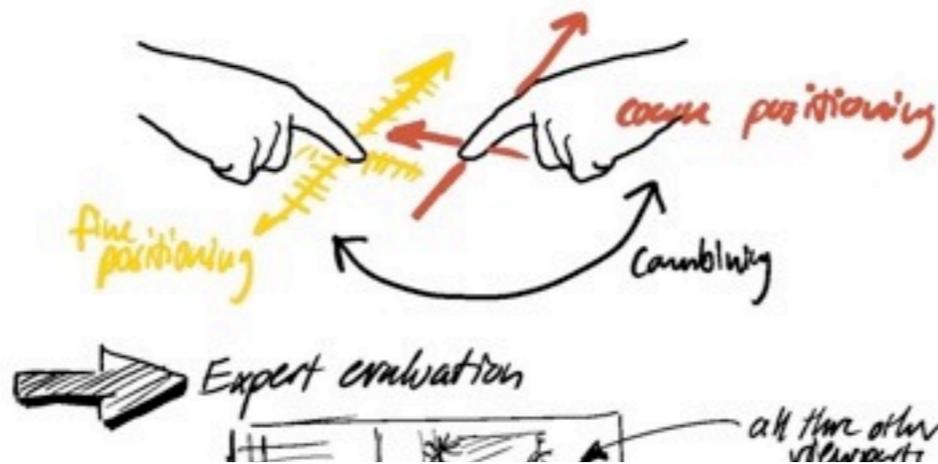
SENSOR SYNAESTHESIA
HYUNYOUNG & DEN



EDEN: Multitouch tool for constructing virtual
(with Björn Hartmann) organic environments

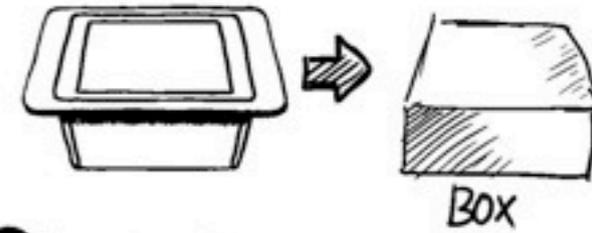


Imprecision of multitouch: → Organic environment
vs. man-made ones



DESCRIBE OBJECTS FROM GESTURES
CHRIS HOLZ & SANDY

① Often describe into PRIMITIVES



② Showing top 3 objects

③ Use timing to remove transition gestures

Ideas: - differences between cultures?

- what about providing feedback?

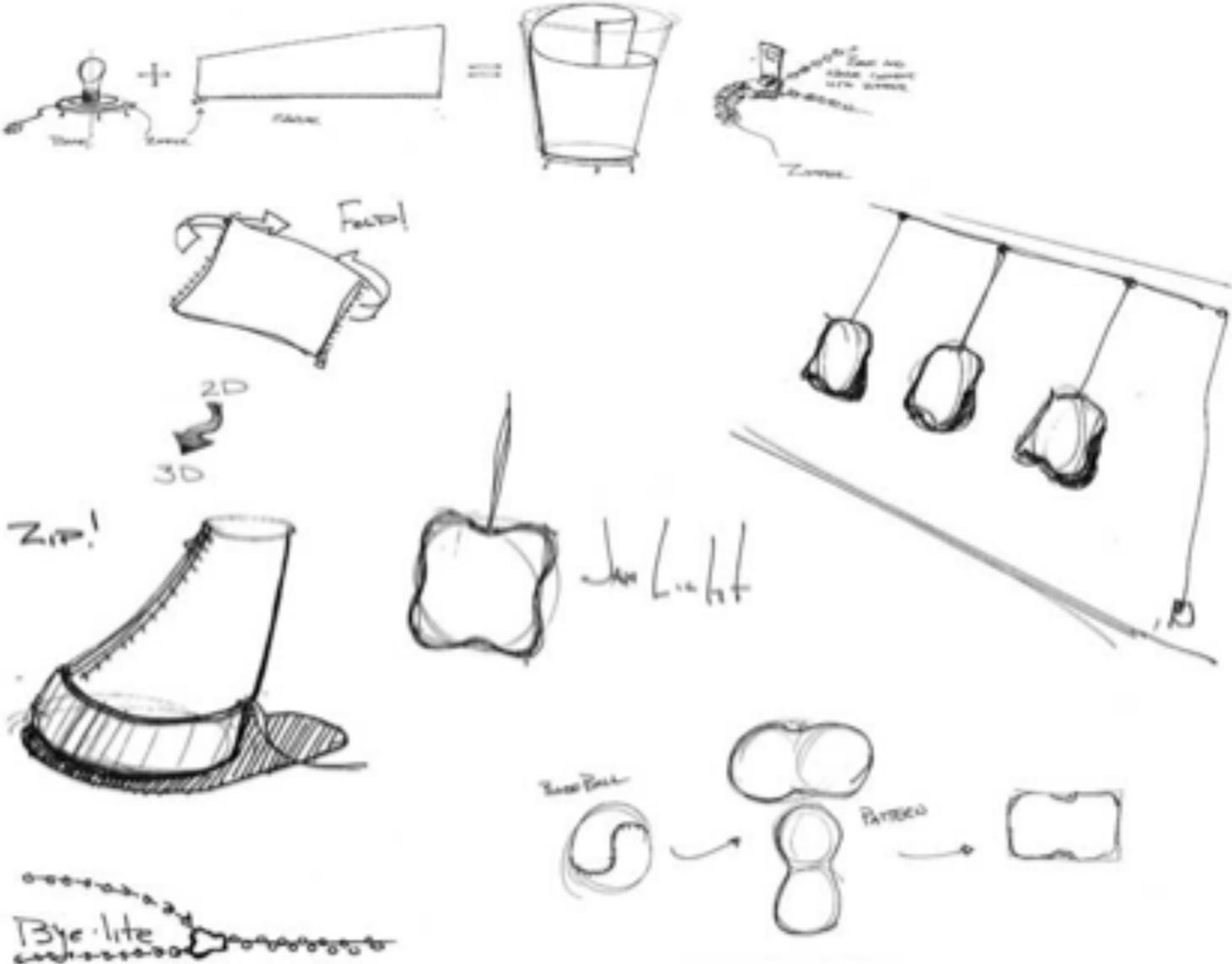
Design Principles

- ① one gesture at a time
→ difficult for artist to use multiple, simultaneous gestures
- ② split gestures across hands
- ③ simple gestures to frequent operations
- ④ Motion reflects operation
- ⑤ Control at most two parameters
- ⑥ Incorporate indirect manipulation
- ⑦ Avoid long traversals

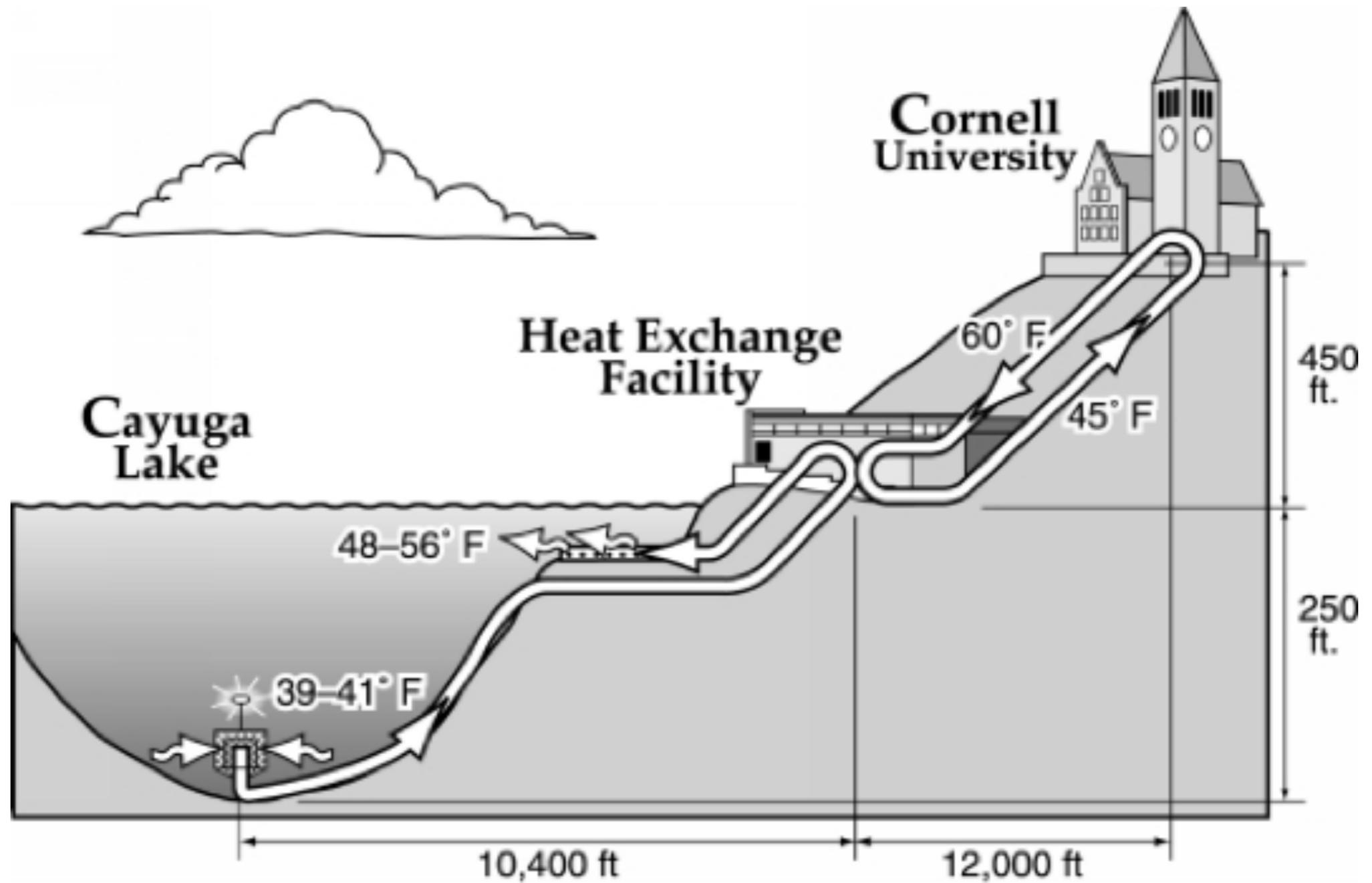
Sketching Interaction

- The Definition of Sketching
- Characteristics of Sketches and Sketching
- Sketches and Prototypes
- Is it a Sketch ?
- Sketching Techniques
- Storyboarding

Is this a sketch? Why or why not?

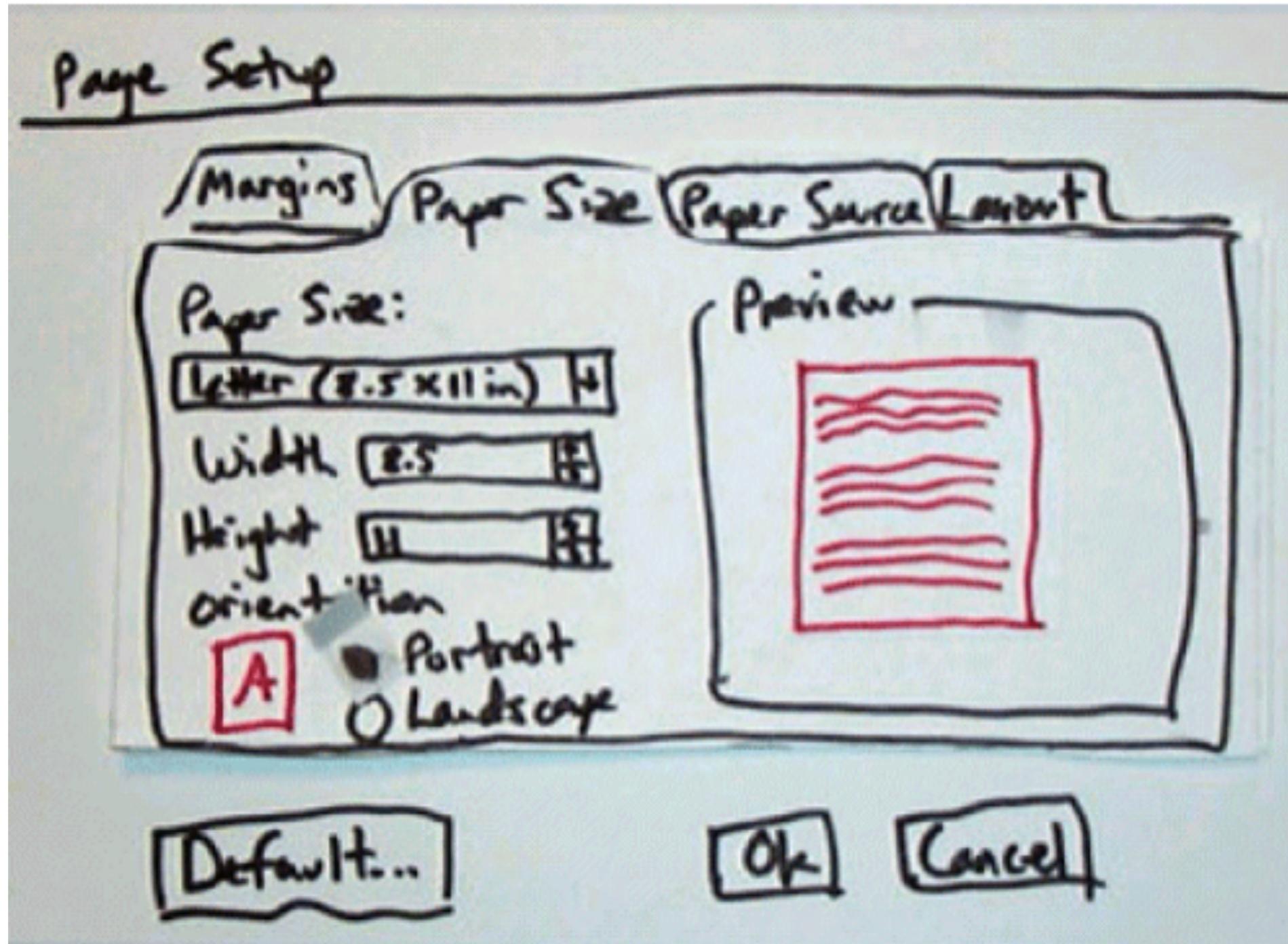


Is this a sketch? Why or why not?



source: [3]

Is this a sketch? Why or why not?



Is this a sketch? Why or why not?



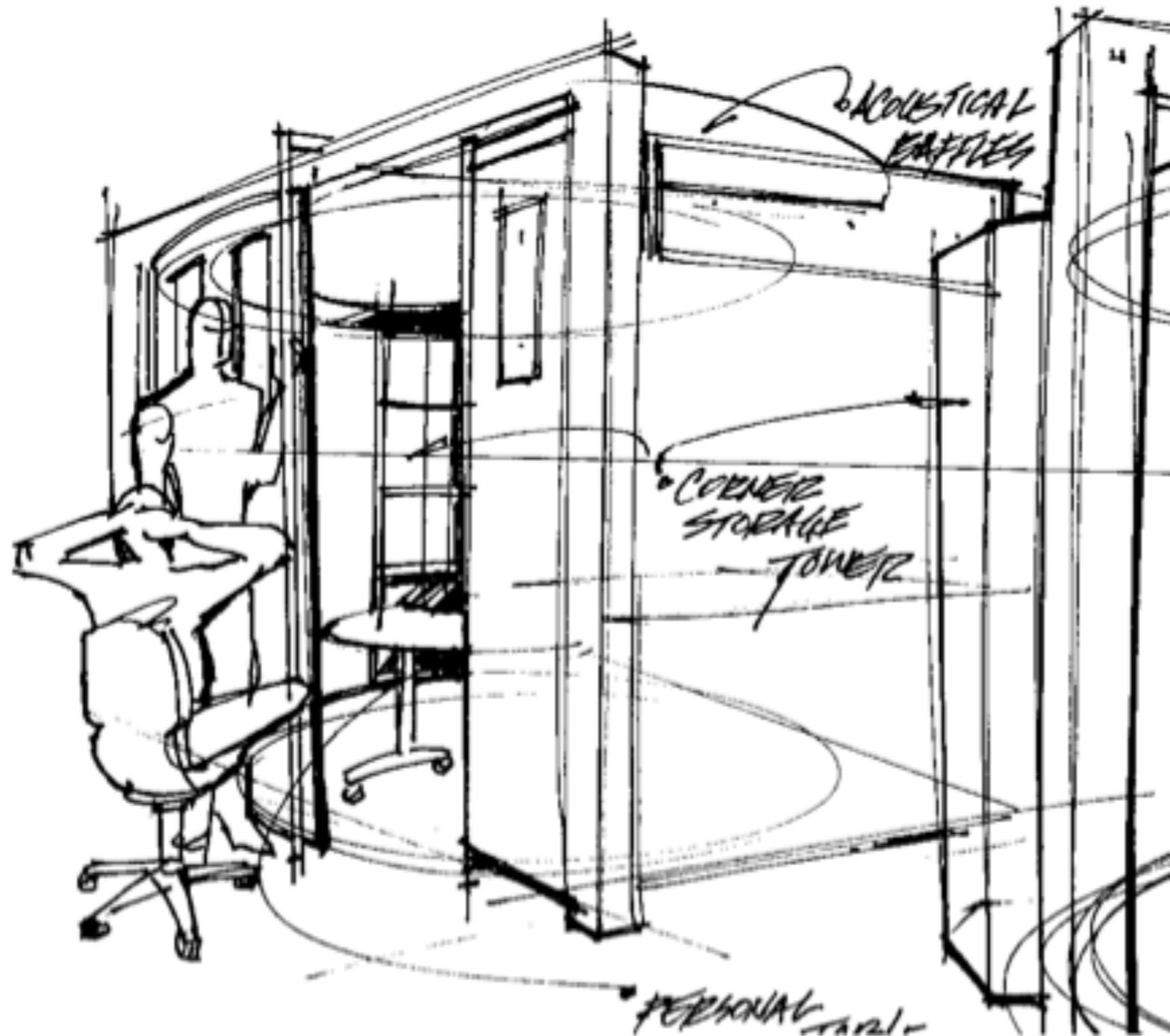
source: [3]

Is this a sketch? Why or why not?



source: [3]

Is this a sketch? Why or why not?

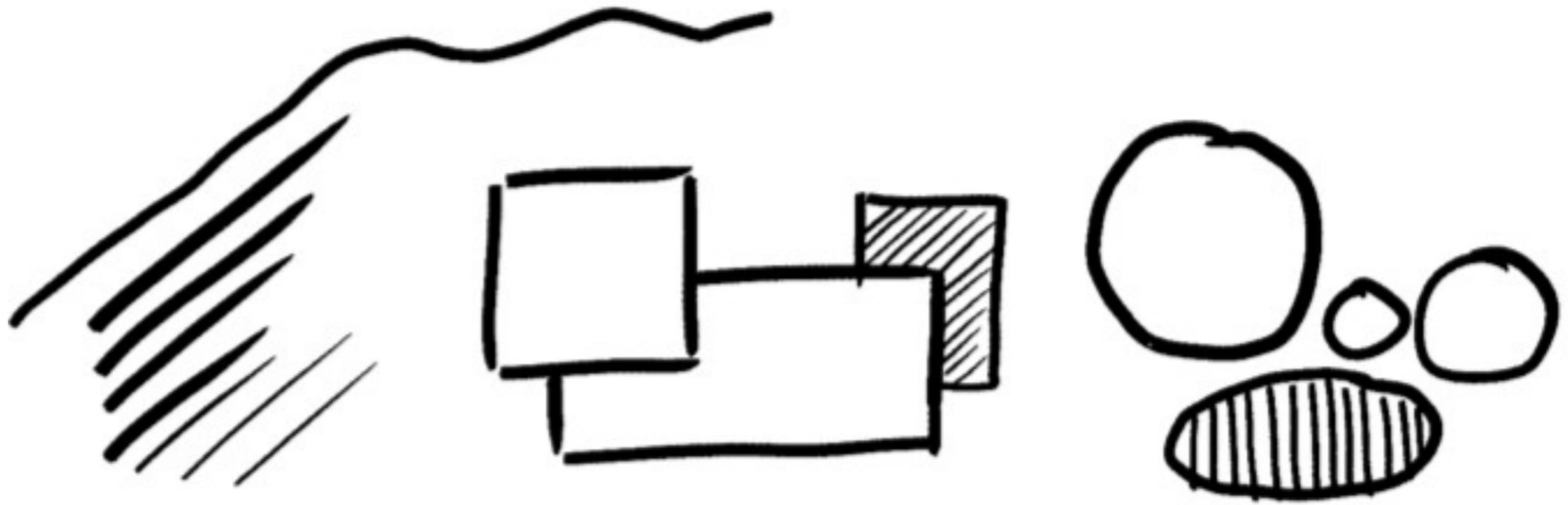


Sketching Interaction

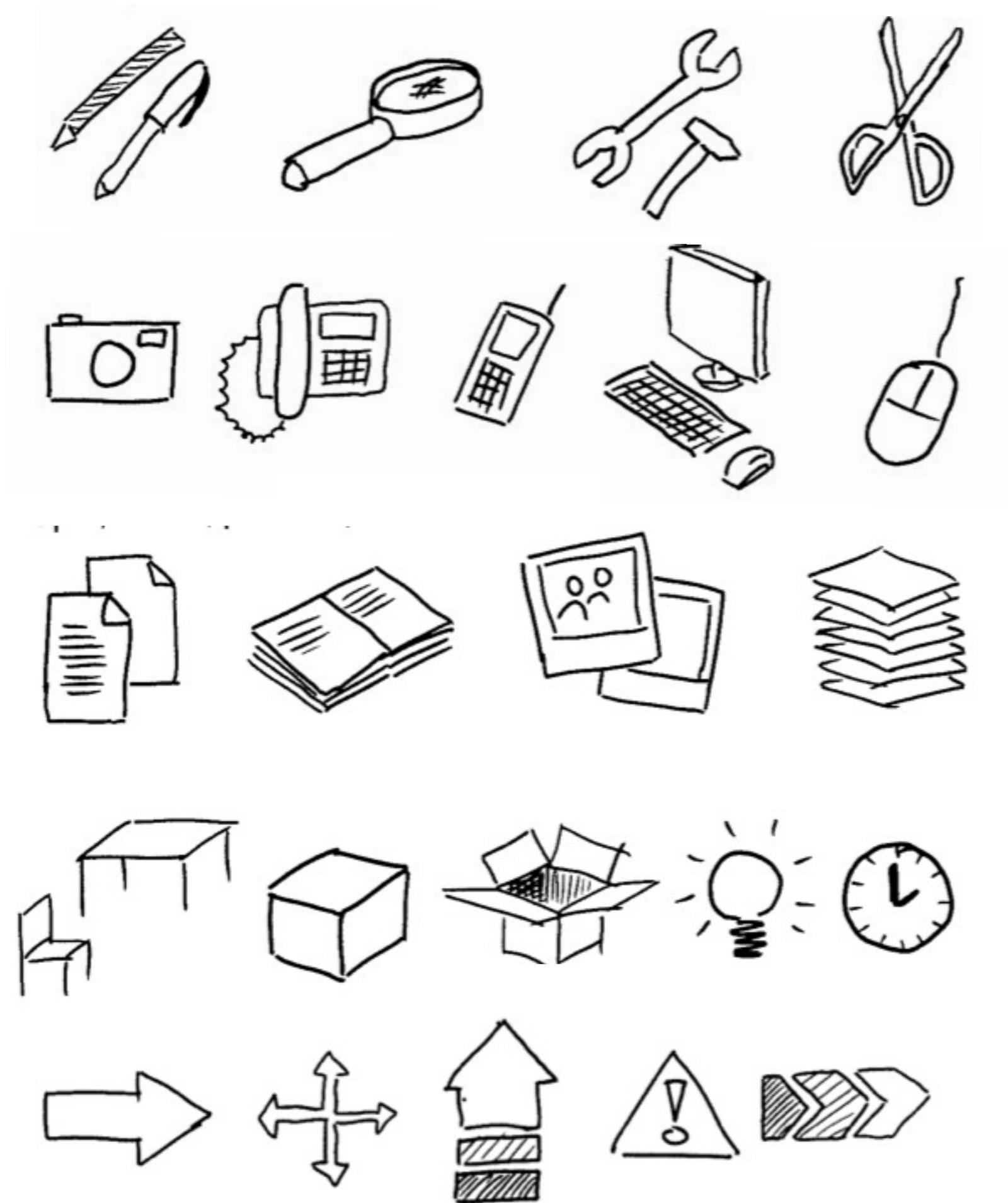
- The Definition of Sketching
- Characteristics of Sketches and Sketching
- Sketches and Prototypes
- Is it a Sketch ?
- Sketching Techniques
- Storyboarding

Technique: Develop Sketching Vocabulary

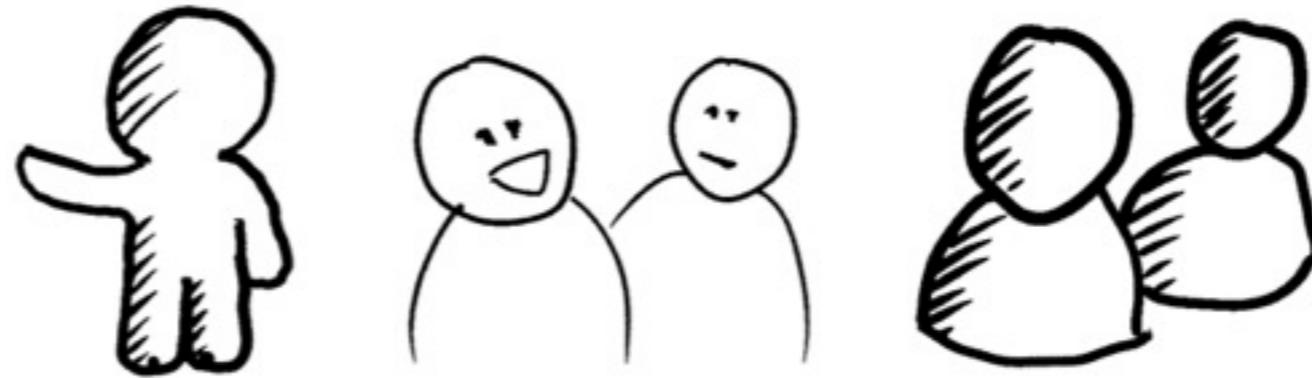
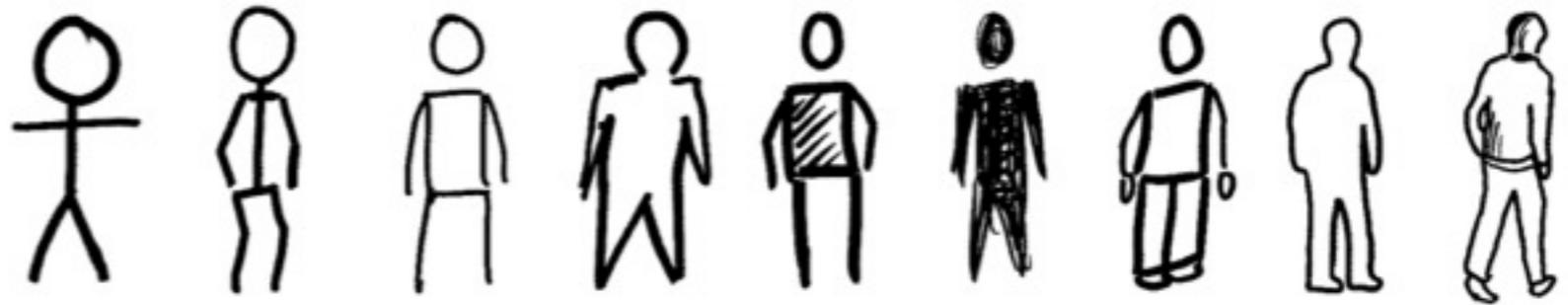
1) Begin with simple lines and shapes



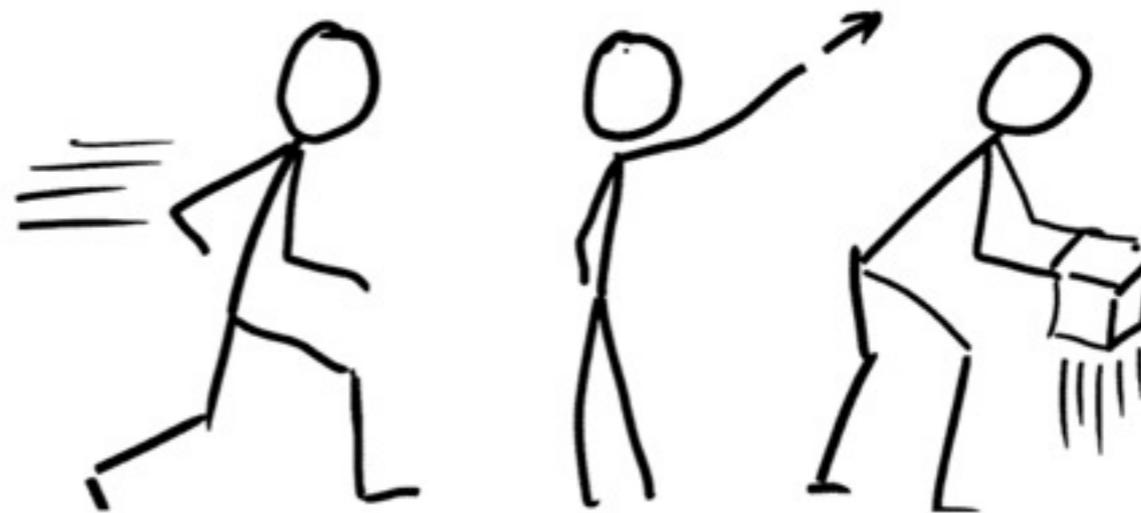
2) Next, compose simple objects



3) Try out different ways to draw people as part of the interaction sketches

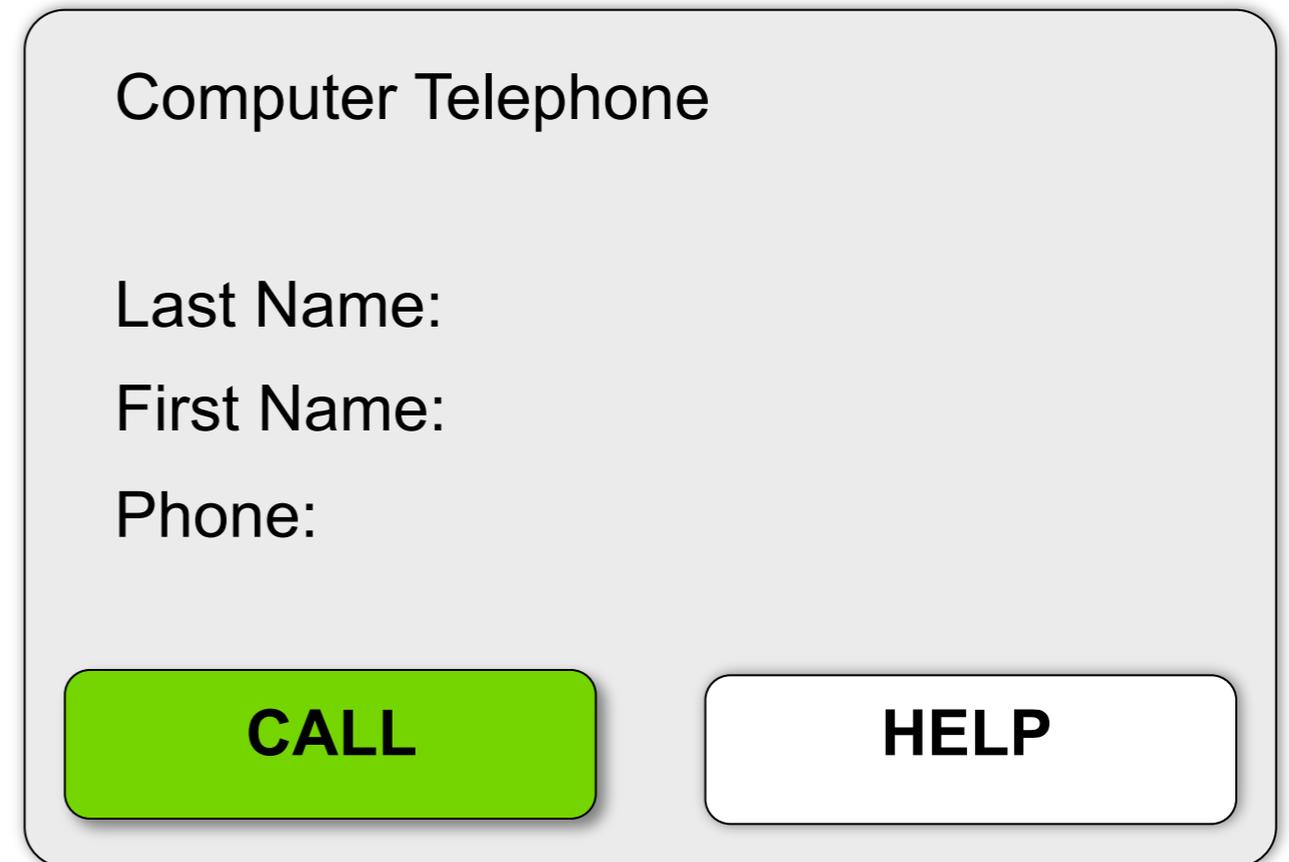
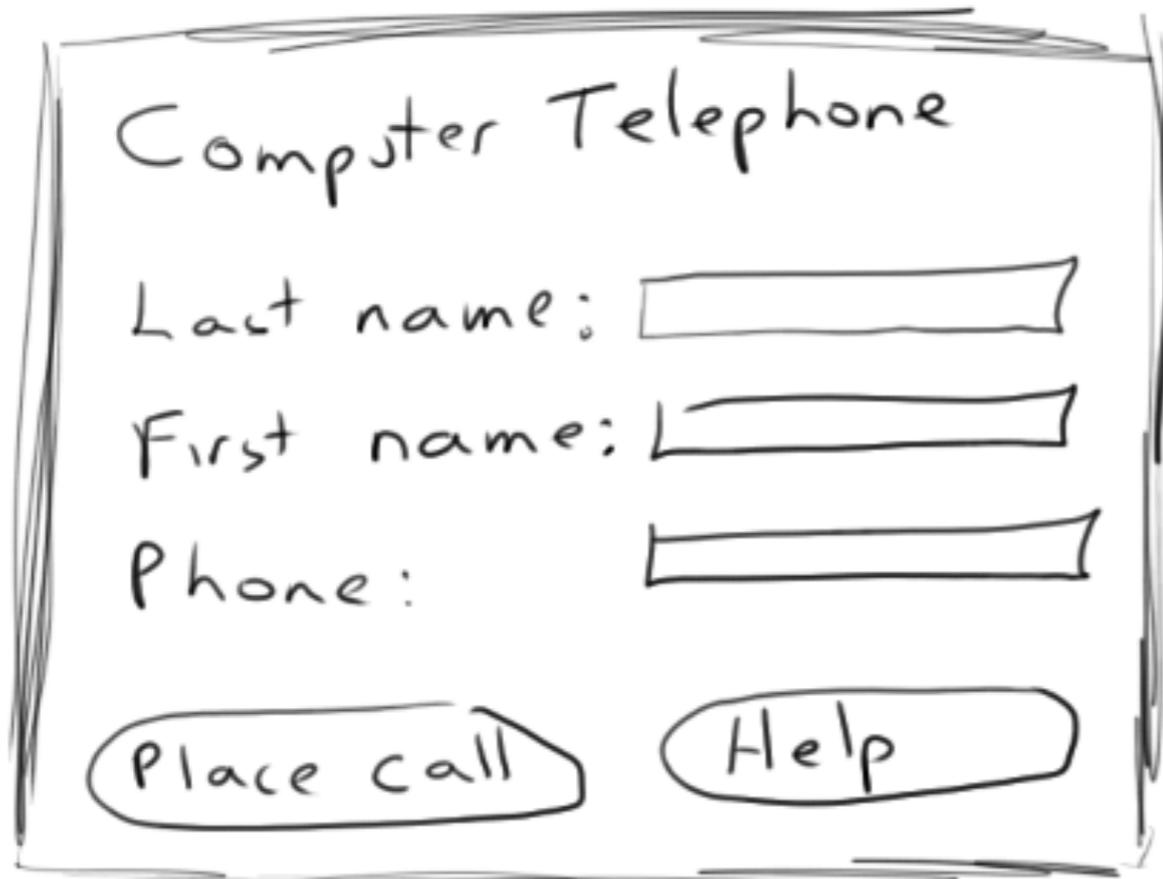


4) Illustrate activities and dynamics



**>> Hands-on sketching:
“Sketching Vocabulary”**

Technique: Reduce to essentials

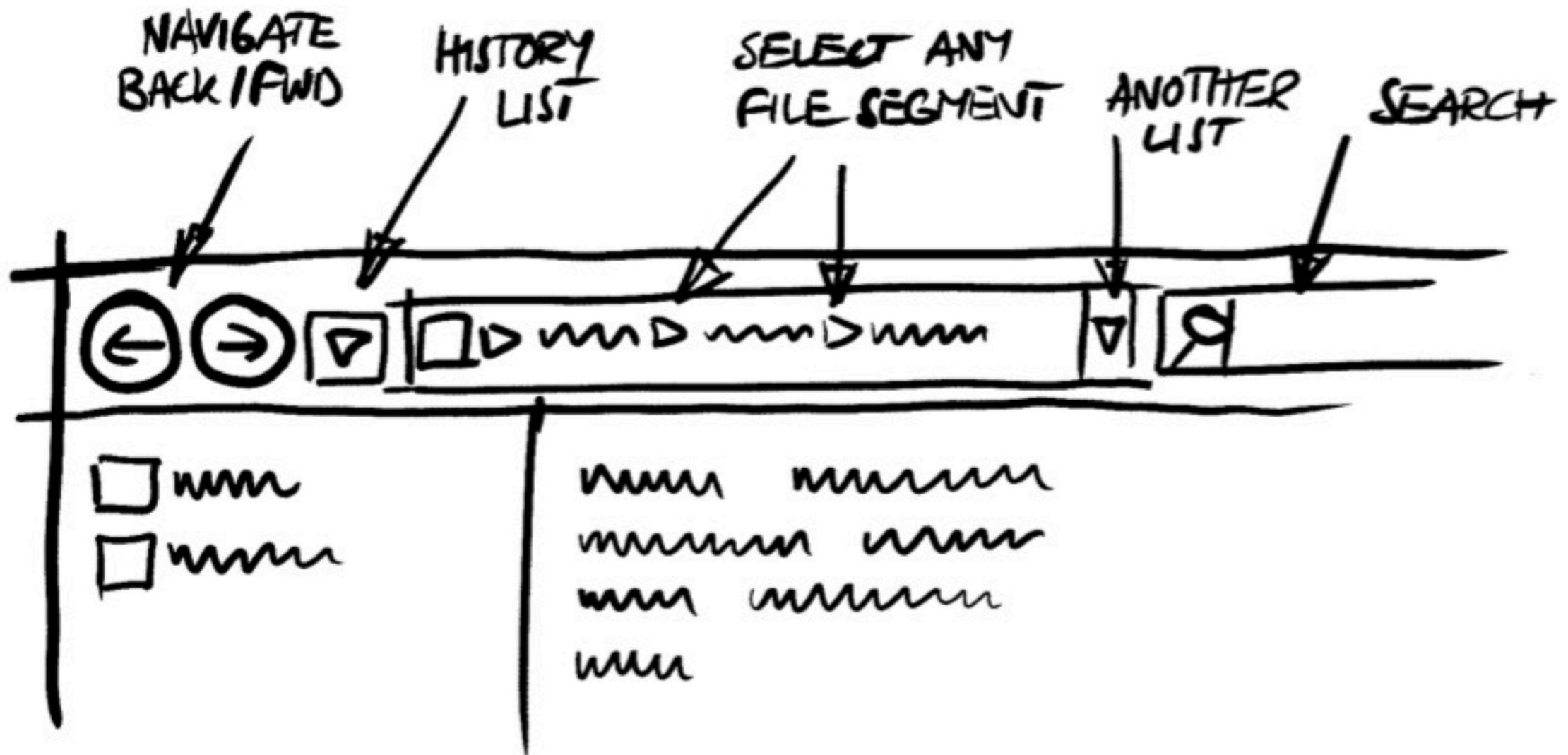


Low Fidelity

High Fidelity



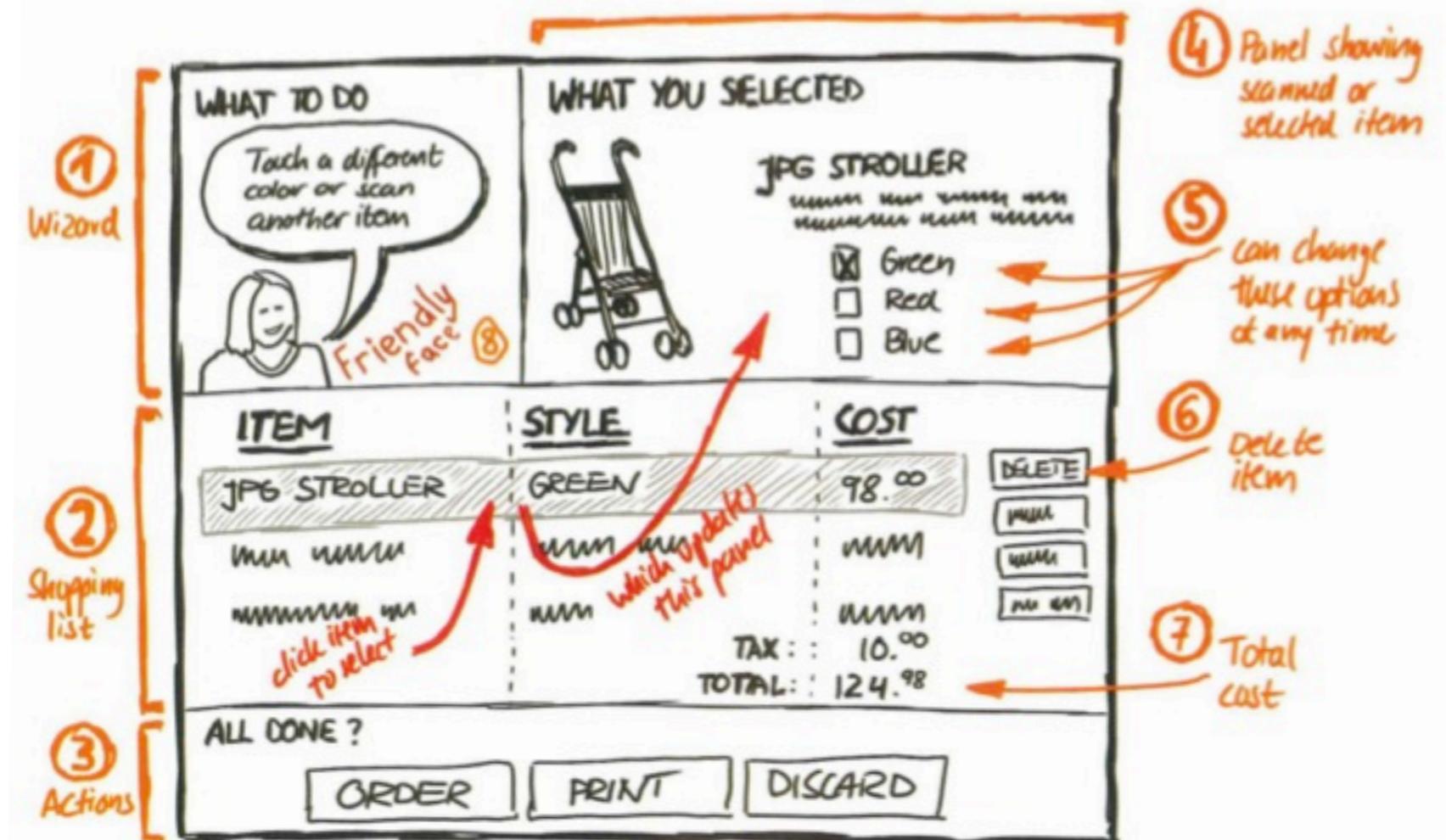




Technique: Annotations

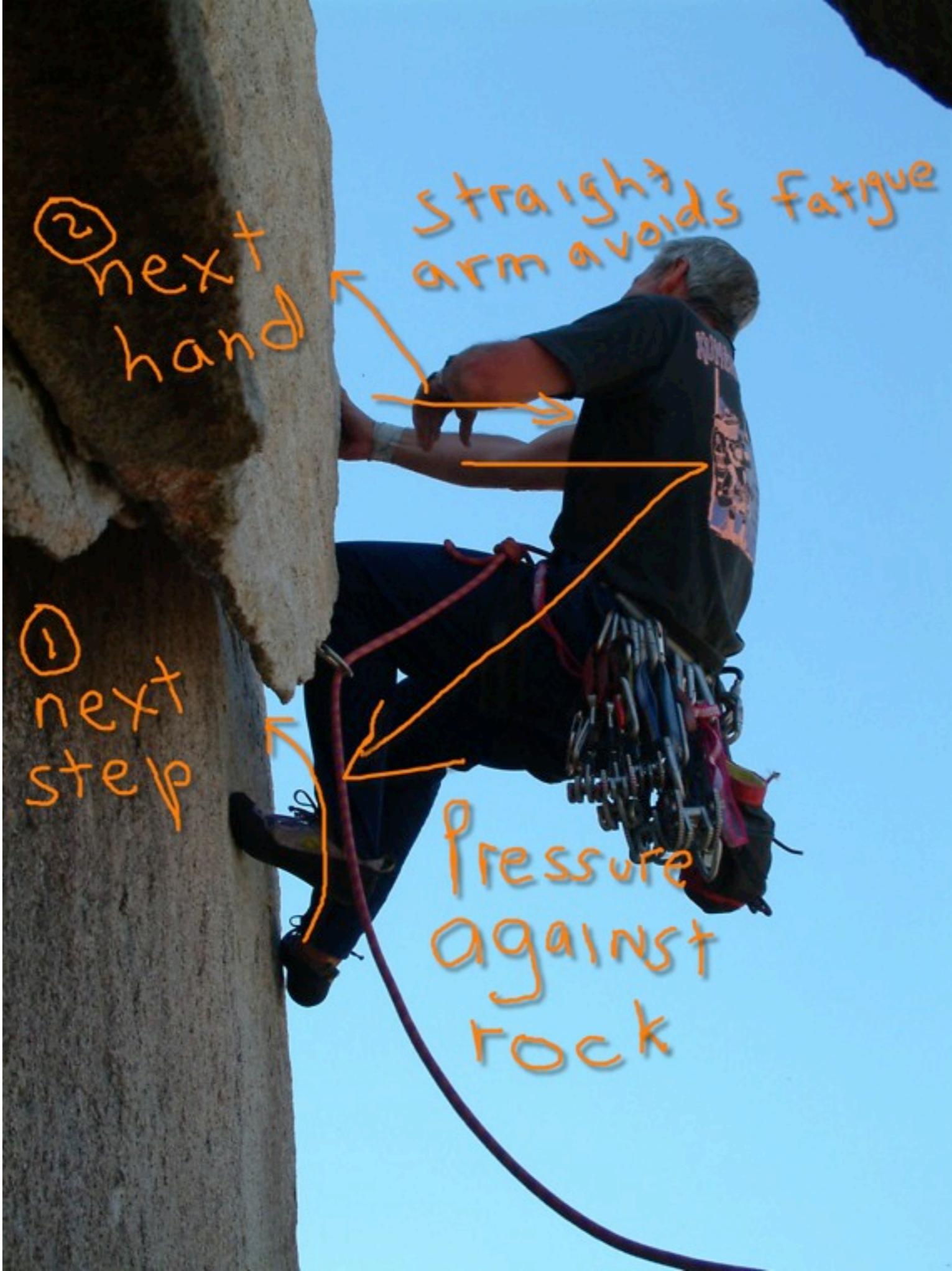
- **Textual notes**
 - name and / or explain things
 - add detail
 - lists of items
 - questions / issues about design...
- **Graphical marks**
 - connects notes to sketch elements
 - relates sketch elements
 - show dynamics of elements or interaction over time...

- **Augment a sketch**
 - directly on sketch
 - as layer
 - tracing
 - Photoshop layer
 - over dynamic media





source: [1]

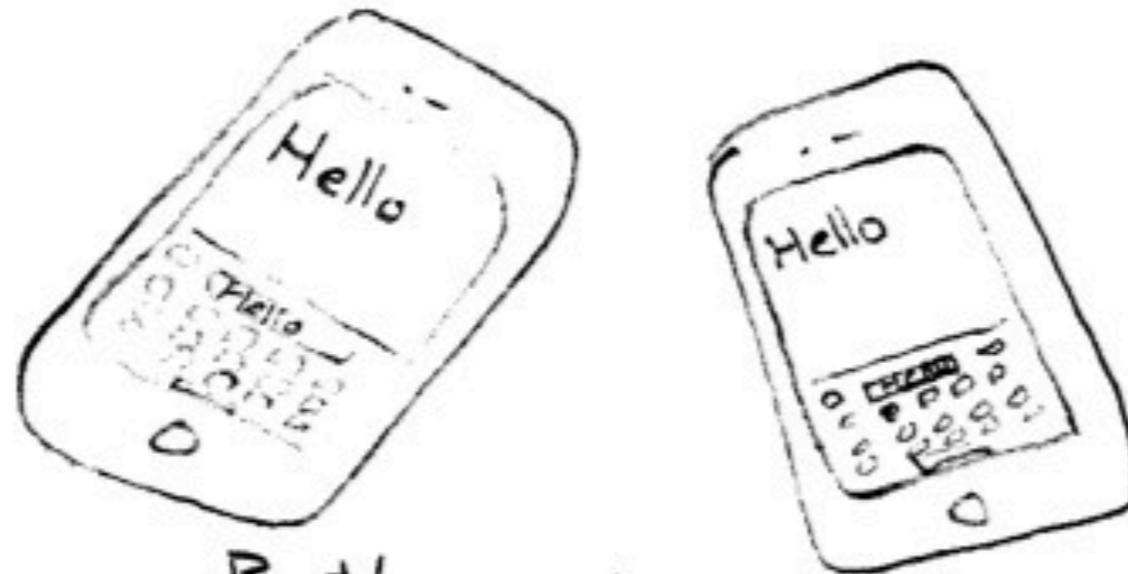


source: [1]

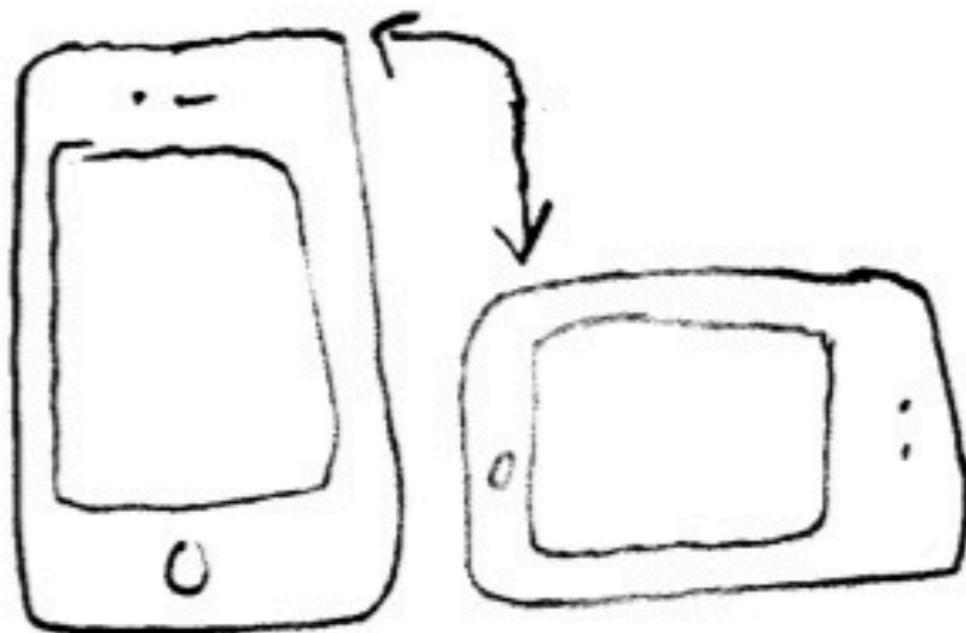
>> Hands-on sketching:
“Simple sketches and annotations”

Technique: 10 plus 10

- 1) State the design challenge
- 2) Generate 10 different designs – as creative and diverse as possible
- 3) Reduce the number of design concepts
- 4) Choose the most promising designs as a starting point
- 5) Sketch 10 details and/or variations of design concepts
- 6) Present ideas to a group
- 7) As your ideas change, sketch them out.

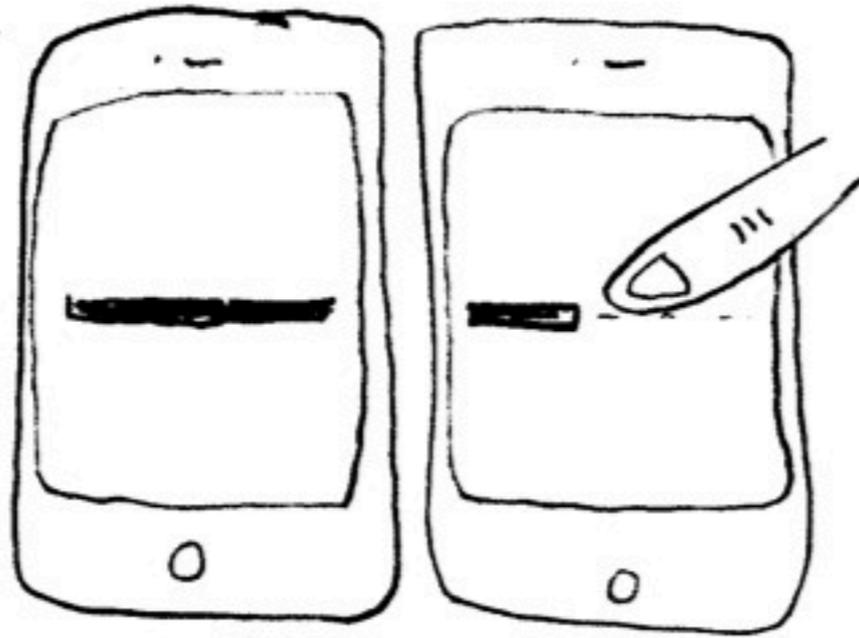


Both people type a word chosen by them

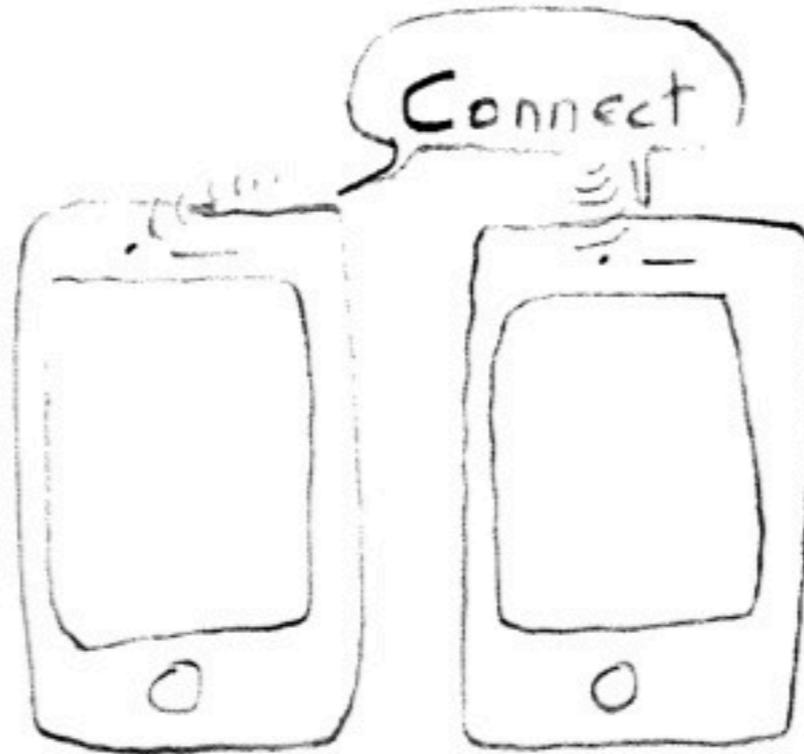


Rotate in a pattern, where other person has to mimic it (accelerometer)

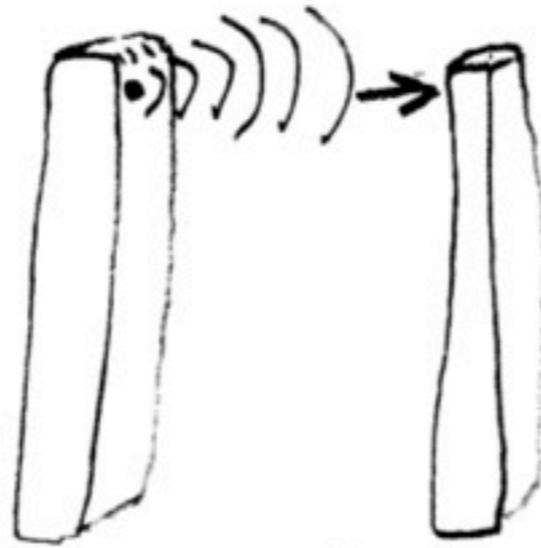




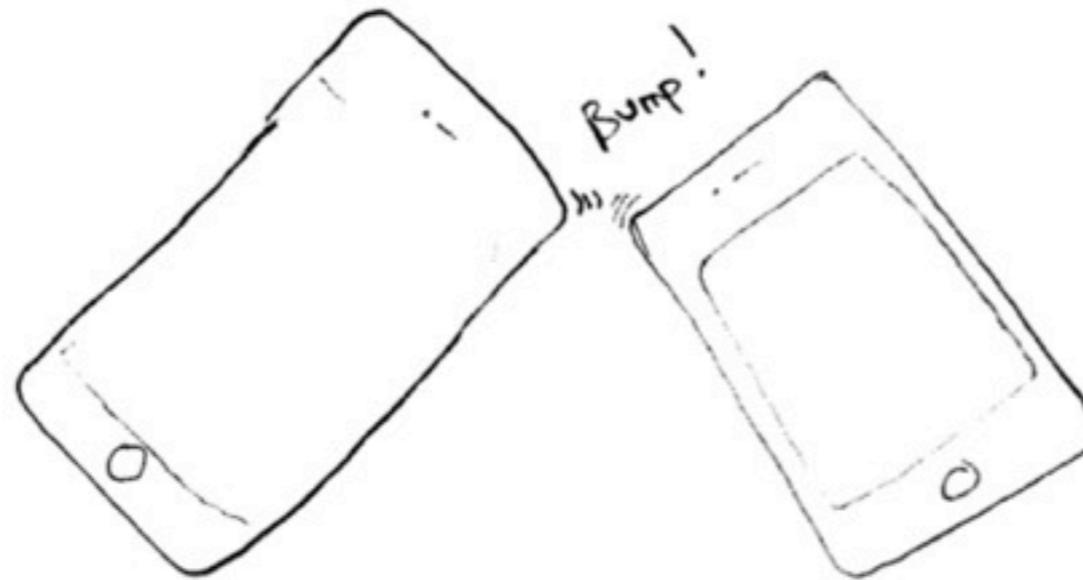
Synchronous
gesture
Trace a line
across both
side by
side devices
as a single
stroke



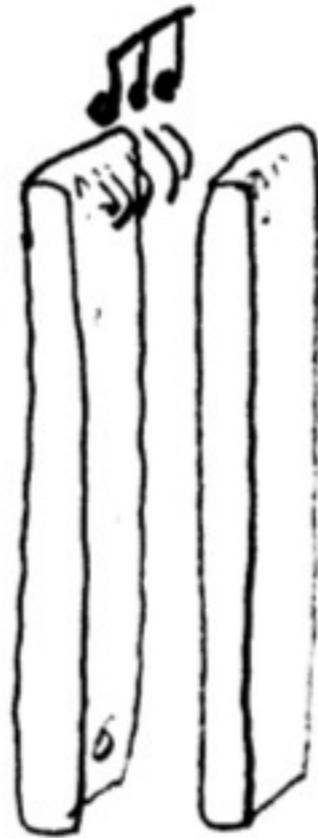
Microphones pick
up spoken
command at
similar volume



LED strobe
pattern captured
by camera



Bump. Accelerometer matches
bump vibrations



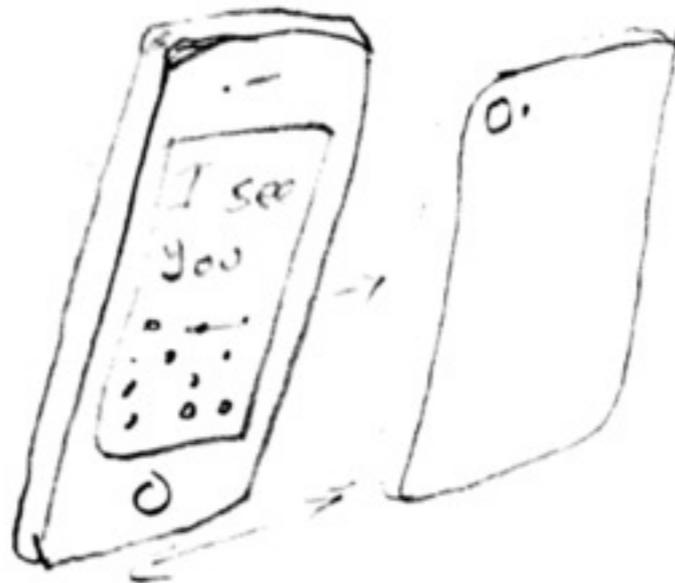
Faint musical
sound played
on one device
picked up by
the other
device



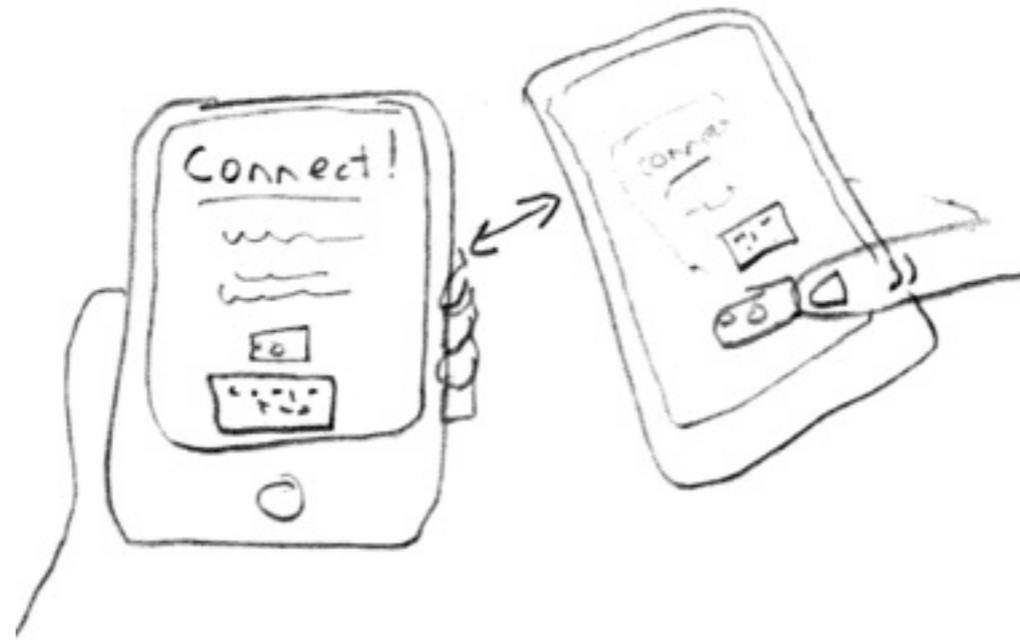
Ambient
light
sensor
Touch
surfaces
together
in a pattern;
Both detect
same light/
dark pattern



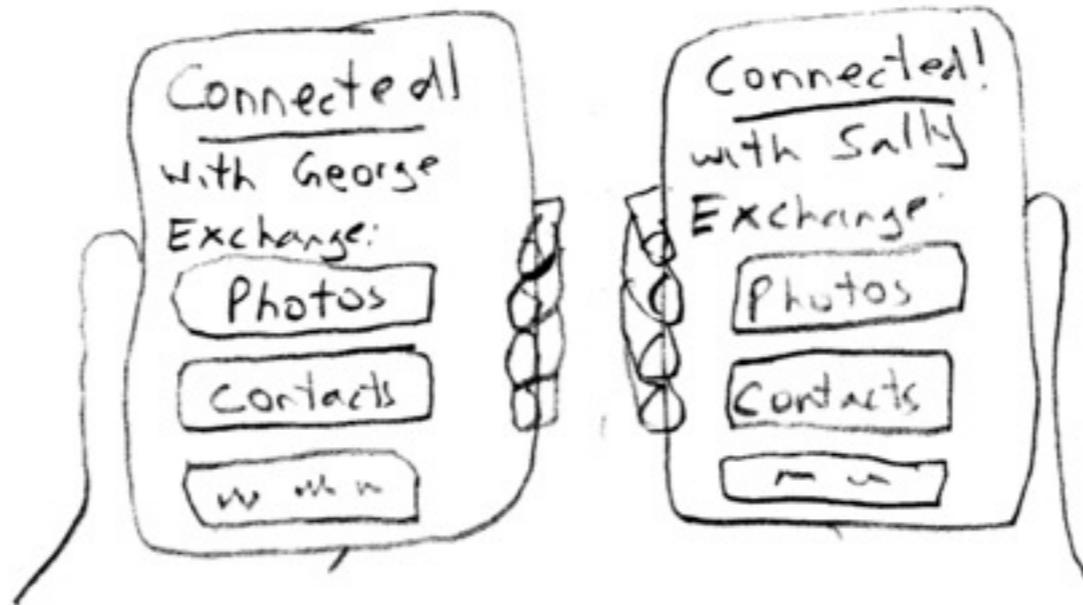
3 simultaneous
taps on both
phones



mutual
video/photos
captures
identifying
images such
as tags via
camera



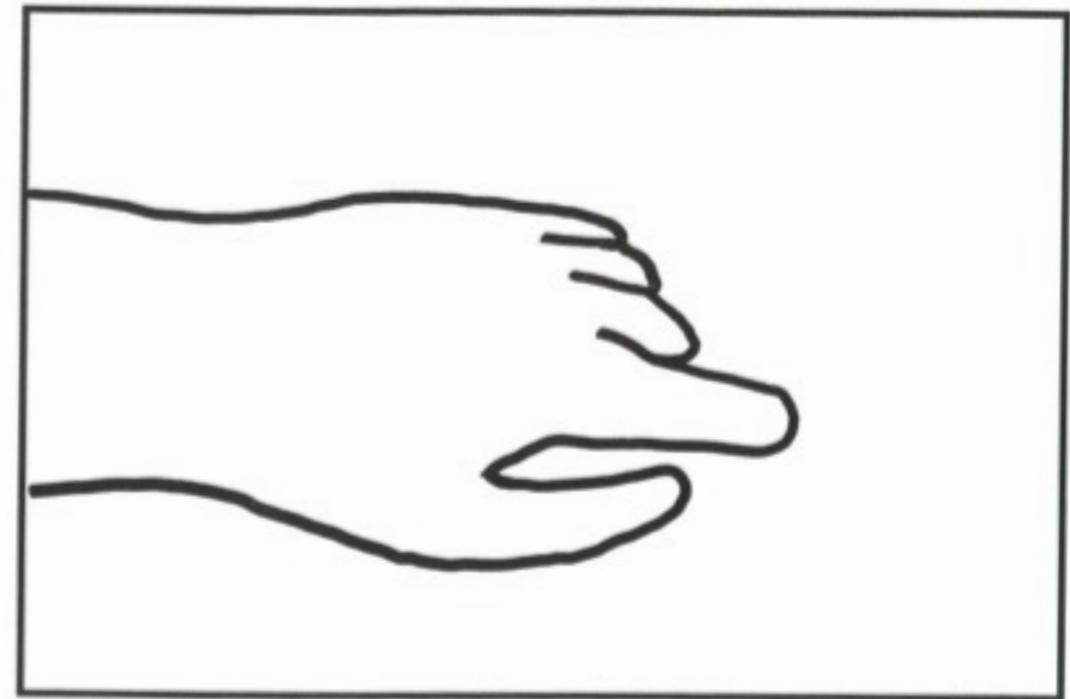
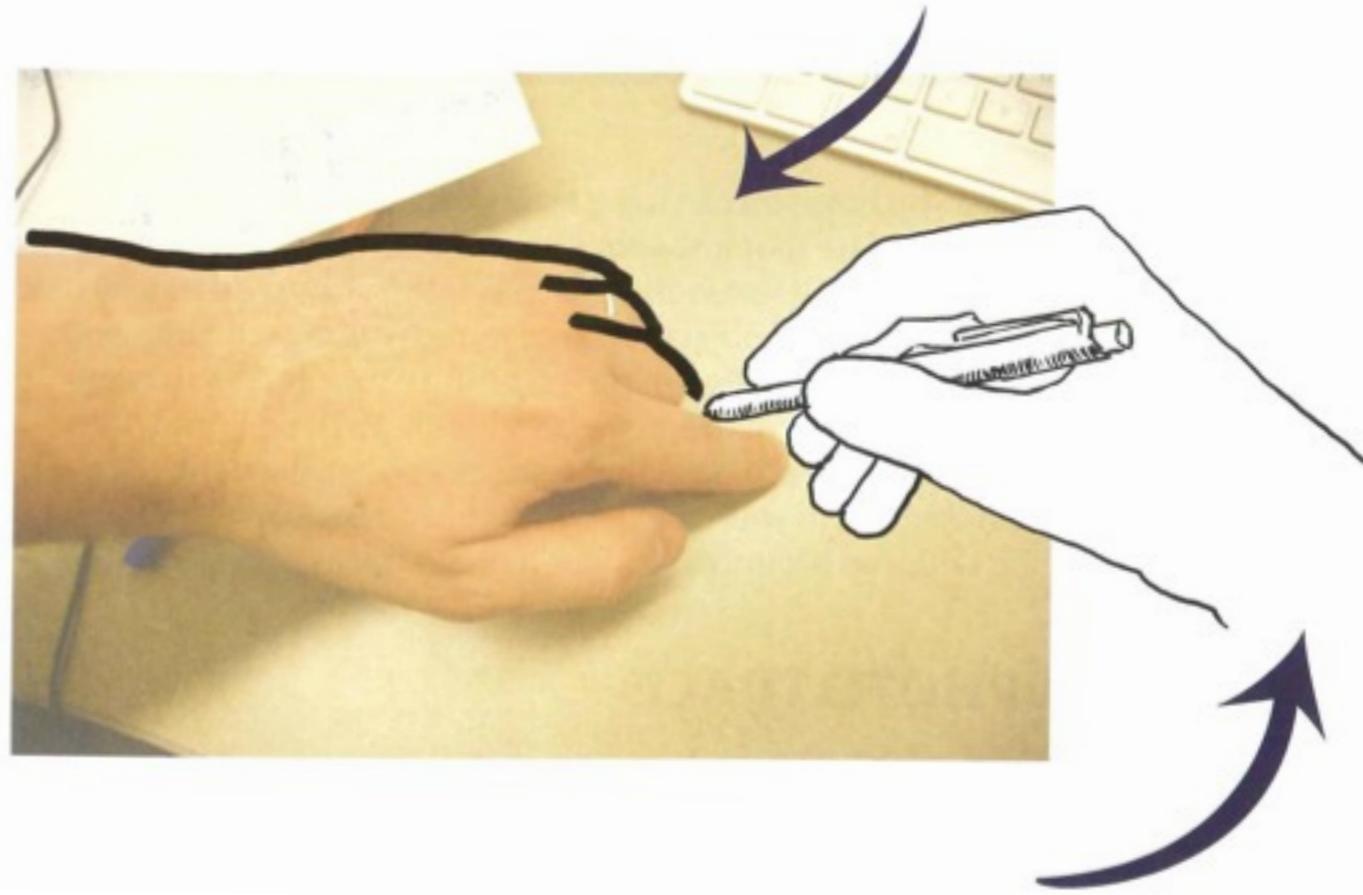
One person
takes
picture of
the other's
Screen

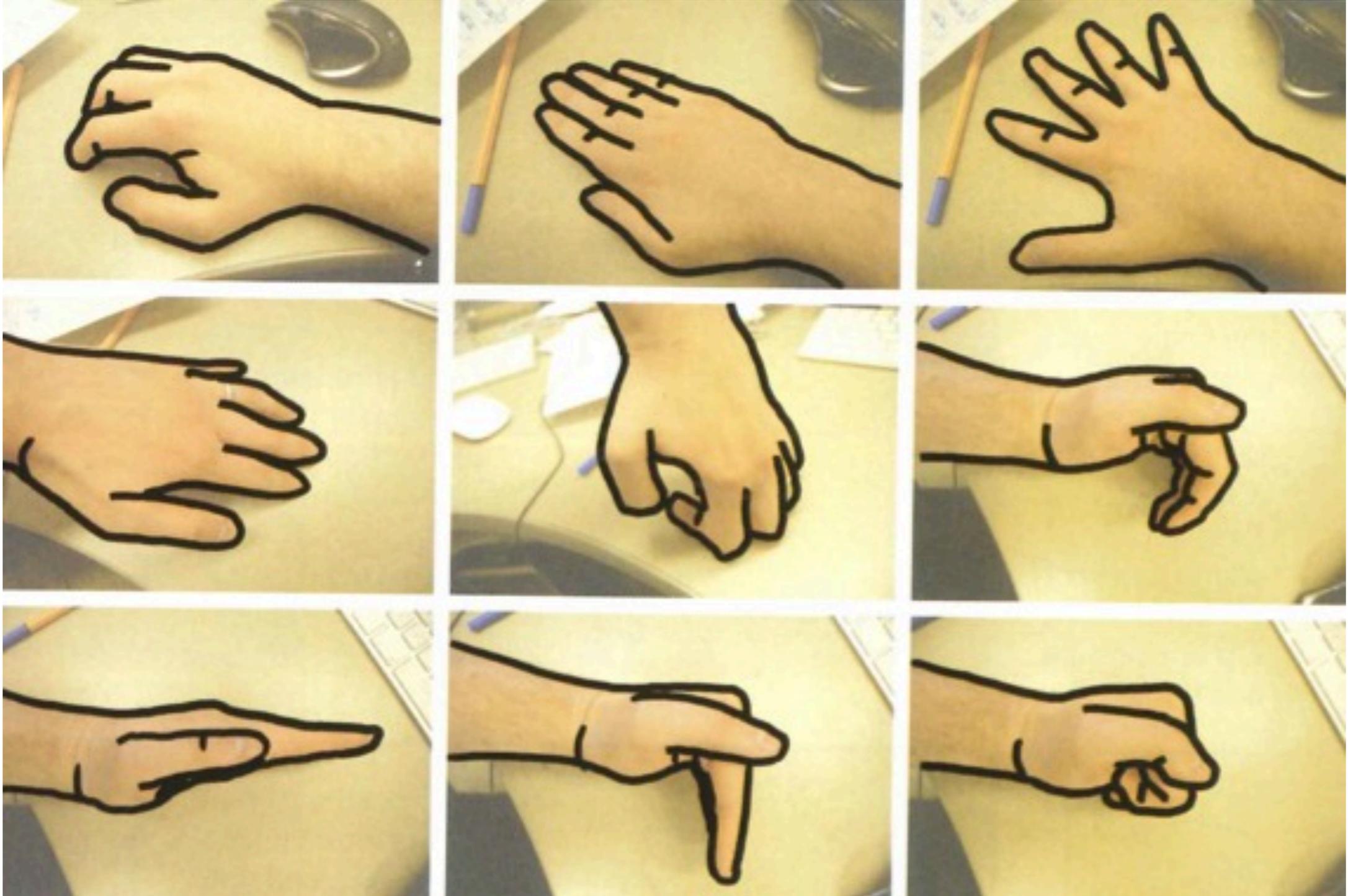


Once
connected,
people can
then exchange
various
things on
their phone

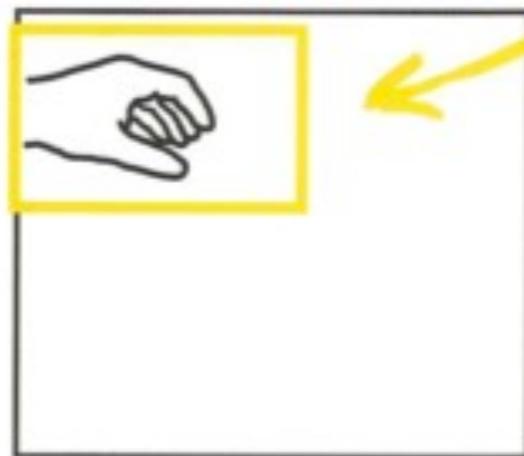
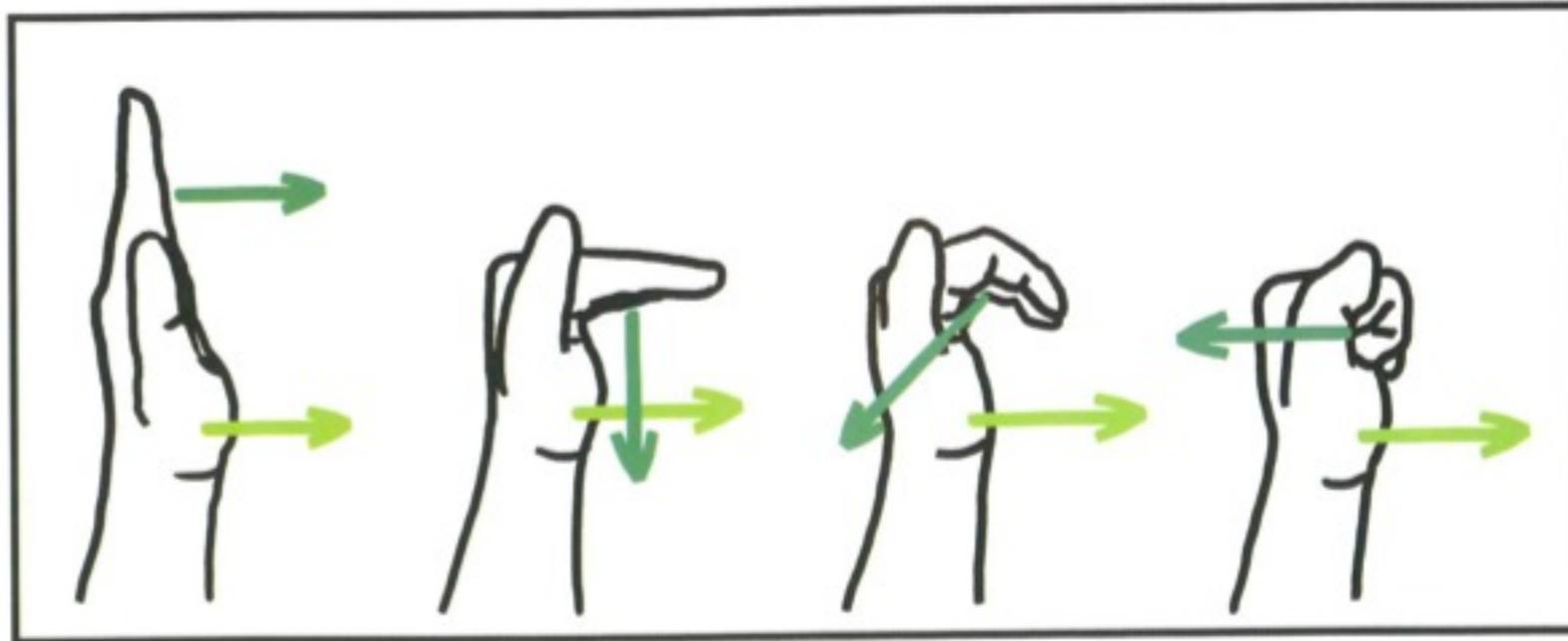
Technique: Tracing

- **Basic idea**
 - copy / trace the fixed elements of an existing interface/screen
- **Technology**
 - camera, photograph, tracing paper or...
 - Photoshop or equivalent (trace over image on a separate layer)
- **Drawing skill required**
 - almost zero

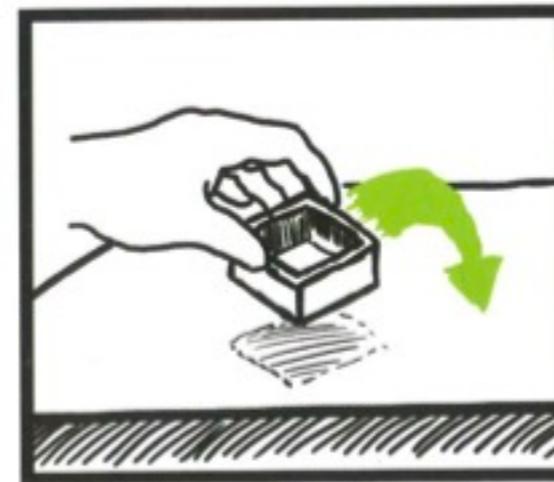
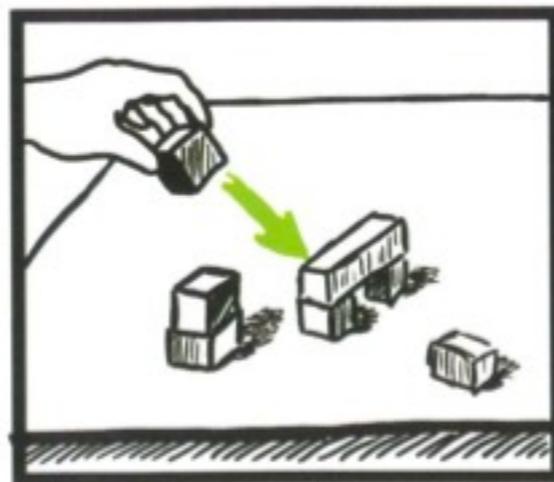
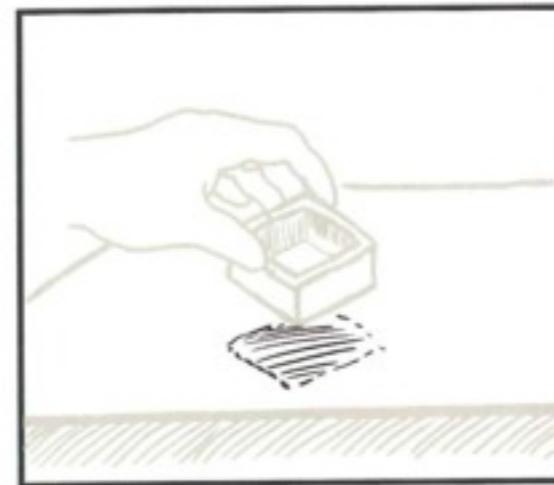
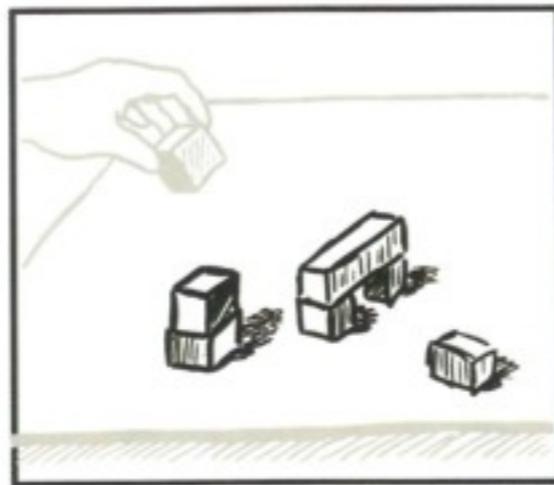
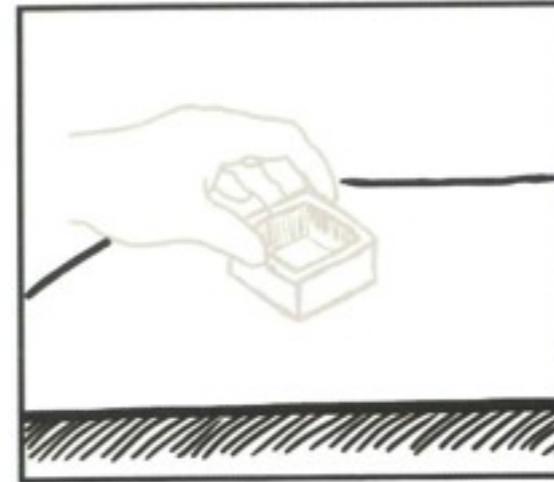
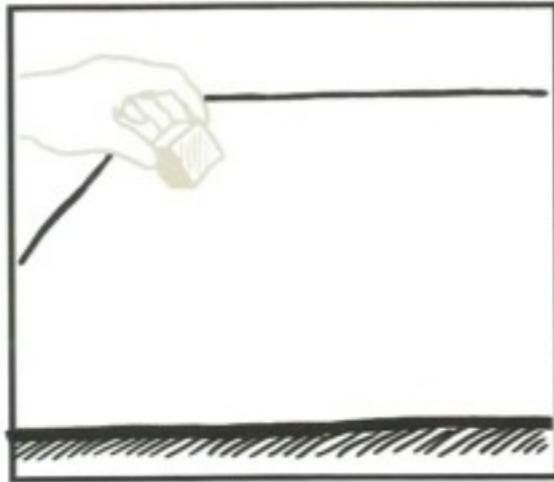


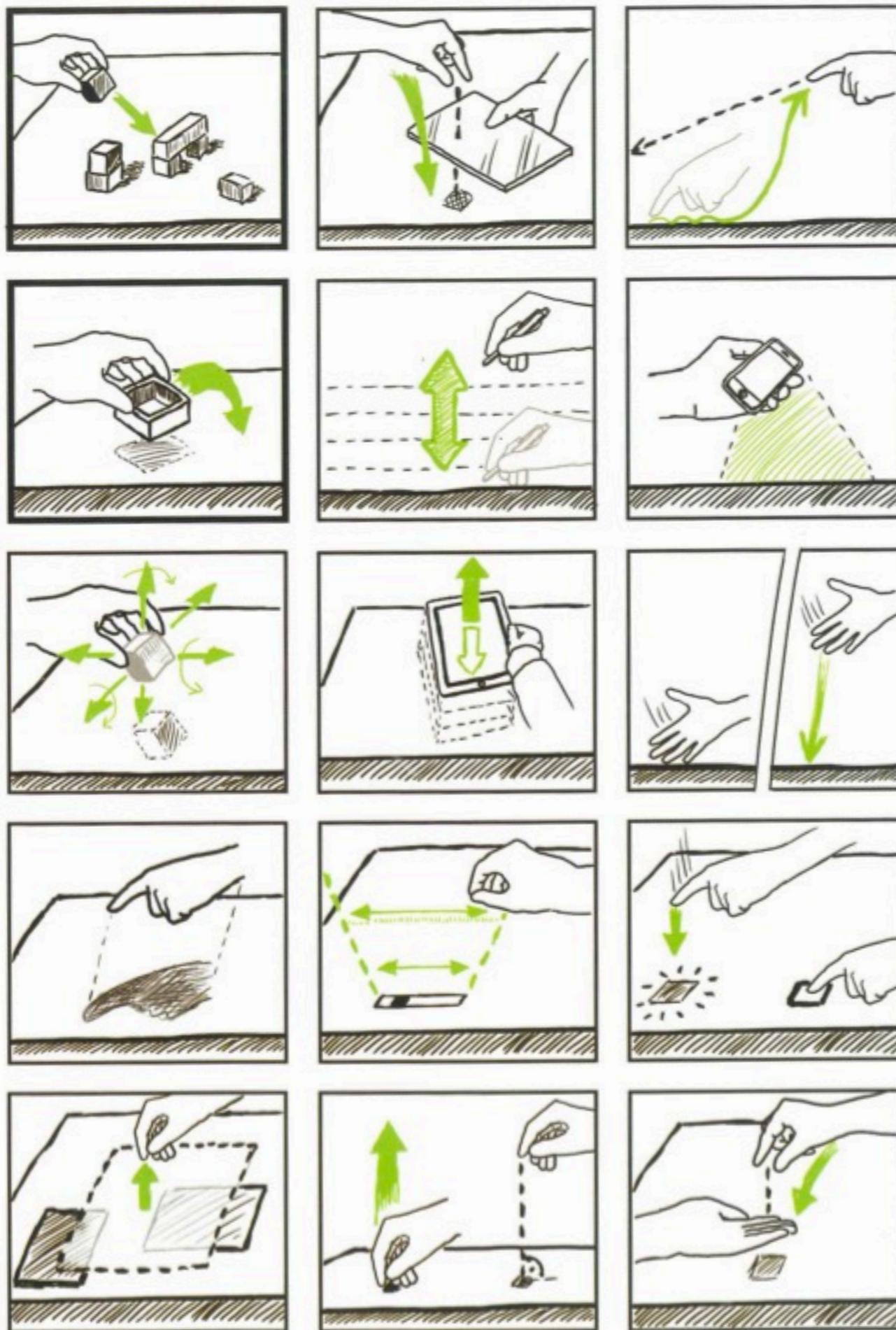


source: [2]

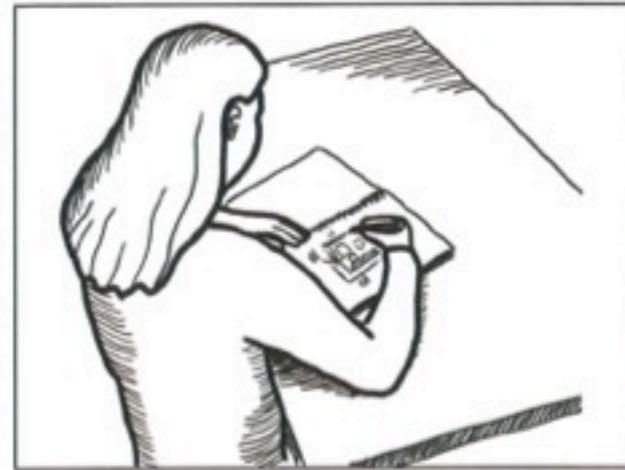
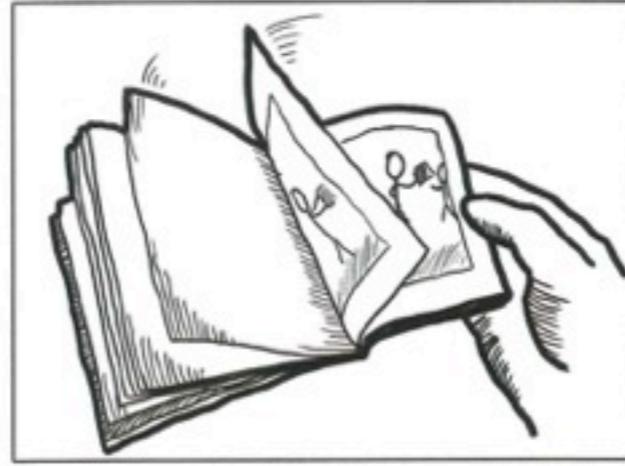
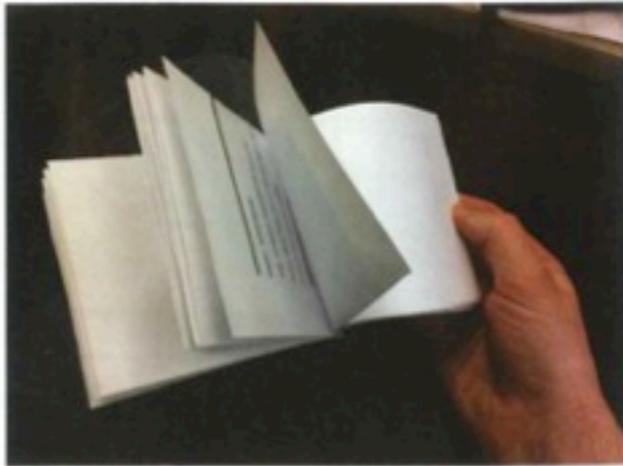
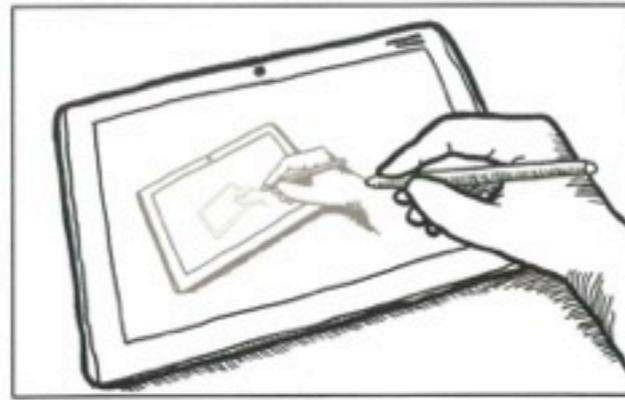


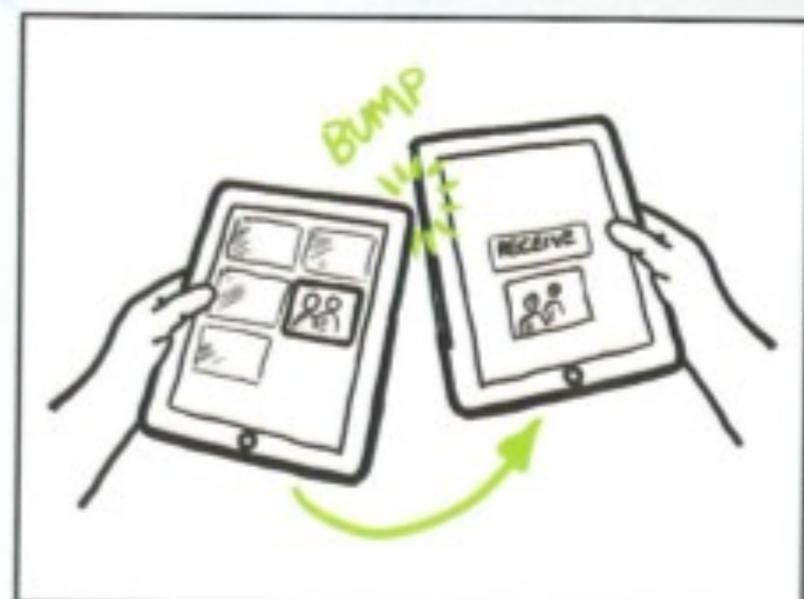
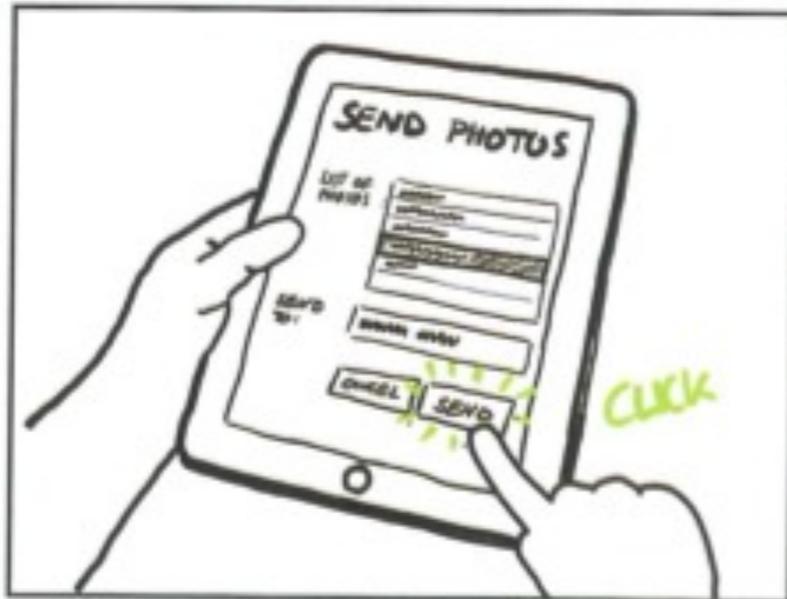
source: [2]





source: [2]





>> Hands-on sketching: “Tracing”

Technique: Hybrid Sketches

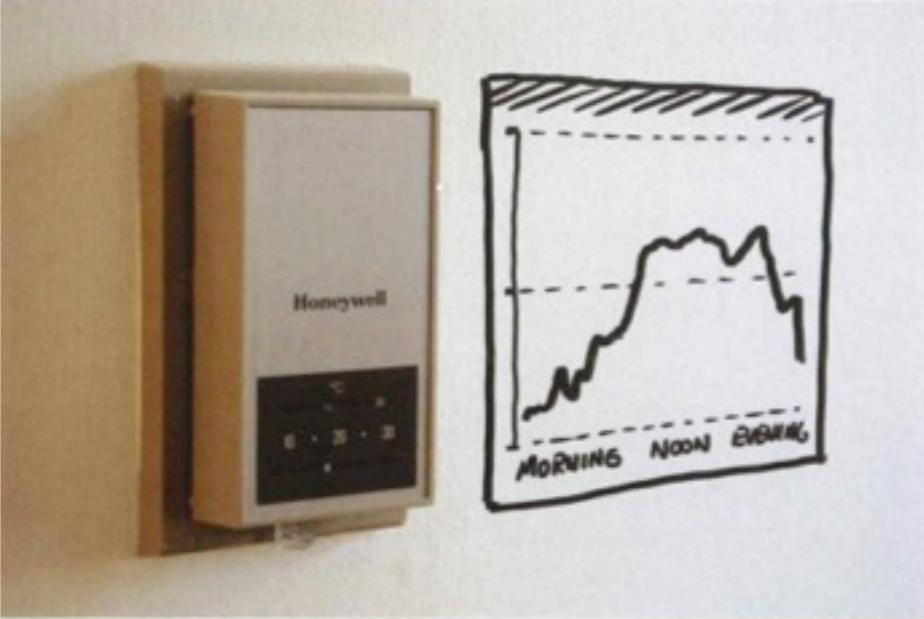
- **Mixes full and low fidelity elements**
- **High fidelity parts:**
 - fixed design elements
- **Low fidelity parts:**
 - speculative components
- **Contrast**
 - makes certain parts of sketch stand out over others





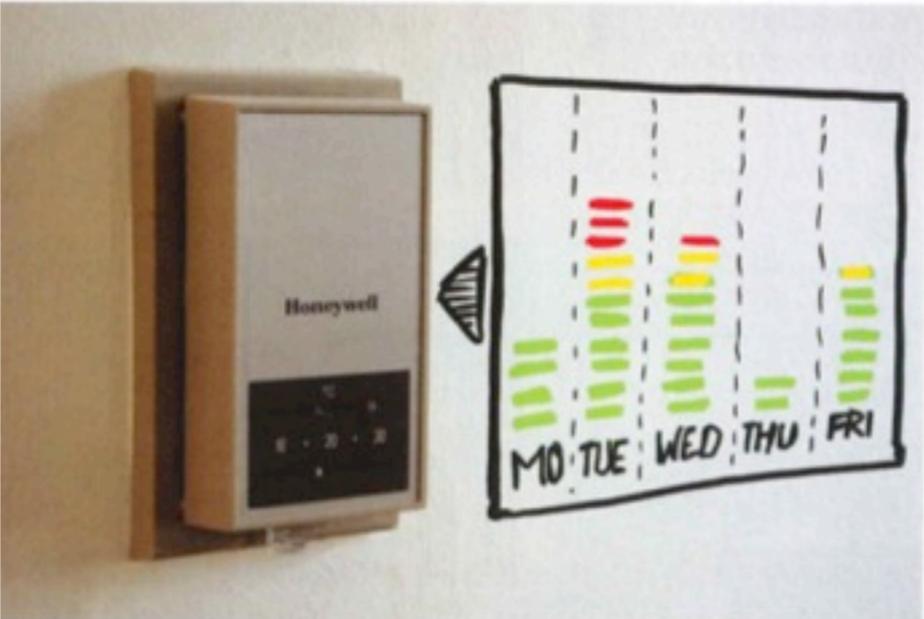
source: [2]

Hybrid Sketches



Lo-fi = speculative

Detail = fixed elements



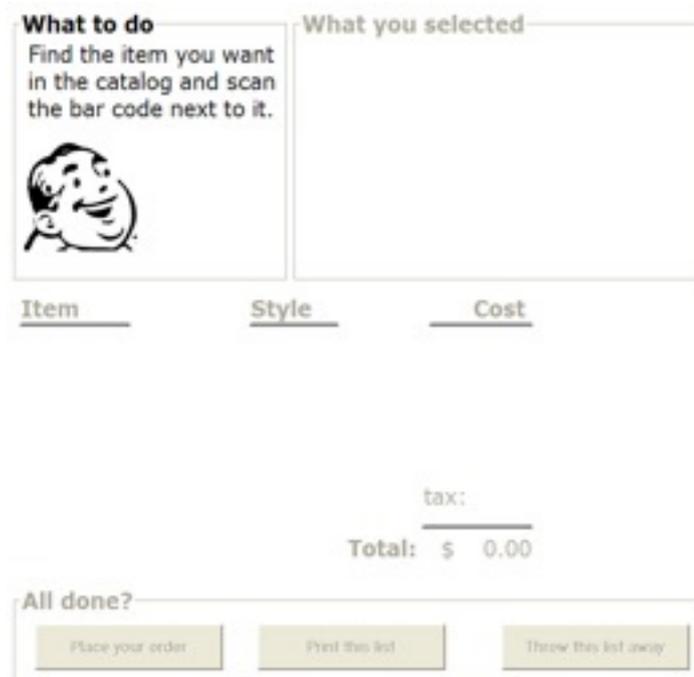
source: [2]

Sketching Interaction

- The Definition of Sketching
- Characteristics of Sketches and Sketching
- Sketches and Prototypes
- Is it a Sketch ?
- Sketching Techniques
- Storyboarding

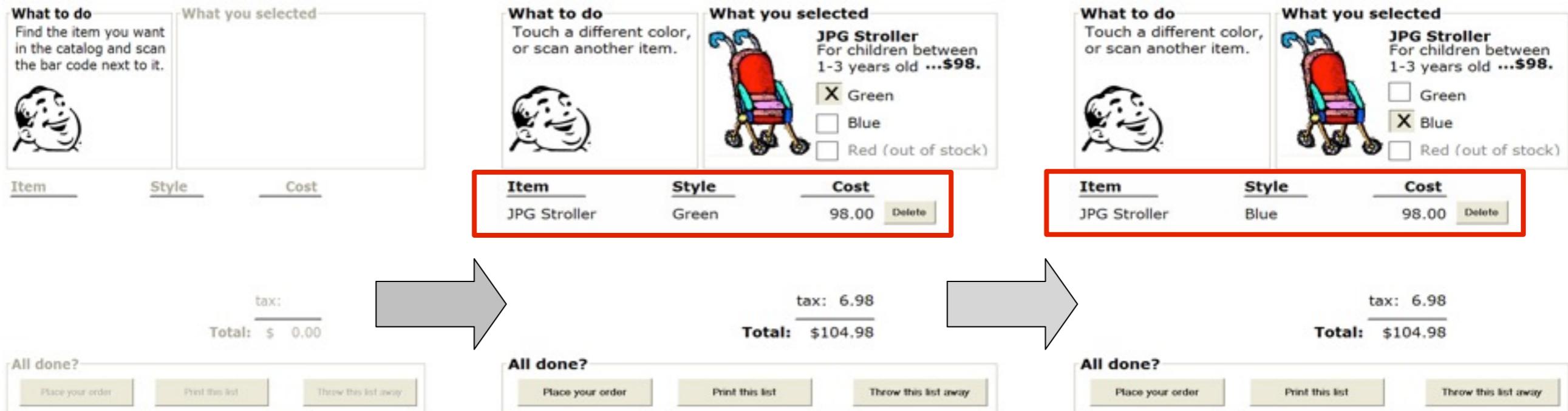
Storyboarding

- Problem with **single sketches**
 - hard to capture dynamics of interaction over time
 - captures user interface, not user behavior
- A good sketch should **tell a story**



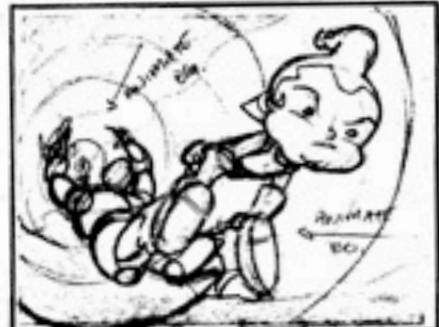
Storyboarding

- Solution: use more than one image
 - a series of **key frames** as sketches
 - originally from film; used to get the idea of a scene
 - **snapshots of the interface** at particular points in the interaction
 - **portrays key scenes** in the interface and the transitions that caused the changes



source: [2]

SC PNL 1



ACTION ANIMATE BG AS RUSTY FALLS. SYNTH-DWAYNE THROUGH EXIT TUBE BY HIM, GET. DAL

SC PNL 2



ON SYNTH-DWAYNE. PAW BG

SC PNL 2



HE SPREADS HIS ARMS OUT, PUTTING HIS PALMS TO THE TUBE SIDE. <SPARKS> 117

SC PNL 1



ON RUSTY. PAW BG AS HE FLIES. PAW BG

SC PNL 2



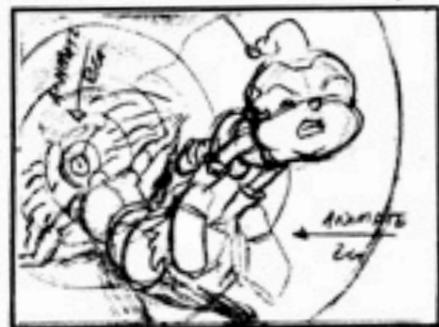
RUSTY IS JERKED BACK A BIT. HE LOOKS BACK IN SHOCK. PAW BG

SC PNL 3



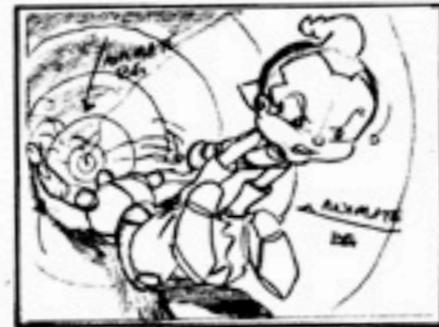
RUSTY IS PULLED BACK SLOWLY. PAW BG

SC PNL 1



ACTION RUSTY PULLS AS SYNTH-DWAYNE REACHES UP HIM WITH HIS HANDS. SPIKES ON THE SIDES OF THE TUBE. DAL

SC PNL 2



RUSTY PUTS HERO DOWN. HE STRUGGLES. RUSTY - OH NO YOU DON'T! ANIMATE BG

SC PNL 1



PAW BG AS RUSTY GAINS INTO SC. PAW BG

SC PNL 2



RUSTY CONTINUES AHEAD. PAW BG

SC PNL 3



RUSTY FLIES O.S. SYNTH-DWAYNE'S FOOT PULLED INTO SC. PAW BG

SC PNL 4



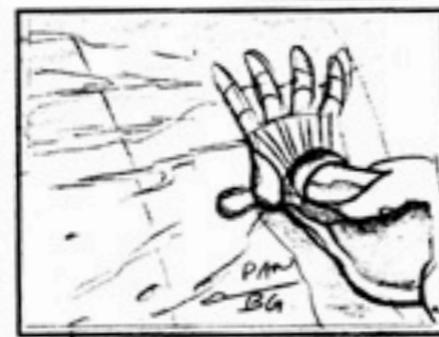
SYNTH-DWAYNE'S HAND SLIPS INTO SC. PAW BG

SC PNL 5



ACTION SYNTH-DWAYNE'S HAND PULLED INTO SC. DAL

SC PNL 6



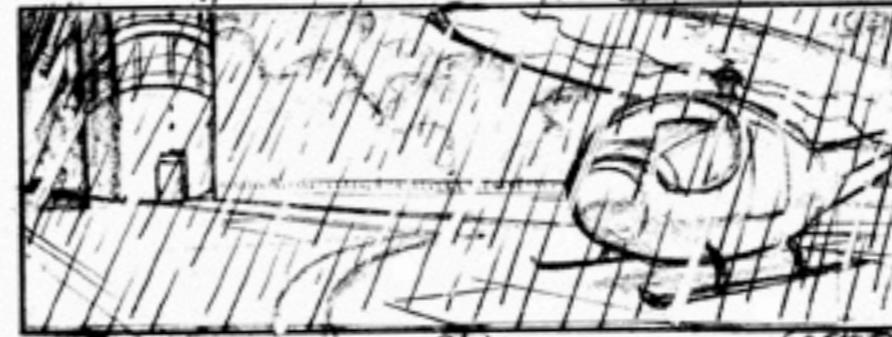
S. DWAYNE'S HAND SLIPS ACROSS TUBEWAY, SPARKING. <SPARKS> PAW BG

SC PNL 7



S. DWAYNE'S HAND O.S. SPARKS FOLLOW. PAW BG

SC PNL 1



STOP HELICOPTER WITH BLADES WHIRLING. START STREAM CONTINUES. RAIN FALLS. PAW BG

SC PNL 2



TRUCK IN AS THE SIDE OF DOOR WITH JODY ON HIS SHOULDER APPEARS IN. PAW BG

note how each scene in this storyboard is annotated

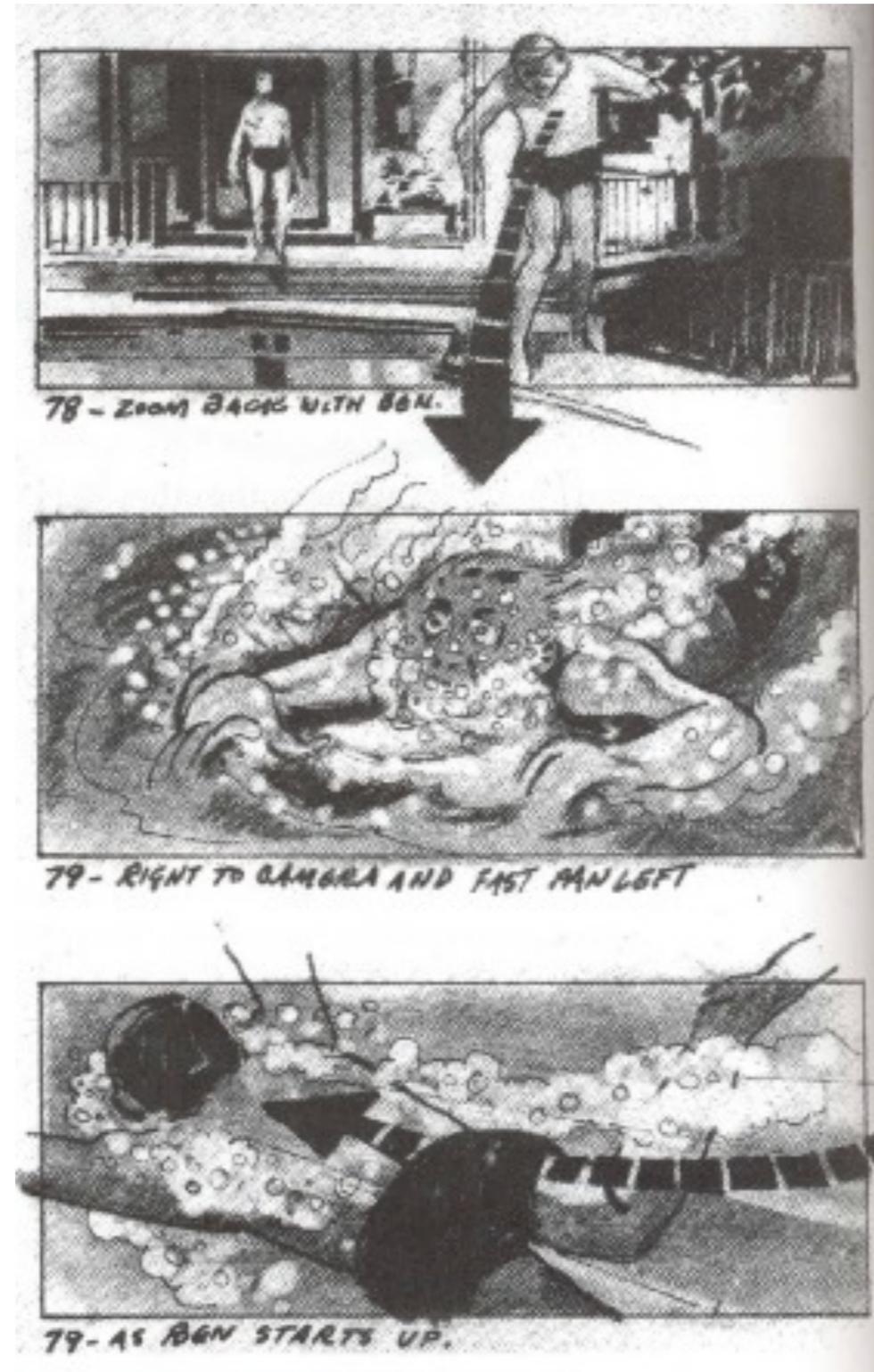
source: [3]

Storyboarding: Transitions are key



source: [1]

Storyboarding: Transitions are key



source: [1]



1. Person passing by an advertisement board



2. Notices one announcement and is interested in more information



3. Taking a photo of a barcode on the poster.



4. The mobile phone downloads detailed information about the new product.



5. The person puts away the phone and turns around.

Inspiration from camera shots and film making



**Extreme long shot
(wide shot)**
A view showing details of
the setting, location, etc.



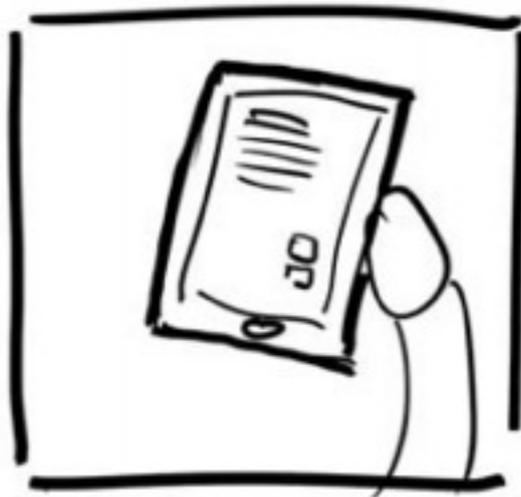
Long shot
Showing the full height
of a person.



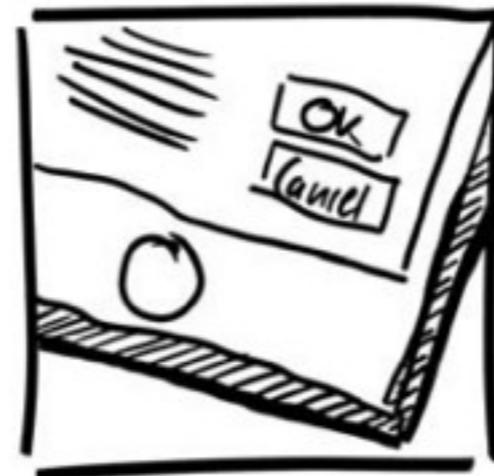
Medium shot
Shows a person's head
and shoulders.



Over-the-shoulder shot
Looking over the shoulder
of a person.



**Point of view shot
(POV)**
Seeing everything
that a person sees
themselves.



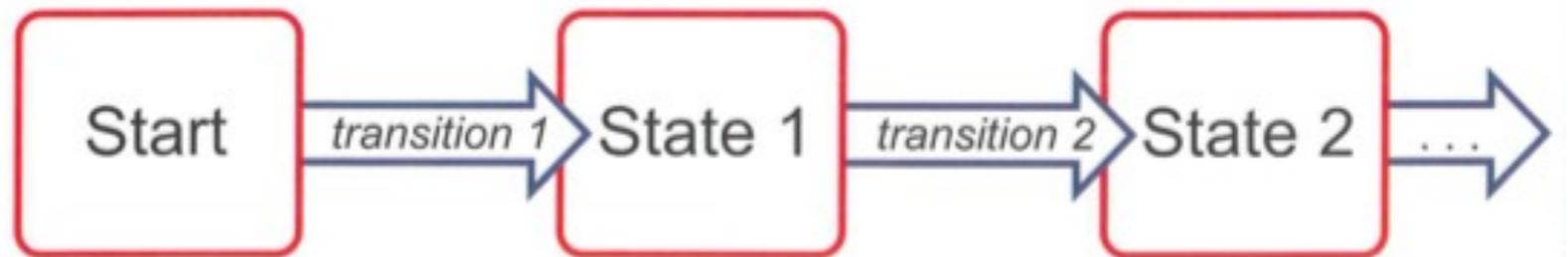
Close-up
such as showing details of
a user interface a device
the person is holding.



Technique: State Transition Diagrams

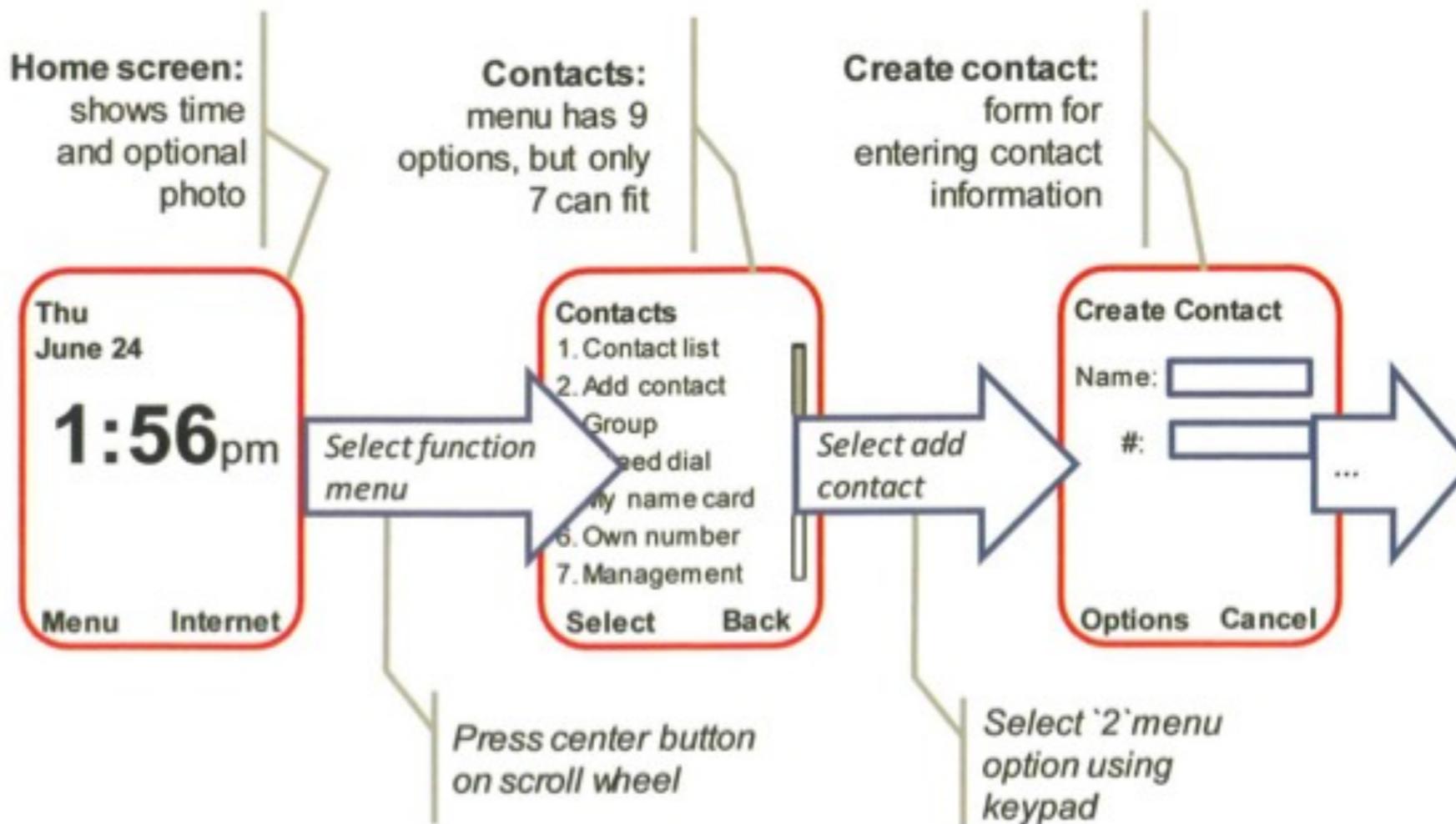
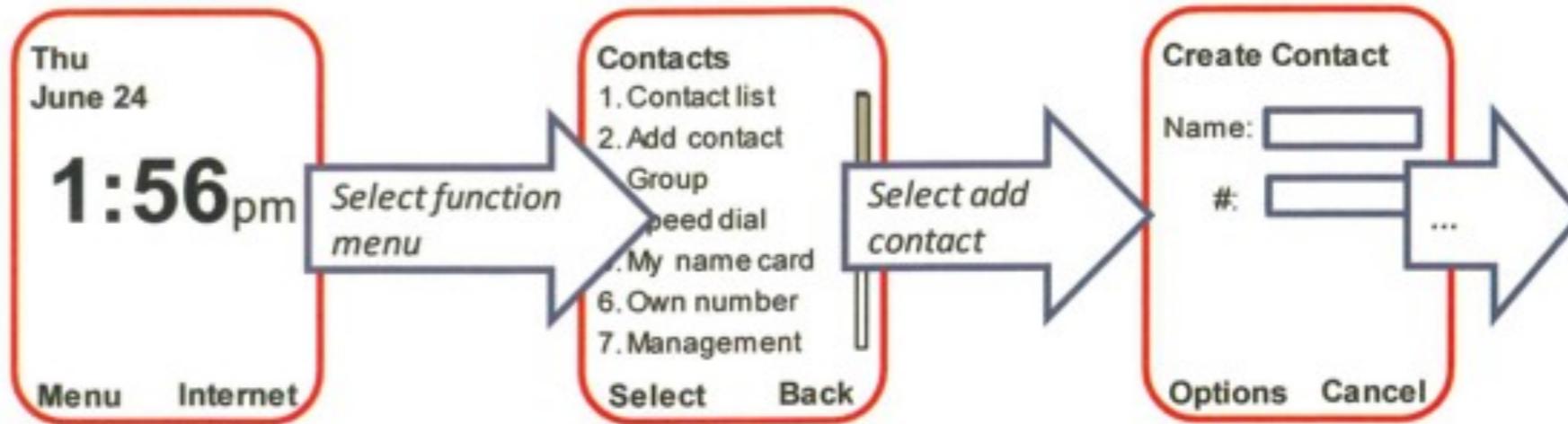
- **Create transition diagram**

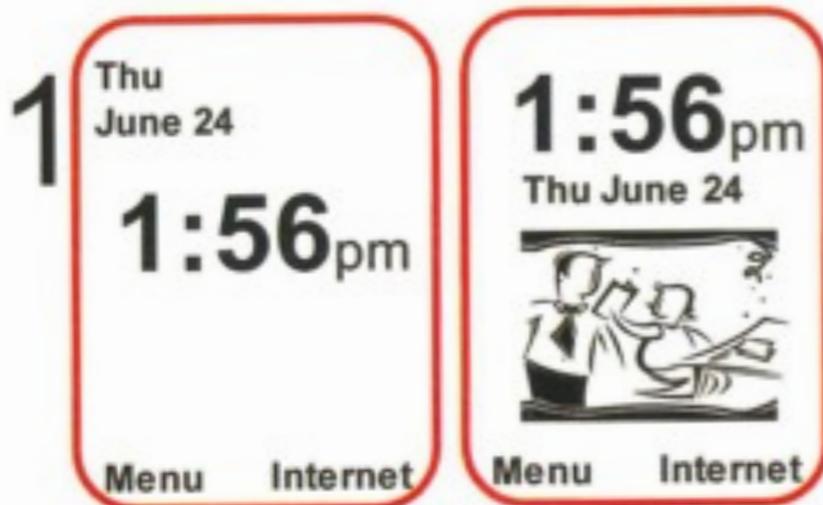
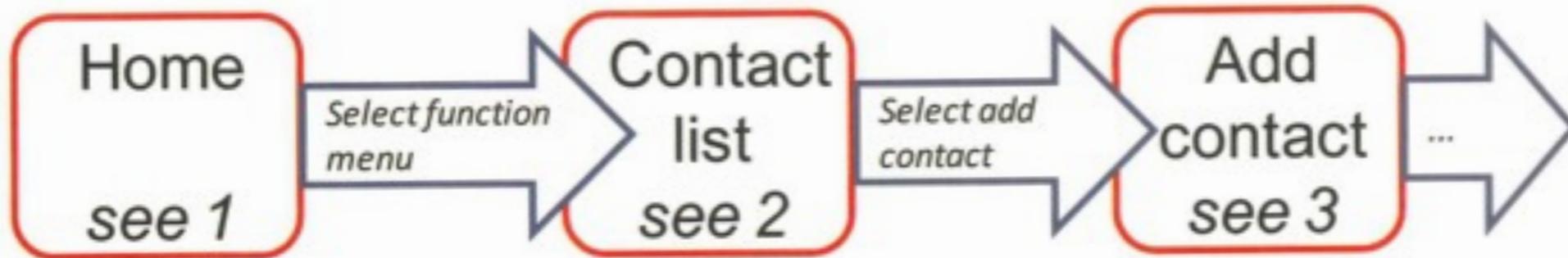
- key interaction steps
- branch points



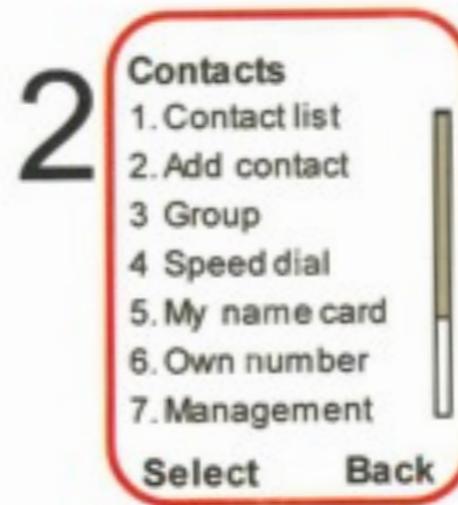
- **For each transition**

- sketch the screen
- include the transition diagram (a navigational map)
- label the transition with what triggered the transition (typically user input or set of system responses)

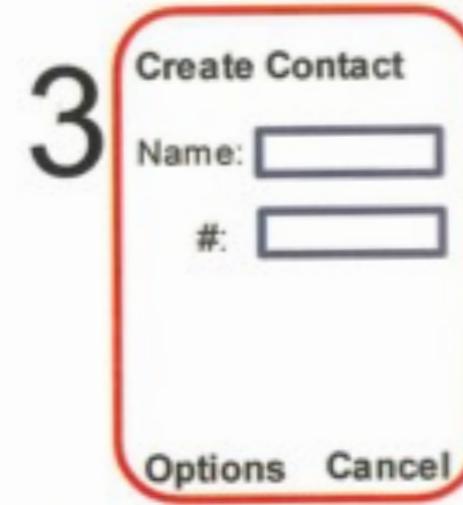




Possible home screens



Contact list

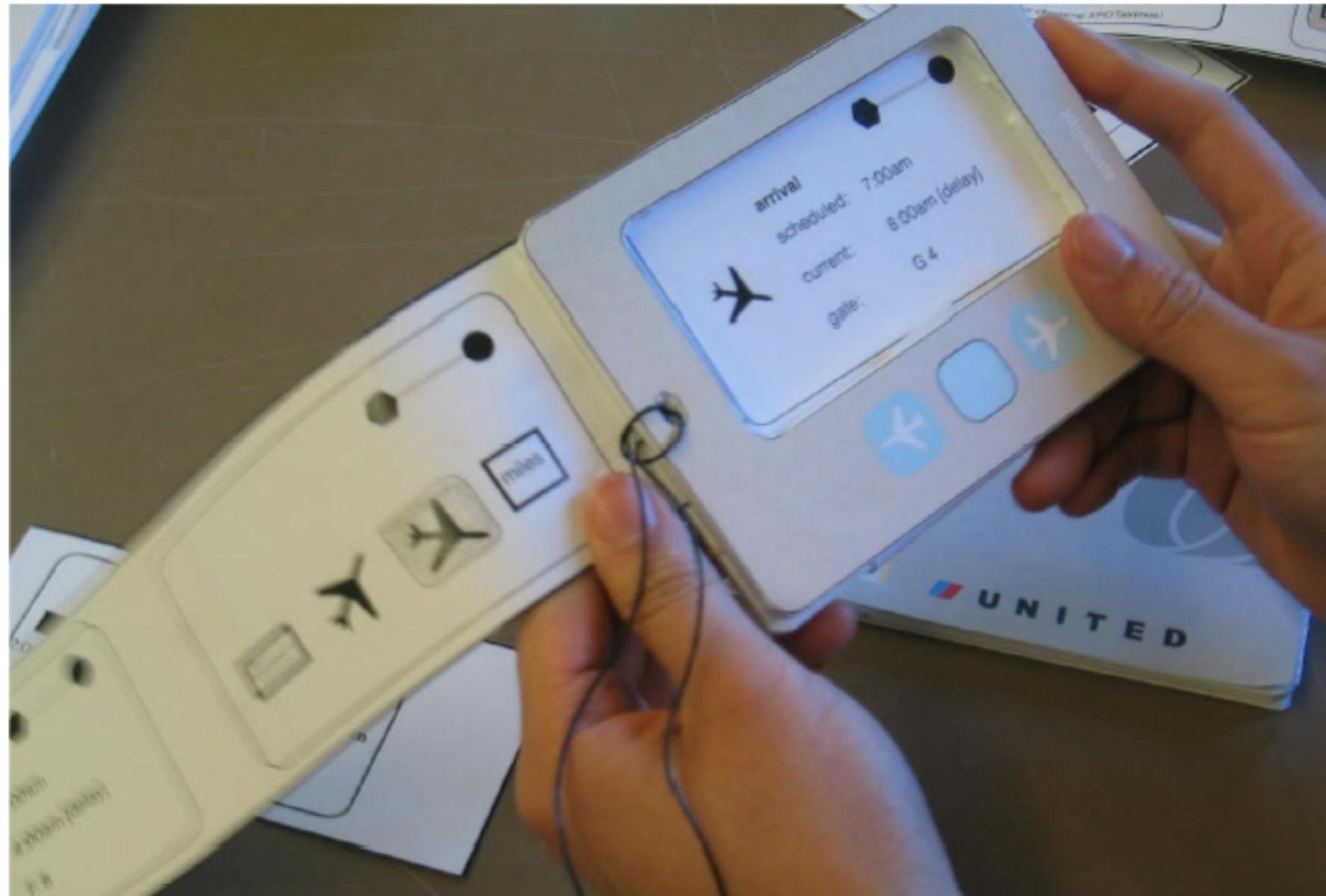


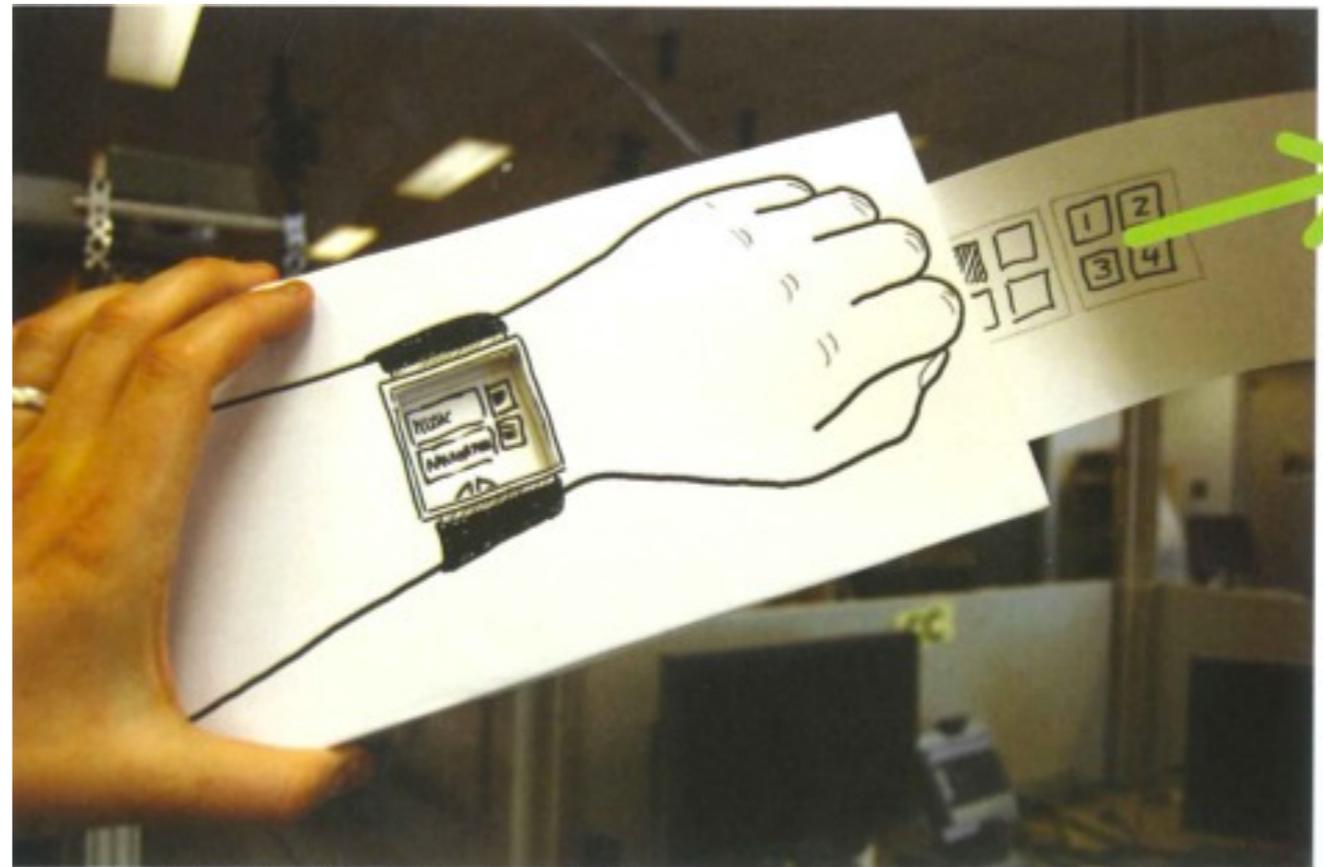
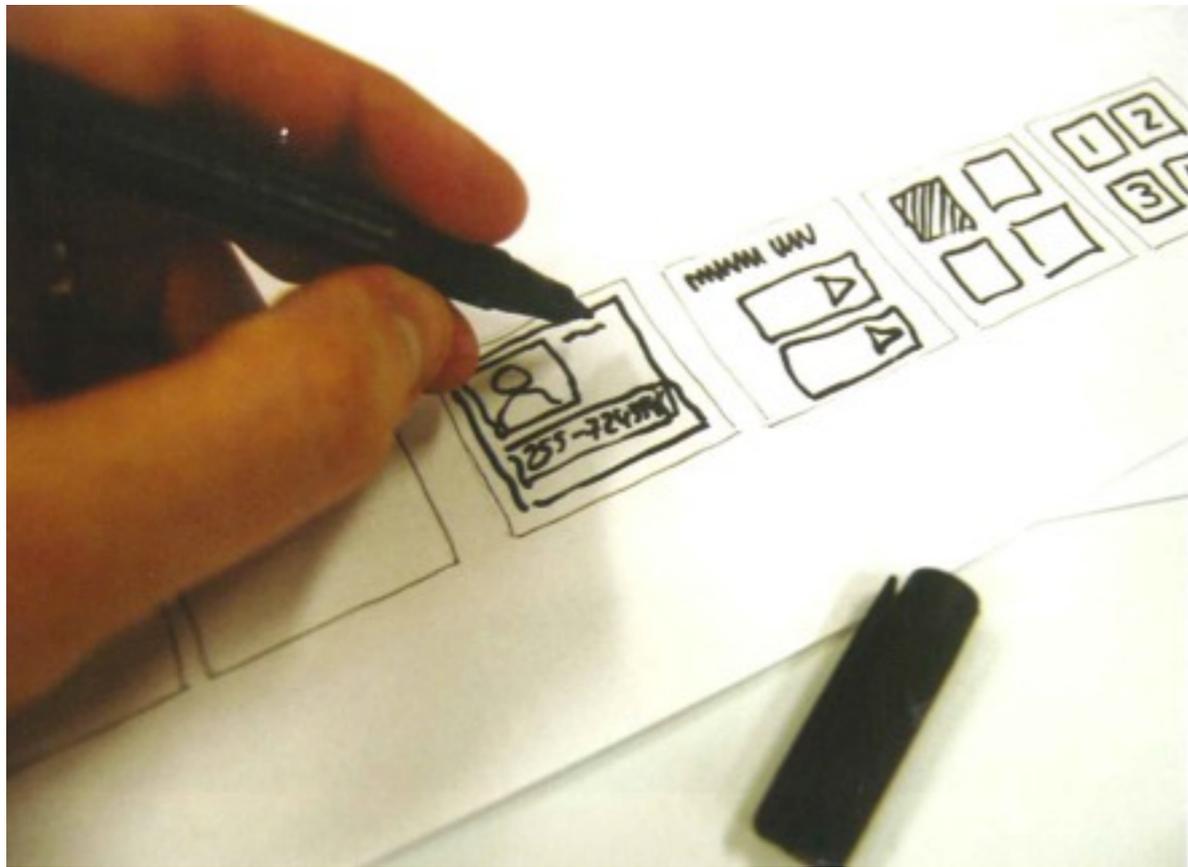
Add contacts

**>> Hands-on sketching:
“Storyboard sketching”**

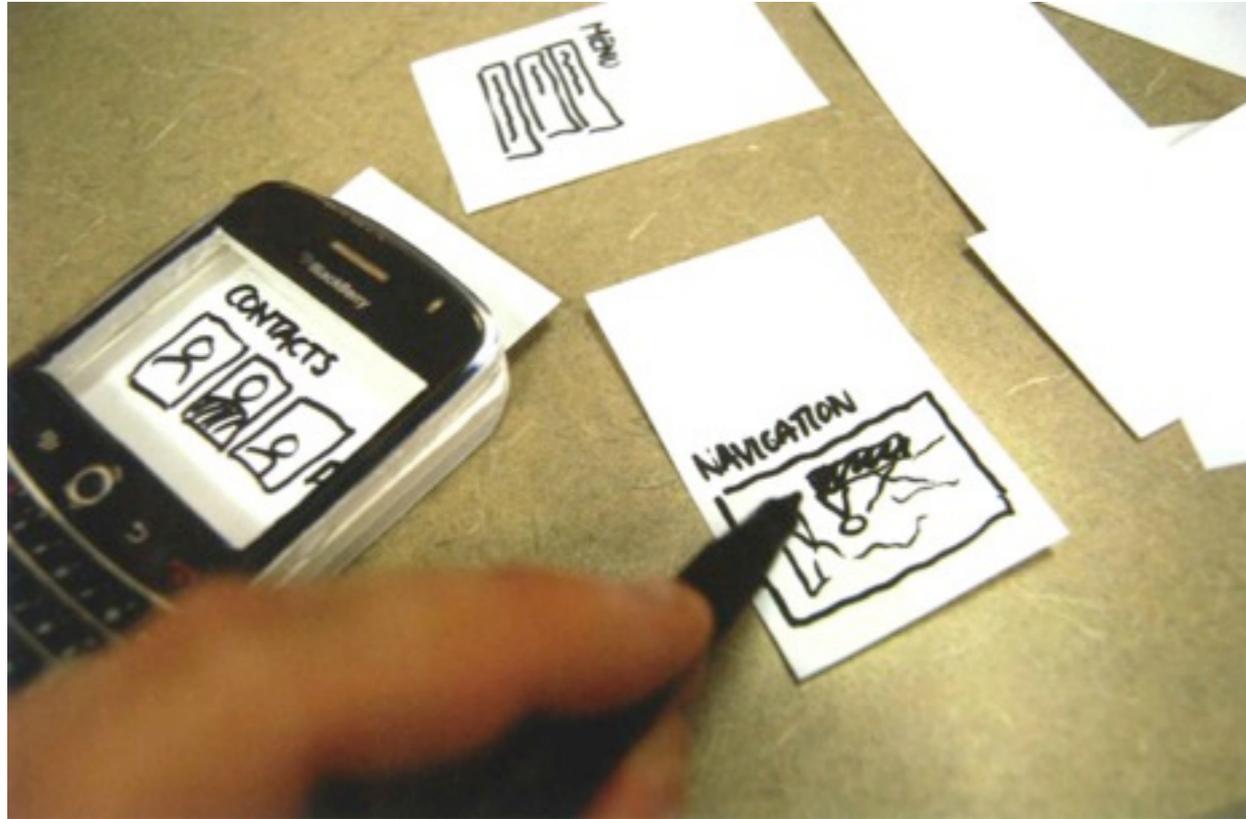
Technique: Make storyboards come alive

- **Spotlight:** an interactive foam core and paper sketch/storyboard





source: [2]



source: [2]

**>> Hands-on sketching:
“Sketching with physical
materials”**

References:

- [1] Buxton, W. Sketching User Experiences, *Morgan Kaufmann 2007.*
- [2] Greenberg, S. et al. Sketching User Experiences: The Workbook. *Morgan Kaufmann, 2012.*
- [3] Stevens, G. UX Lecture Series *University of Siegen 2010.*
- [4] Snyder, C. Paper Prototyping, *Morgan Kaufmann 2003.*