

The Diverse Tasks of Haptic Design and how to support them

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Design

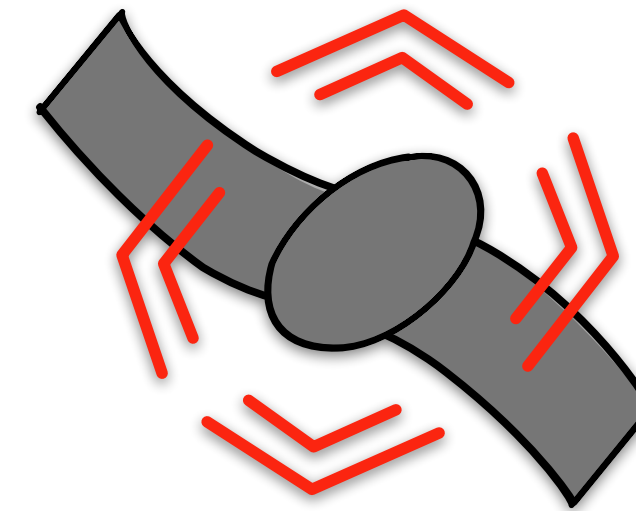
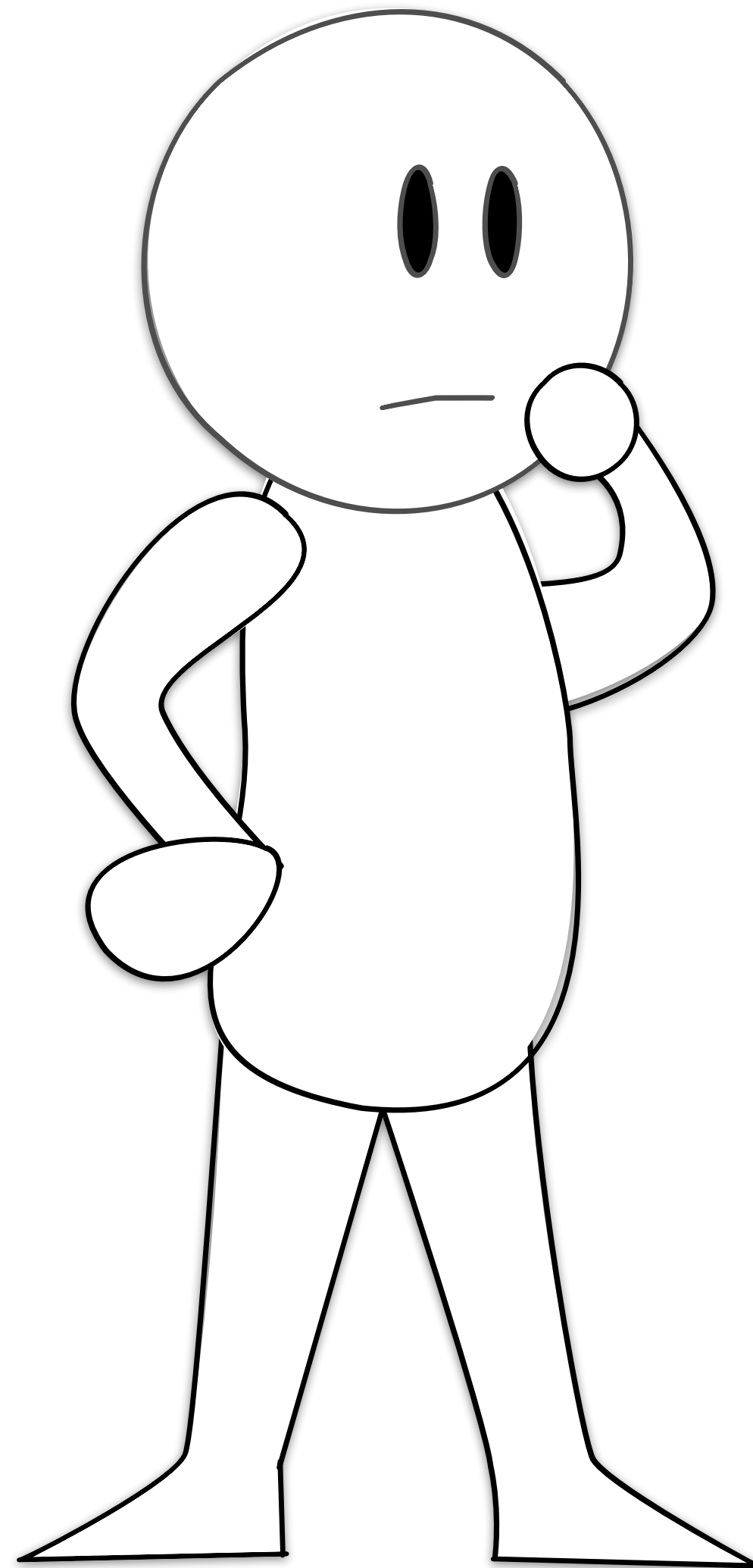
— the most over-appropriated word **ever**.

Each interpretation has its methods and values.

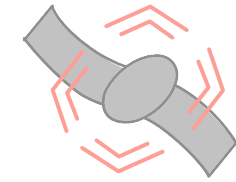
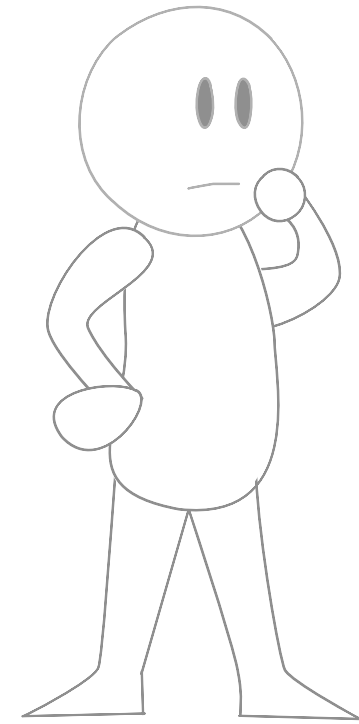
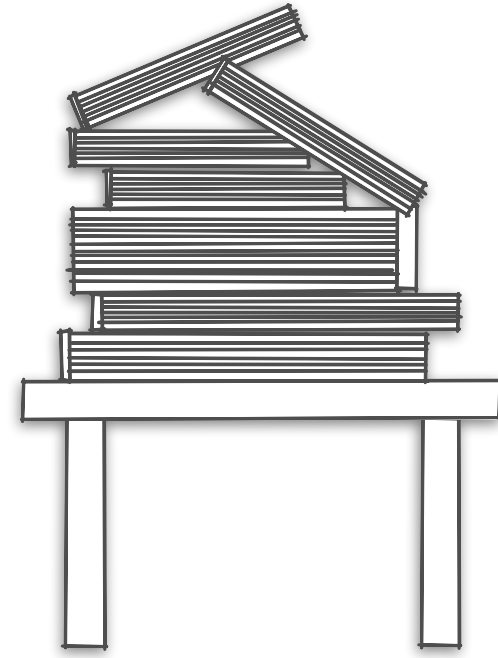
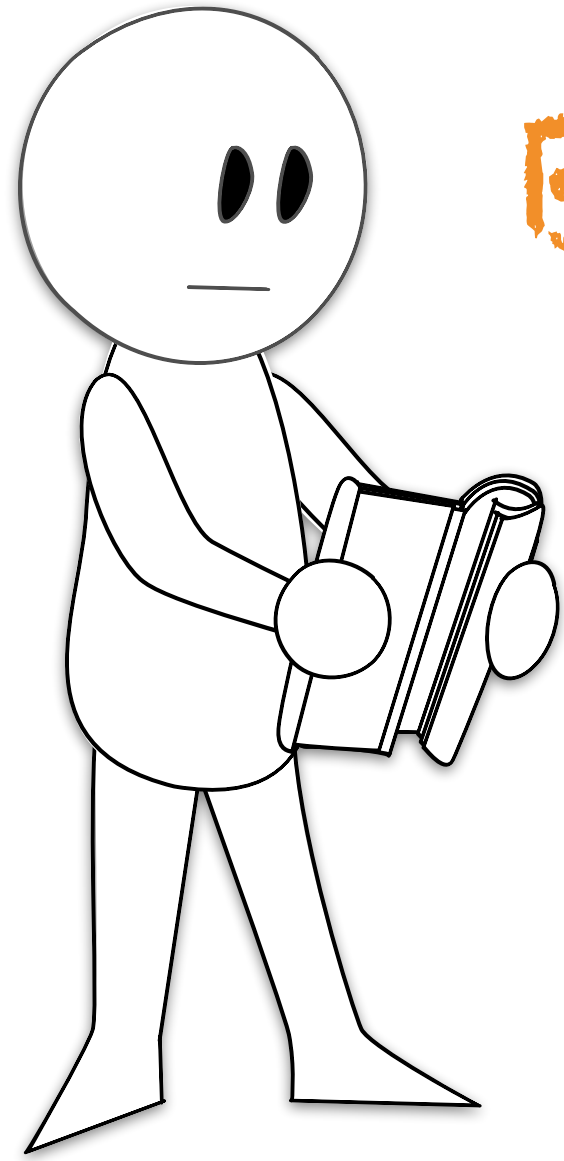
Here: the **process** of
connecting complex **technologies**
to **solve human problems**

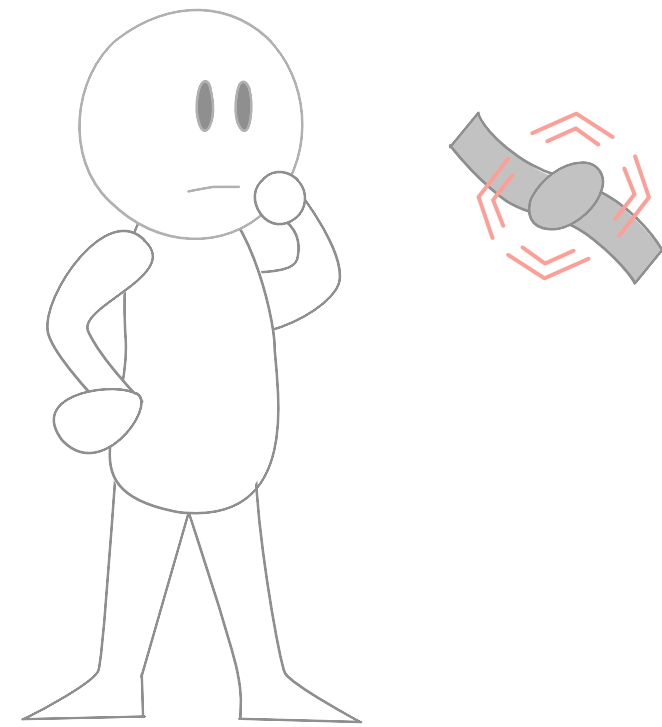
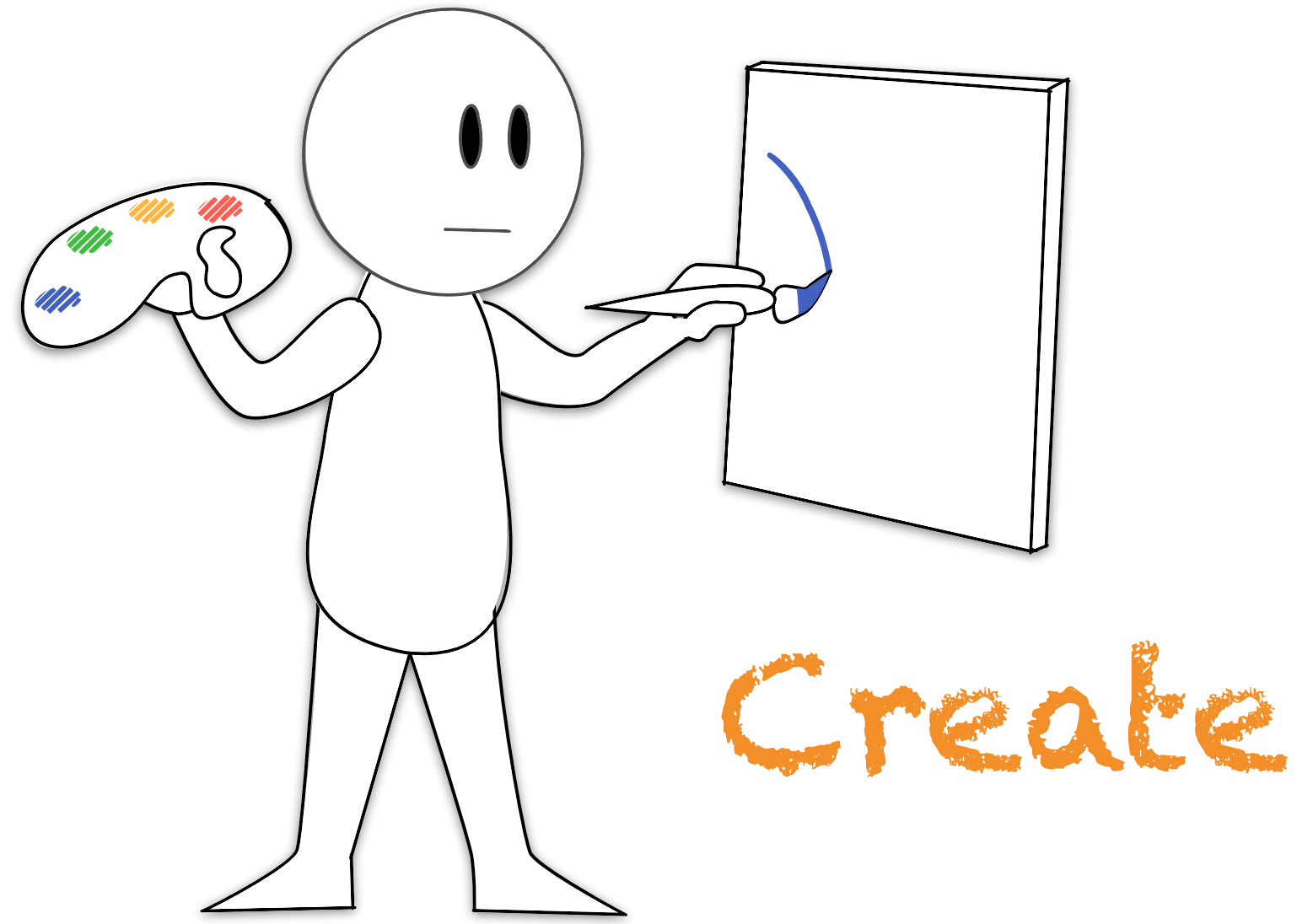
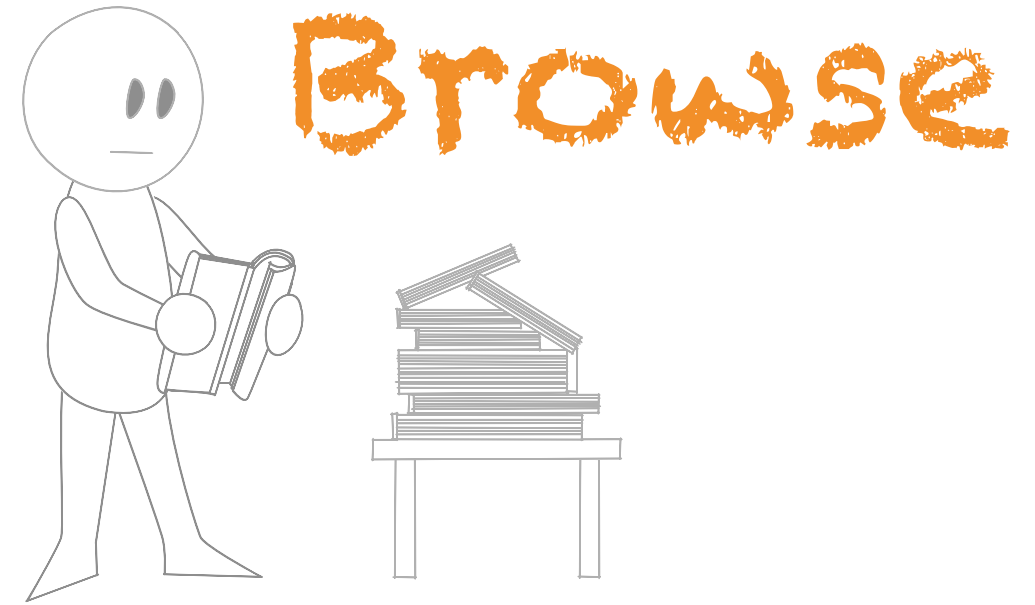
using **techniques** from
engineering and human-computer interaction.

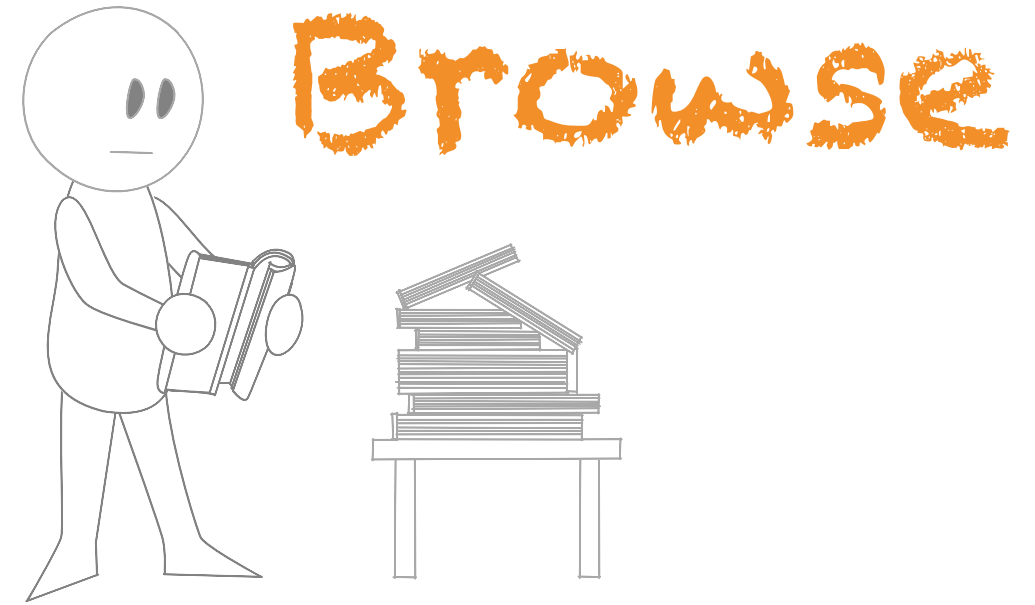
There are
types of things
we do at different
stages of
haptic design.



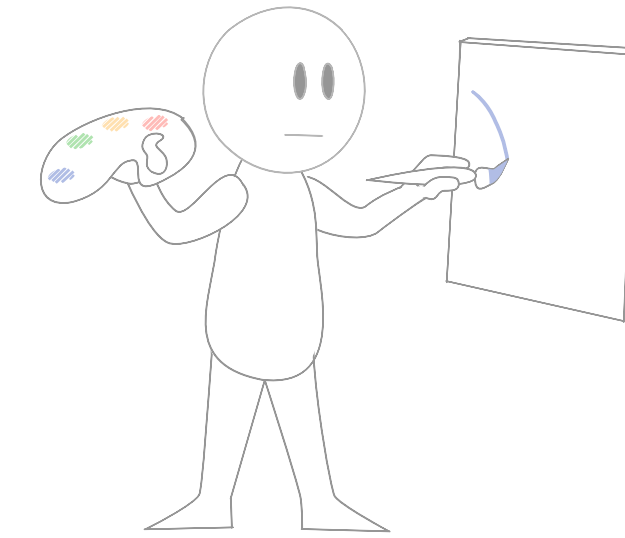
Browse



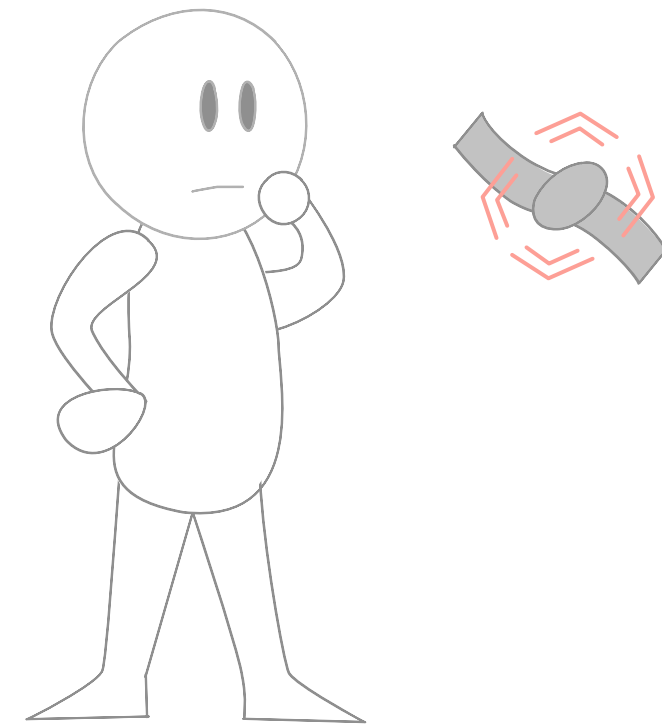




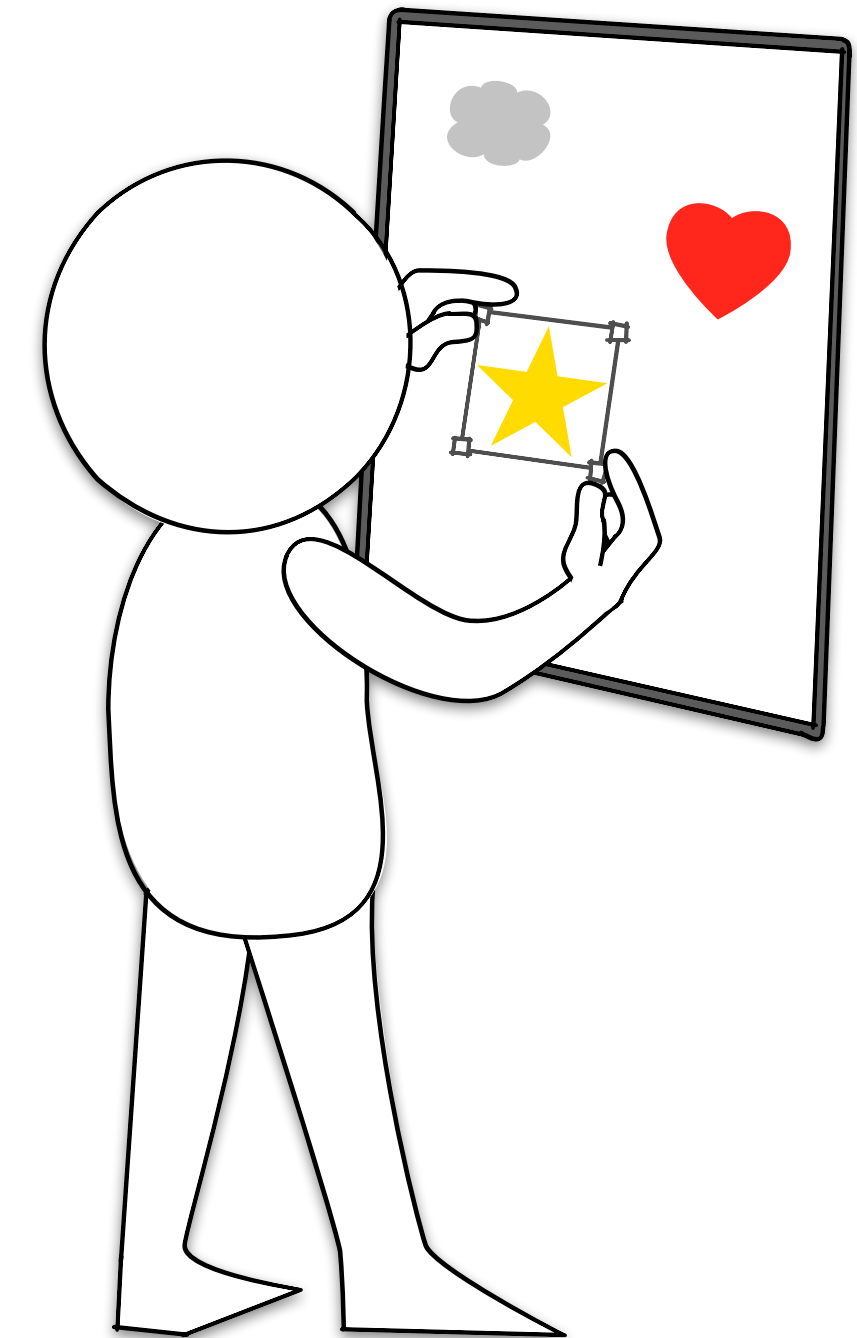
Browse

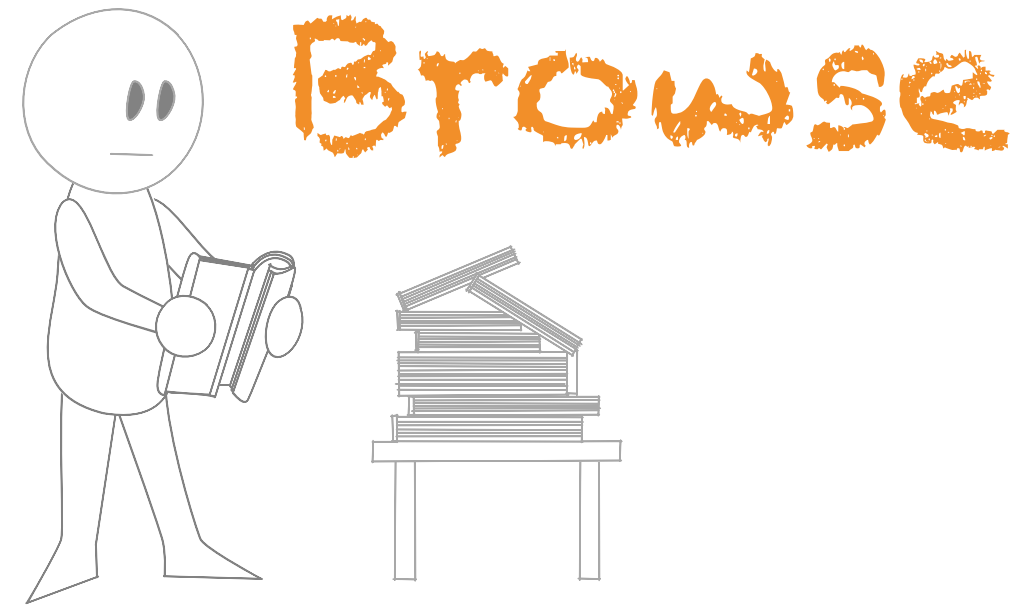


Create

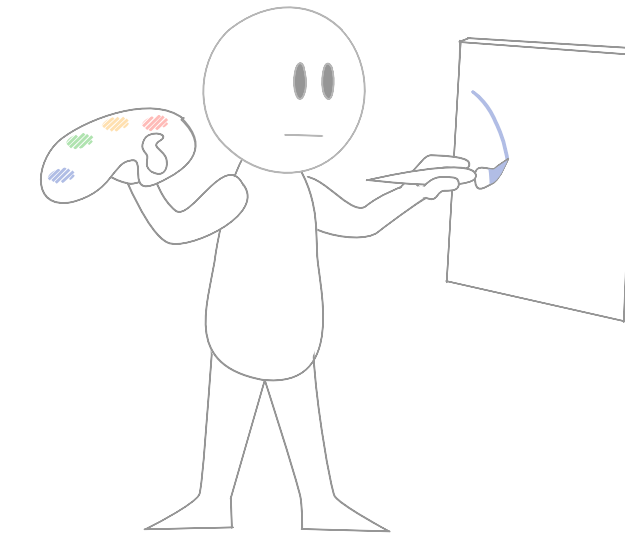


Edit

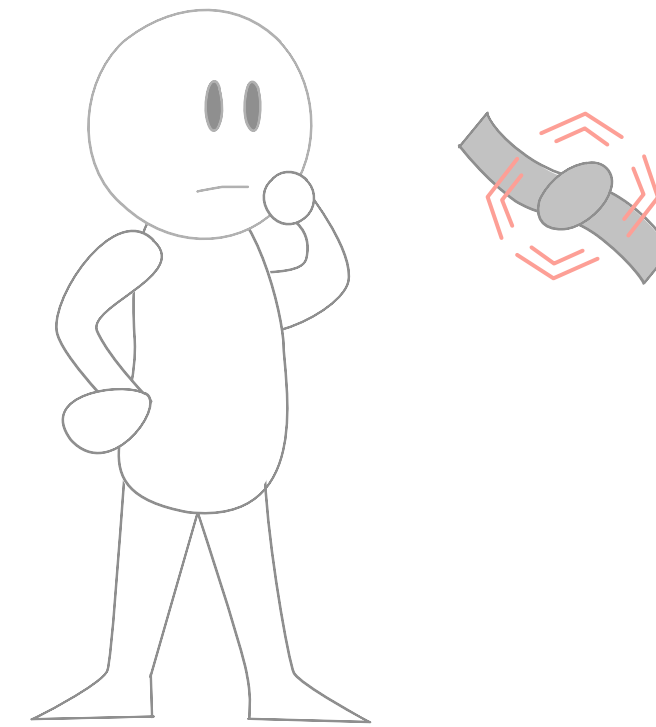




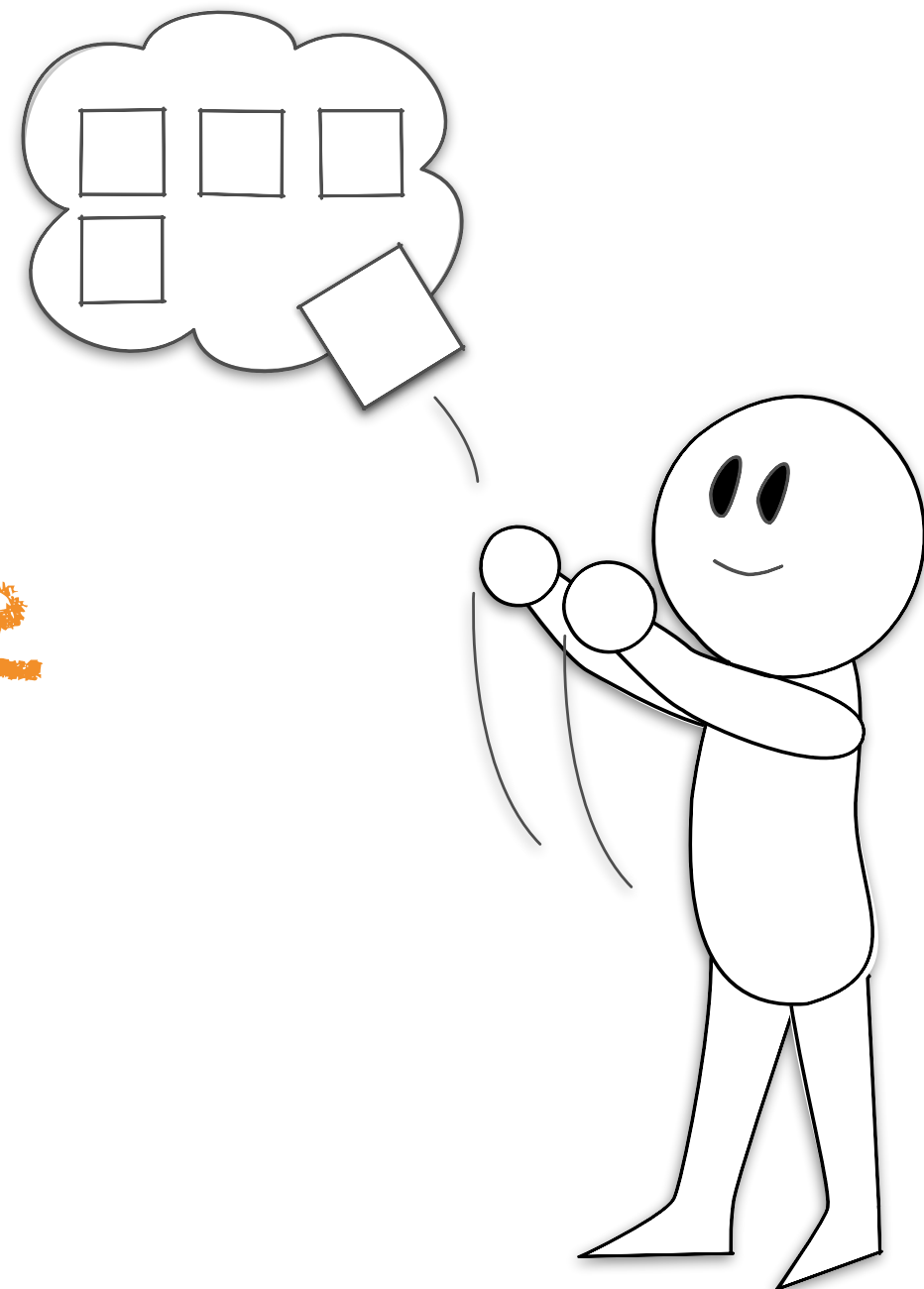
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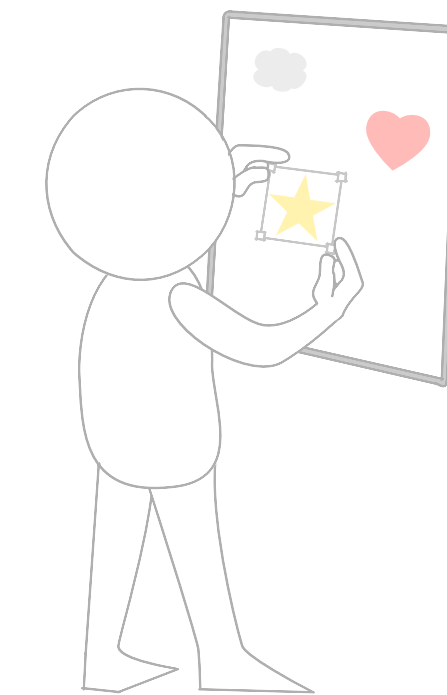
Create



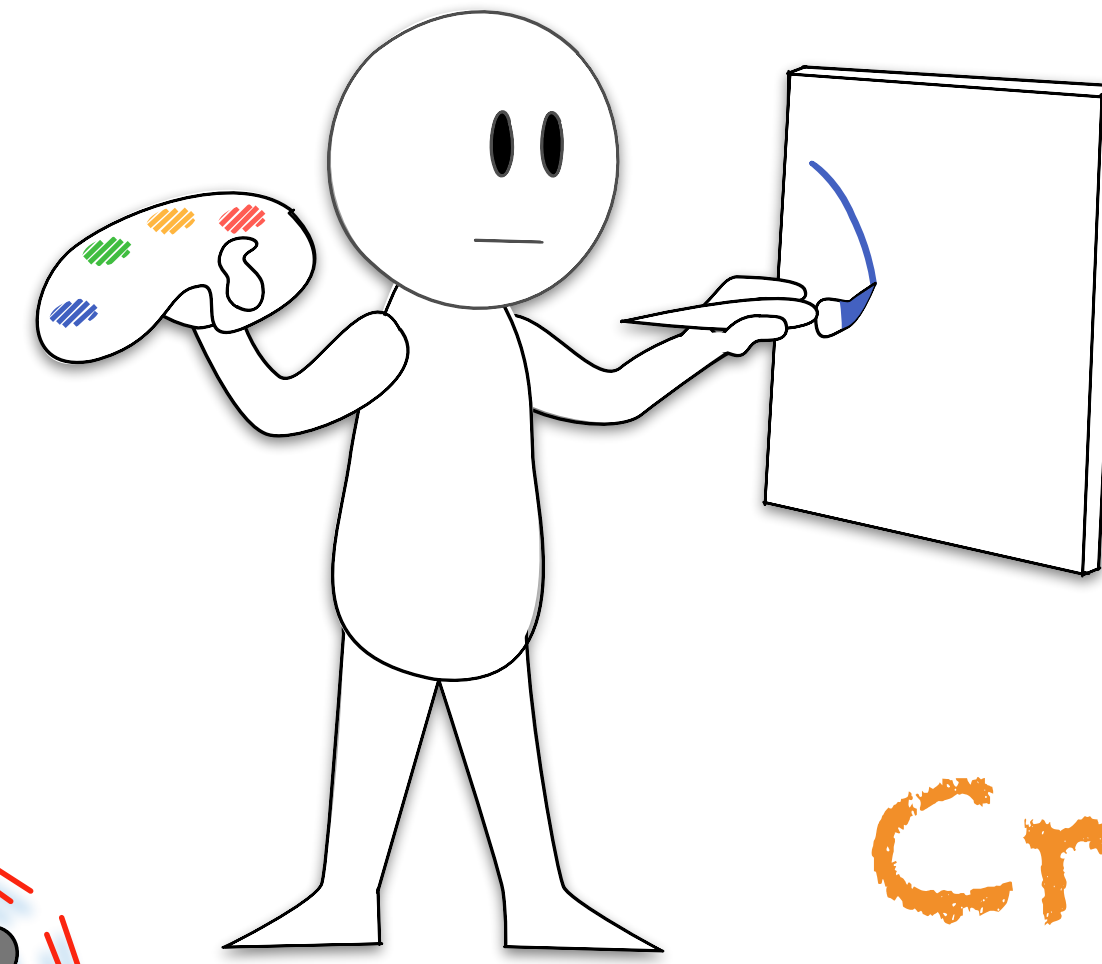
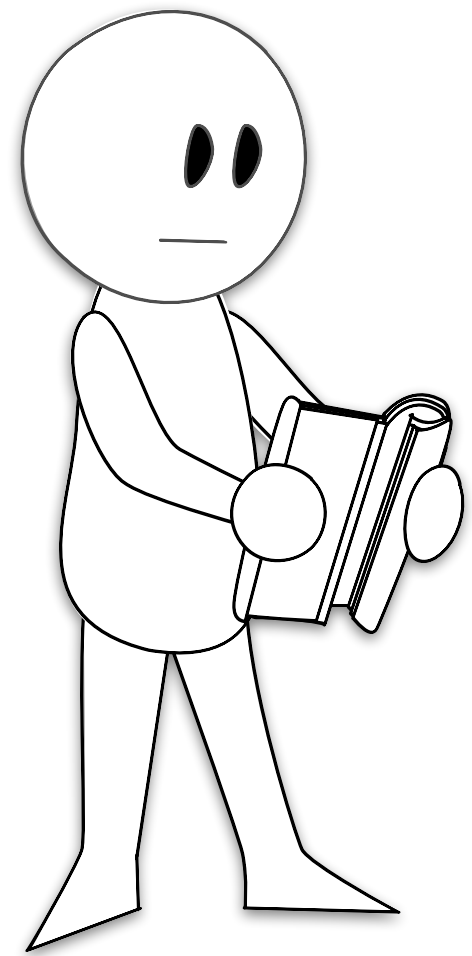
Share



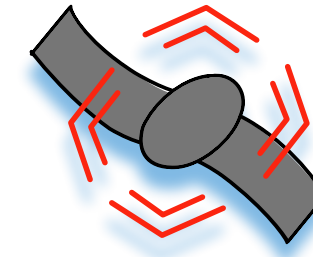
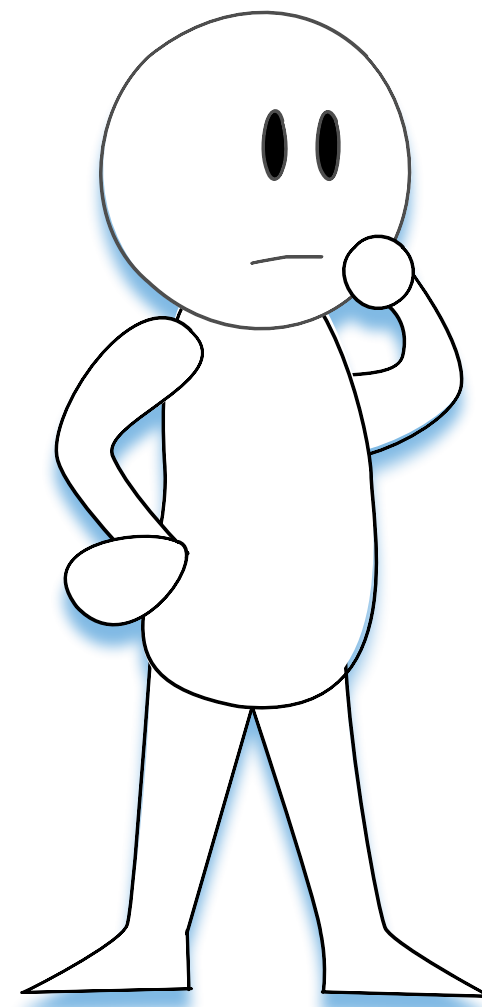
Edit



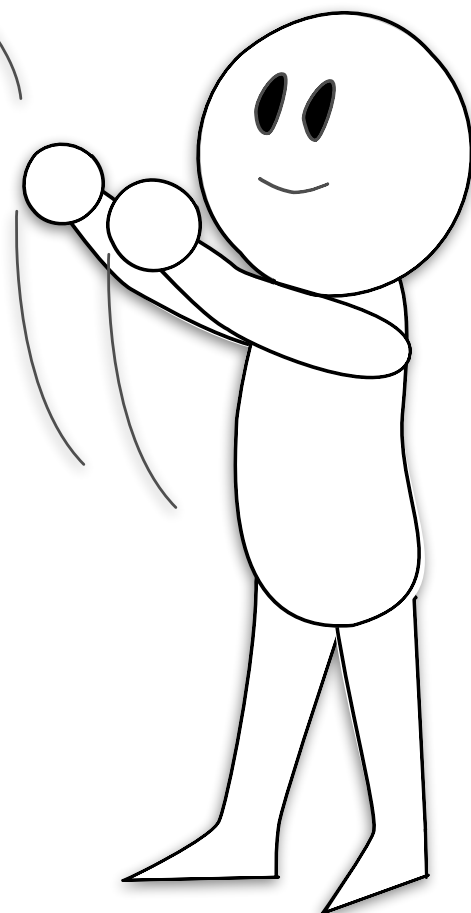
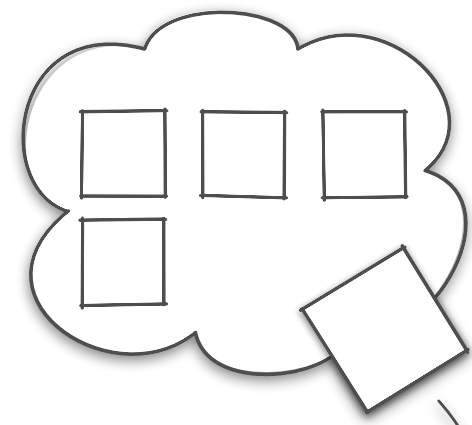
Browse



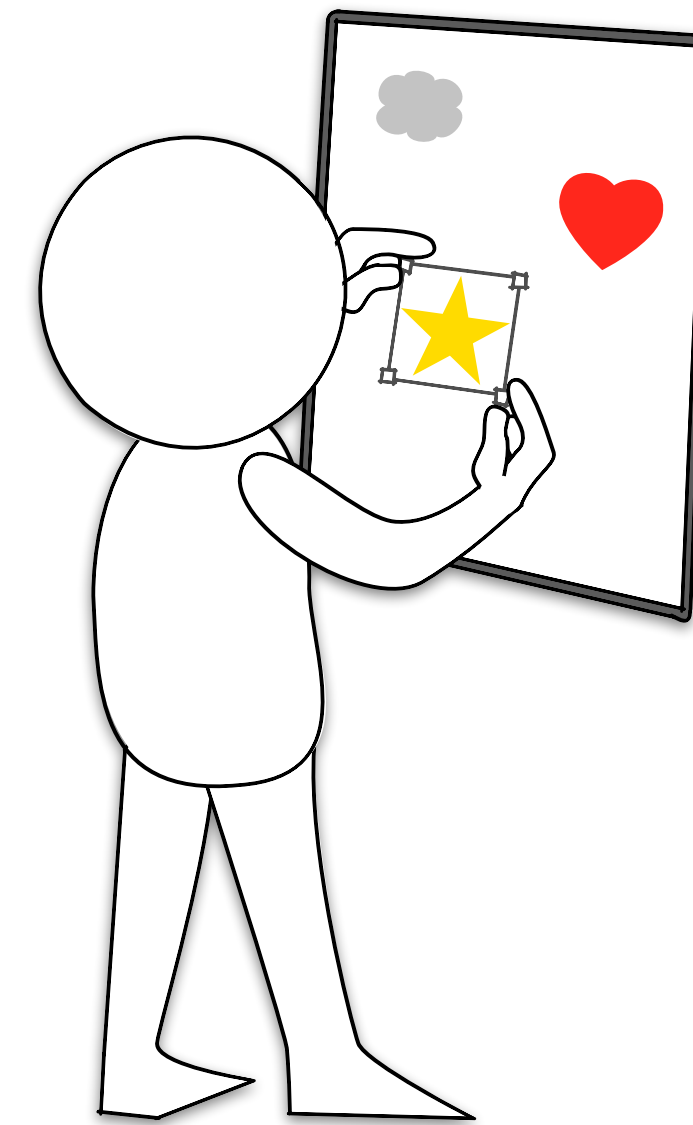
Create



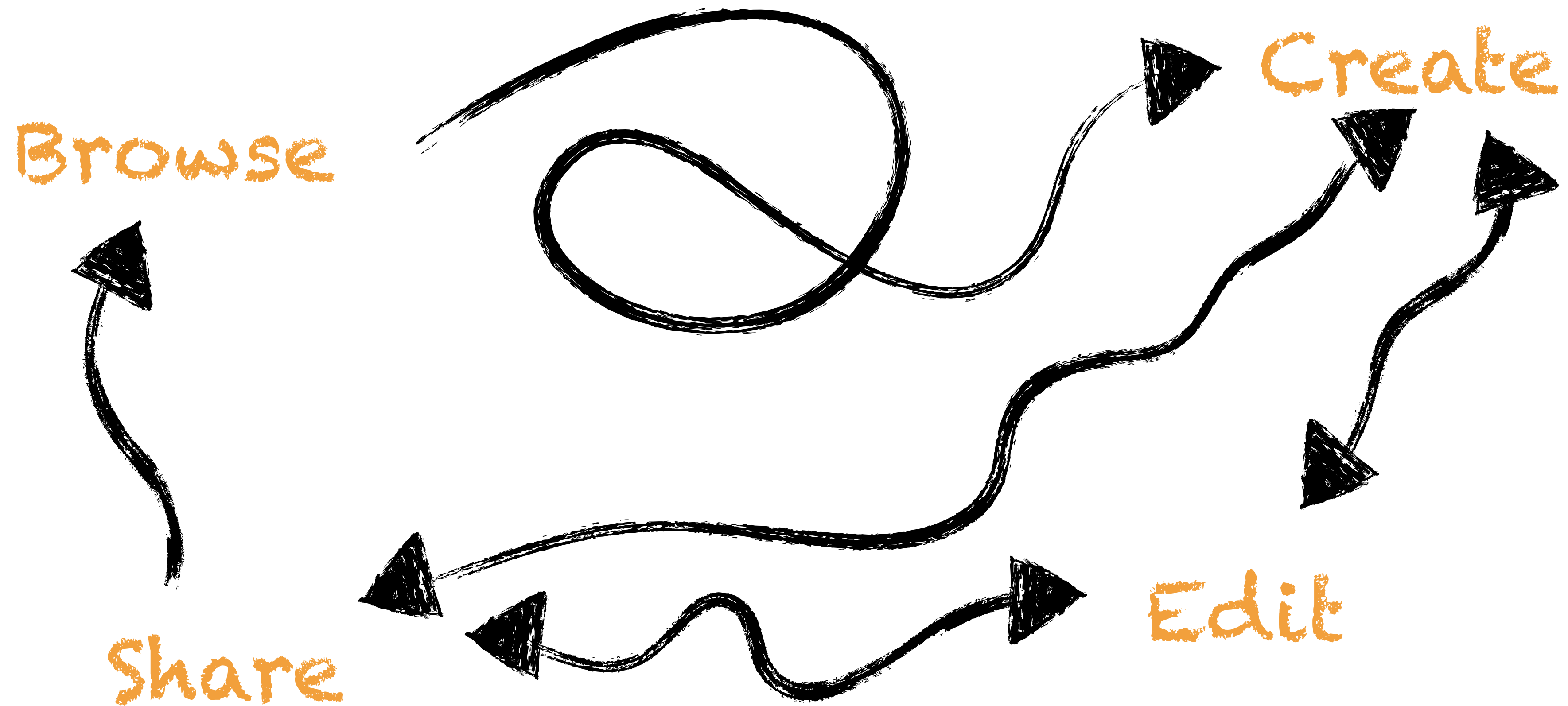
Share



Edit



These “tasks” blend, loop
and feed material and ideas to one another



prototyping looks different for each of these tasks

Browse

peruse examples -
materials and
other prototypes

depends: on who needs to
experience it

Share

Create

lots of throw-away
sketches

Edit

increasingly polished,
functional and committing

tools to support that prototyping and ideation need to be different too.

Browse

access,
organization, diversity,
openness

platform commonality,
representations, networks

Share

Create

fluency,
immediacy

Edit

precision, iteration support

of course,
there's a lot more to design than this

like,

- **Goal** of design (notify, inform, evoke, ...)
- **Mechanism** of design (technical innovation to meet requirements)
- The many ways we can **prototype** and get **feedback** on our design
- ...

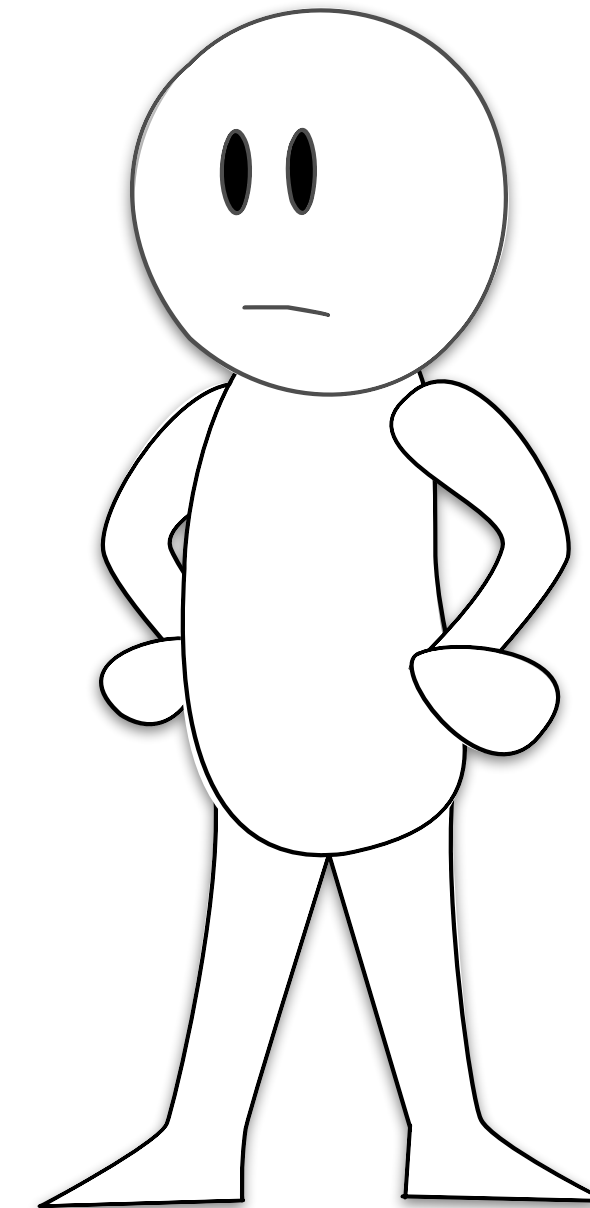
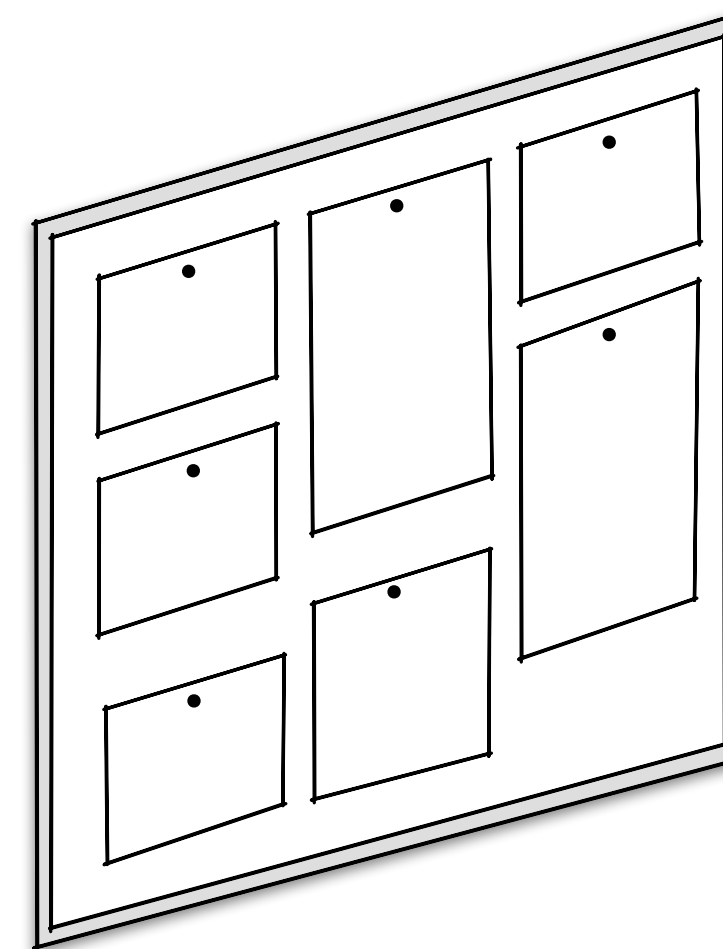
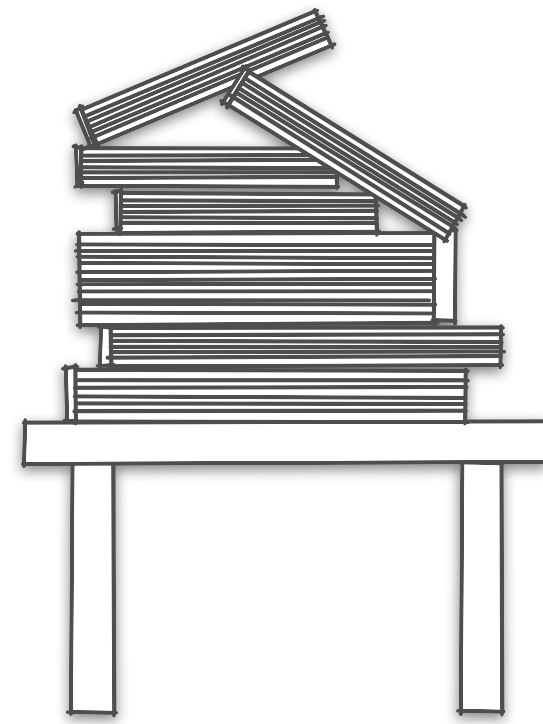
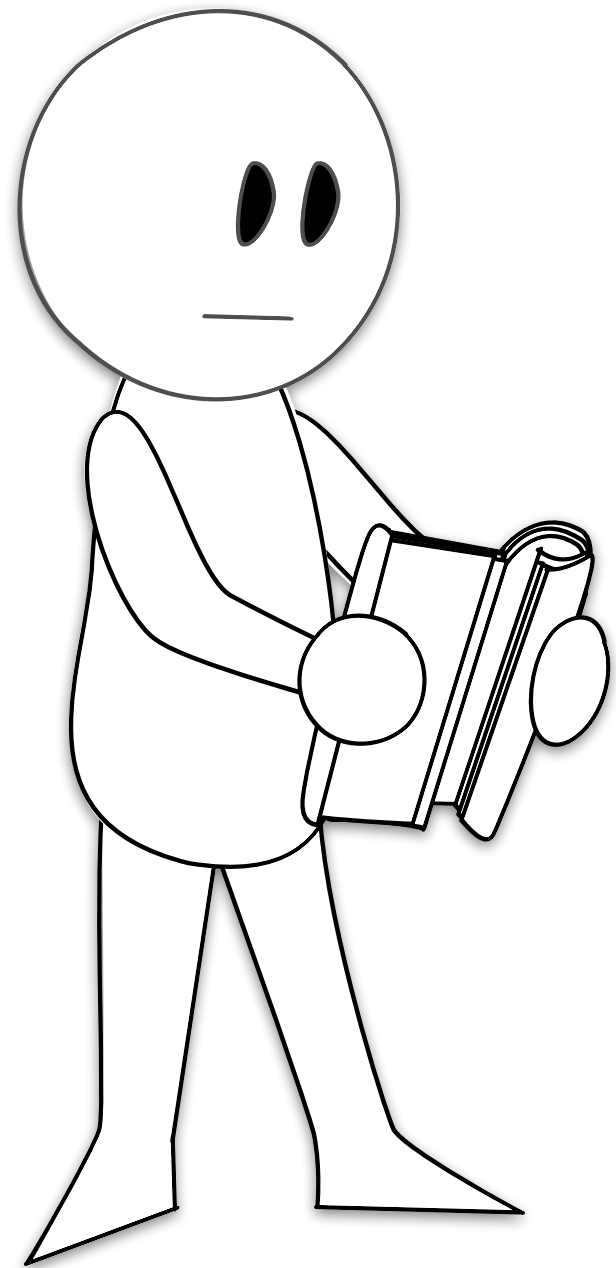
These are topics for another day.

for each task, we'll offer

1. some elaboration on what we might want of that task for ***haptic*** design
 2. examples of support tools in **other media**
 3. example of a **haptic tool** for this kind of task
- where we need **better tools**

Browsing

is all about getting ideas



— discover, and be inspired

Browsing in other media:

a music-
browsing
system

The screenshot shows the Musiccovery website interface. At the top, there is a navigation bar with links for RADIOS, MY MUSIC, LAB, MOBILE APP, MUSICOVERY B2B, and API. Below this is a search bar with the placeholder text "Search an artist, genre, tag...".

The main content area is divided into two sections:

- Artists, Tags:** This section features a "Popular" category with several tags: dubstep, instrumental, Lou Reed (highlighted in blue), and Autumn. Below these are other tags: party dance, party chillout, party chillout, classical ballet, classical, salsa, cinema, classical concertos, electro ambient, and dance euphorical.
- New:** This section displays a grid of new music releases, including "The Neighbourhood", "Frozen", and "Avicii".

On the right side of the interface, there is a "Play your mood" section. It features a large scatter plot of colored dots representing different moods: Energetic (top), Dark (left), Positive (right), and Calm (bottom). Below the scatter plot is a grid of genre buttons: Rock, Electro, Pop, R & B, Rap, Metal, Classical, Jazz, Soundtrack, World, Latino, Reggae, Folk, Blues, Country, Vocal Pop, All Genres, and Clear genres.

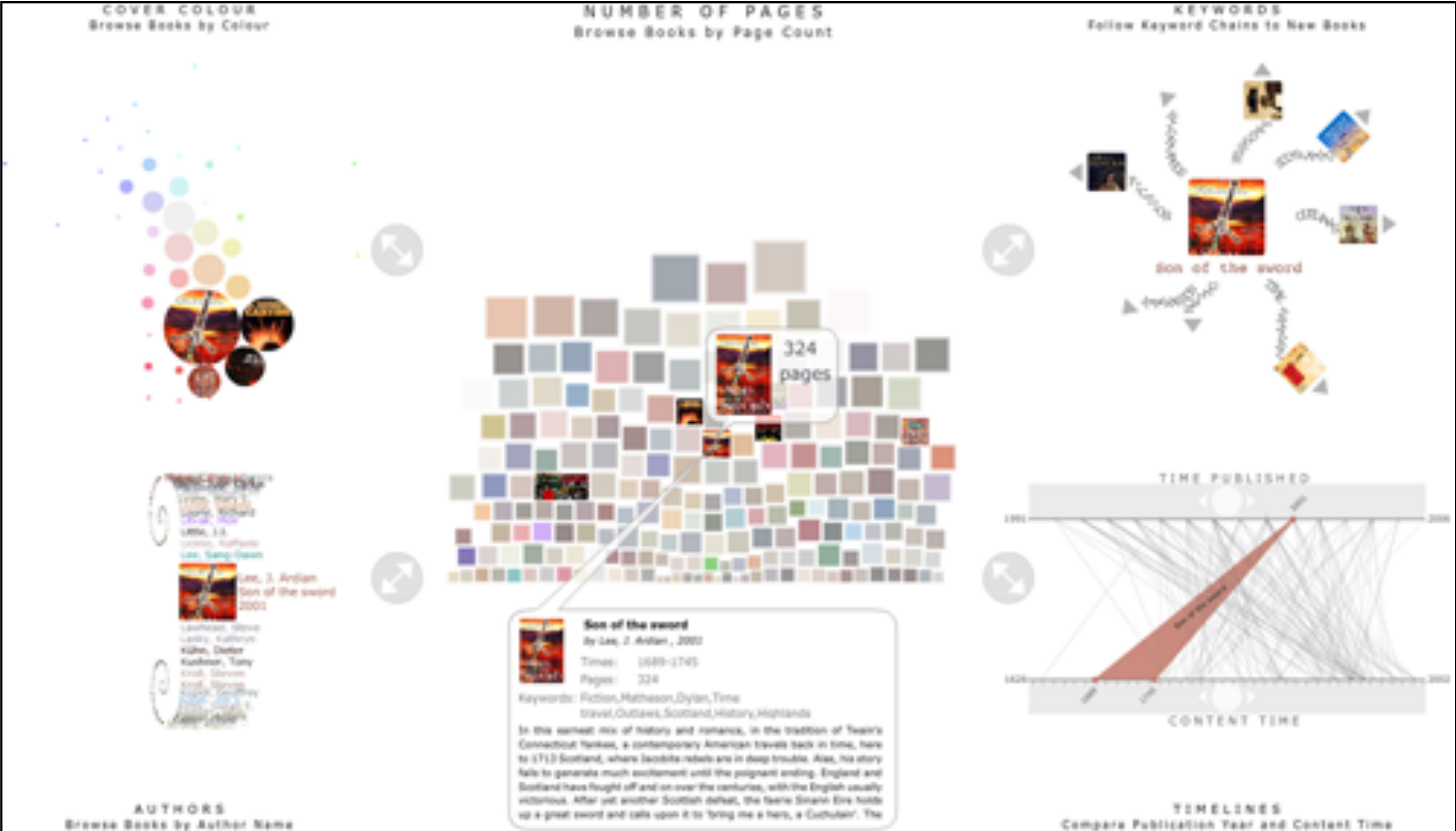
A handwritten note in blue ink says "Roll over the mood pad the mood of the radio". A green line connects this note to a specific mood pad (Positive) which is highlighted. Below this mood pad, a music album cover for "Deja La Vida Volar" by Victor Jara is shown, with a green bar at the bottom containing the text "Victor Jara".

www.thingiverse.com/glitchpudding/collections/bunnies/page:1

- Chocolate Easter Bunnies** by hindessm, Mar 13, 2016. 5 likes, 5 downloads, 0 comments.
- Bunnified Expobar / Brewste...** by RodLaird, Feb 23, 2015. 3 likes, 5 downloads, 0 comments.
- Windup Bunny** by gzumwalt, Mar 5, 2016. 83 likes, 76 downloads, 9 comments.
- Bunny Cable Holder / Bookm...** by shiuan, 2 days ago. 10 likes, 2 downloads, 0 comments.
- Bunny Napkin Ring** by faberdasher, 16 hrs ago. 30 likes, 10 downloads, 0 comments.
- Easter Egg Holder Bunnies** by muzz64, Mar 13, 2016. 134 likes, 156 downloads, 0 comments.
- Bunny Ears Headband** by faberdasher, Mar 15, 2016.
- Animal Keychains** by MakerBot, Feb 12, 2013.
- VW Rabbit Logo (Hollow)** by jasonatepaint, Sep 11, 2011.

www.thingiverse.com

Non-visual media must be represented **(prepared)** — for browsing.



The Bohemian Bookshelf:
Supporting Serendipitous Book Discoveries through Information Visualization.
Thudt, Hinrichs and Carpendale, CHI 2012.

a set of vibrations could be **browsed** in different ways

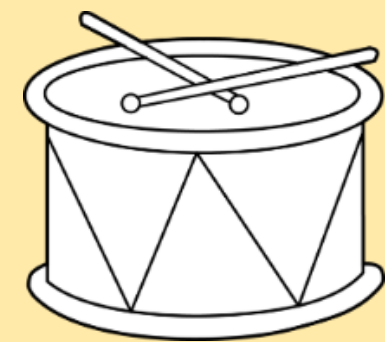
1- Physical Structure

- duration
- energy
- tempo/speed
- rhythm
- ...

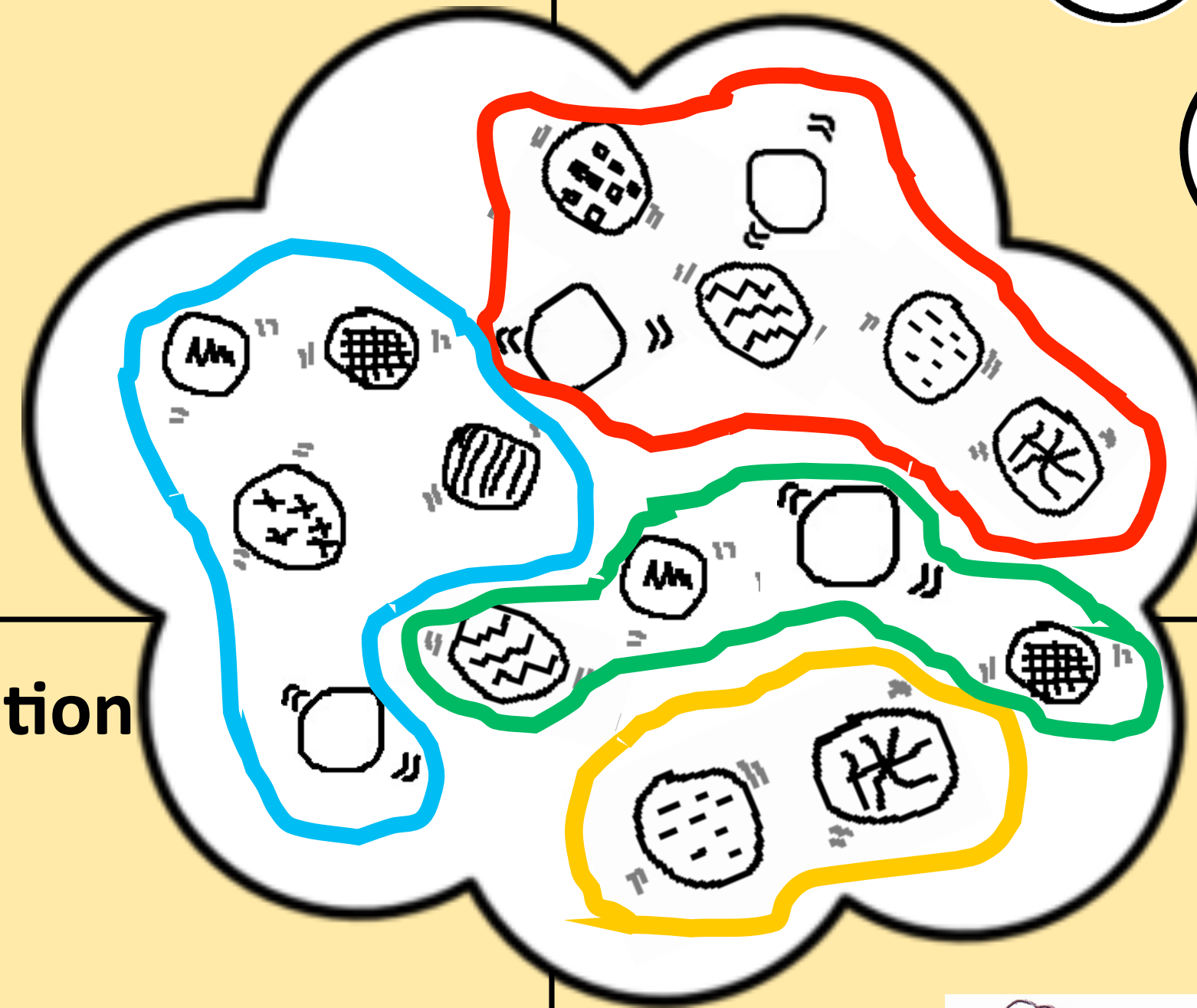
2- Sensory & Emotional Connotations



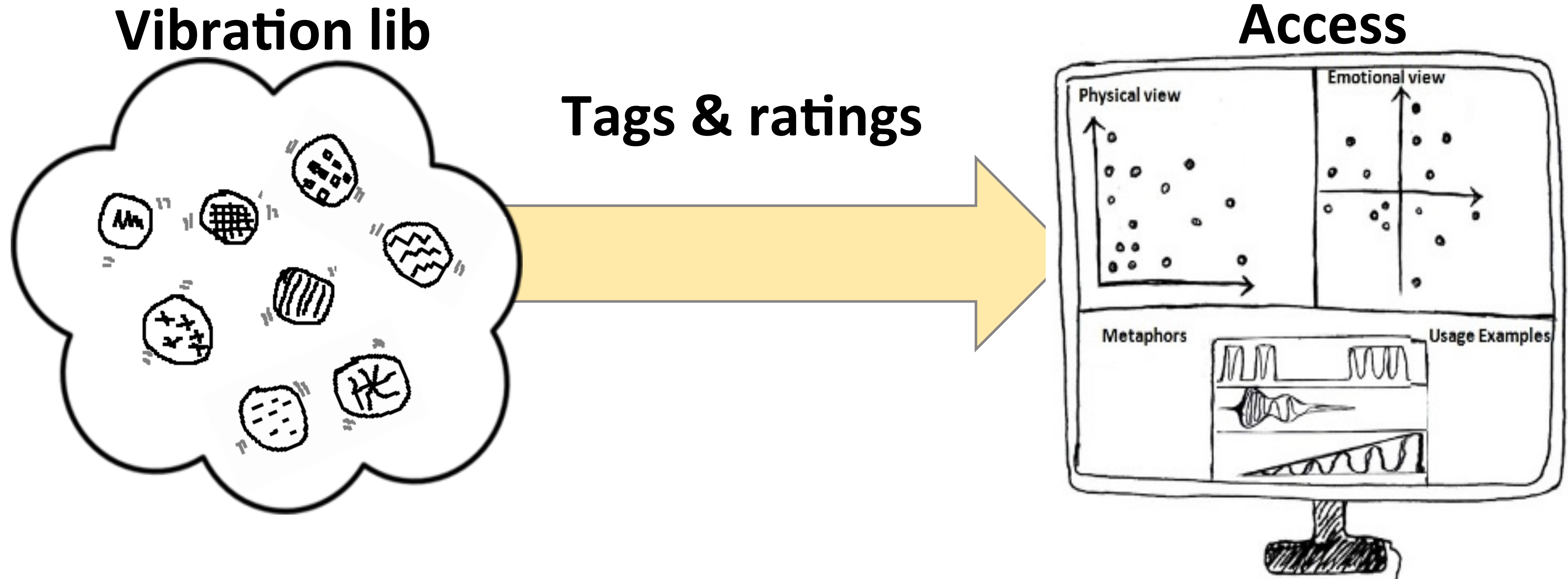
3- Metaphoric Association



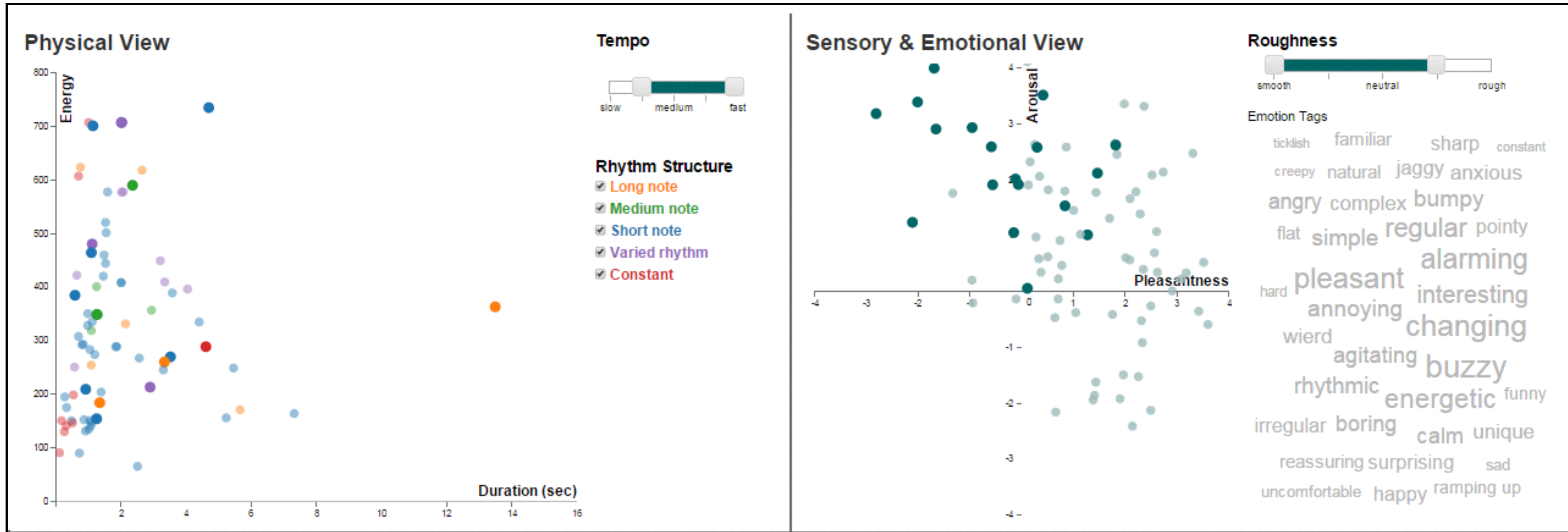
4- Usage Example



—> a haptic browser can use facets too



VibViz: Organizing, visualizing and navigating vibration libraries.
Seifi and MacLean, WorldHaptics 2015.



Metaphor & Usage Example View

Metaphor Filters	Metaphor Tags	Vibration Pattern	Usage Example
<p>Metaphor Filters</p> <p>pawing, clock ticking, bumpy road, hearbeat, fly/bee, morse code, nature, drums, walking, pulsing, jumping, engine, snoring, cheers, knocking, blip, animal, poking, horn, knocking, game, gun, bell, SOS, phone, sliding, explosion, tapping, phone, explosion, take off, alarm, coming & going, electric shock, whistle, breathing, insects</p>	alarm, take off, bell, horn, jumping, game		encouragement, warning, alarm, resume, overtime, running out of time, speed up, start, above threshold, below threshold
	alarm, gun, tapping, knocking		alarm, overtime, get ready, resume, one minute left, warning, stop, running out of time, below threshold, above threshold
	bumpy road, tapping, knocking, animal, gun, pulsing		warning, stop, reach milestone, incoming msg, overtime, get ready, running out of time, speed up, one minute left, pause, encouragement

Usage Example Filters

battery low, speed up, start, running out of time, stop, overtime, one minute left, pause, warning, encouragement, reminder, reach milestone, alarm, get ready, resume, confirmation, below threshold, incoming msg, above threshold

but...

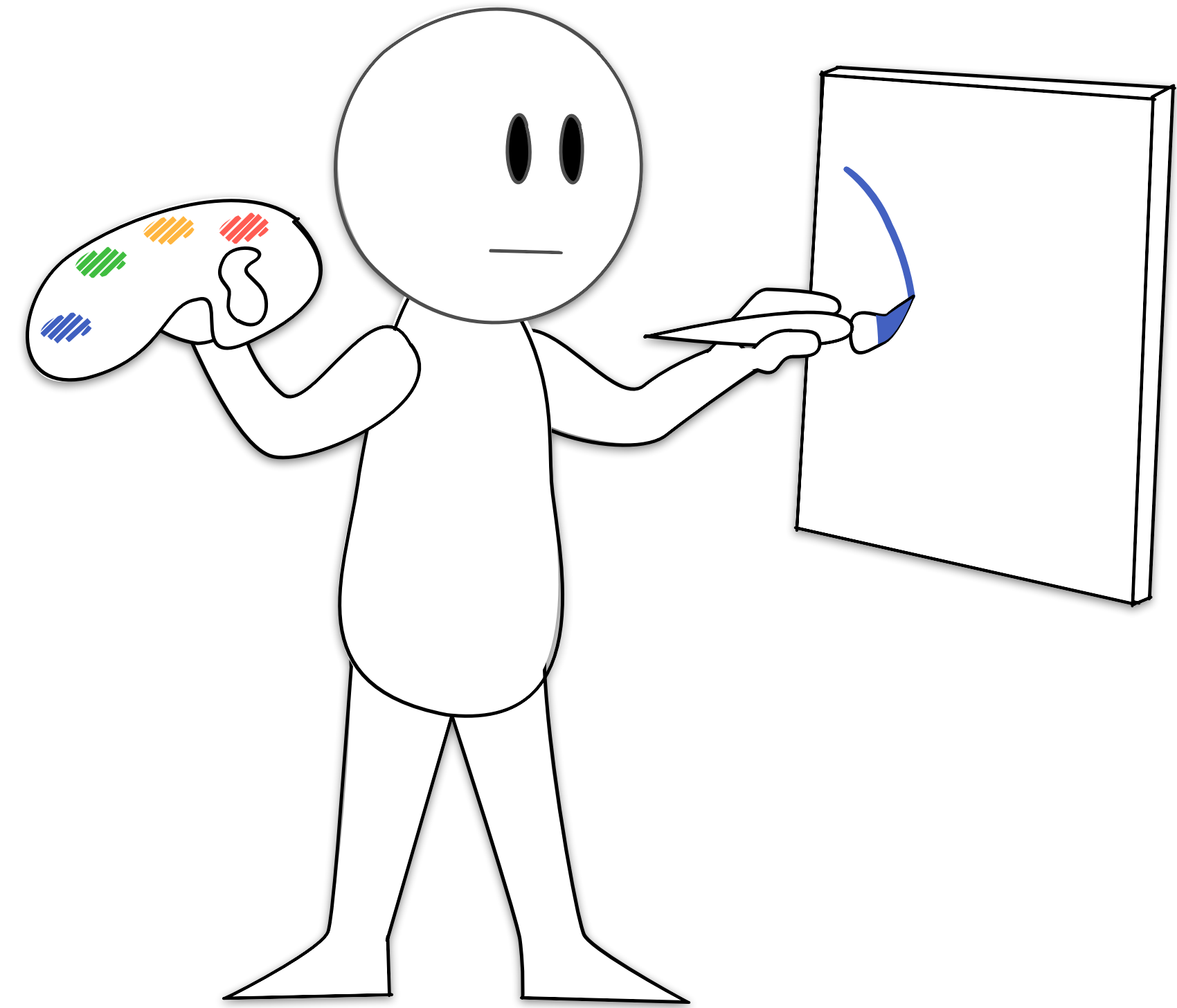
browsers often aren't very good for creating and editing.

even for sharing, they need some special capabilities.

for haptics, representations can be a real problem -
more on that in a moment.

facets are good; what are the right ones for a given job?

Creating
is about starting.



explore many ideas as we make something new

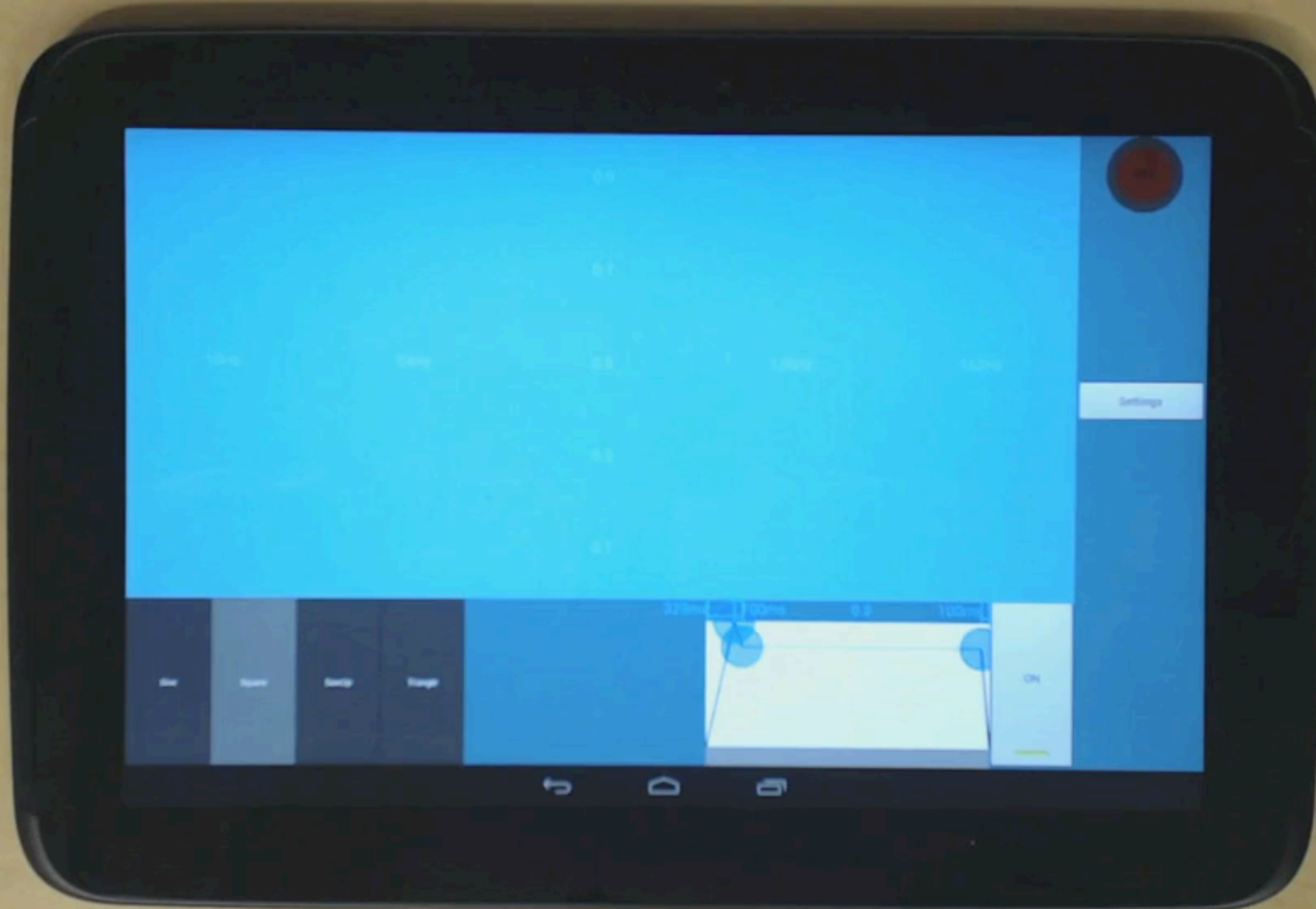




“Step into the Page”
Glen Keane



“Haptic Instrument”
Schneider & MacLean



“Tactile Animation”
Schneider, Israr, MacLean



"Tactile Animation" Schneider, Israr, MacLean

Mango

Move in Space Move on Path New Object Add Path Remove Path New Vector Save Load Load Audio

VC2: 0 VC1: 0 VC0: 0

VC6: 0 VC5: 0.63 VC4: 0.65 VC3: 0

VC9: 0 VC8: 0.89 VC7: 0

1.0

0ms 700ms 1400ms 2100ms 2800ms

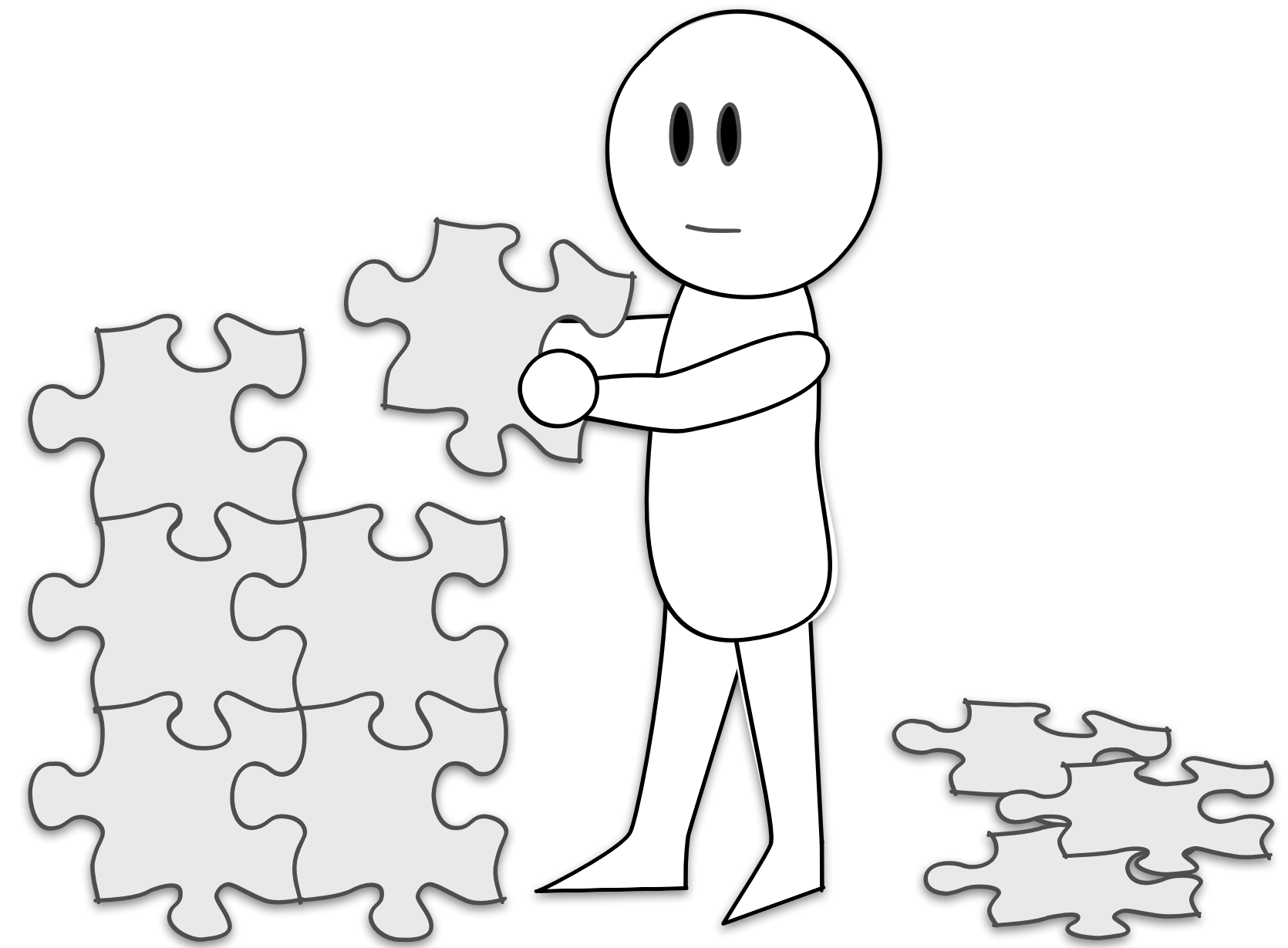
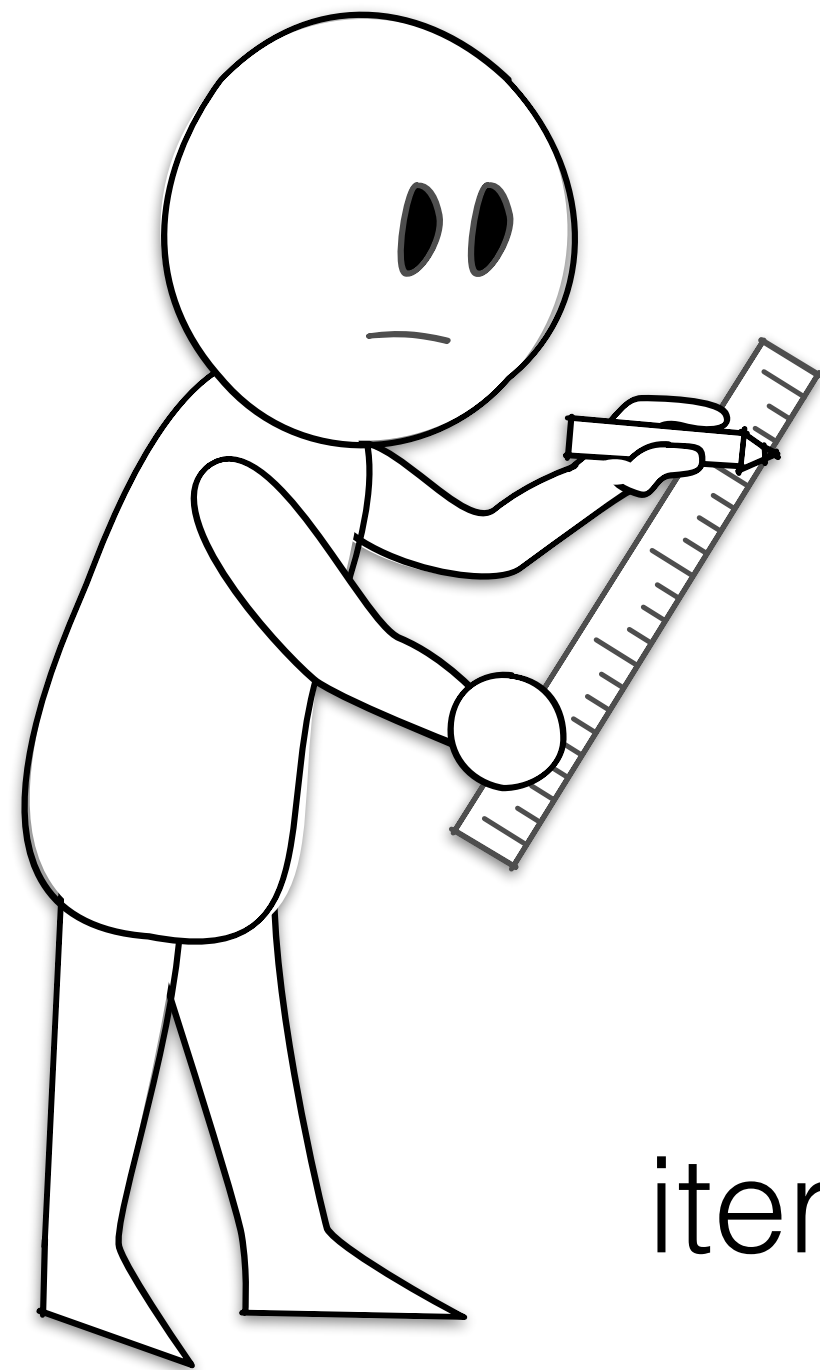
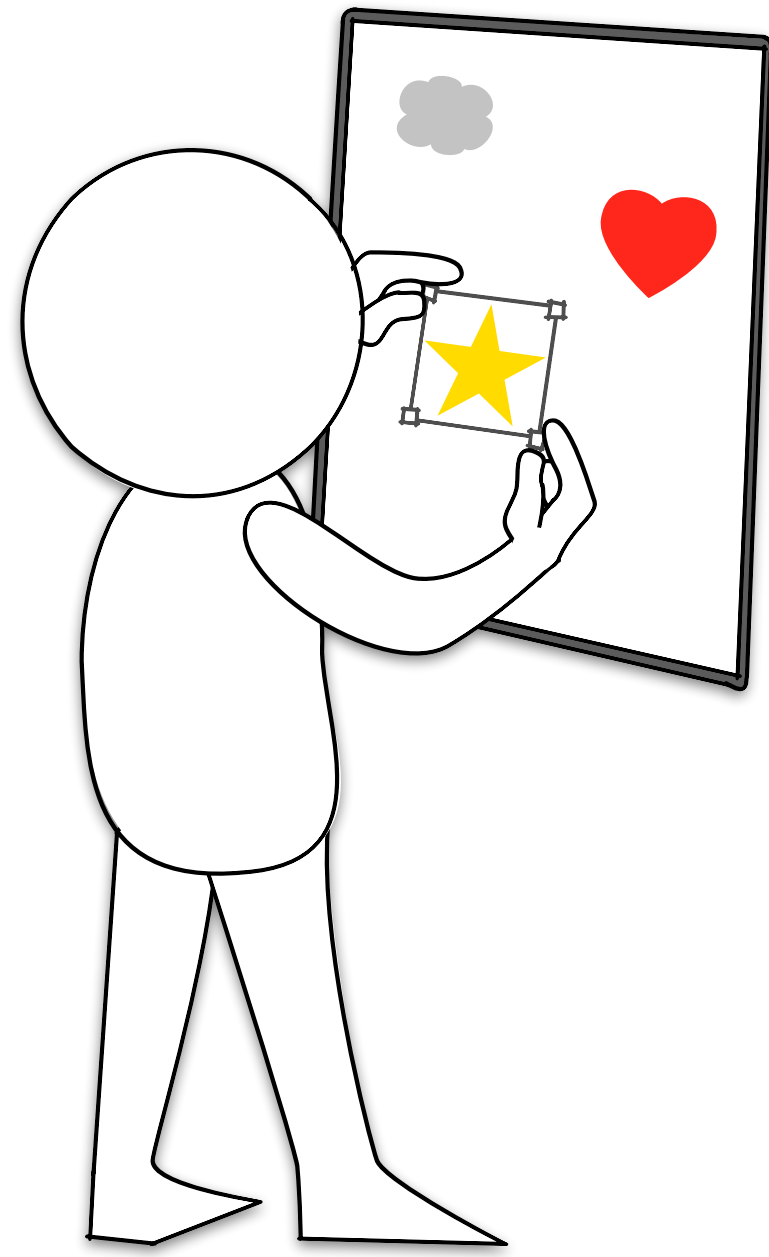
No Audio Loaded

Feel 4

- y 14.0
- x 14.0
- r 1.0

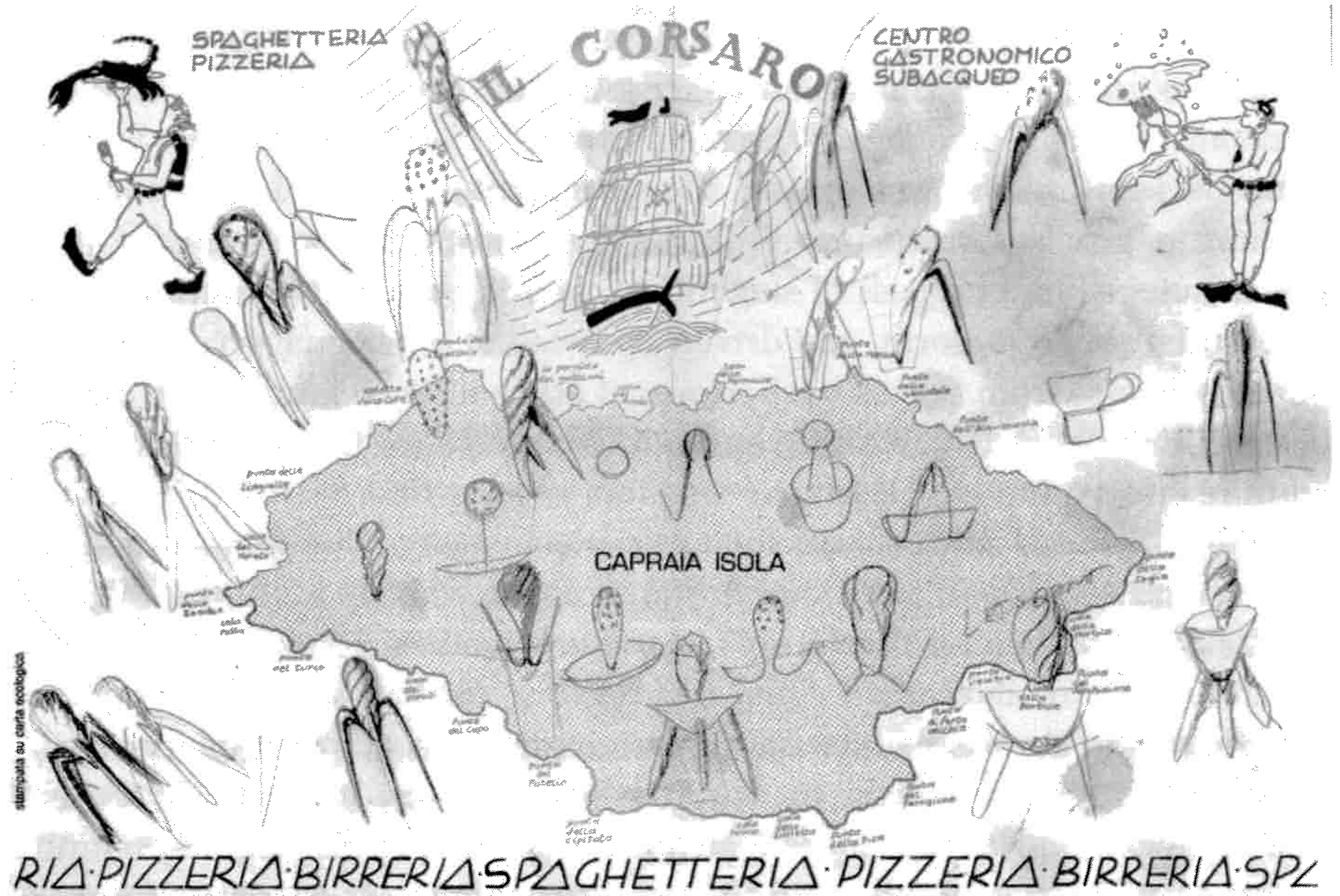
Editing

build upon, assemble, refine

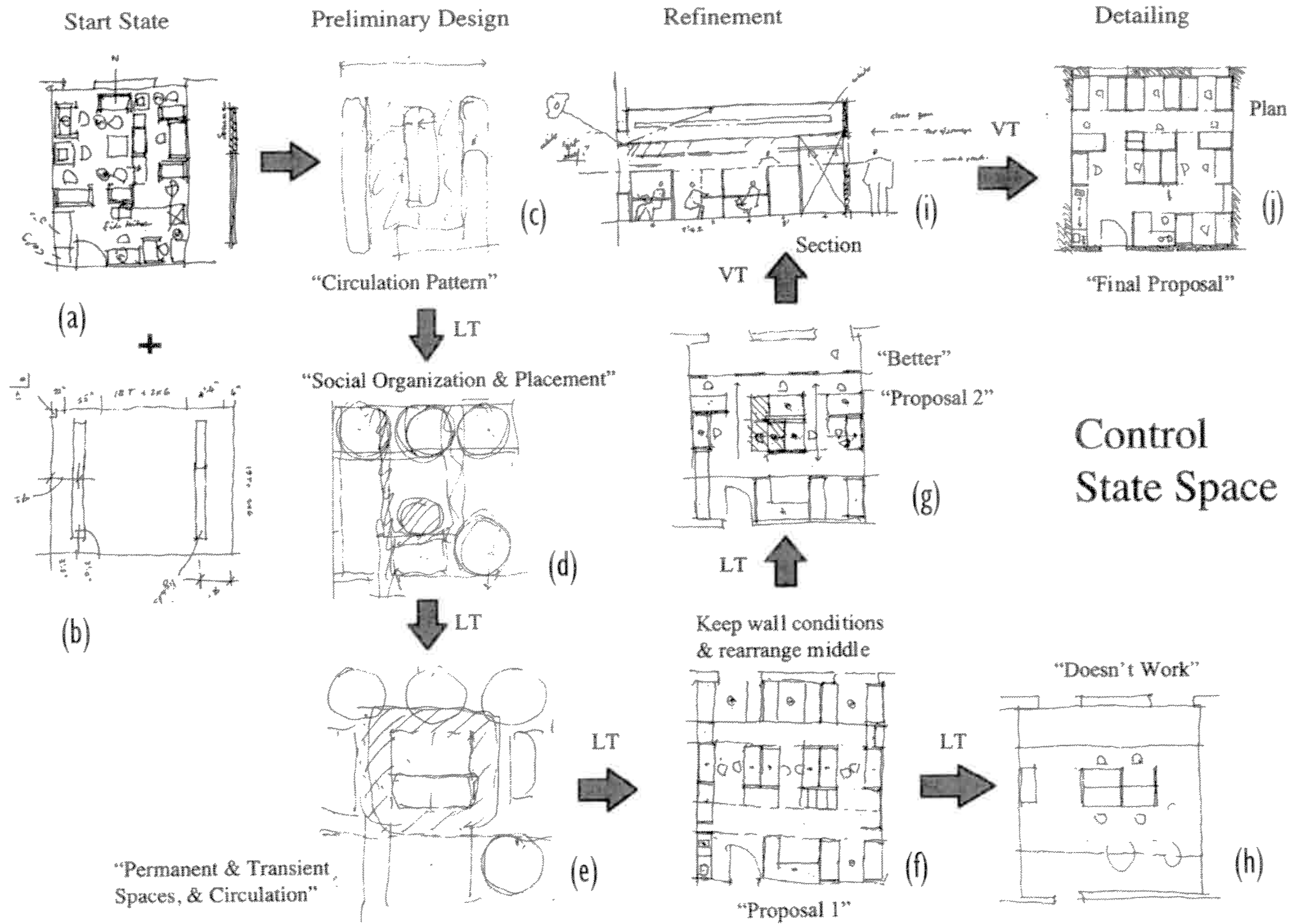


iterate to approach an ideal, or meet a requirement





Cross 2007, *Design Thinking*



“Vibrotactile Score” Lee, Ryu, Choi

(a) VibTest.xml - VibScoreEditor

File Score View Help

vibration playback cursor

editing cursor

Total 10 bars, 34/36 symbols (23 notes, 11 rests, 2 blanks) | bar 10, symbol 6 | OVERWRITE

(b) Clefs

File: clef2.xml

ID: clef2 Type: curve

Defs: clef1, clef2

New, Open, Delete

(c) Waveform

Tempo: 0.5000

Number 1: 0.0500
Number 2: 0.1000
Number 3: 0.1500
Number 4: 0.2000
Number 5: 0.2500
Number 6: 0.3000
Number 7: 0.3500
Number 8: 0.4000
Number 9: 0.4500

String 1, String 2, String 3, String 4, String 5, String 6

Sinewave

Tempo: 1.0000

Number 1	0.2000	String 1	50
Number 2	0.4000	String 2	100
Number 3	0.6000	String 3	150
Number 4	0.8000	String 4	200
Number 5	1.0000	String 5	250
Number 6	1.2000	String 6	300
Number 7	1.4000		
Number 8	1.6000		
Number 9	1.8000		

Waveform

Tempo: 1.0000

Number 1: 0.2000
Number 2: 0.4000
Number 3: 0.6000
Number 4: 0.8000
Number 5: 1.0000
Number 6: 1.2000
Number 7: 1.4000
Number 8: 1.6000
Number 9: 1.8000

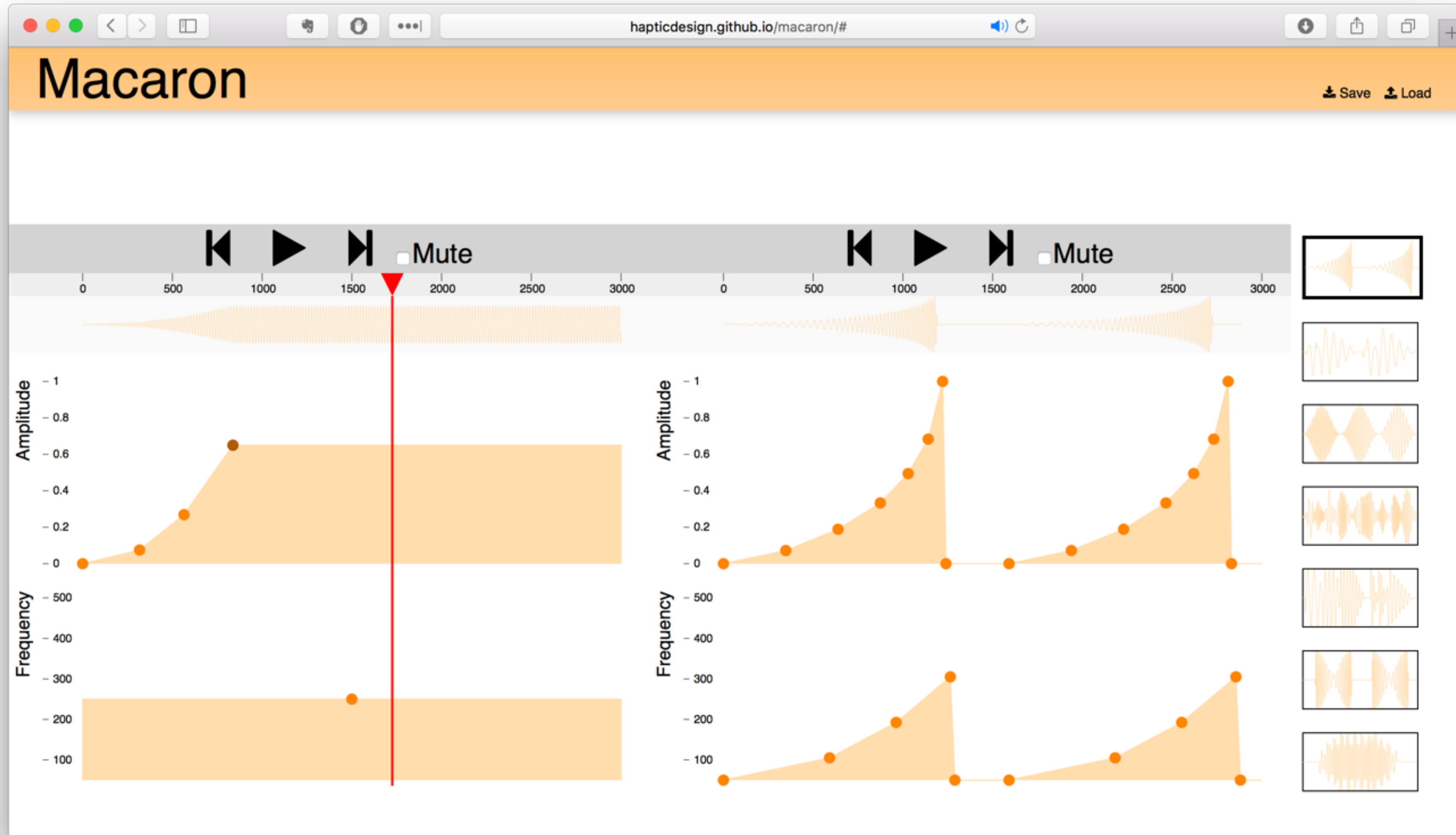
String 1, String 2, String 3, String 4, String 5, String 6

Waveform

Tempo: 1.0000

Number 1: 0.2000
Number 2: 0.4000
Number 3: 0.6000
Number 4: 0.8000
Number 5: 1.0000
Number 6: 1.2000
Number 7: 1.4000
Number 8: 1.6000
Number 9: 1.8000

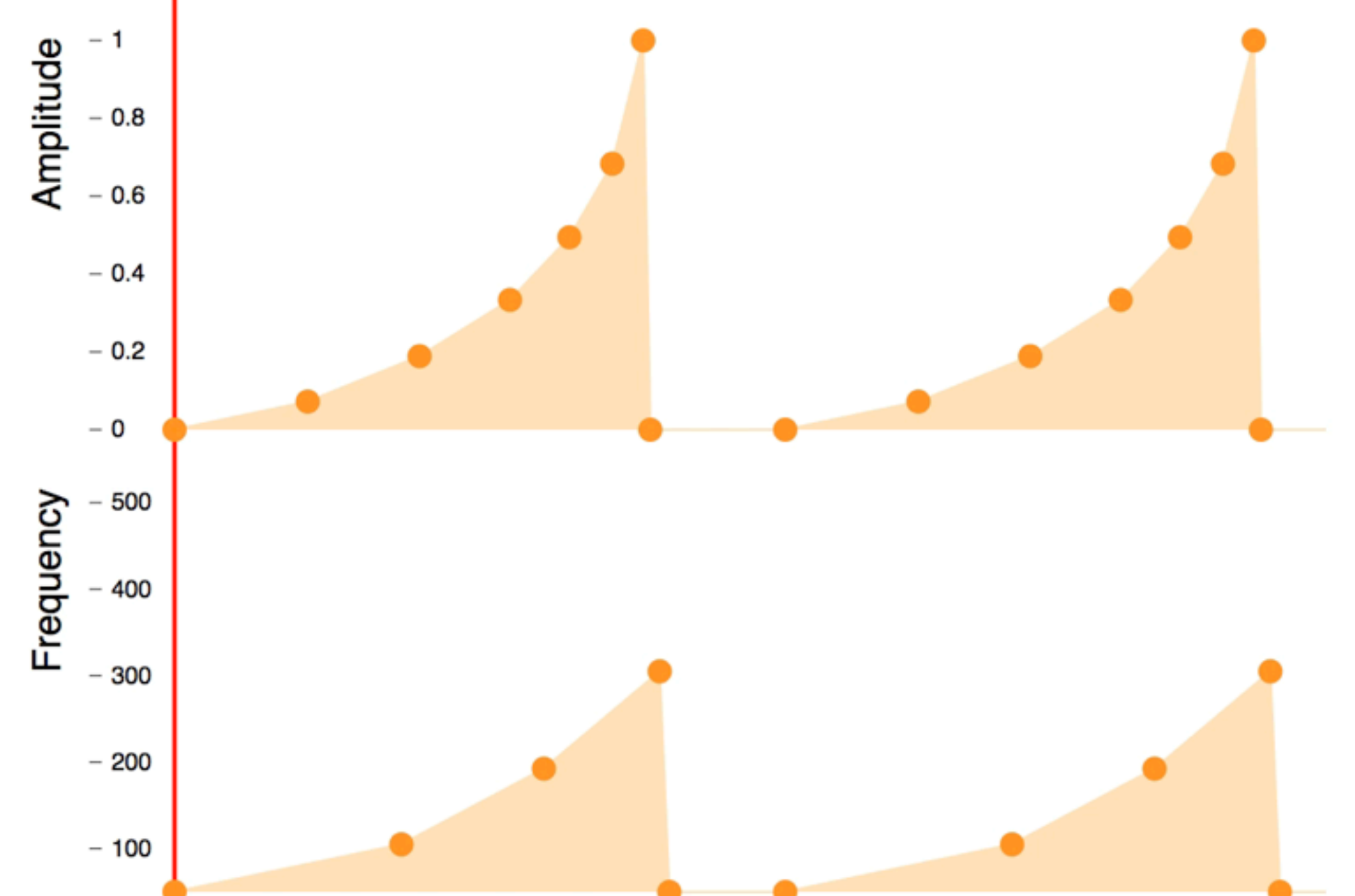
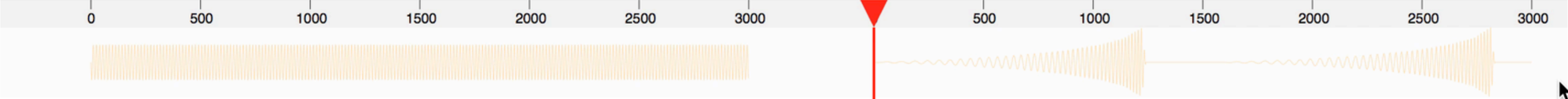
String 1, String 2, String 3, String 4, String 5, String 6



<http://hapticdesign.github.io/macaron>

Macaron

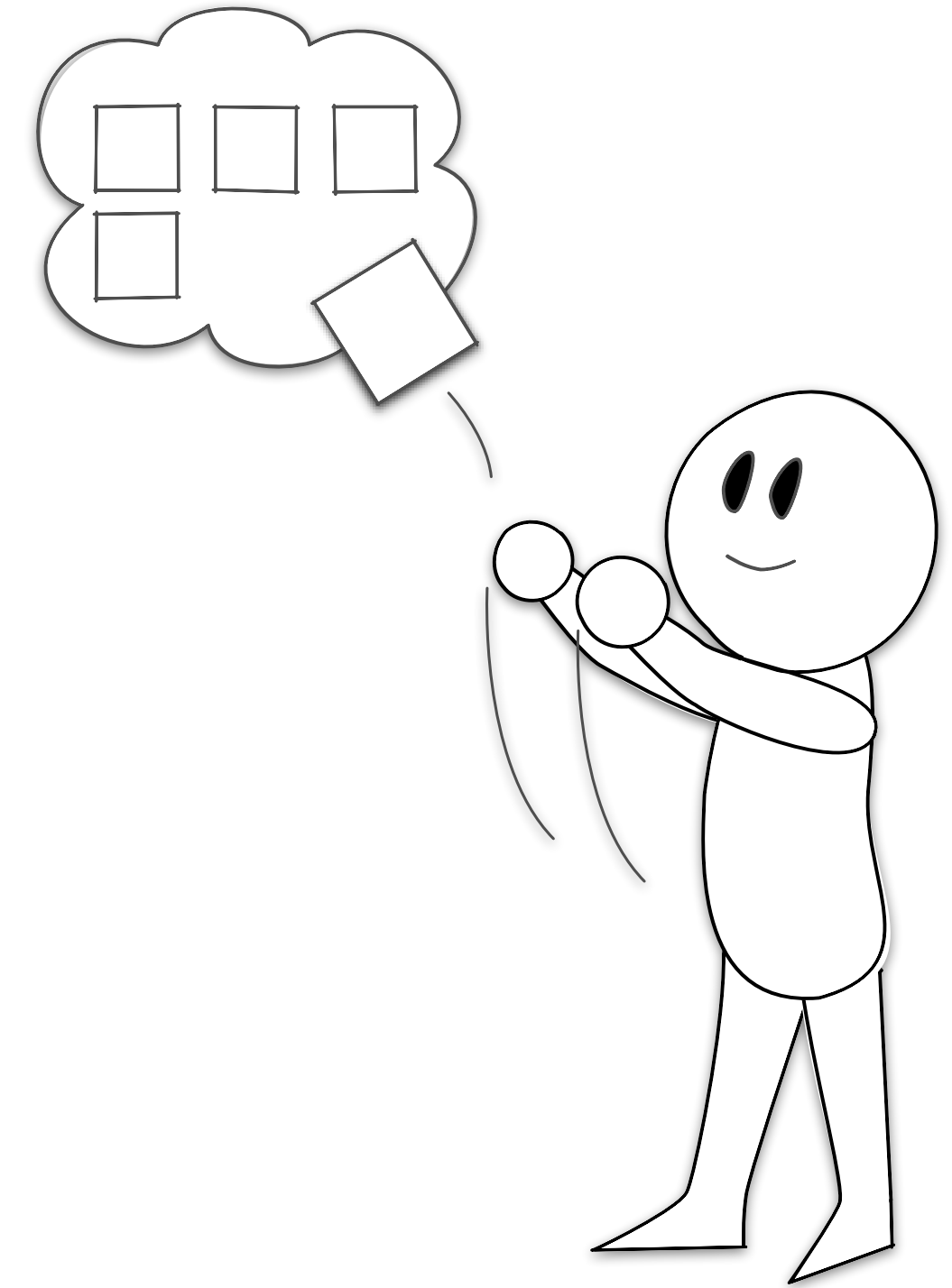
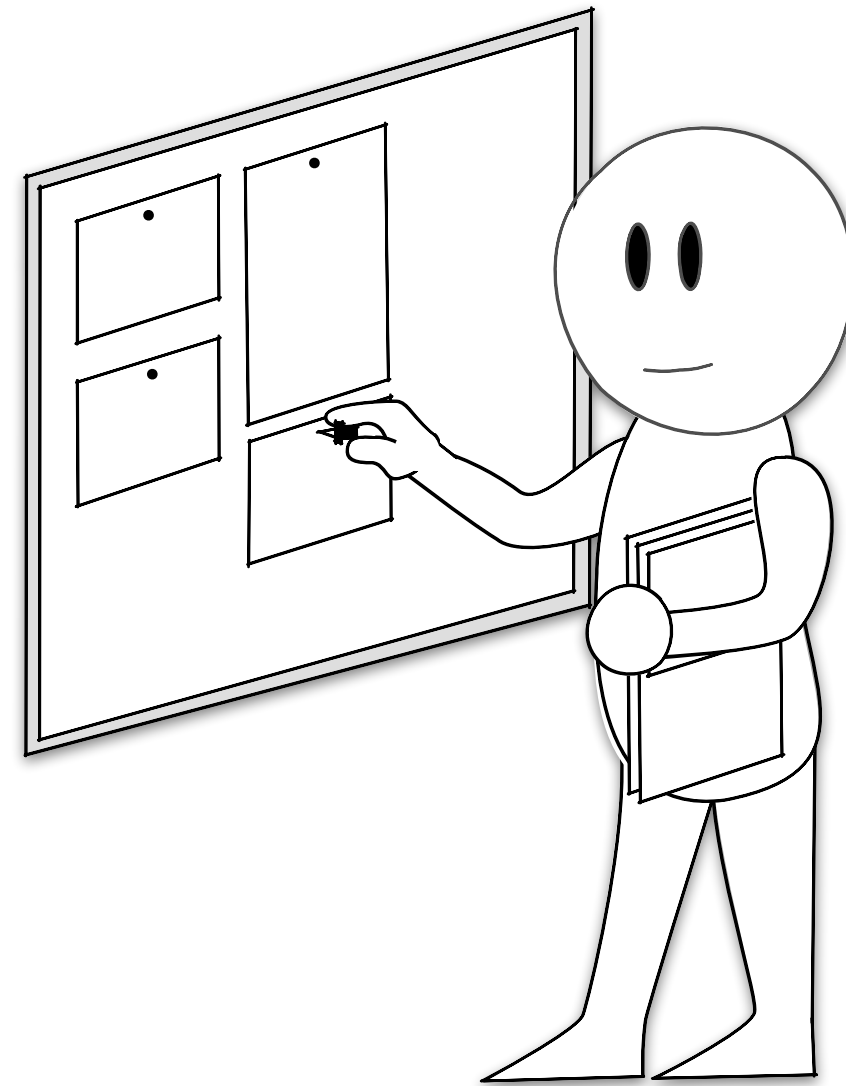
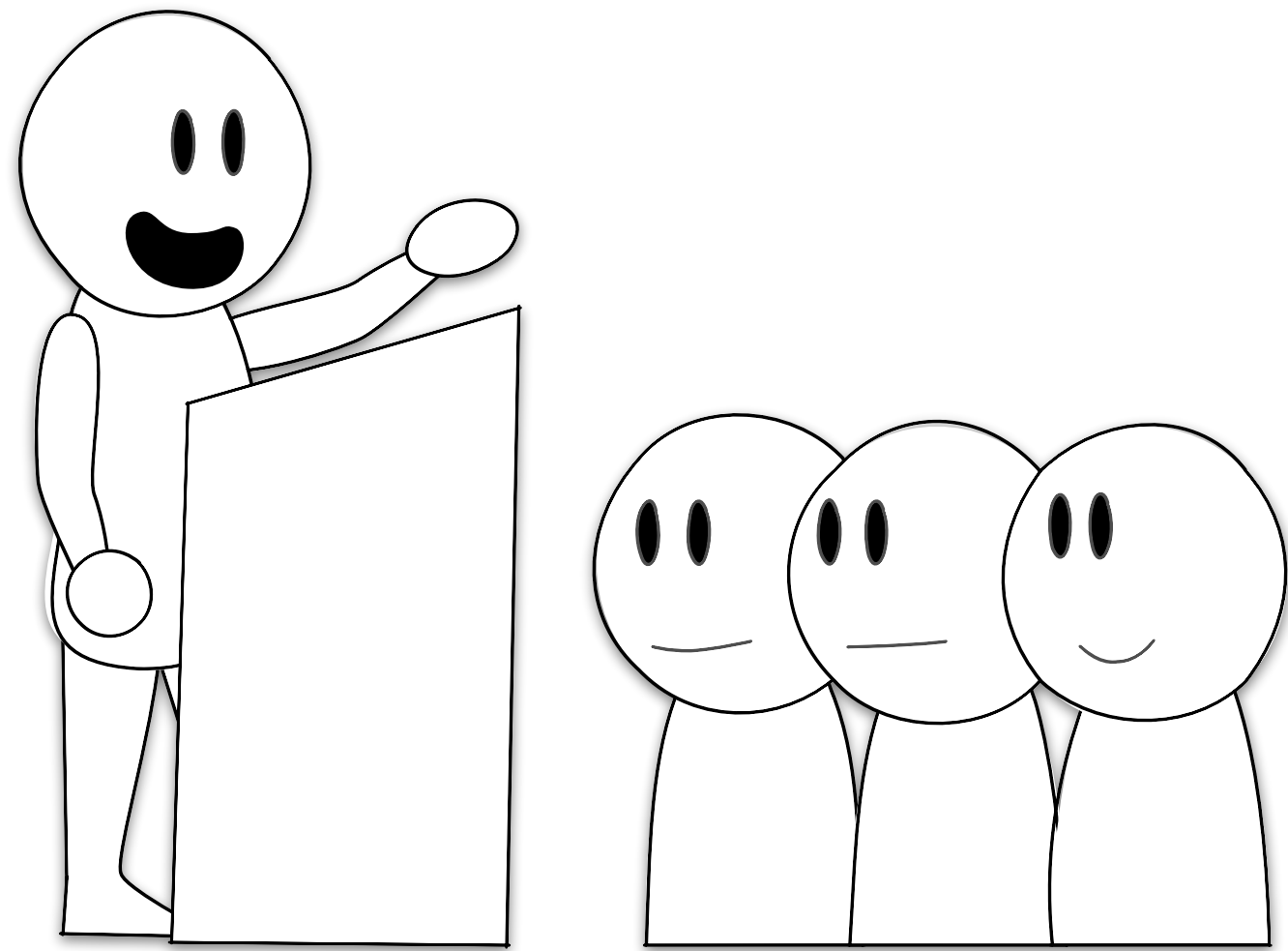
Audio player controls: Play/Pause, Stop, Mute, and a progress bar.



A vertical stack of seven small waveform thumbnails, each showing a different segment of the audio signal. A mouse cursor is pointing at the second thumbnail from the top.

Sharing

put designs out into the world



including — to places where others can **browse**.



Published on March 29th, 2016 | by IH guest

1



If you hack IKEA, we want to see it.



An alternative kitchen island

Share 317 +1 3 Pin 214 Share 541 Tweet 0

IKEA items used: 2 x Finnvard desk legs

My new apartment has a fairly big kitchen, plenty of space for a kitchen island, but I couldn't afford to splash out on one. I had an IKEA Finnvard desk and after a little brainstorm, figured that the legs could be used as a starting point for a kitchen island.

The great thing about Finnvard desk legs is that you can mount them to different heights meaning we could have a work top high enough, as well as shelving space underneath. It now serves as extra worktop space, extra storage space and a high breakfast table.

All you need is:

- 2 IKEA Finnvard desk legs
- 1 120cm x 80cm plank of wood for the top
- 2 90cm x 35cm planks of wood or 1 90cm x 70cm plank (the supplier I went to didn't stock 70cm width planks) for the shelf in between
- A kitchen worktop wood protection rub that's food safe

- 1) Start by mounting the Finnvard desk legs following the instructions in the manual.
- 2) Sand the planks of wood with fine sandpaper to make sure they are smooth and then follow the instructions to rub the kitchen worktop protection onto the wood.
- 3) Once dry, carefully mark out where the top removable part of the Finnvard desk legs need to go through the two smaller planks of wood.



Recommended for you

- Ikea Self-Hack: Pax as Walk-in Closet - IKEA...
www.ikeahackers.net
- DIY mudroom using IKEA STUVA benches...
www.ikeahackers.net
- More kitchen storage without drilling into til...
www.ikeahackers.net
- 2000 recycled IKEA hangers become a ro...
www.ikeahackers.net
- Cheap, Stylish IKEA designed Kitchen Isla...
www.ikeahackers.net

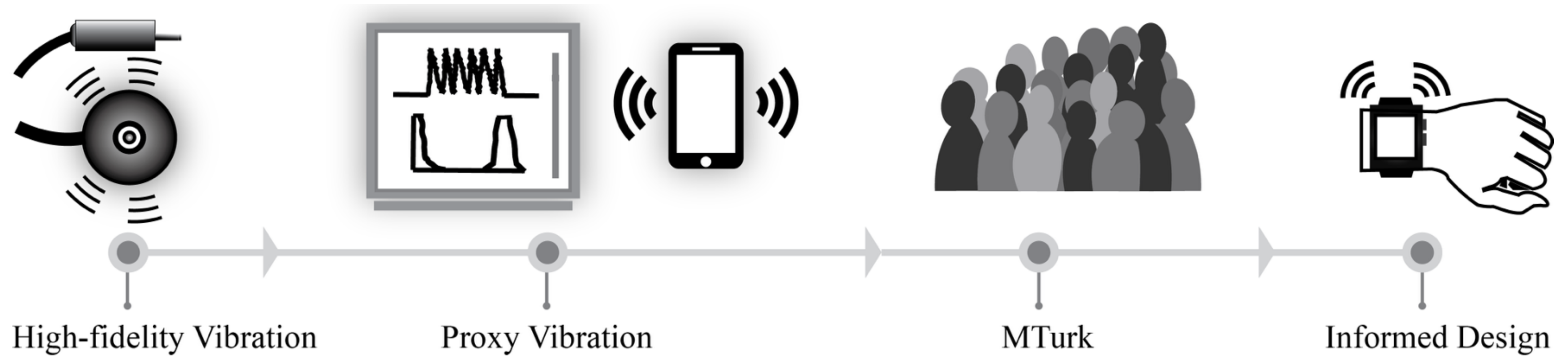
AddThis

FREE 20 Best IKEA Hacks ebook. Get it here!

Email Address

First Name

Crowdsource: HapTurk



Schneider, O., Seifi, H., Kashani, S., Chun, M., & MacLean, Karon. *HapTurk: Crowdsourcing Affective Ratings of Vibrotactile Icons*. CHI 2016.

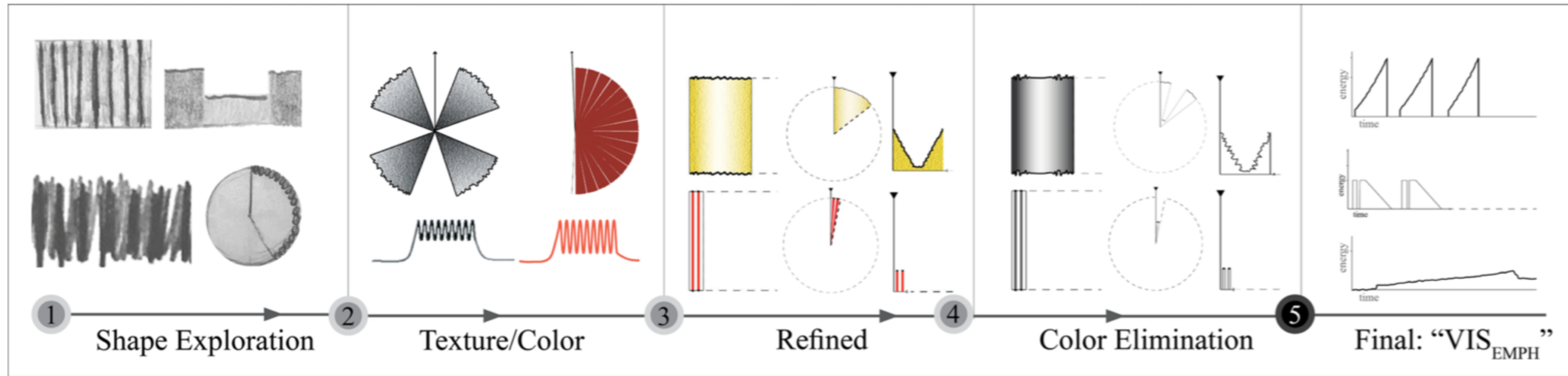
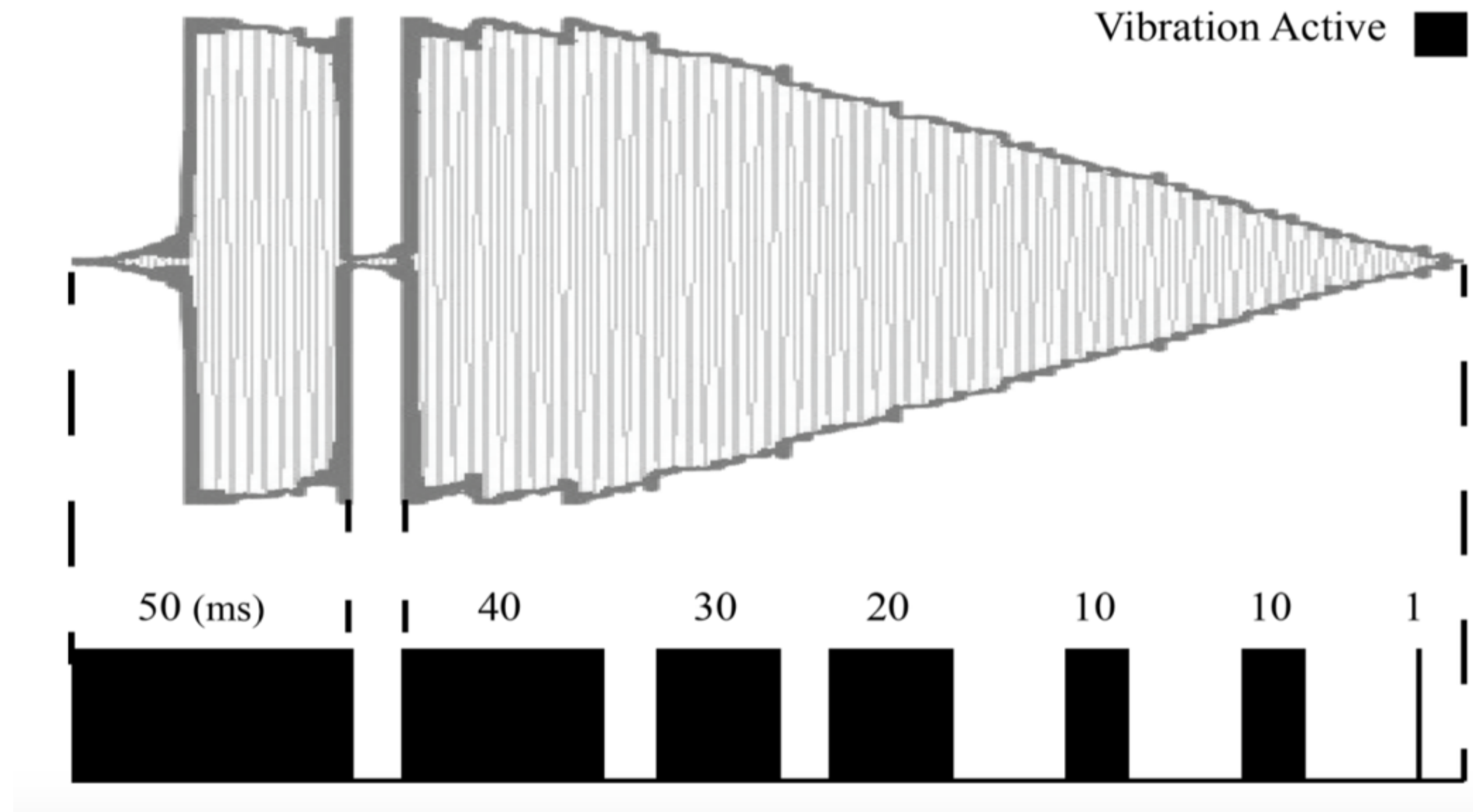


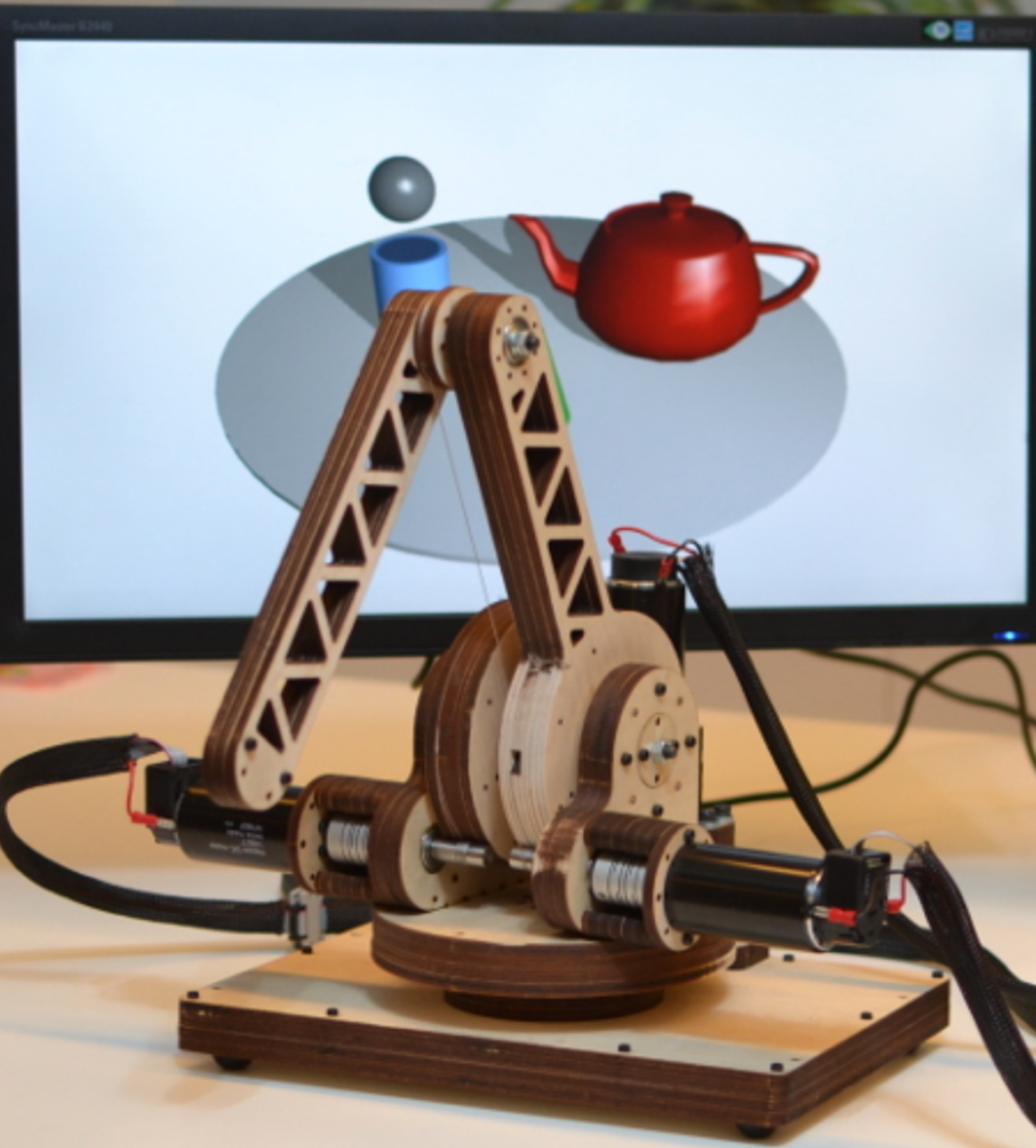
Figure 4: Visualization design process. Iterative development and piloting results in the VIS_{EMPH} visualization pattern.

Example	Roughness	Energy	Duration	
	by the line's roughness	by the line's thickness & by height	by the length of the x-axis	
	rough so-so smooth	high medium low	 	longest short (compared to the longest)

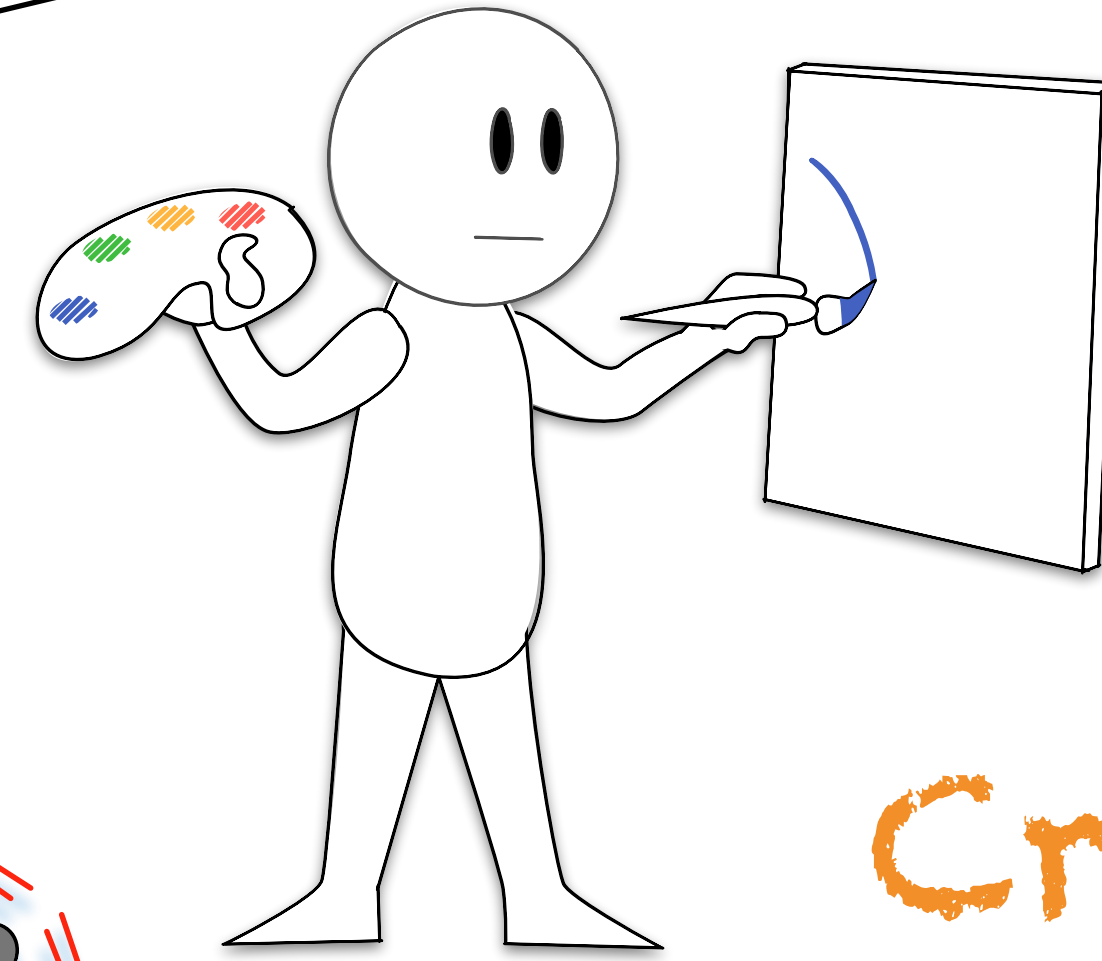
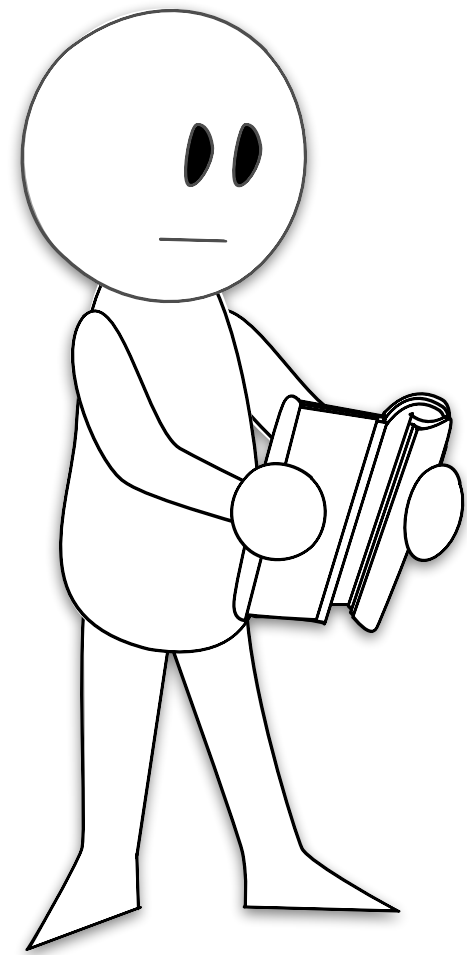


HapTurk: low-fidelity phone vibrations

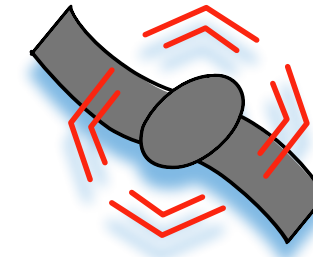
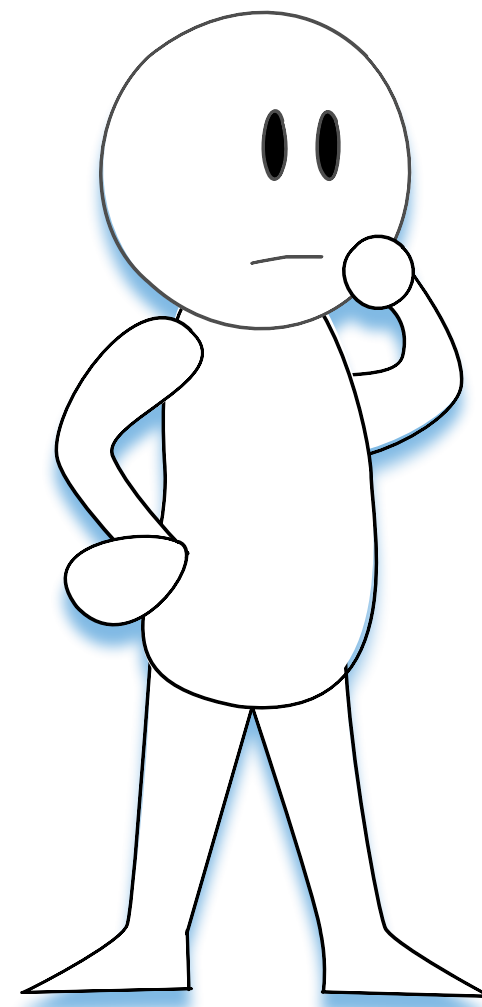
WoodenHaptics
Forsslund et al.



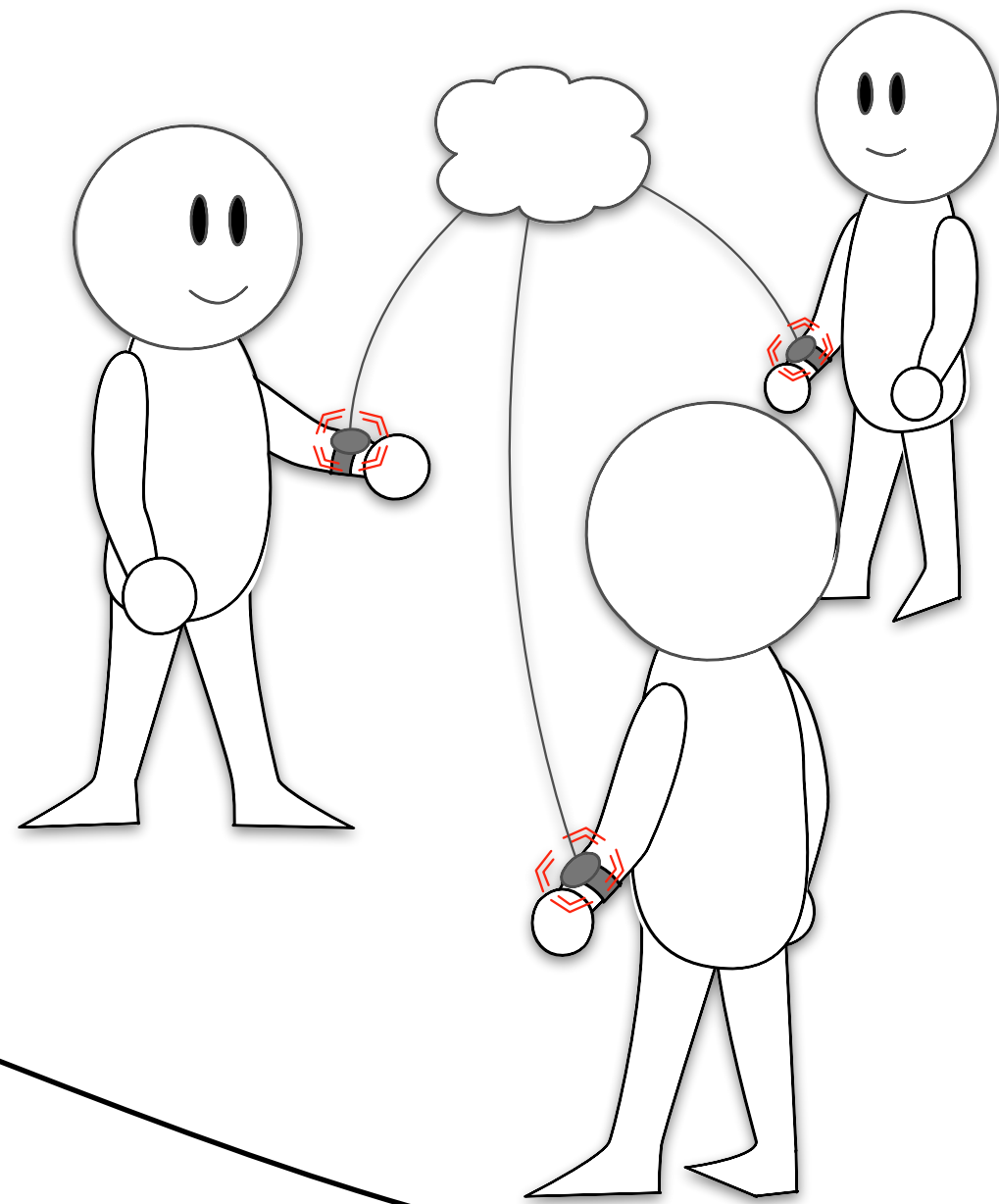
Browse



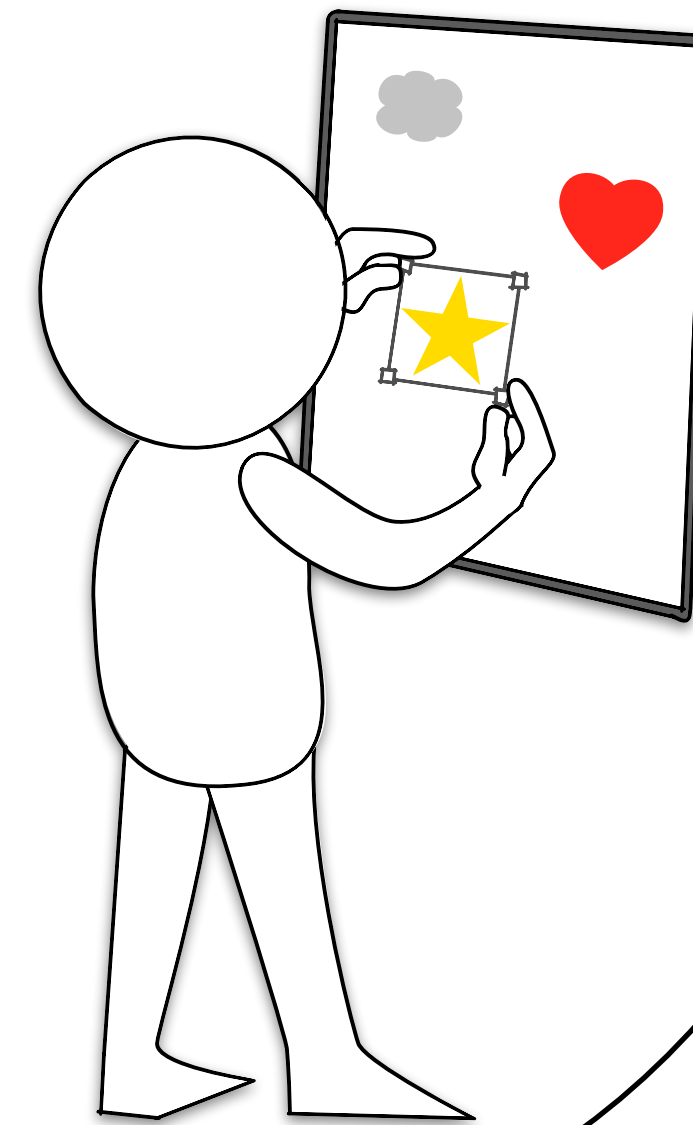
Create



Share



Edit

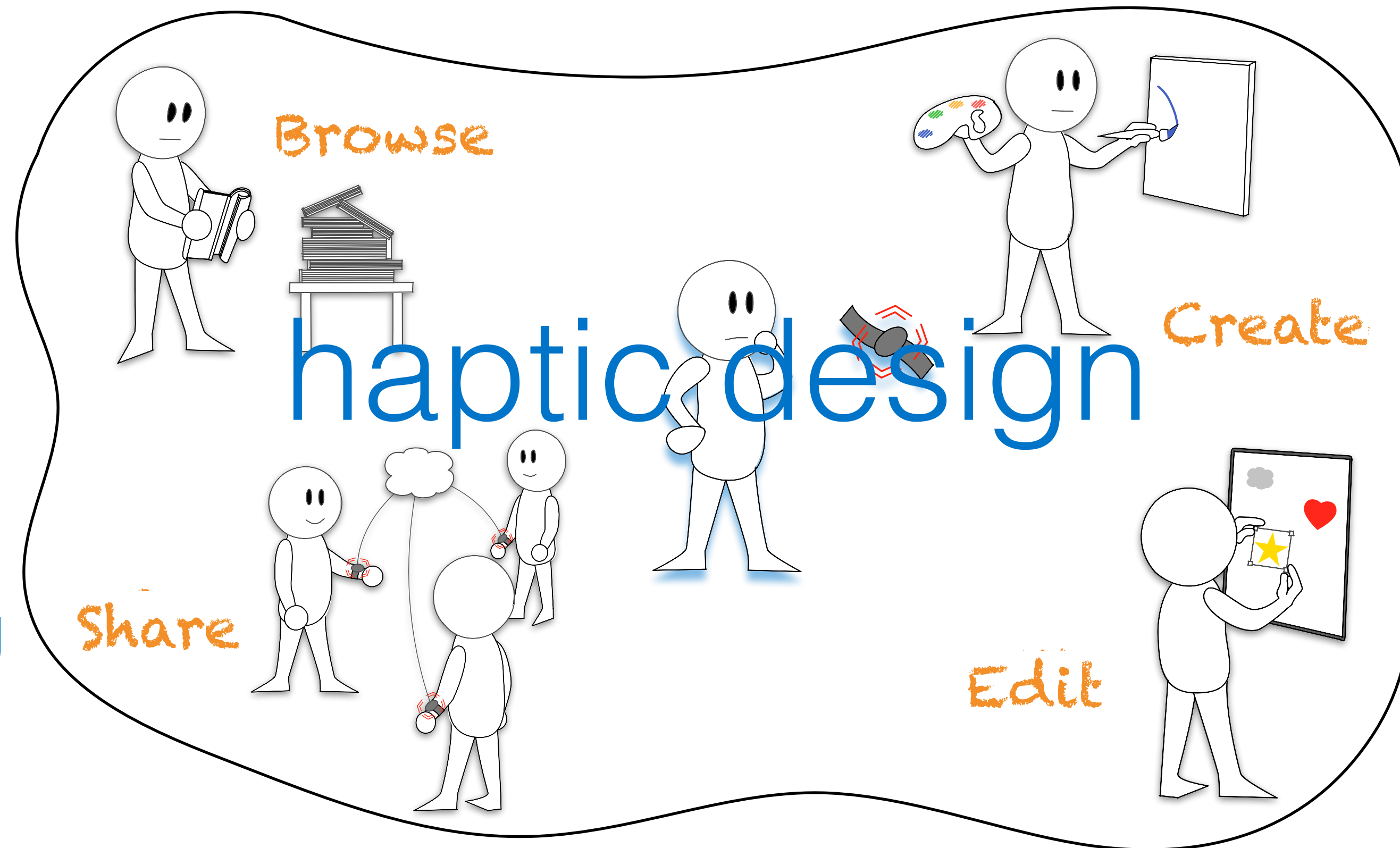


many other domains feed into this
some of them are changing fast too

psychophysics

visualization

new ***haptic***
technology



crowdsourcing

linguistics

**sketching & prototyping
methods / technology**

sensing:
wearables,
digital materials

**personal
fabrication**

message:

Haptic design practice is not monolithic.
It requires a rich, interconnected ecosystem of tools.

We actually **have** a lot of tools already.
Some of them are pretty good for their specific jobs.

But, many other jobs are not supported,
and isolated tools are far from a workflow.

—> as the technology matures,
we need to focus on **how to build things with it.**

support Haptic Design

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