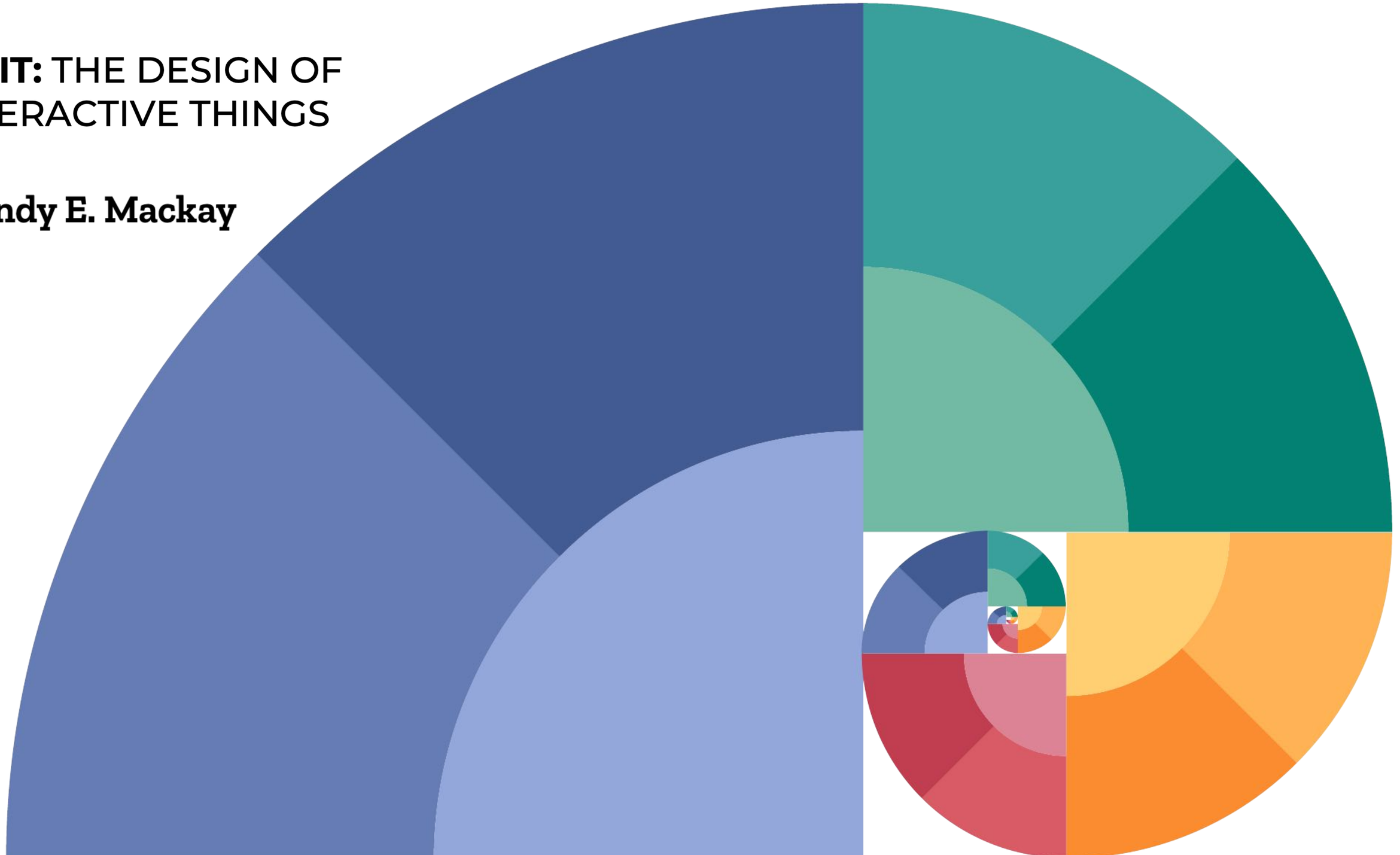
DO IT:
THE DESIGN OF INTERACTIVE THINGS

Wendy E. Mackay
25 April 2023

mackay@lisn.fr

DO IT: THE DESIGN OF INTERACTIVE THINGS

Wendy E. Mackay



Generative design

Discovery

Who is the user?

Inspiration

What is possible?

Design

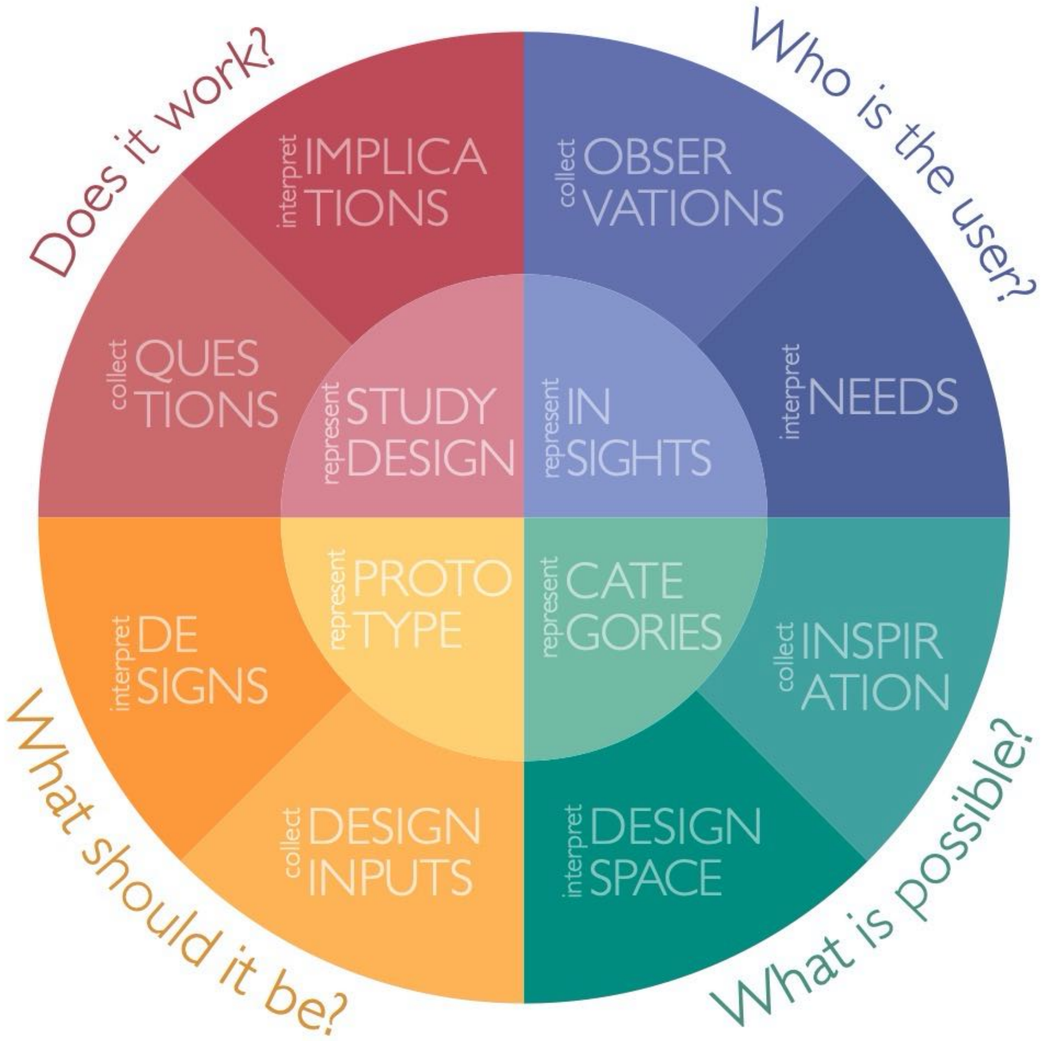
What should it be?

Evaluation

Does it work?

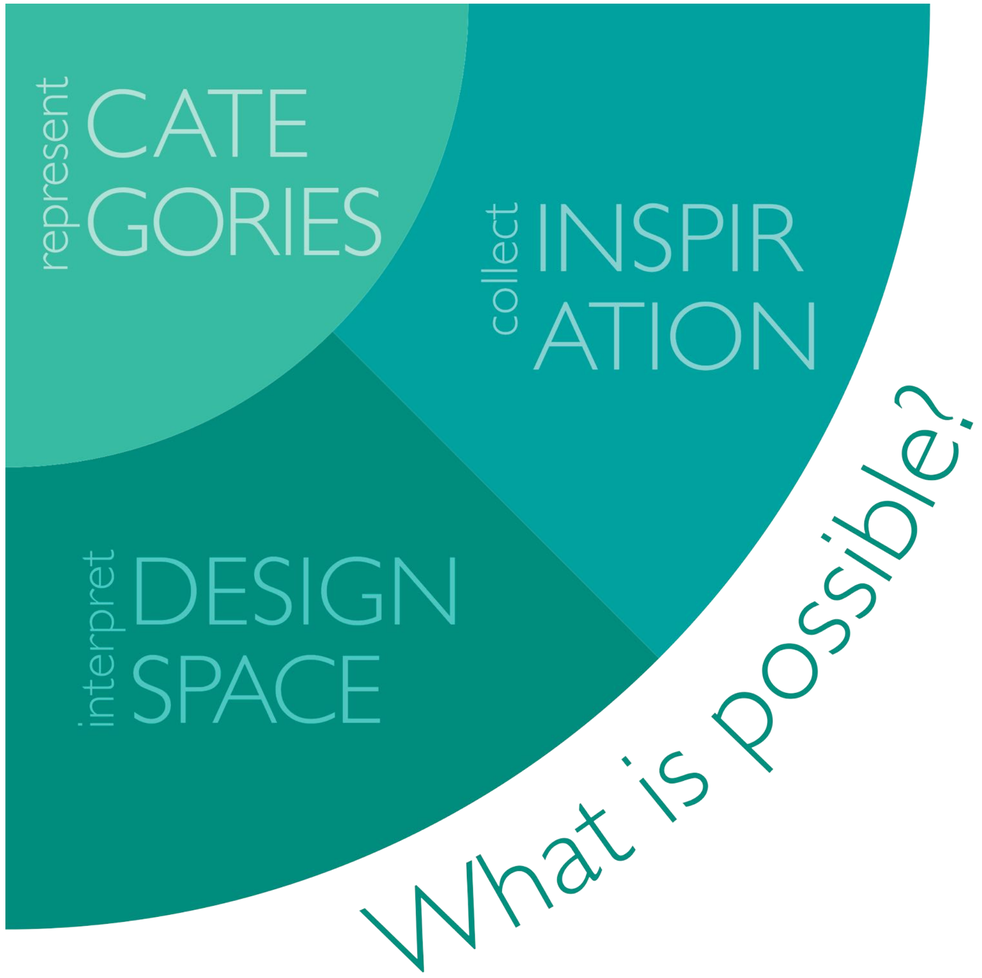
Redesign

Make it better!



Collect ideas

Inspiration



Inspiring Ideas	System	Activity	Story
Collect	Web links Brainstorm ideas	GATHER IDEATE	Literature review Brainstorm interactions
Represent	Idea archive Video brainstorming Improvisation Cultural probes	SELECT SIMULATE EMBODY ENGAGE	Interaction snippets Video brainstorming Bodystorming Technology probes
Interpret	Idea dimensions Design space	CLASSIFY SKETCH	Breakdowns Interaction snippets

Table 2. Inspiration Methods

Find a concept

Gather ideas from diverse sources

- Existing systems
- Other designers
- Web resources, e.g. Pinterest

Generate your own ideas

- Brainstorming
- Video brainstorming

Finding inspiration

Sources of inspiration

User Needs that inspire solutions

Revisit your surprises! Find user innovations

Finding inspiration

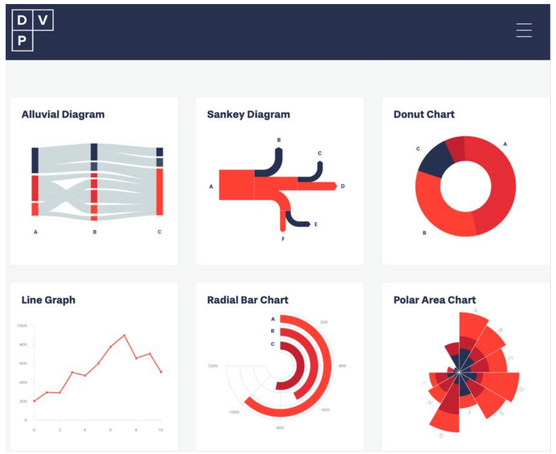
Sources of inspiration

User Needs that inspire solutions

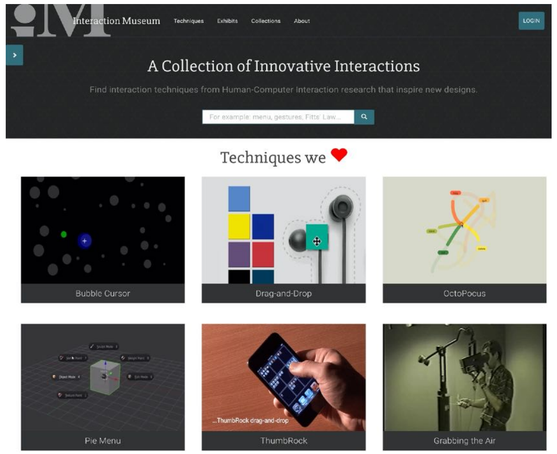
Revisit your surprises! Find user innovations

Online Design Resources

Websites that demonstrate interaction ideas



datavizproject.com



hci-museum.lri.fr

Finding inspiration

Finding inspiration

Sources of inspiration

User Needs that inspire solutions
Revisit your surprises! Find user innovations

Online Design Resources
Websites that show ideas

Research Literature
User challenges
Design solutions
Generative theory

Examples: *Instrumental Interaction*

Alignment example

Menu-based alignment is cumbersome…

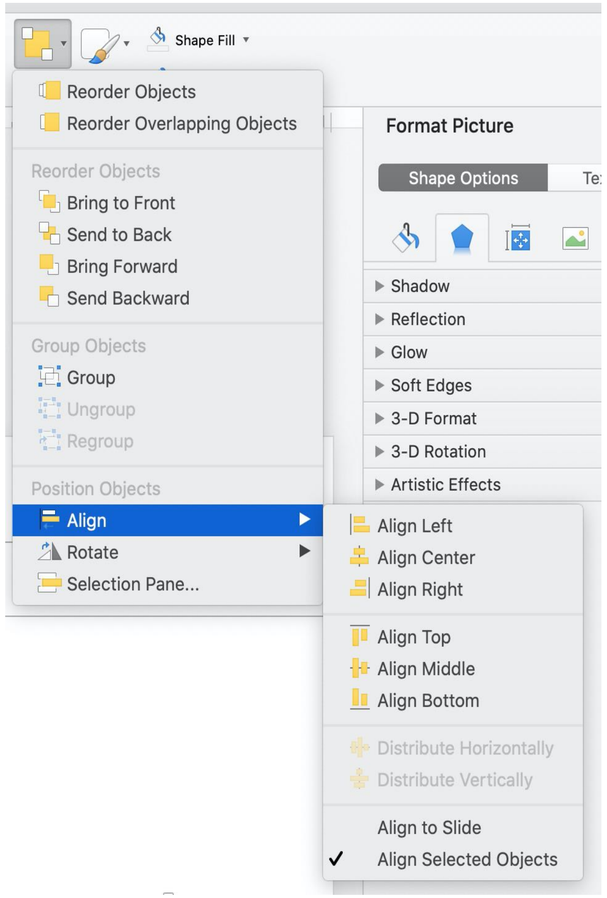
Hierarchical menu

Hard to find correct alignment

Fitts' law issue

Tricky to click on the correct item

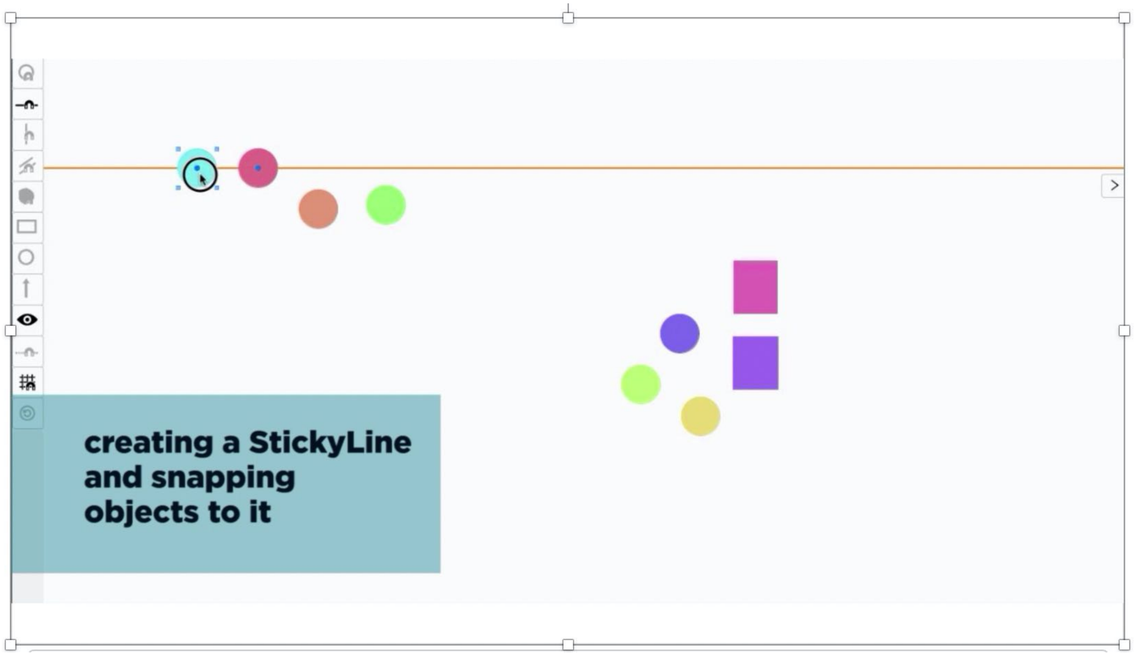
Every new aligment requires navigating the menus again



Stickylines

Ciolfi et al. (2016)

What if the aligment command is reified into an interactive alignment tool?



Key principles

Reification
Transforms commands that disappear into interactive tools

Polymorphism
Applies tools to multiple types of conceptual objects

Reuse
Takes advantage of previous actions and past results

Beaudouin-Lafon (2000), Beaudouin-Lafon & Mackay (2000)

Instrumental interaction

Generative design strategy

Reification

First:
Identify a command that disappears
after being used once

Then:
Make it persist
Make it interactive
Make it a tool

Example:
StickyLines reifies the alignment command

Instrumental interaction

Beyond Snapping

Persistent, Tweakable Alignment and Distribution with StickyLines

Marianela Ciolfi Felice Nolwenn Maudet Wendy Mackay Michel Beaudouin-Lafon

LRI, Université Paris-Sud, CNRS, Inria, Université Paris-Saclay
Orsay, France

Example: Create a route

Command

“Show me how to go to the HCI building”

Result

The route appears on the map

But if I use another command, it disappears

Reify a route on a map

Example: Create a route

Reified command

“Show me how to go to the HCI building”

Result

The route persists as an **interactive object**

Modify it, Copy it, Share it, Reuse it…

Reify a route on a map

Brainstorm ideas for:

an interactive system
that supports navigating
through space and time

Generate new ideas

Consider your interviews and observations

Imagine different situations
    where users will interact in a new way
    to meet their needs

Focus on interaction **in context**
    not just a list of functions

Classic brainstorming

Classic brainstorming

Common alternatives

Solo brainstorming

More ideas	Less group cohesion

Sticky notes on the wall

Visual overview	Expensive (Post-it™)
Many parallel ideas	Can miss other ideas
Supports sketching	Harder to vote

Scribe takes notes

Temporal overview	Requires a good scribe
More interaction	Inexpensive
Helps later voting	

Best: Solo first, then group

Generate new ideas

Roles Moderator Scribe

Resources Design brief

Phase 1 Generate maximum ideas

- Everyone participates
- Record every idea
- Everyone add at least one stupid idea

Phase 2 Reread all ideas

- Everyone votes for three favorite ideas
- Rank ideas based on number of votes
- Discuss ideas related to the design concept
- Don’t forget weird or unusual ideas!

Classic brainstorming

Do not …	Instead …
Discuss ideas	State each idea
Criticize ideas	Ask for clarification
Argue about merits	Move to next idea
Ignore others' ideas	Build on them
Shift topics	Stick to key topic
Jump to abstractions	Keep it specific
Get stuck	Think orthogonally

Classic brainstorming

Opposites technique

Take each idea to an extreme

cheap	expensive
funny	serious
simple	complex
happy	sad
good	bad
text	graphics
audio	touch
process	object
begin	end
single	sequence

Classic brainstorming

Example #4

List of ideas

Example 4. Classic Brainstormed Ideas

- Show overall path with a focus circle around current location
- Above idea, but allow multiple waypoints, with close-up circles for each
- Send locations of multiple people to show up on everyone's map
- Highlight confusing intersections and show closeup circle to show where to go
- If street name isn't visible, show a local landmark
- Show different landmarks for people who are walking, biking or driving
- Snap a photo of directions on a laptop and upload as a map to the phone
- Do the opposite: send a map from the phone to a laptop
- Navigation arrows from phone onto smart watch
- Communicate from phone to a drone to show navigation

Classic brainstorming

Exercise

Team

Choose a moderator and a scribe
Generate as many ideas as possible
    Quantity is more important than quality
Everyone must participate
    and say at least one “stupid” idea!
Record all ideas

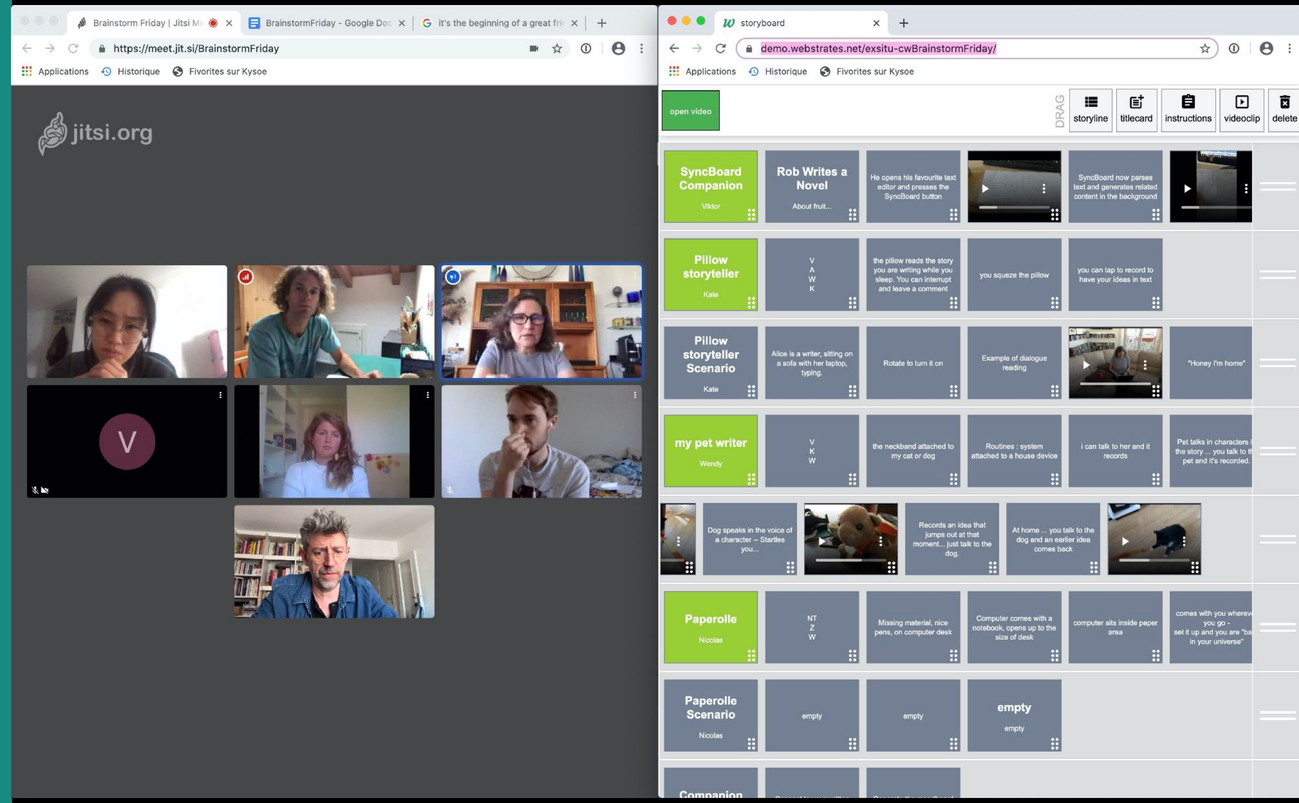
Phase 1: Generate at least 20 ideas
Phase 2: Scribe rereads ideas
              Everyone votes for 3 favorite ideas

Video brainstorm

Video brainstorming

Video brainstorming

Remote brainstorming



Represent ideas

Increasing levels of depth

Text	Explain an idea in words Standard brainstorming
Sketch	Draw to illustrate an idea Standard brainstorming
Mockup	Interact with paper prototypes Rapid prototyping
Theater	Act out the idea Rehearse brainstorming
Video	Capture interaction details Video brainstorming

Story-based design focuses on
interaction in context

Interaction snippets capture details about
how the user interacts with the system

Easy-to-use format
highlights interaction
supports later design activities

Generate ideas from user data

Miniature storyboards

Describe interaction between user and system

Title: What does the user want to accomplish?

Sketches and descriptions

What did user do?	What did system do?
How did system react?	How did user react?
How did user react?	How did system react?

Focus on surprises:
breakdowns, workarounds, user innovations

Interaction snippets

Miniature storyboards

Title: Summarizes the interaction

Identify the sequence of events:
- User acts – System reacts – User reacts
- System acts – User reacts – System reacts

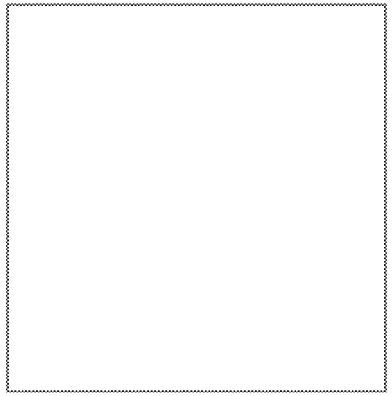
Each panel:
- Sketch what happened
- Describe what happened

What does the user want to accomplish?
Does it work?

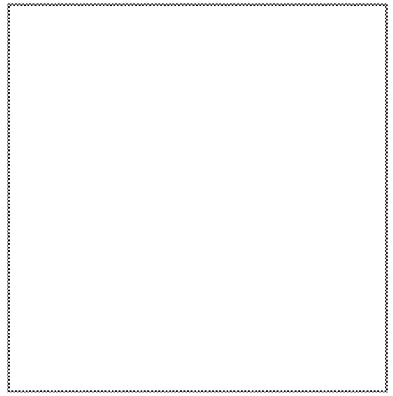
Interaction snippets

Title

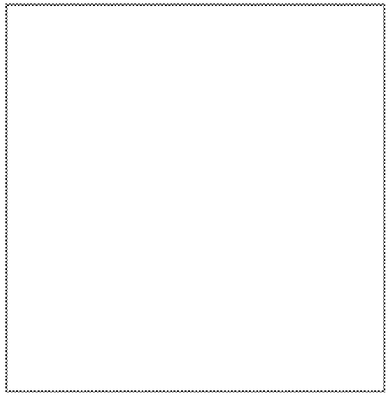
a



b



c



Author: _____

Interaction snippets

Interaction snippet

Example #5

Idea

Example 5. Interaction Snippet

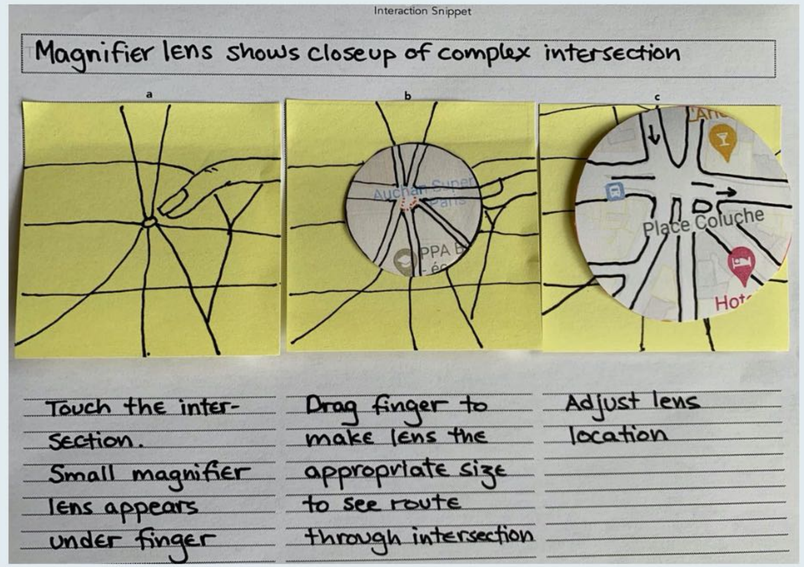


Figure 10. Interaction snippet shows how to create and enlarge a magnifing lens.

Video brainstorming

Video brainstorming

One director per idea

Every director controls:
- Choice of the idea
- Presentation of the idea
- Recording the idea
- Assigning roles:

Scribe	complete title card
Makers	create paper prototypes
Camera	shoot the action
Talent	perform interaction
	record voice-overs

Paper prototyping

Video brainstorming

Wizard of Oz

Video Clipper

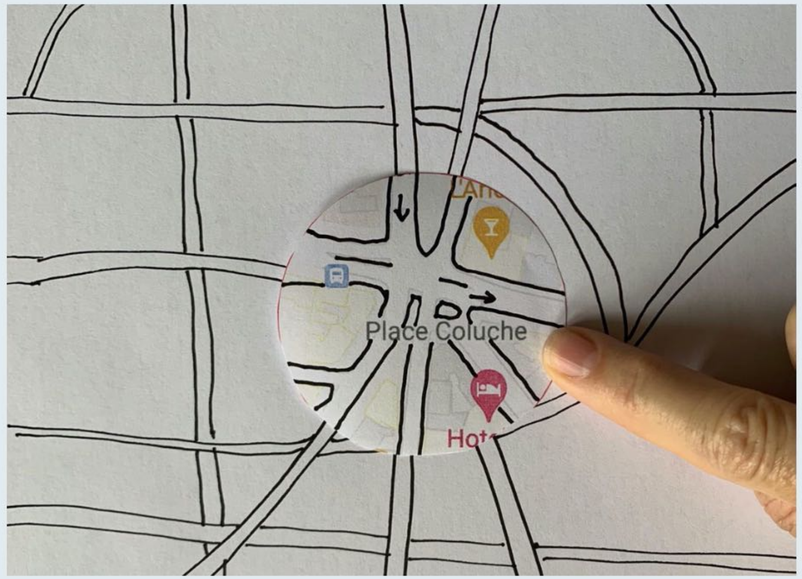
Video Brainstorming

Example #6

Idea

Example 6. Video Brainstormed Idea

Figure 11. User drags the edge of the magnifing lens to make it bigger.



Name		Team		Due	

Video brainstorming

Inspire Ideas **Worksheet**

ACTIVITY Record a video of one or more interaction snippets that illustrate how users would interact with a new design.

	Director	Idea
Idea 1.		
Idea 2.		
Idea 3.		
Idea 4.		
Idea 5.		
Idea 6.		
Idea 7.		
Idea 8.		

Video brainstorming

Video brainstorming

Exercise

Team

Shoot at least 8 ideas (2 each)

Choose a team scribe to summarize all ideas
Each team member chooses 2+ ideas to direct

Roles

Director	Choose idea, roles, presentation
Makers	Create paper prototypes
Talent	Manipulate prototype, act as user
Camera	Shoot 30”-60” sequences

In other words ...

Stop talking & start shooting!

Stop talking & start shooting!

Video brainstorming

Advantages

Generates reusable videos that explore the details of interaction

Trade-offs

Disadvantages

Generates fewer ideas

Video brainstorming

Advice

Select brainstormed ideas
create paper prototypes
shoot the interaction

Caution!
Keep ideas short
avoid creating future scenarios!
shoot variations if you disagree.

Remember to ...

choose one director for each idea
avoid arguing, and follow the director's lead
shoot variations to capture disagreements