DO IT:
THE DESIGN OF INTERACTIVE THINGS

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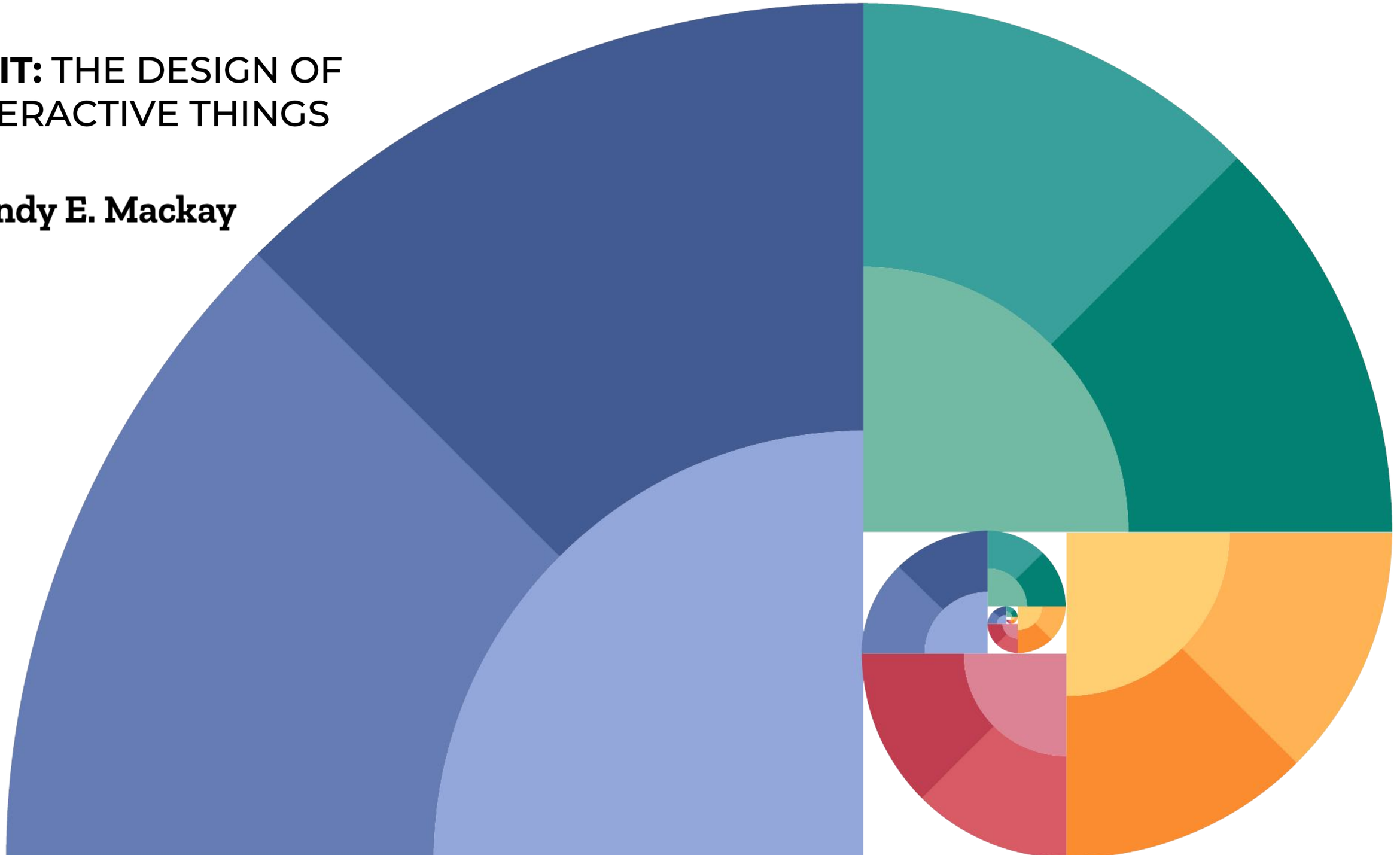
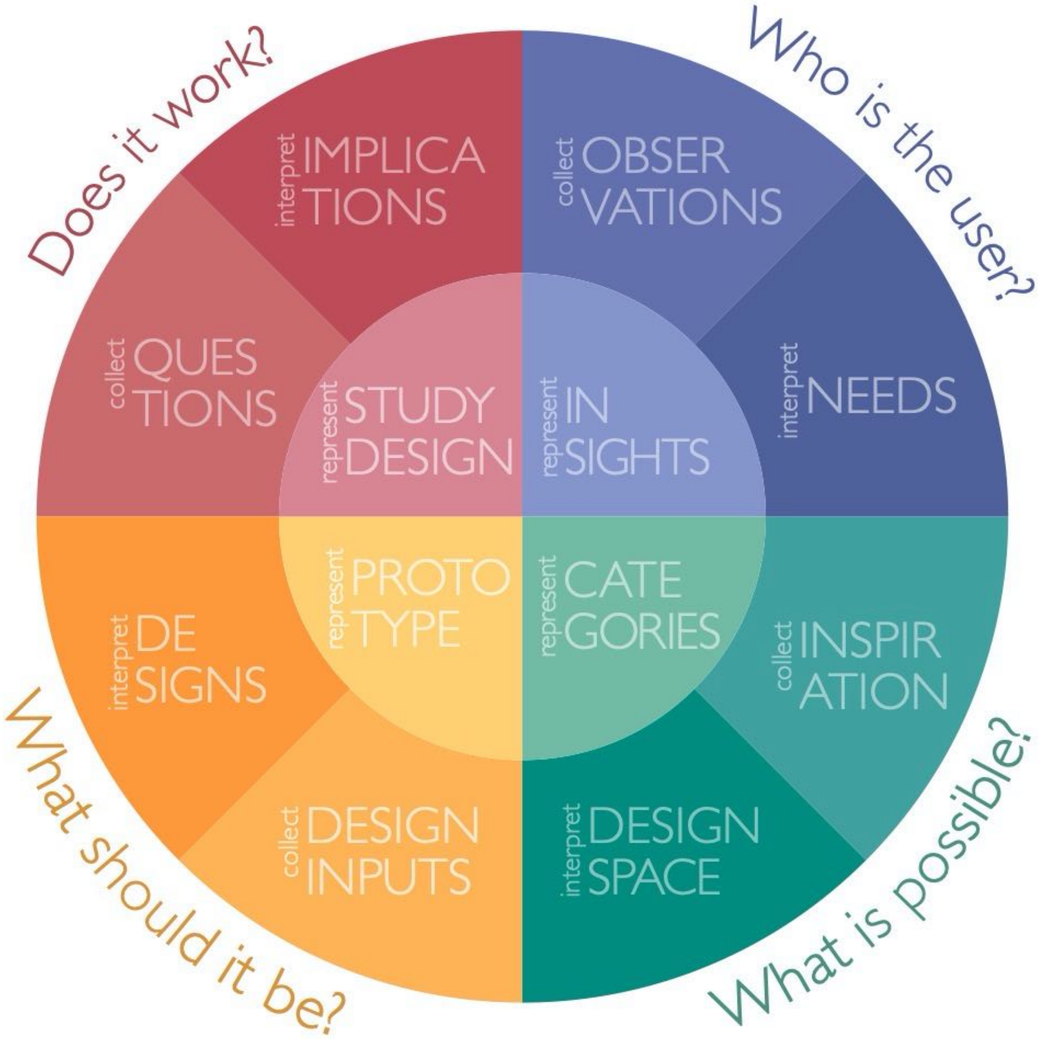


Finding Problems	System	Action	Story
Collect	Research questions Study questions	DEFINE	User contexts User activities
Represent	Questionnaire User study Controlled experiment Field study	ASK CONDUCT	Interview Design walkthrough Structured observation Diary study
Interpret	Descriptive statistics Inferential statistics Design requirements	ANALYZE	Thematic analysis Mind Map Design implications

Table 4. Evaluation Methods



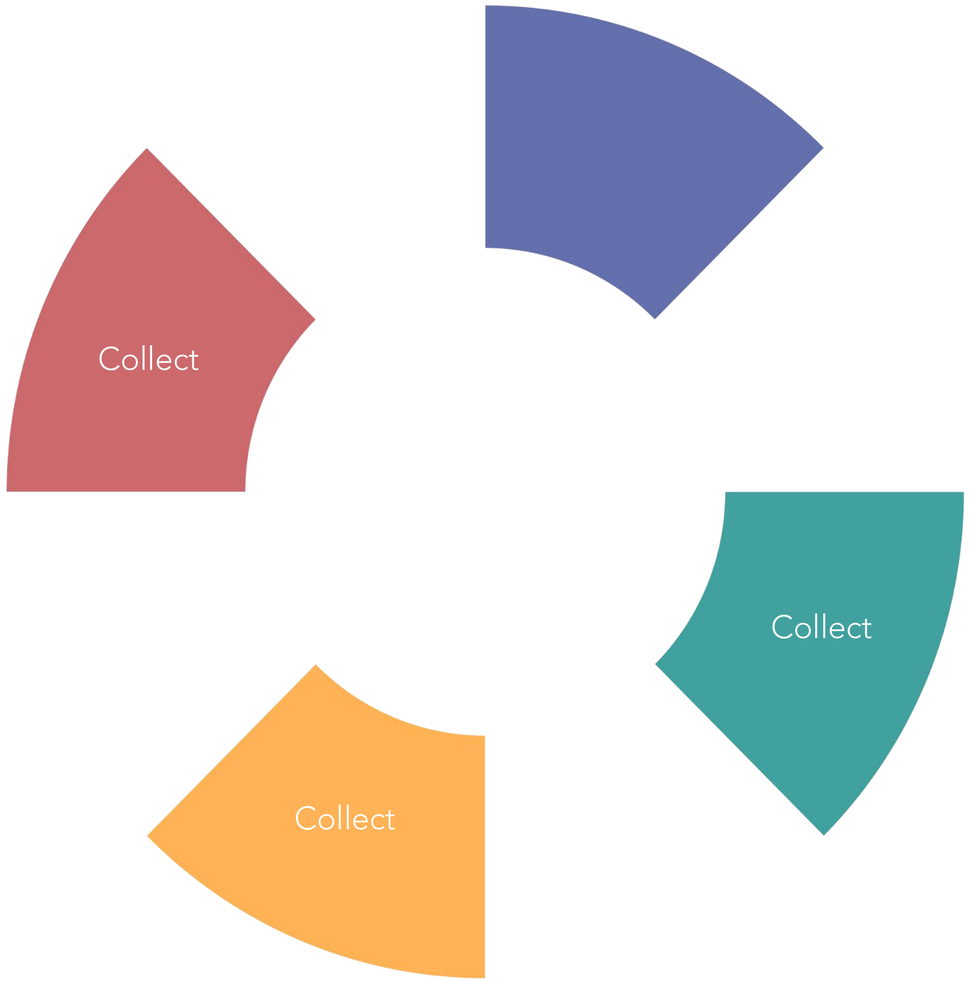
Generative design

Key activities

Collect information

Represent with artifacts

Interpret the results

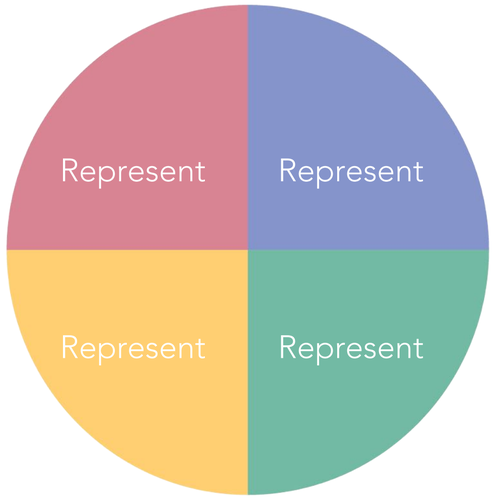


Generative design

Key activities

Collect information

- Specific typical and rare stories
- Surprises, breakdowns & user innovations



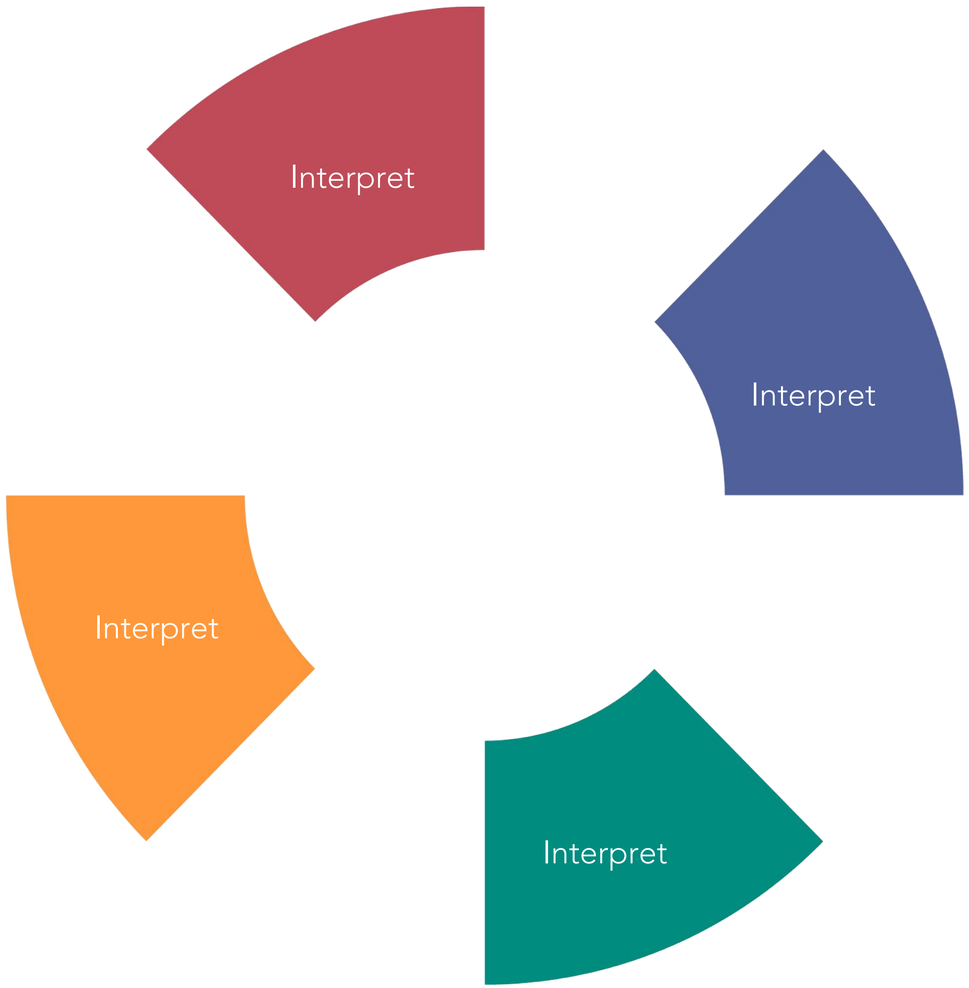
Generative design

Key activities

Collect information

Represent with artifacts

- Scenario, persona, requirements list
- User profile, object table



Generative design

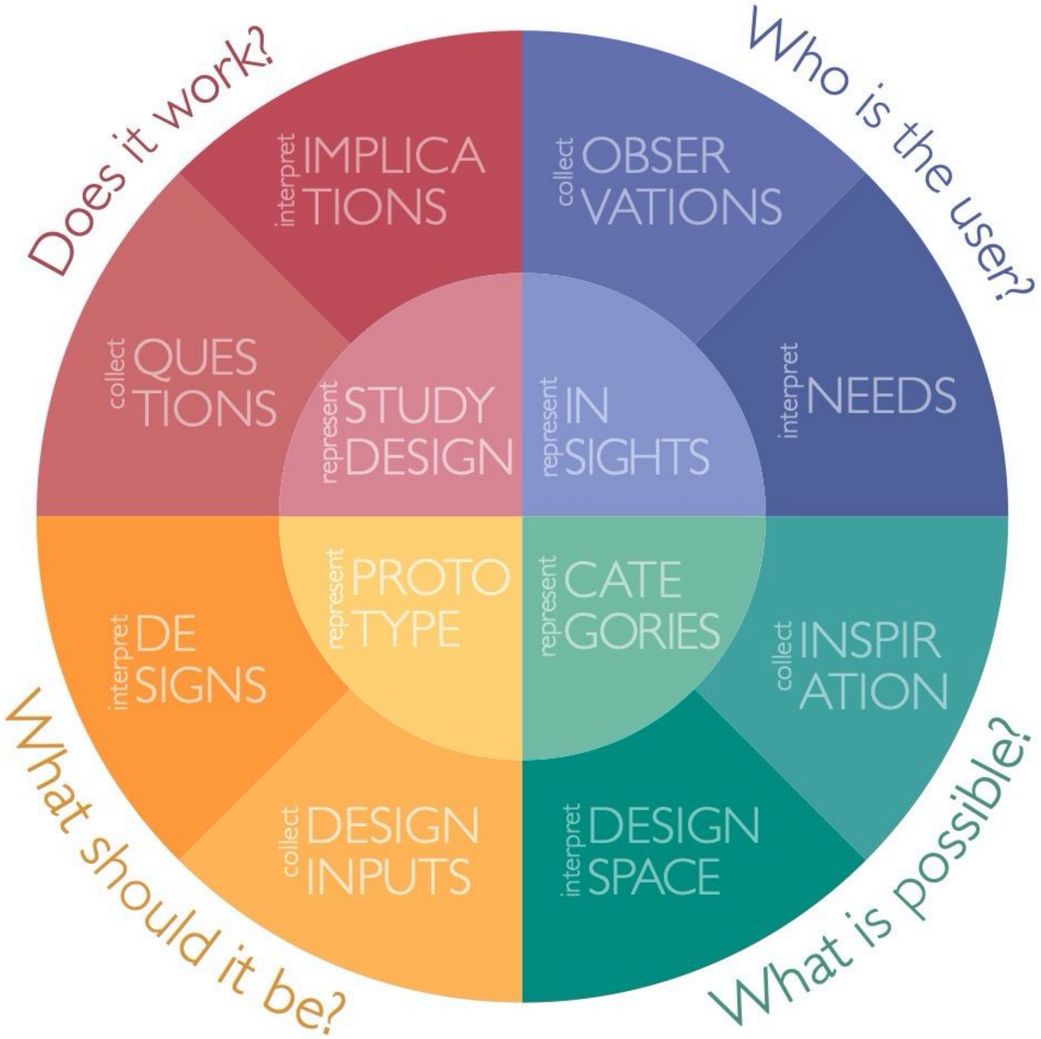
Key activities

Collect information

Represent with artifacts

Interpret the results

- Identify problems, needs, opportunities
- List requirements and critical points



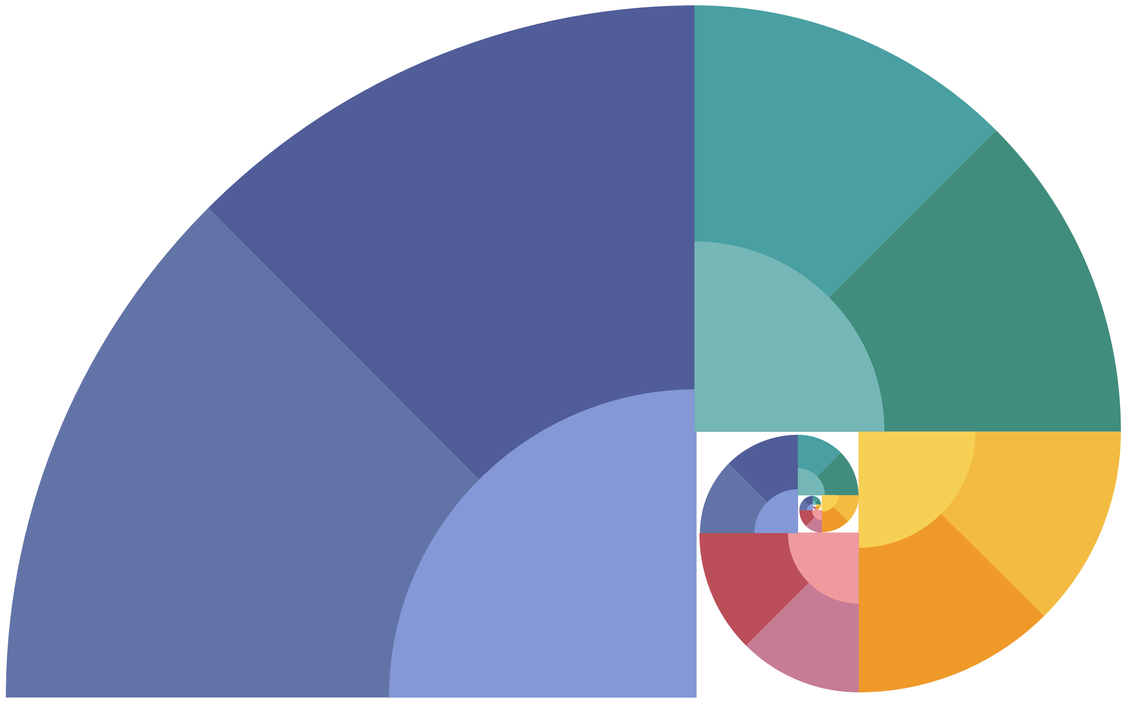
Generative design

Key activities

Collect information

Represent with artifacts

Interpret the results



Socio-technical principles

Socio-technical principles

Situated Action

Rhythms & Routines

Selective Attention

Reciprocal Co-adaptation

Distributed Cognition

Socio-technical principles

Situated Action	Beyond planning
Rhythms & Routines	Identify use patterns
Selective Attention	Consider the periphery
Reciprocal Co-adaptation	Re-interpret use
Distributed Cognition	Reduce cognitive load

Users modify their planned activities in new, unforeseen circumstances

Users establish routines and spatial patterns based circadian and external influences

Users vary their attention and shift between focus and the periphery

Users both learn and customize systems, while systems adapt to their behavior

Users rely on other people and objects “outside the head” to remember or communicate

Social scientists conduct studies of users
and provide deep insights

as **socio-technical principles**

that describe how people interact with
technology in context

But ...
abstract principles are hard to translate
into specific designs

Socio-technical principles

Implications for design

Dourish (2006)

Argument

Social scientists should not try to
generalize from specific field studies
to create general implications for design

Counter-argument

HCI can bring social science insights
to bear on specific design artifacts
to enhance and explore the design space

Socio-technical principles

Reflecting on sticky notes

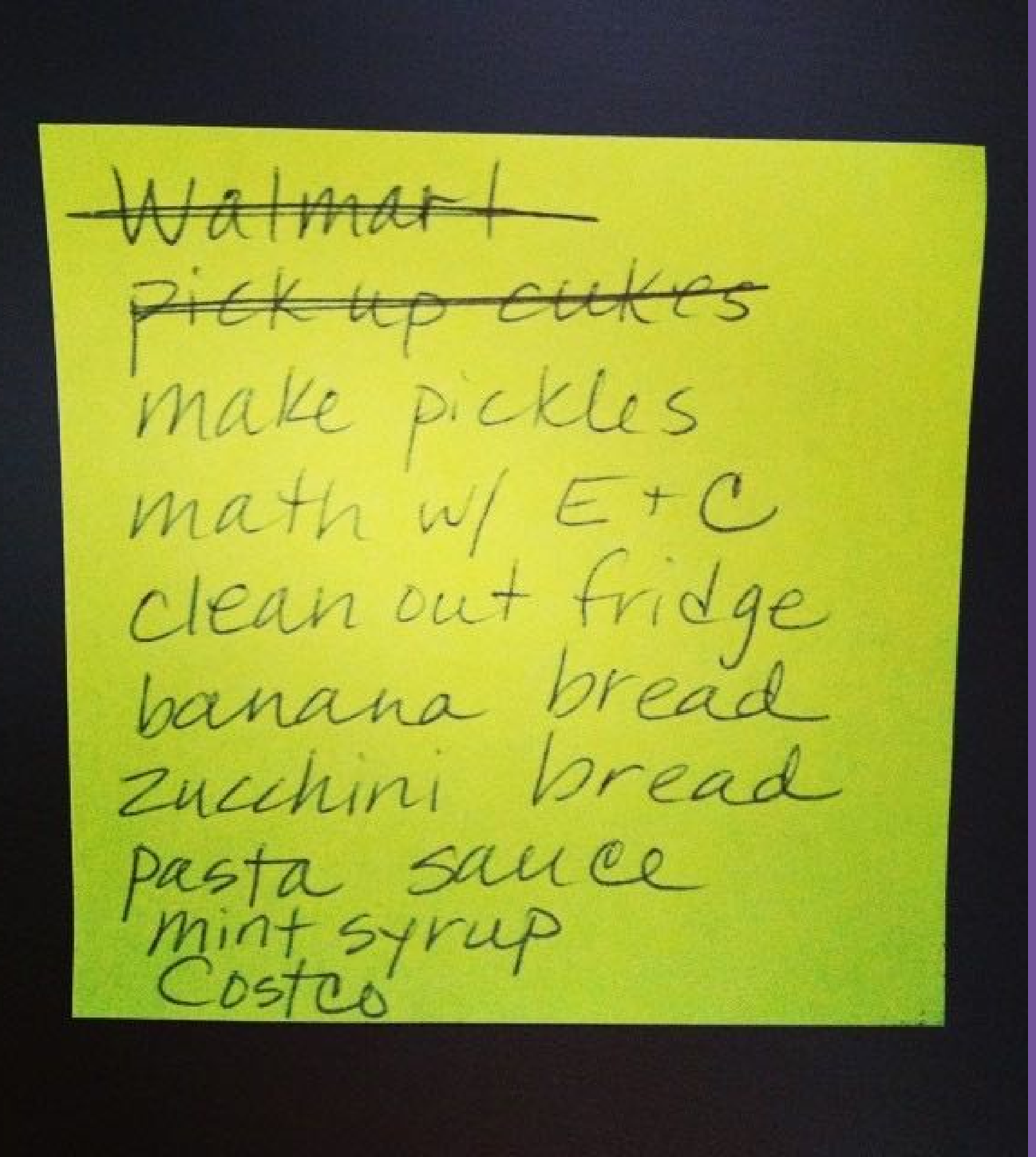
What are sticky notes?

What are they used for?

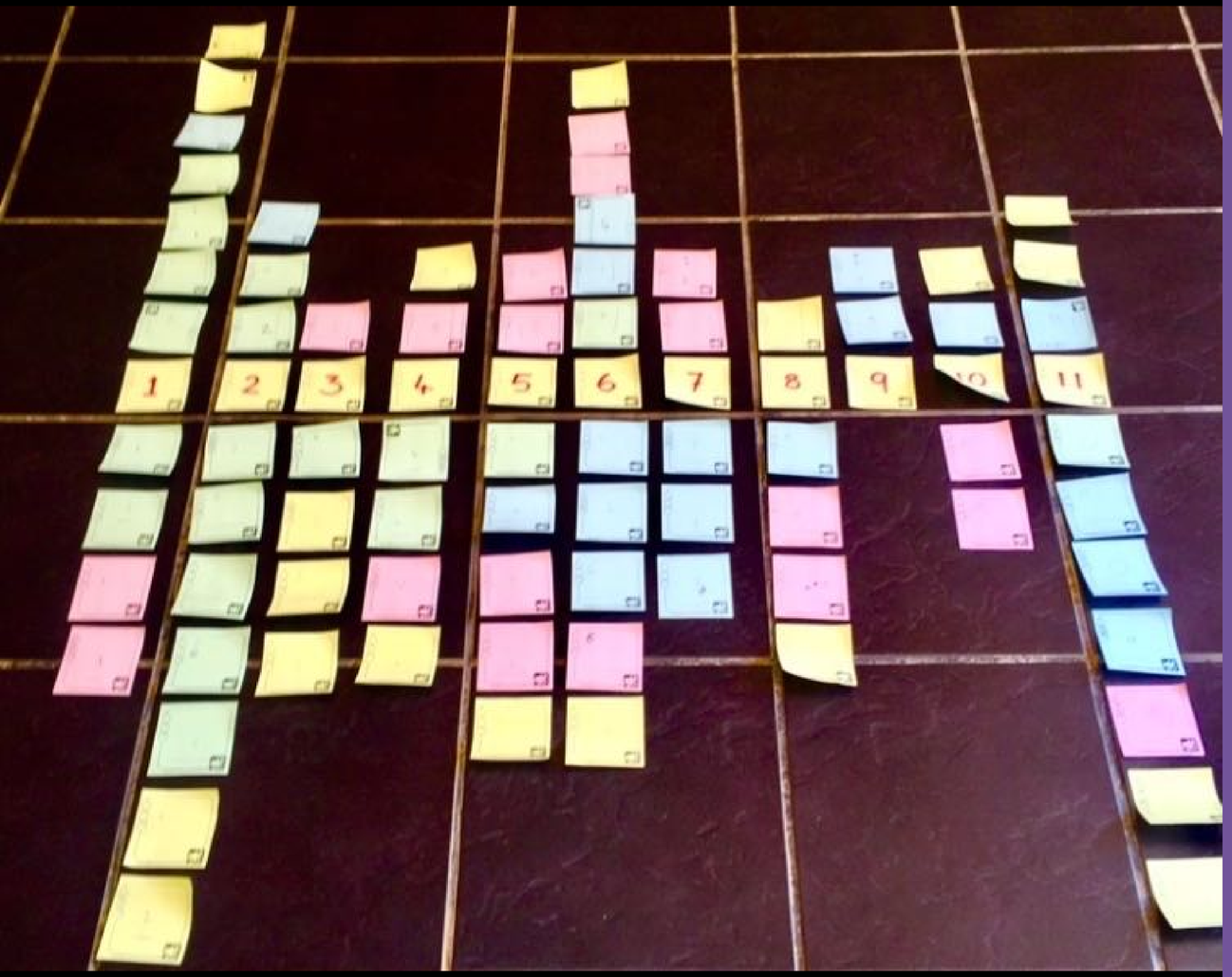
What are their most important properties?

Why do they work?

Have you seen any creative uses of sticky notes?


~~Walmart~~
~~Pick up cukes~~
make pickles
math w/ E+C
clean out fridge
banana bread
Zucchini bread
pasta sauce
mint syrup
Costco

Memory aid

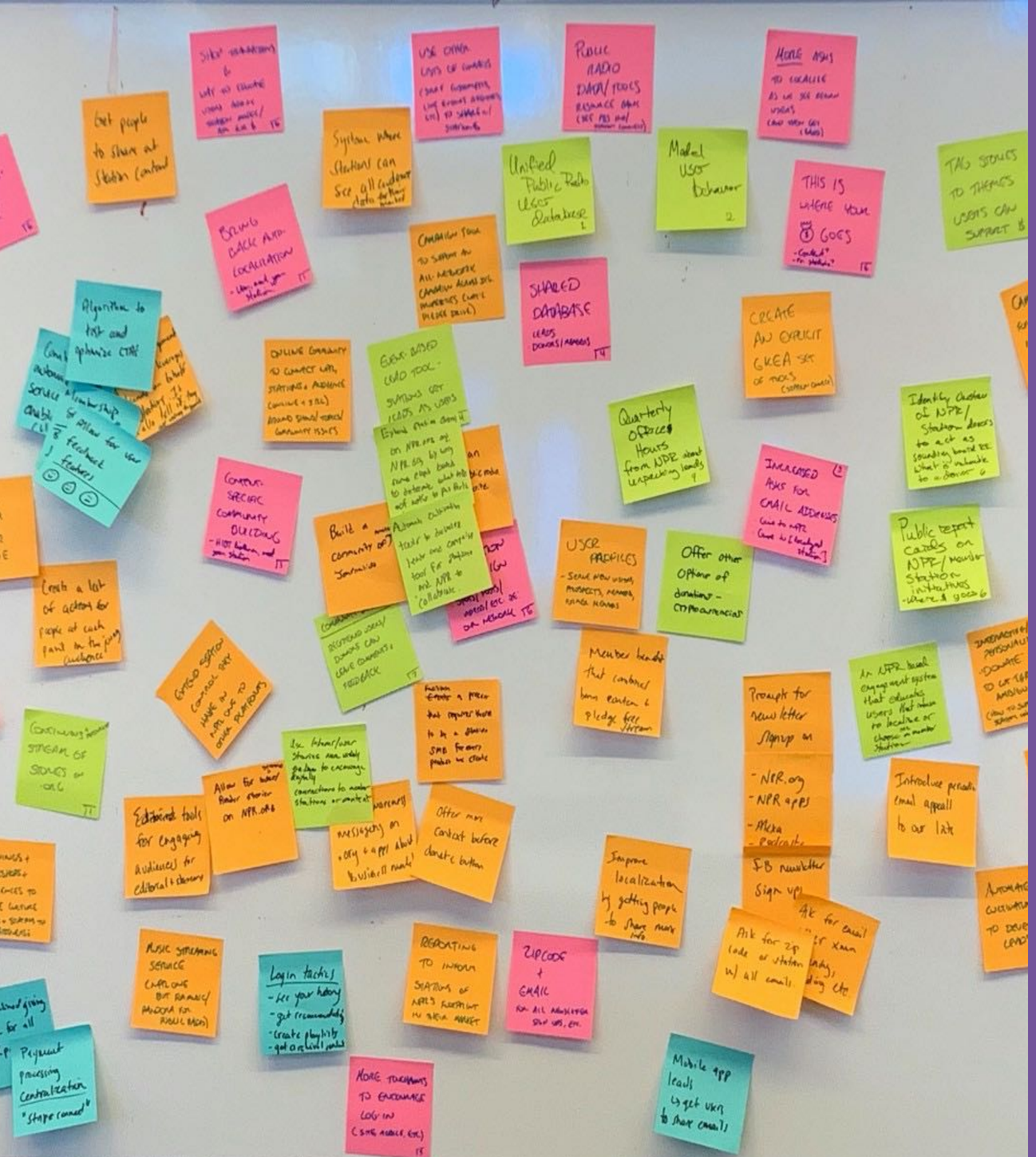


Planning

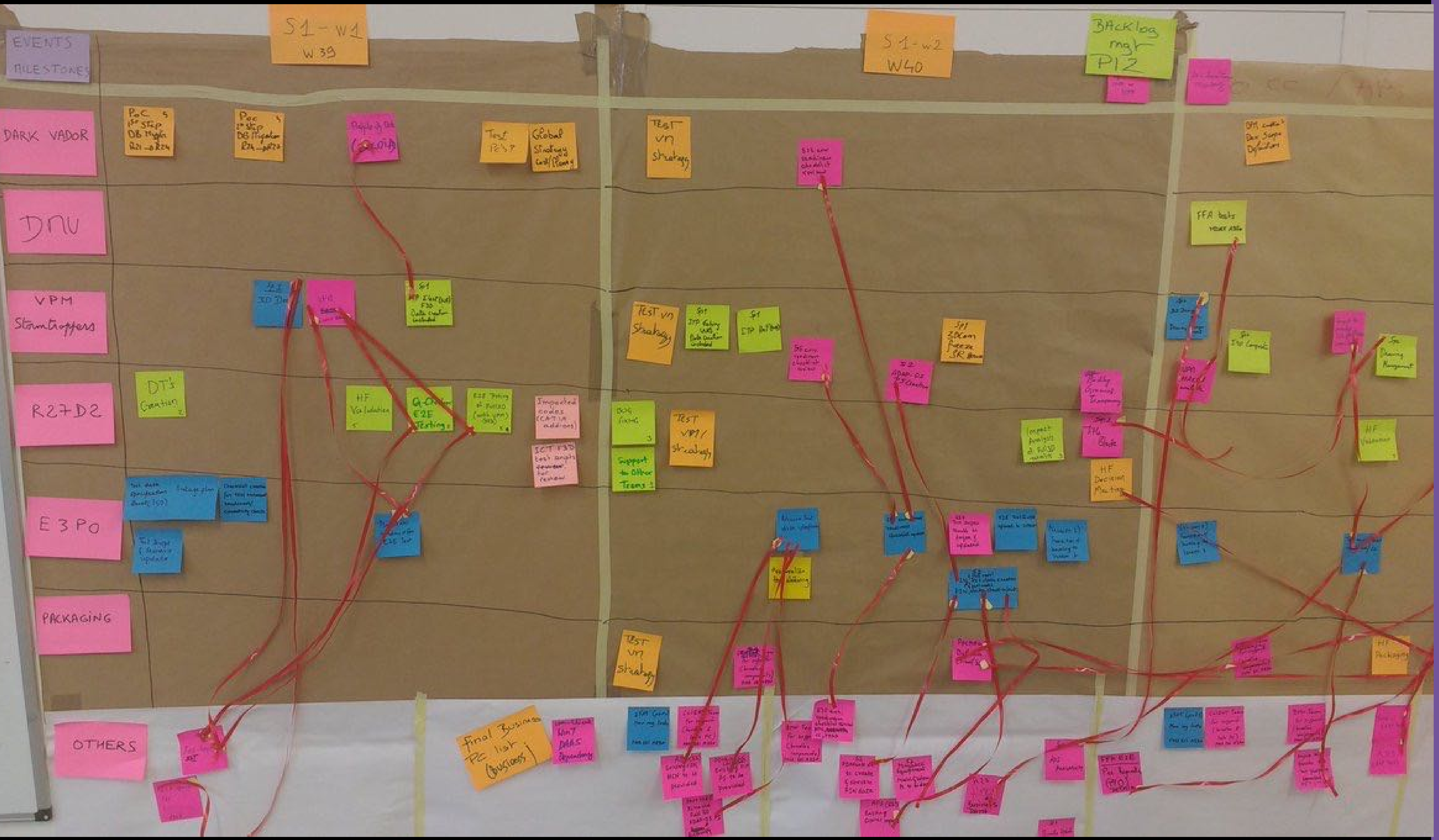

ORCHESTRA
A
B
C
D
E
F
G
H
J
K
L
113 112 111 110 109 108 107 106 105 104 103 102 101
114 113 112
114 113 112 111 110 109 108
103 102 101

Assigning

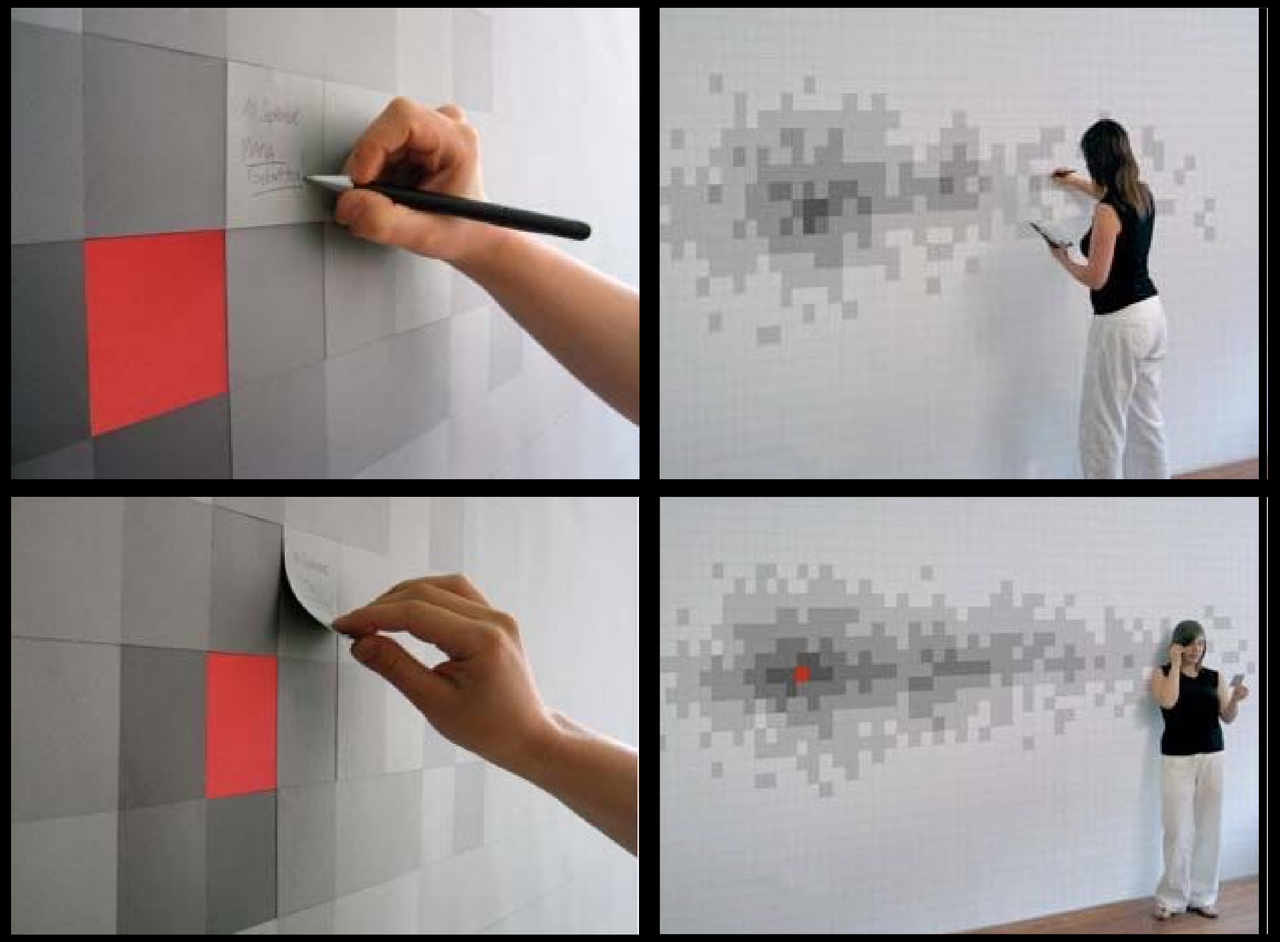
Organizing



Brainstorming


EVENTS
MILESTONES
S1 - W1
W39
S1 - W2
W40
BACKlog
mgr
PI2
DARK VADOR
DNU
VPM
Stormtroopers
R27D2
E3PO
PACKAGING
OTHERS

Tracking



Wall calendar

Sticky mania

Socio-technical principles

Situated Action

Rhythms & Routines

Selective Attention

Reciprocal Co-adaptation

Distributed Cognition

Hutchins, 1995

Distributed cognition

Distributed Cognition

Overview

Not all cognition is located in the brain
    We take advantage of the physical environment and other people

Physical objects form part of our memory
    if we know where to find it,
    we can forget it

Objects may be shared among people
    but different people may have different interpretations of the same object

Distributed Cognition

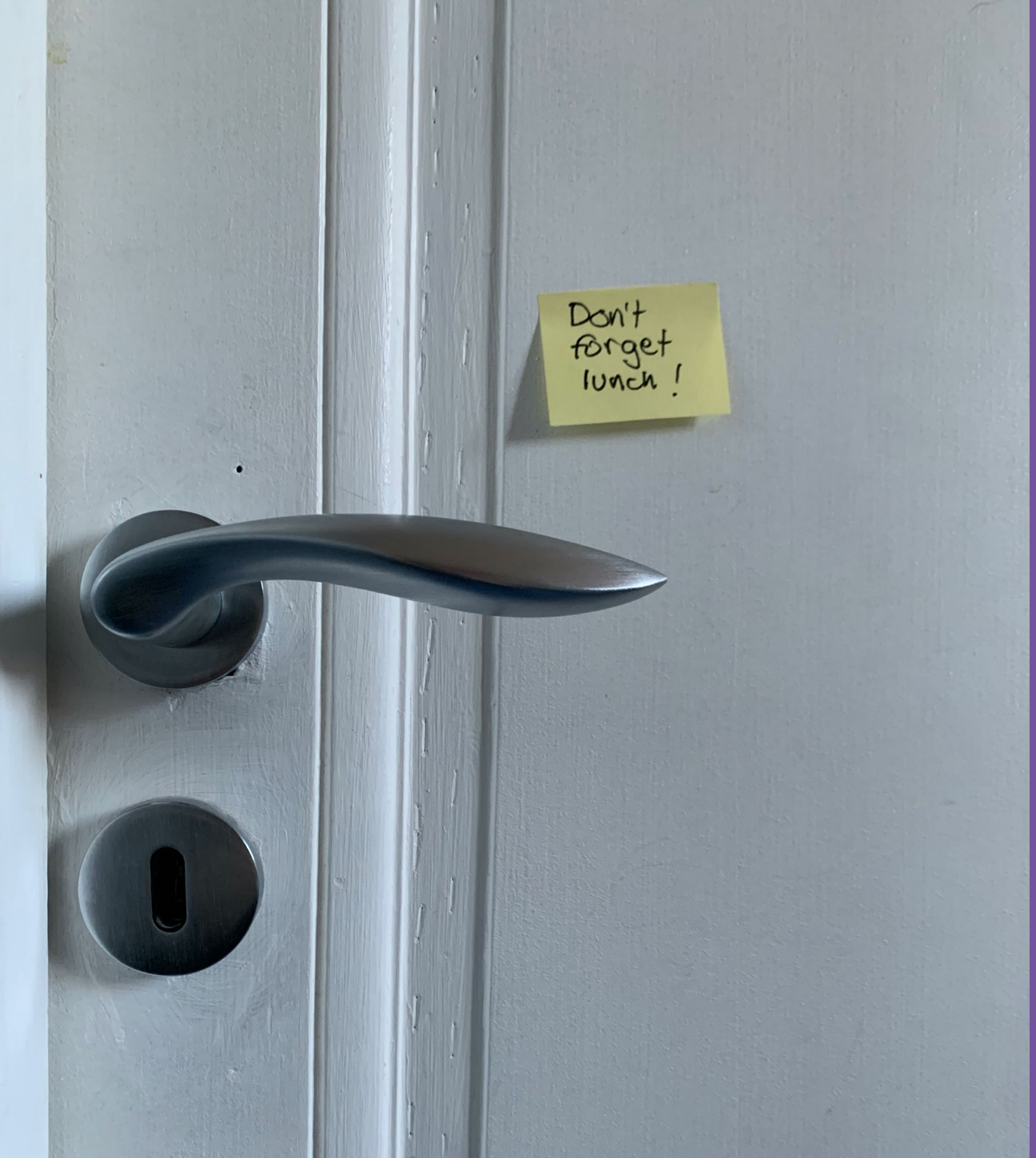
Principles

Memory aid

Writing it down lets us forget
until we need it

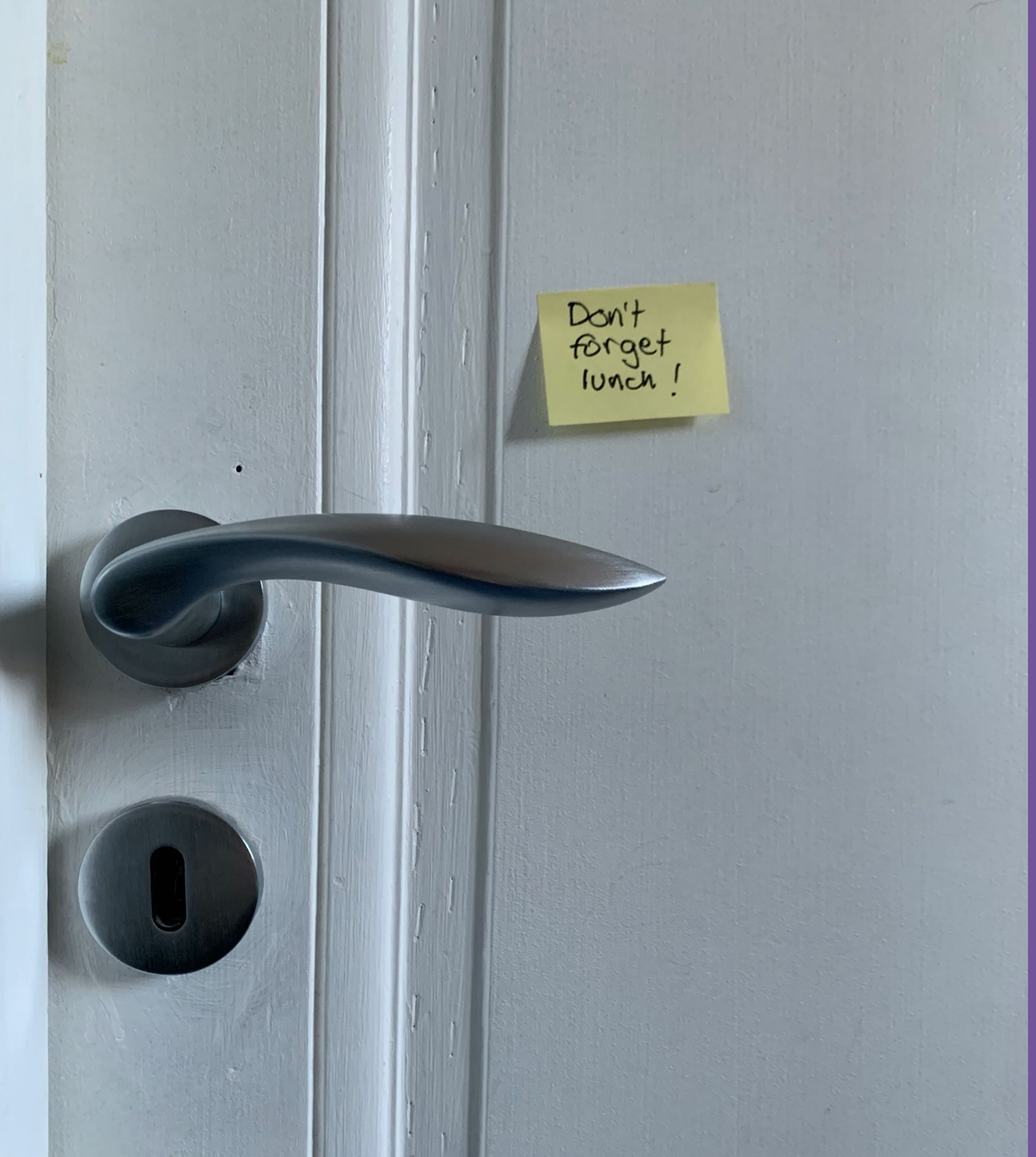
Boundary object

Different people interpret objects differently



Memory aid

We can leave physical objects where we know we will find them when we need them



Memory aid

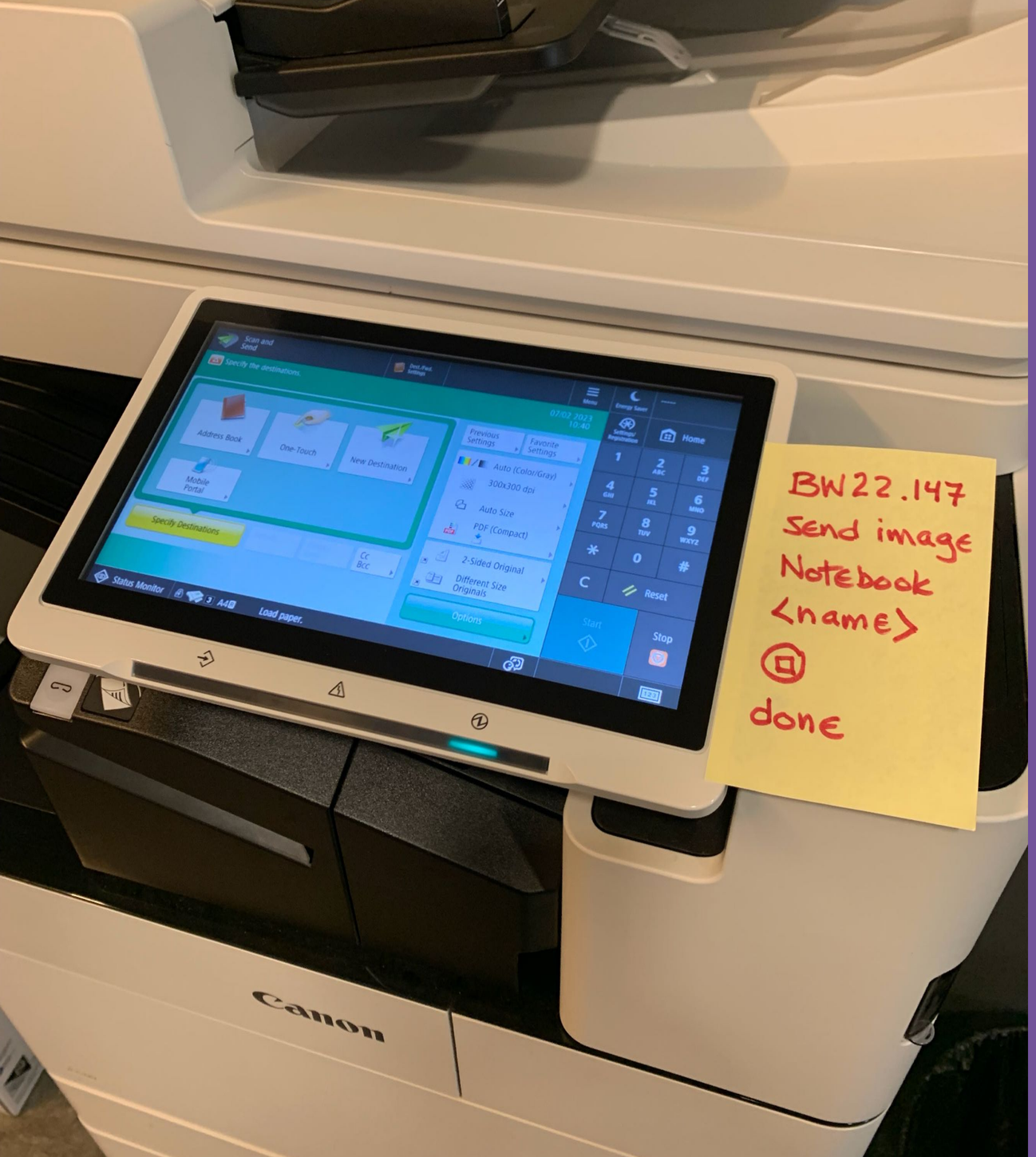
We can leave physical objects where we know we will find them when we need them

Problem:

Bob needs to remember to bring his lunch to work

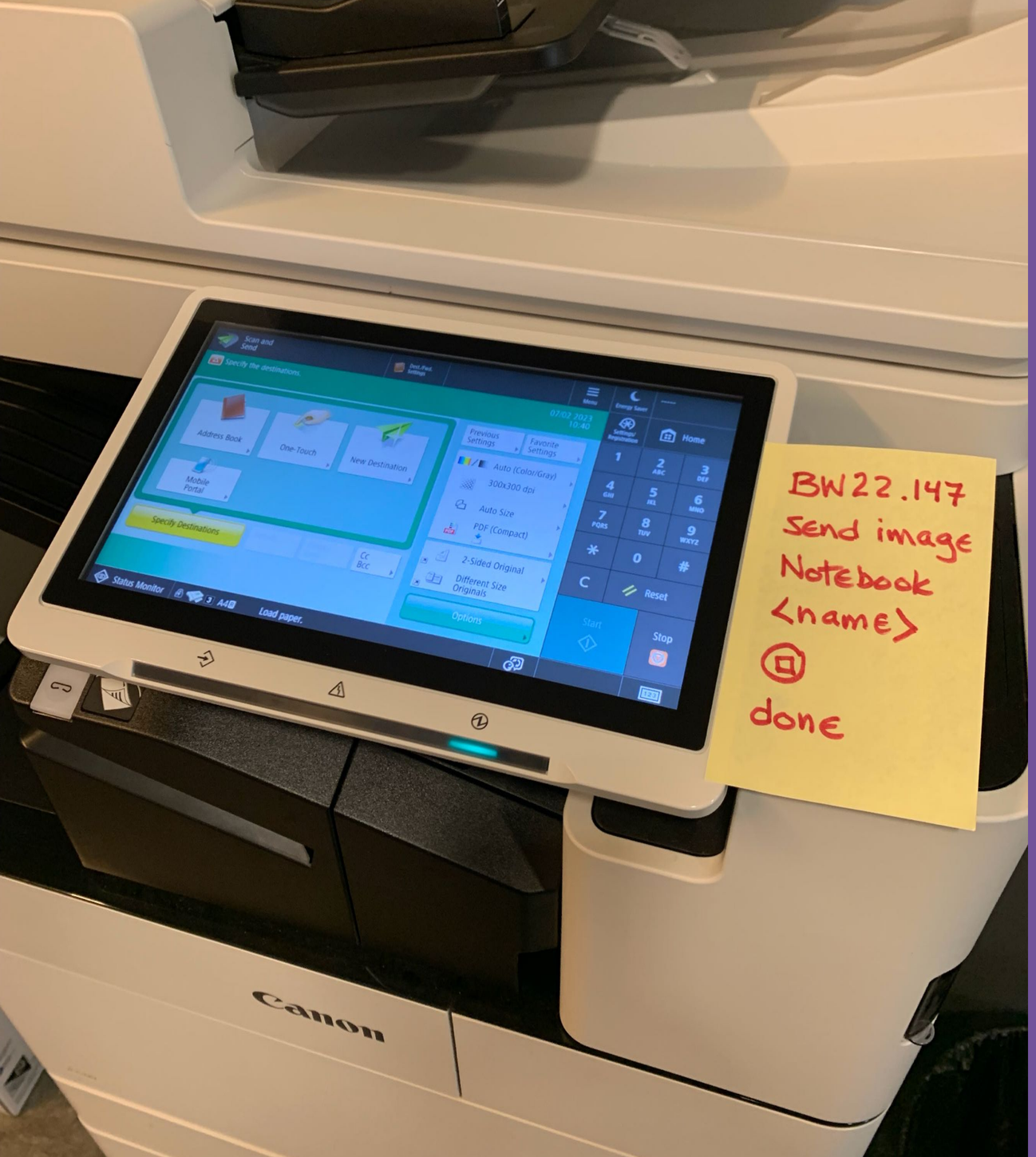
Solution:

Put a note next to the door handle so he'll see it as he leaves



Boundary object

Different people will interpret the same message differently,
based on their existing knowlege



Boundary object

Different people will interpret the same message differently,
based on their existing knowlege

Problem:

Leave a message for users to help them send and image from this printer

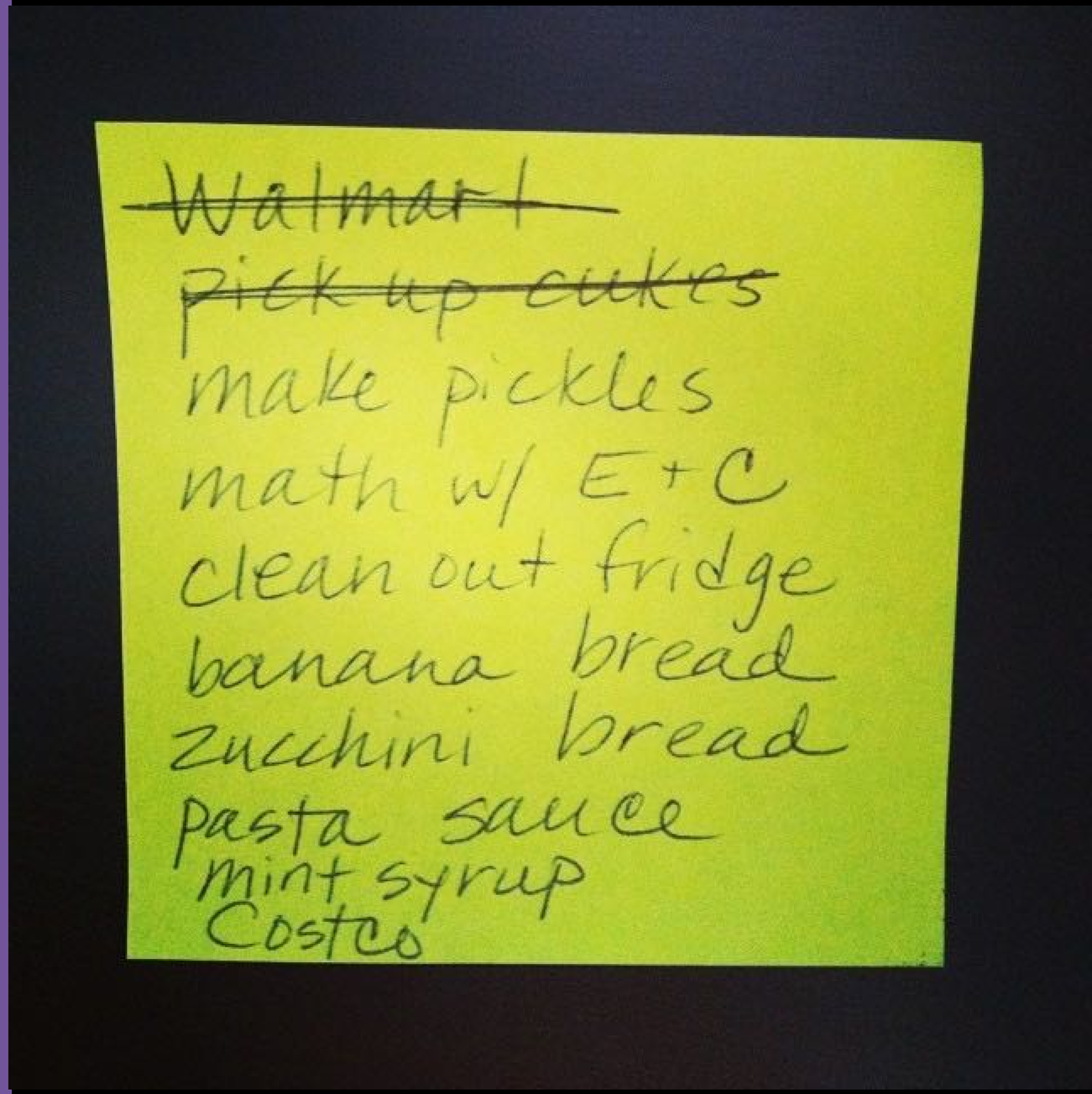
Solution:

Experts will understand how to use the “BW22.147” code and ignore the later steps

Novices will follow the steps
(but may be confused)

How do we incorporate
socio-technical principles
into the design process?

Memory aid


~~Walmart~~
~~Pick up cukes~~
make pickles
math w/ E+C
clean out fridge
banana bread
zucchini bread
pasta sauce
mint syrup
Costco

Process for applying
socio-technical principles
that inform the design process

Generative deconstruction

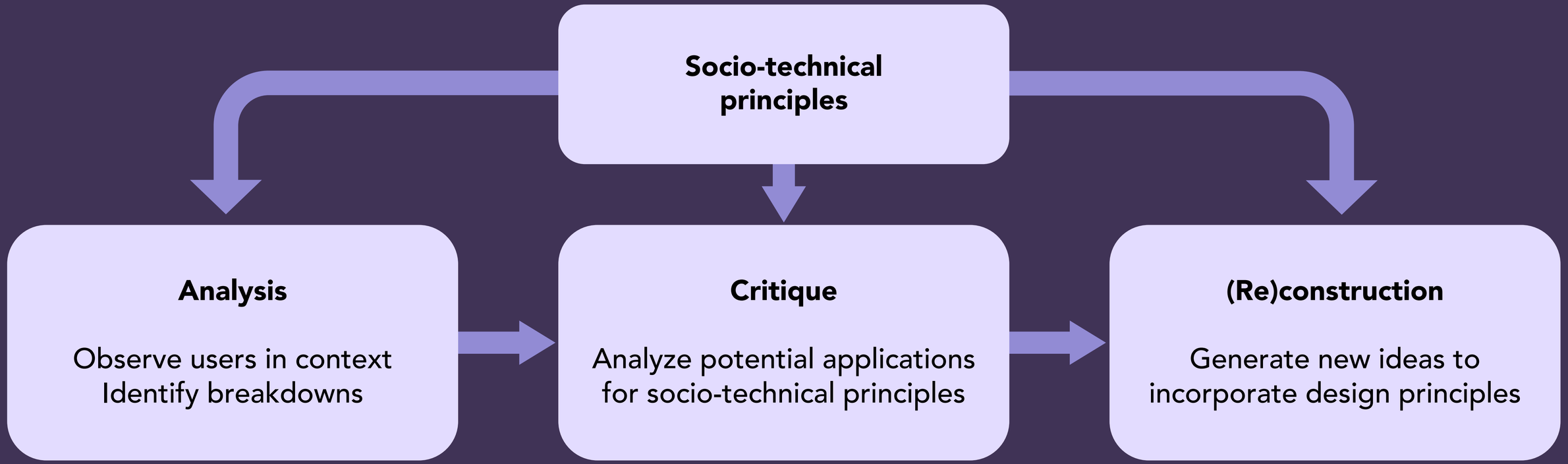
Observe users in order to:
to understand what to design
to evaluate what has been designed

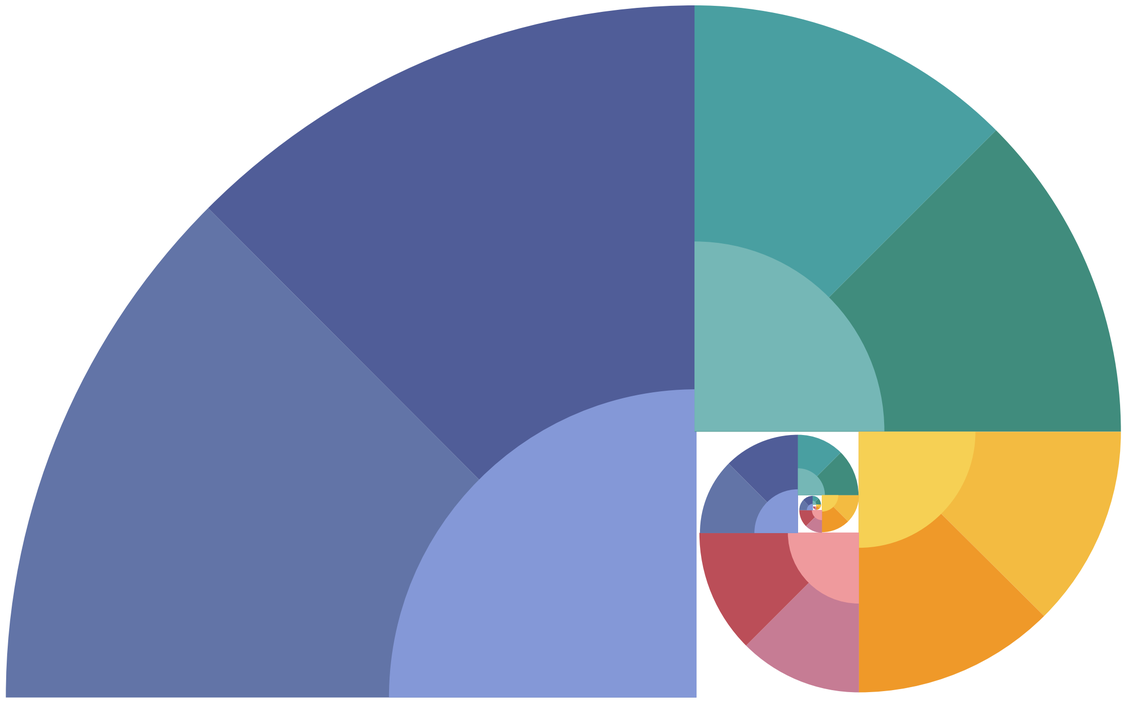
Deconstruct what is going on:
Who is the user?
What is the technology?
What is the user's context?
What is the interaction like?

Reconstruct the design
to design a new technology or
to fix an existing one

Generative deconstruction

Apply socio-technical principles to generate grounded designs





Generative walkthroughs

Generative walkthrough

Generative walkthrough

Design walkthrough

Systematic critique
of a design artifact

Generative walkthrough

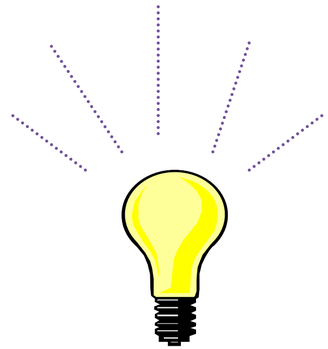
Design walkthrough

Systematic critique
of a design artifact

plus

Targeted brainstorming

Generate new ideas
based on a specific principle



Generative walkthrough

First deconstruct what users do:

- Who is the user?
- What is the technology?
- What is the user's context?
- What is the interaction like?

Then reconstruct the design:

- to design a new technology or
- to fix an existing one

Generative walkthrough

Play the full video prototype through once

Then, for each interaction snippet:

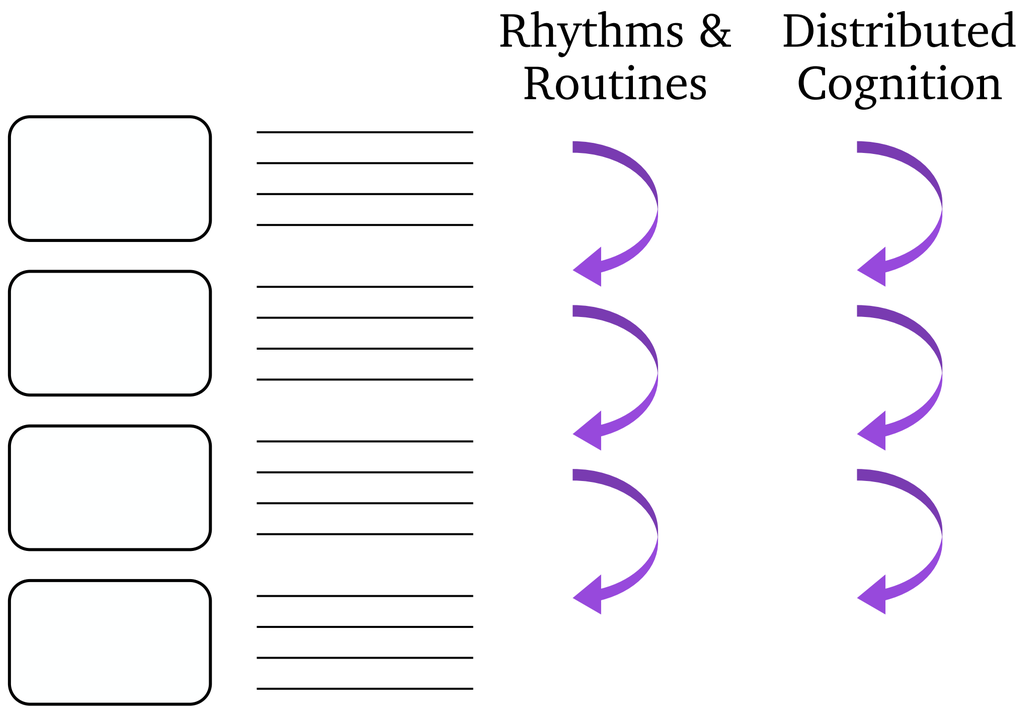
- Analyze it
  - Do the principles exist?
- Critique it:
  - What works well? What does not?
- Generate it:
  - Brainstorm new ways to apply the principle to the current interaction snippet

Generative walkthrough

Generative walkthrough

Analyze your video prototype

First, play the full video
Next, analyze each interaction snippet



Generative walkthrough

Example #12

List

Example 12. Generative Walkthrough Comments

Event 1: Using the magnifier lens
***Analysis*:** No evidence of distributed cognition.
***Critique*:** The magnifier does not really help remember anything, nor does it act differently for different users.
***Ideas*:** Let the user leave a trace of past uses of the magnifier, so they all pop up as needed. Consider sharing magnifiers associated with problem intersections with people who are unfamiliar with the area. (Locals will already know and will not need them.)

Master		Team		Due	

Generative Walkthrough

Redesign Worksheet

ACTIVITY Apply sociotechnical principles at each step of a story-based design artifact to identify problems and suggest novel design possibilities.

Presenter:		Scribe:	
Principle:			
	Interaction snippet	**Confusions or problems**	**Suggestions**
1			
2			
3			
4			

Generative walkthrough

Generative walkthrough

Advantages

Applies socio-technical principles to find problems and generate ideas

Trade-offs

Disadvantages

Requires minimal understanding of socio-technical principles

Generative walkthrough

Advice

Shoot video of a storyboard that shows how users would interact with the new system.

Caution!

Do not be afraid to shoot breakdowns,
they can inspire new ideas and solutions!

Remember to ...

shoot based on the storyboard
distinguish user interaction from pointing
include situations that push the limits of your design

Just do it!

Value diverse perspectives

Swap roles

Prepare activities in advance

Ensure everyone participates

Avoid “analysis paralysis”!

Stop arguing and sketch something

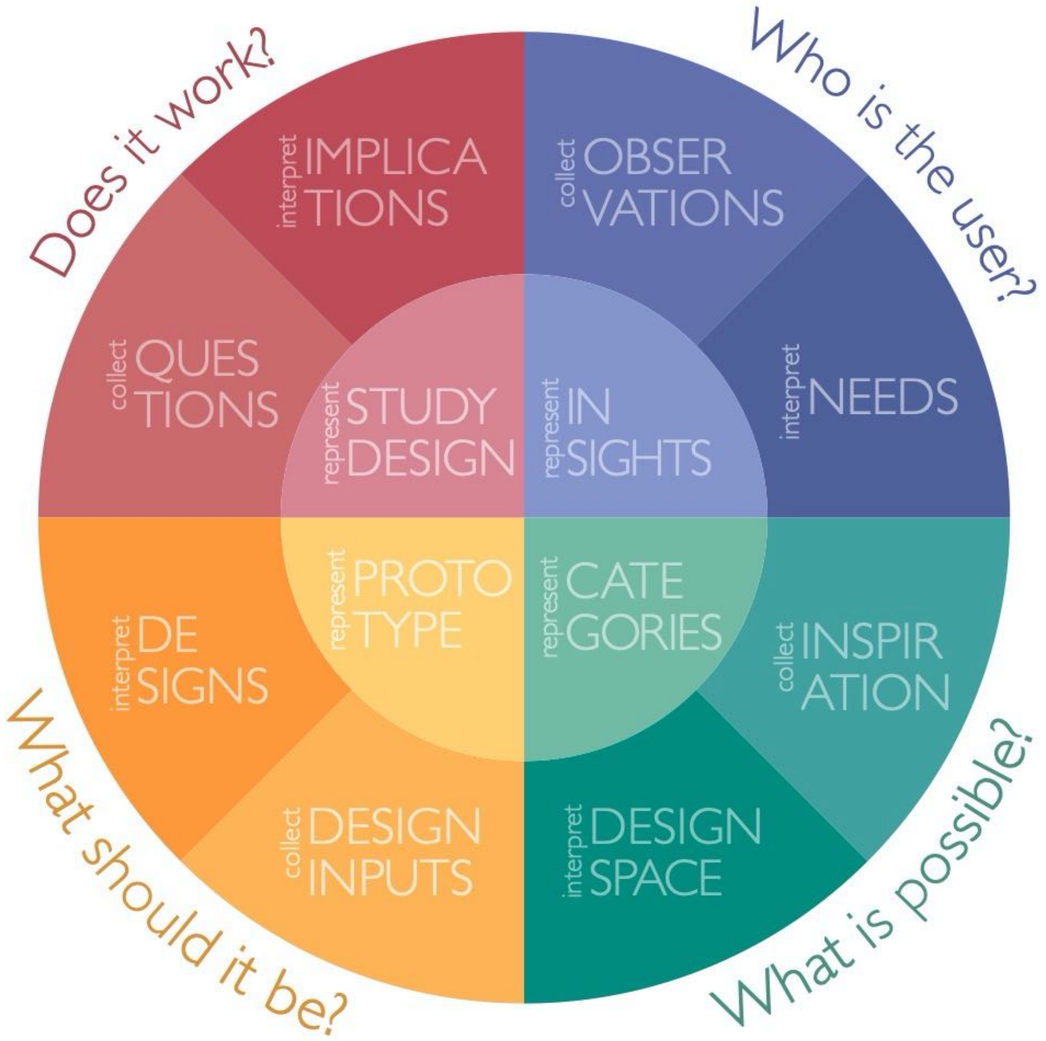
Avoid post-hoc video editing

Debrief at the end of every session

Schedule reflection time

Reuse your design artifacts

Design Interactive Things!



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