DESIGN OF INTERACTIVE SYSTEMS

13 OCTOBER 2027

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Inria

WELCOME

DESIGN OF INTERACTIVE SYSTEMS + TER

Lectures
Tuesday 13:45 - 17:15
Room D101

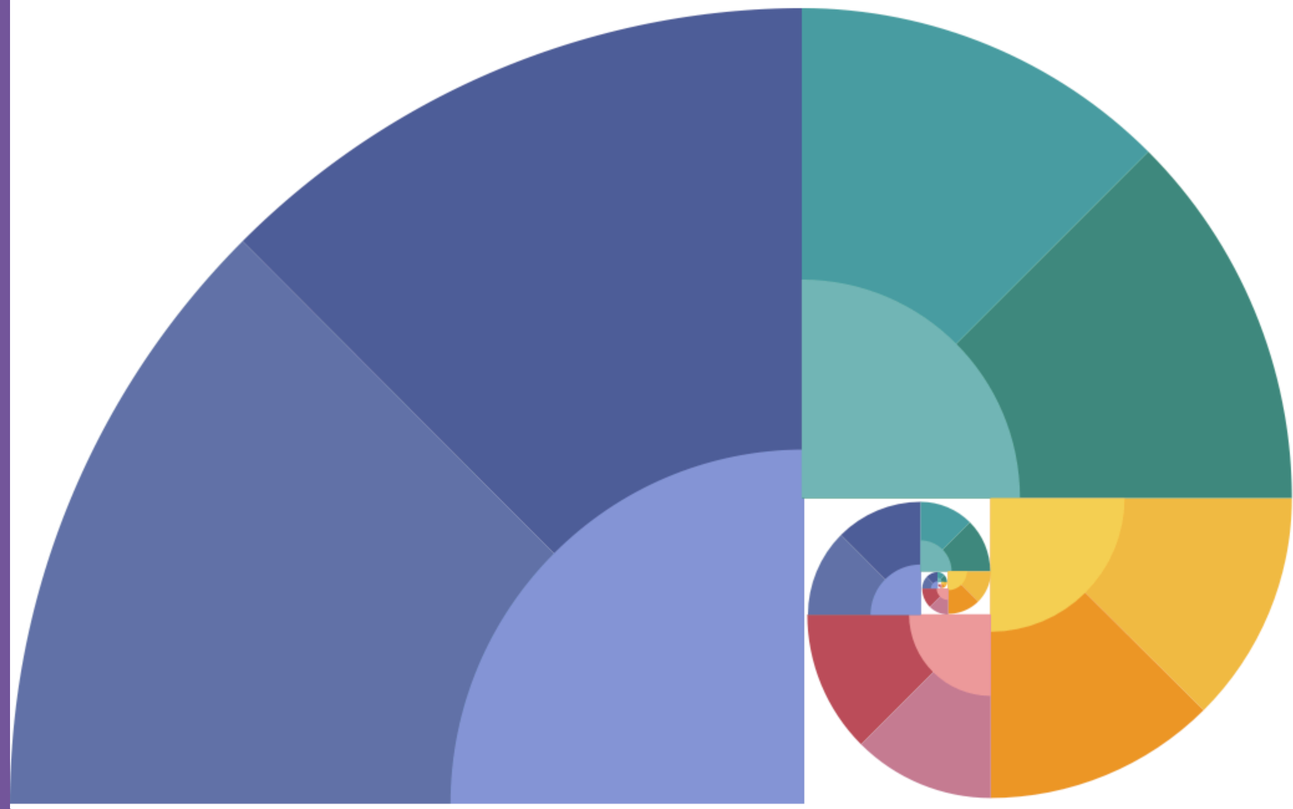
TER
Friday 13:30 - 17:00
Room E212

LECTURE 11

OVERVIEW

Category	Activity	Duration (min)	Start	End
~~Homework~~	~~Review Improvements based on PD WS~~	~~10~~	~~13:45~~	~~13:55~~
Lecture	Socio-technical Design	45	13:55	14:40
Exercise	Generative Walkthrough (a)	40	14:40	15:20
	BREAK	20	15:20	15:40
Exercise	Generative Walkthrough (b)	40	15:40	16:20
Lecture	Final Presentation	5	16:20	16:25
Homework	Improvements based on GWT	15	16:25	16:40

SOCIO-TECHNICAL PRINCIPLES



SOCIO-TECHNICAL PRINCIPLES

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

Rhythms &
Routines

Selective
Attention

Situated
Action

Distributed
Cognition

Reciprocal
Co-adaptation

What are sticky notes?

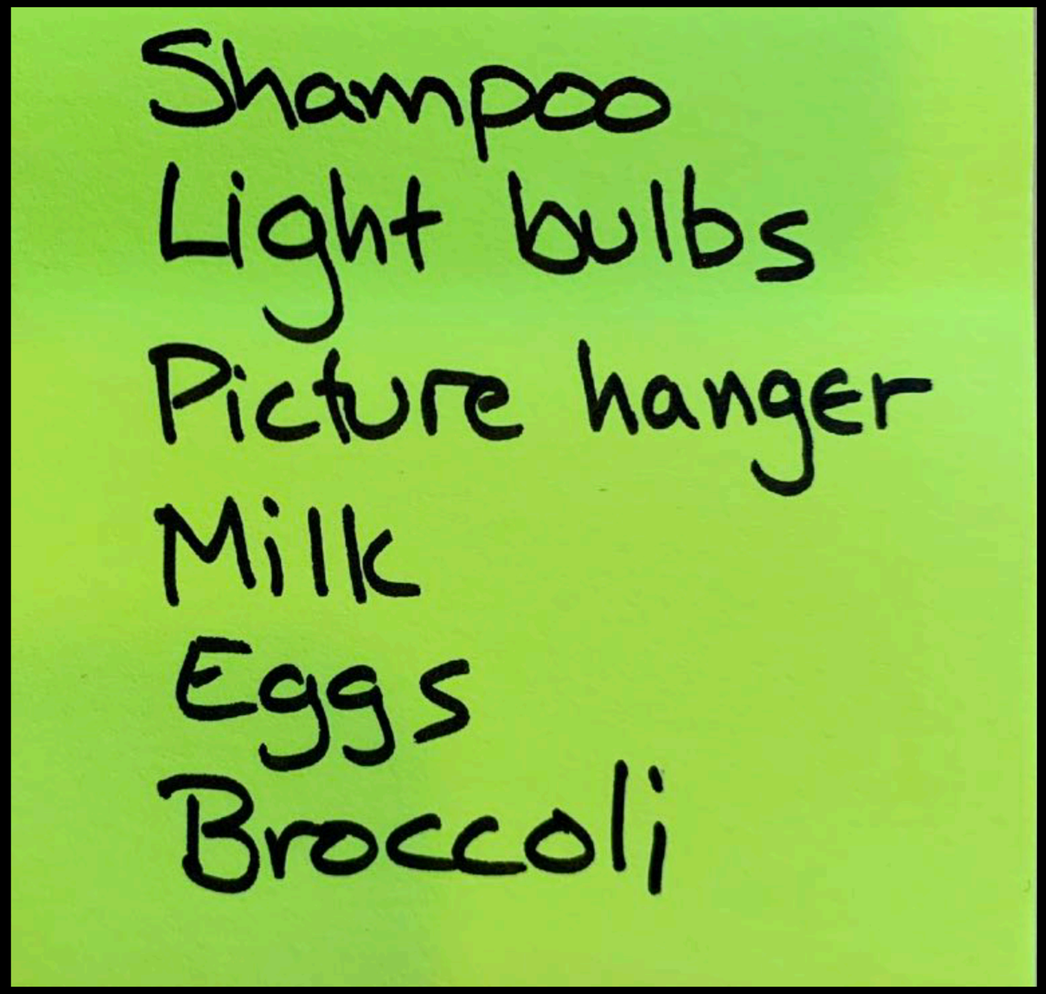
What are they used for?

What are their most important properties?

Why do they work?

Have you seen any creative uses of sticky notes?

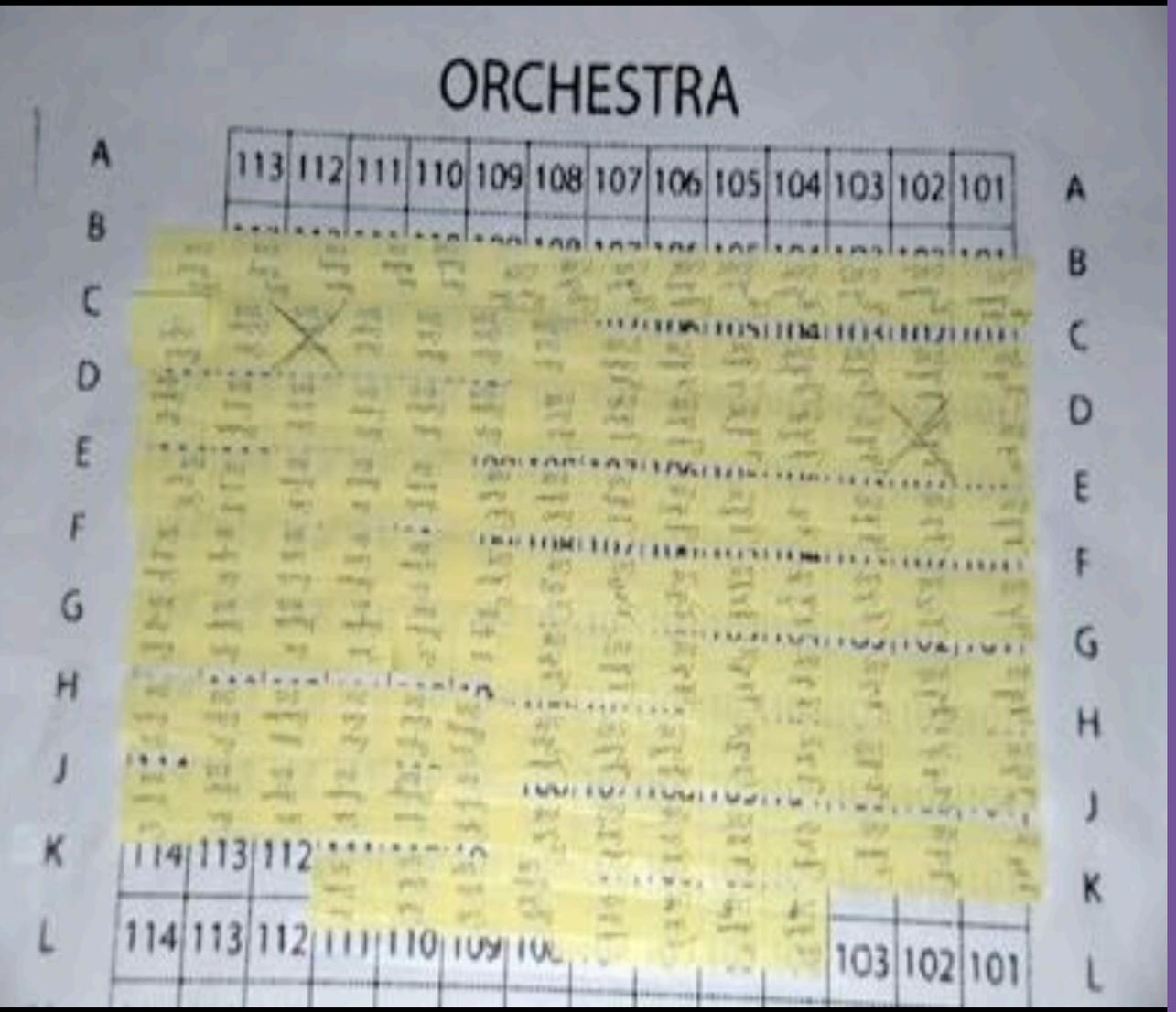
REFLECTING ON STICKY NOTES



REMINDING



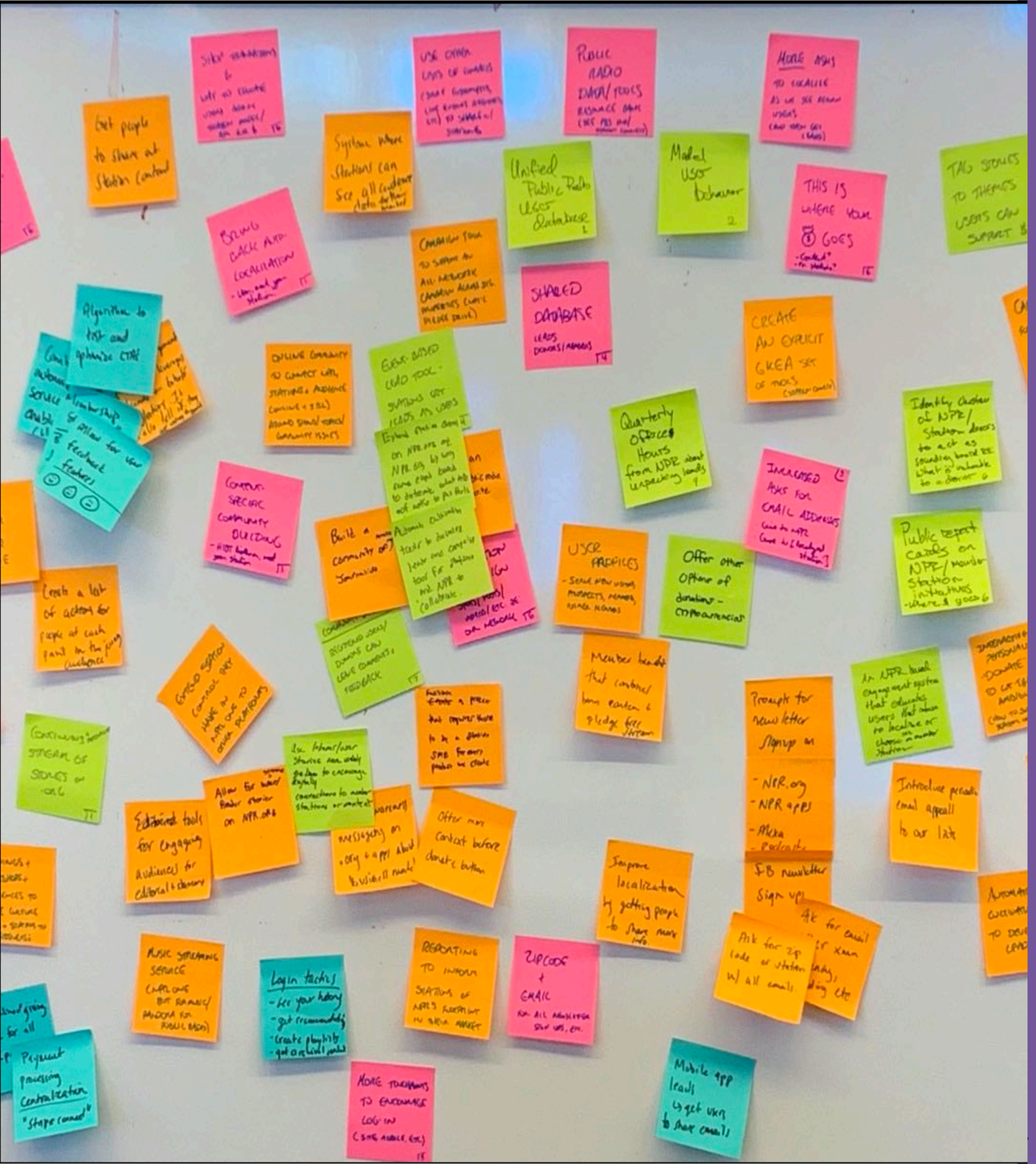
PLANNING


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
114 113 112 111 110 109 103 102 101

ASSIGNING



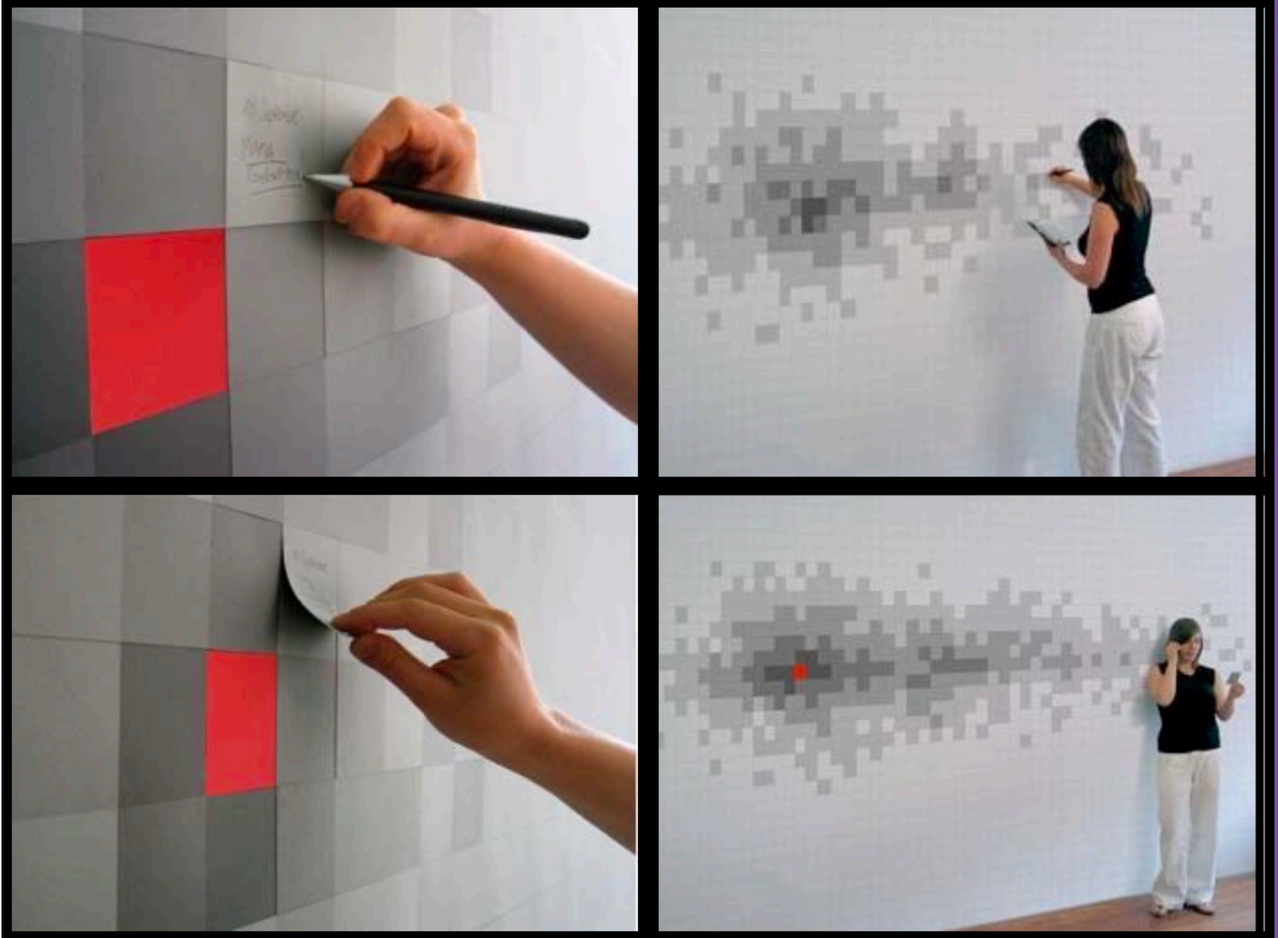
ORGANIZING



BRAINSTORMING


S1-W1
W39
S1-W2
W40
Backlog
mgt
PI2
EVENTS
MILESTONES
ARK VADOR
DMU
VPM
Showstoppers
R27D2
E3 P0
PACKAGING
OTHERS

TRACKING



WALL CALENDAR (!)



STICKY MANIA

RHYTHMS & ROUTINES

Lena Palen & Stinne Aaløkke, 2006

RHYTHMS & ROUTINES

Overview

People are strongly influenced
- by biological rhythms (circadian rhythms)
- Waking up and going to sleep
- Getting hungry

People also establish regular routines
- Going to class or work
- Eating at a particular time

How can we help users take advantage
- of existing rhythms and routines?

RHYTHMS & ROUTINES

Principles

Temporal rhythms

Identify which biological rhythms influence users behavior

Spatial rhythms

Identify which spatial layouts affect users behavior

TEMPORAL RHYTHMS

Situated reminders

Take advantage of human circadian rhythms to plan for future activity



TEMPORAL RHYTHMS

Situated reminders

Take advantage of human circadian rhythms to plan for future activity

Problem:

Ann needs to take her pills every morning

Solution:

Ann needs coffee to wake up in the morning
She places her pills next to the coffee machine

SPATIAL ROUTINES

Situated reminders

Context is important for remembering

Plan using knowledge of future activity

Place a reminder where you will find it at the appropriate time and place



SPATIAL ROUTINES

Situated reminders

Context is important for remembering

Plan using knowledge of future activity

Place a reminder where you will find it
at the appropriate time and place

Problem:

Jean wants let his son know that Tara called

Solution:

Place the message next to his son’s
usual seat at the dinner table

SELECTIVE ATTENTION

Michael Posner, 1988

SELECTIVE ATTENTION

Overview

Human perception involves both
focused and peripheral vision

Example: Vision

Central vision	see **color**, detail
Peripheral vision	see black & white
	see *movement*

Most interactive system designers assume
they have the user's full attention
but users multi-task and live in a complex world

How can we design to account for the periphery?

SELECTIVE ATTENTION

Principles

Peripheral awareness

Assume users will be distracted

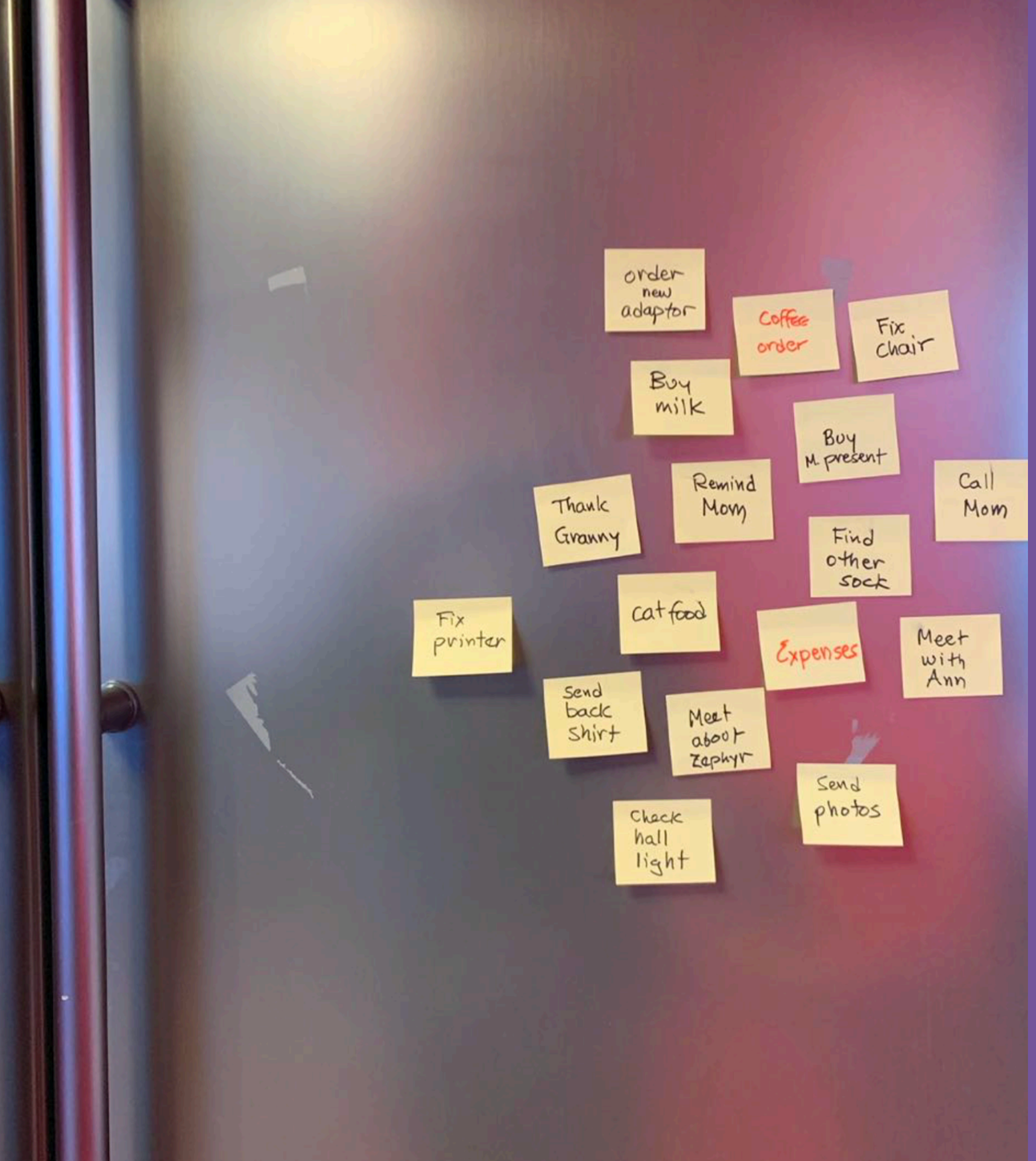
Let users take advantage of peripheral vision

SELECTIVE ATTENTION

Peripheral awareness

Where should we place items?

How can we use peripheral vision to track progress, without distracting us?



SELECTIVE ATTENTION

Peripheral awareness

Where should we place items?

How can we use peripheral vision to track progress, without distracting us?

Problem:

Paul puts his chores on post-it notes on the refrigerator.

Solution:

Paul stops procrastinating when he senses that the refrigerator door is “too yellow”

SITUATED ACTION

Lucy Suchman, 1986

SITUATED ACTION

Overview

We can plan our activities

but we always act within a real-world context

How can we take context into account?

What about interruptions?

What about breakdowns?

How can we give users flexibility

to adapt their plans

as the context changes?

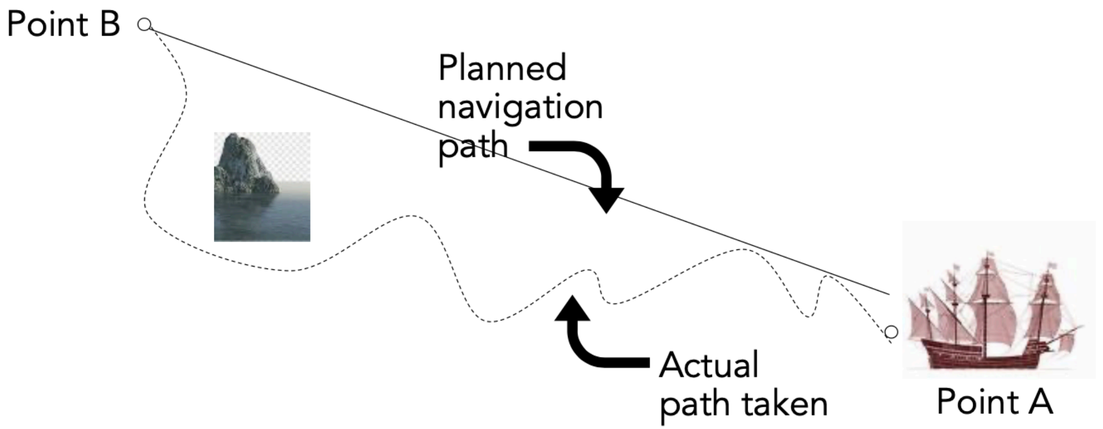
SITUATED ACTION

Principles

Emergent action

Identify which actions emerge when the user is in a specific situation

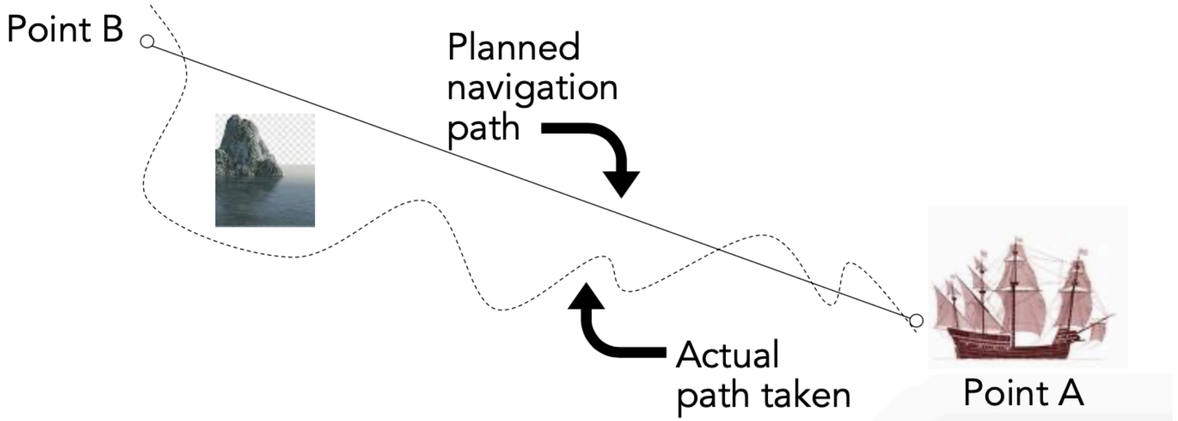
Consider relevant properties of the object or the environment



SITUATED ACTION

"The plan consisted of navigating
on a direct course
from point A to point B
including a small detour to avoid a rock.

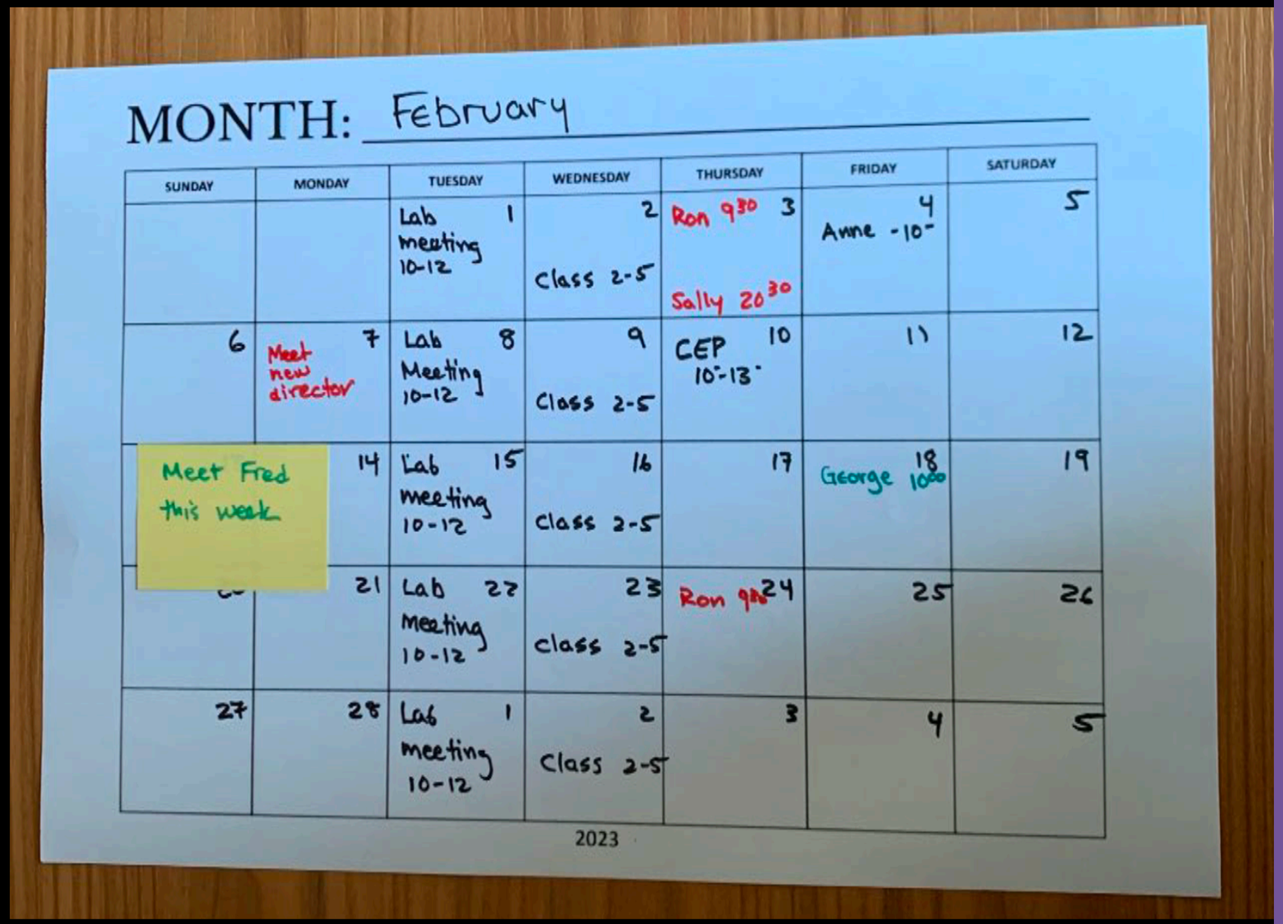
In reality, the course was an intricate
series of adjustments to circumstances
including changing wind,
water currants, drift, and
operator over-compensation."



EMERGENT ACTION

Planning for change

Paper calendars help plan future events
but ink is hard to change.
How can sticky notes help add flexibility?



EMERGENT ACTION

Planning for change

Paper calendars help plan future events
but ink is hard to change.
How can sticky notes help add flexibility?

Problem:

Sally wants to meet with Fred next week
but does not yet know when

Solution:

Place a sticky note at the beginning
of the week

DISTRIBUTED COGNITION

Ed Hutchins, 1995

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

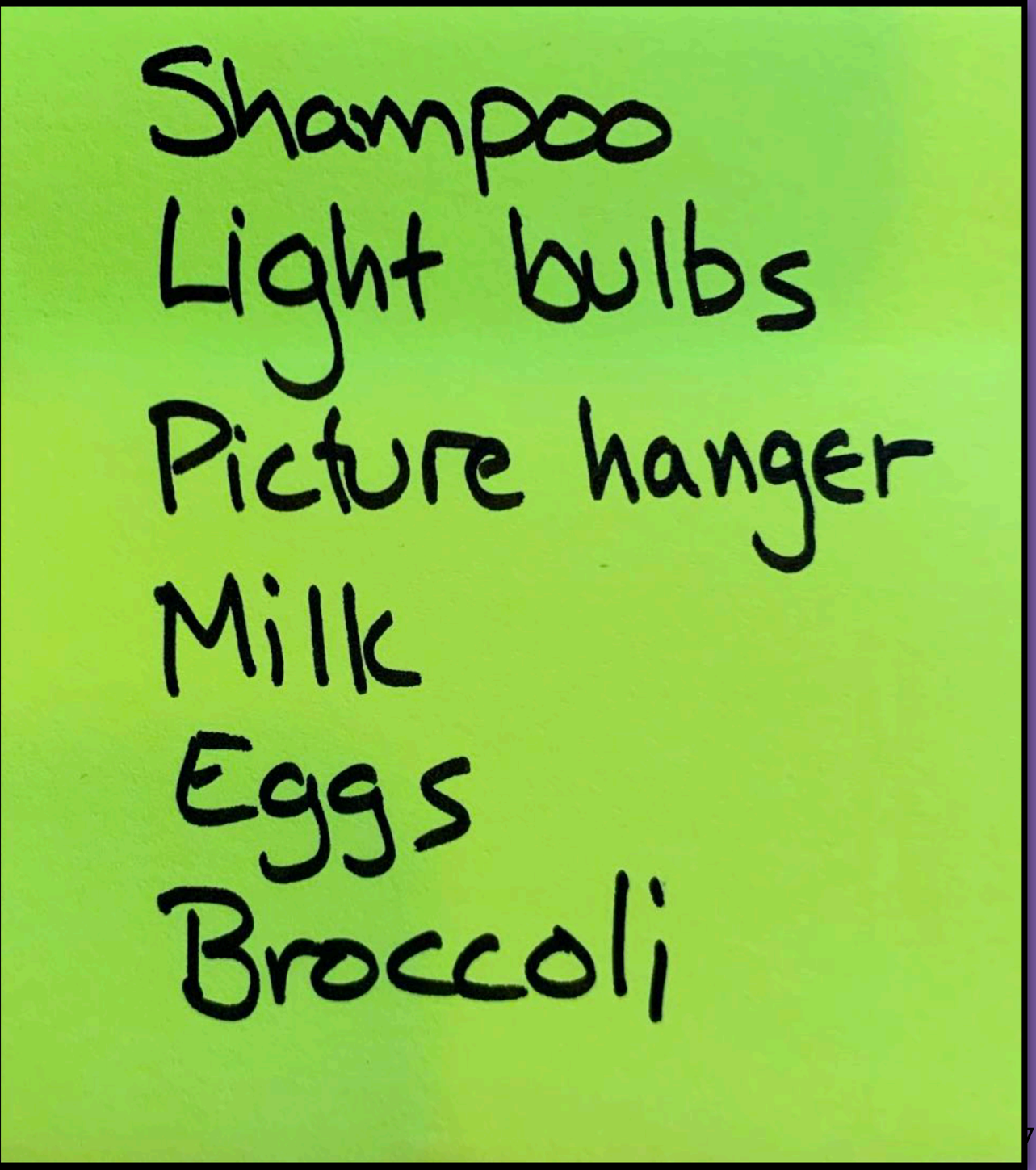
Principles

Memory aid

Writing it down lets us forget until we need it

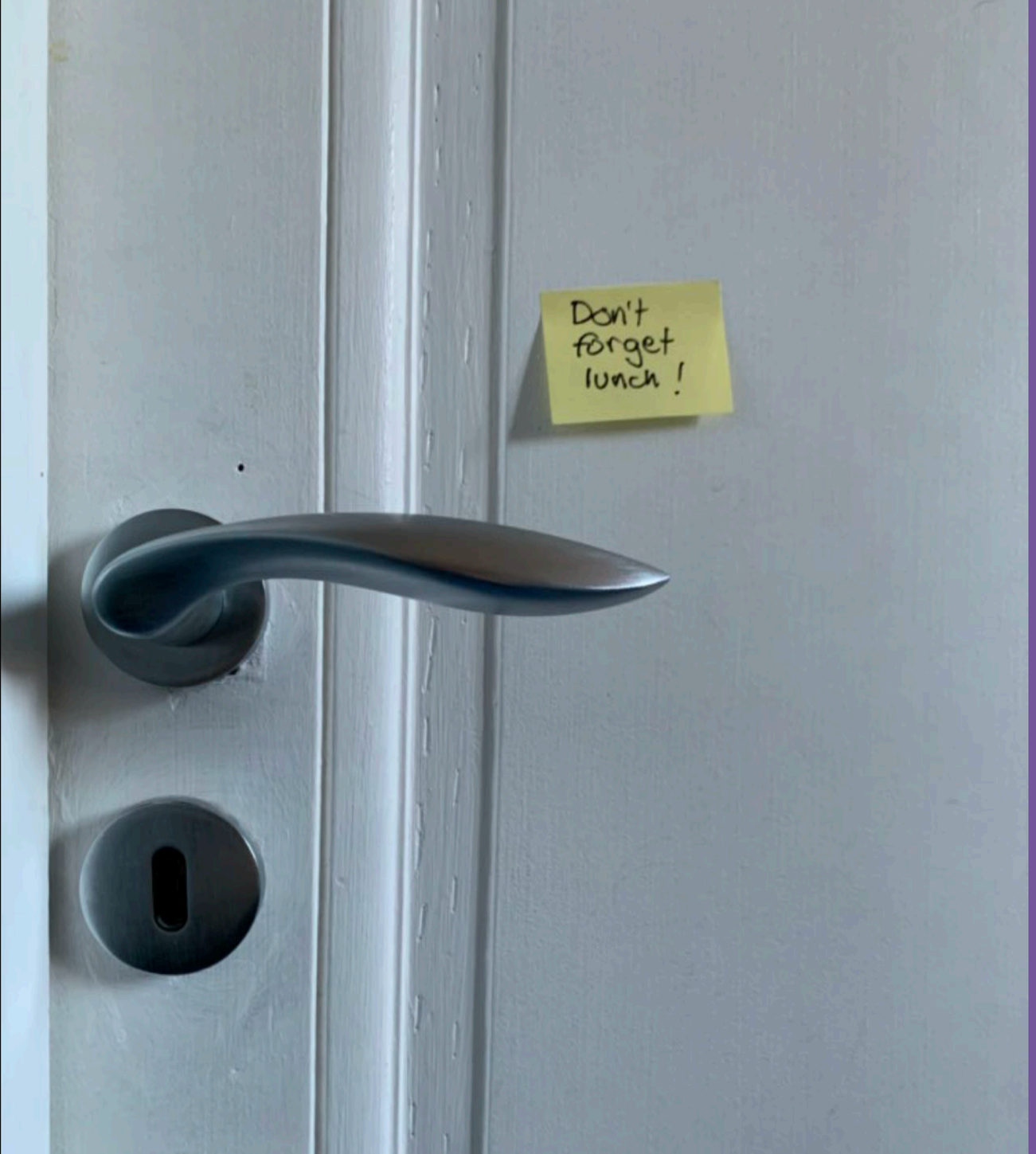
Boundary object

Different people



Memory aid

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



Memory aid

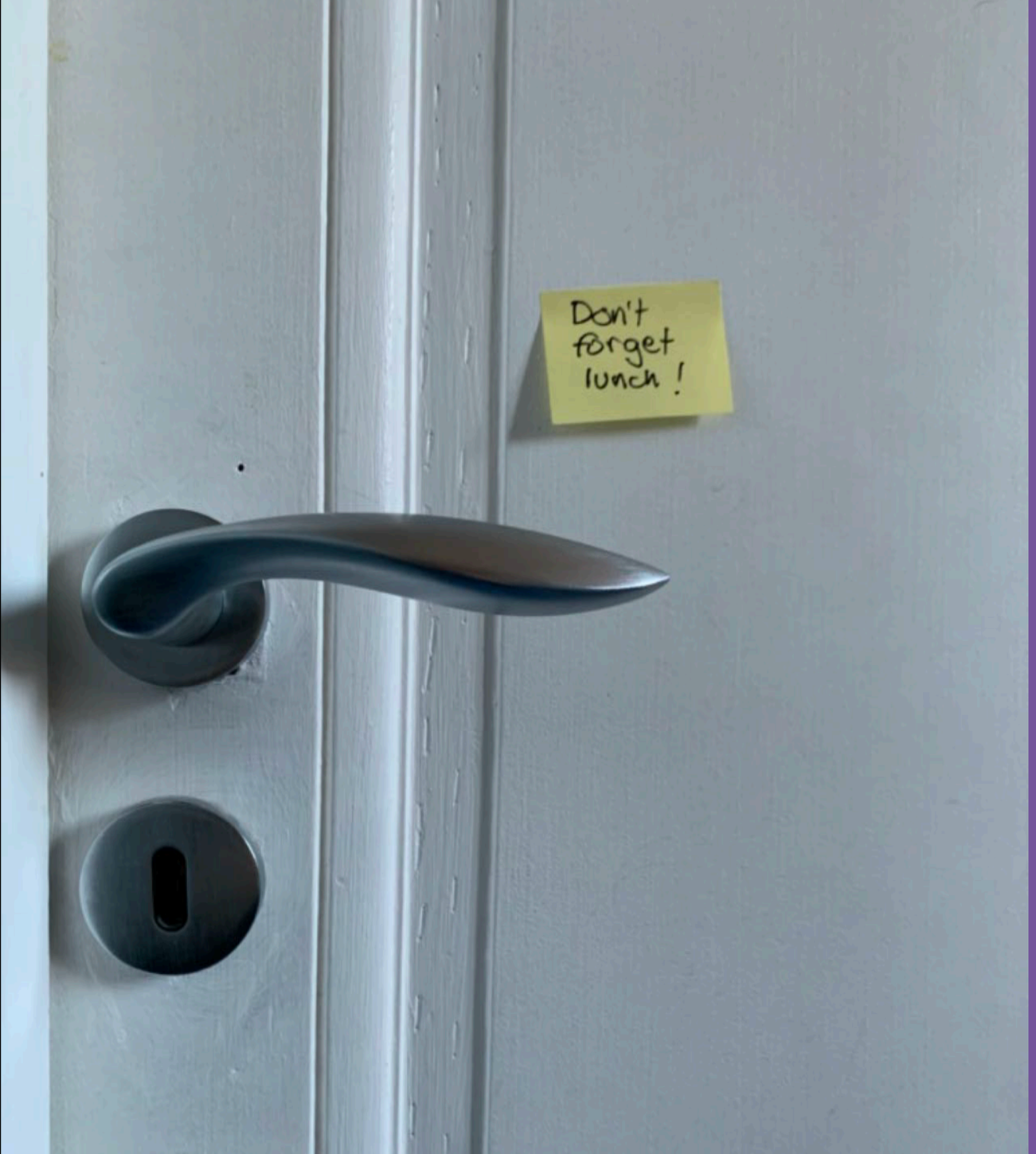
We can leave physical objects where we know
we will find them when we need them

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



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:

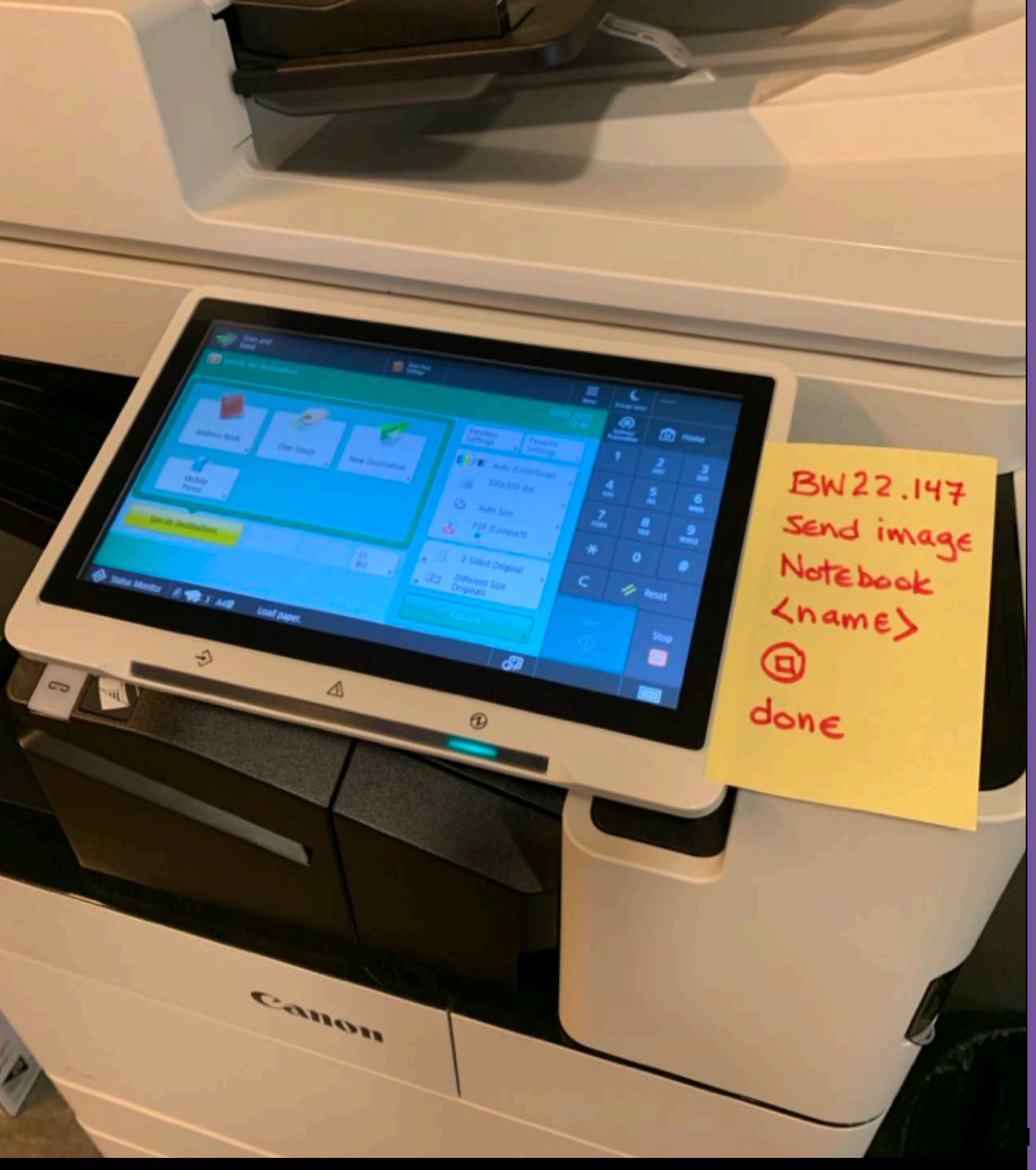
Put a note next to the door handle so he'll see it as he leaves

What other principles do you see?

Emergent action
Distributed cognition
Spatial routine
Temporal routine

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)

RECIPROCAL CO-ADAPTATION

Mackay, 2000

Beaudouin-Lafon et al., 2022

RECIPROCAL CO-ADAPTATION

Overview

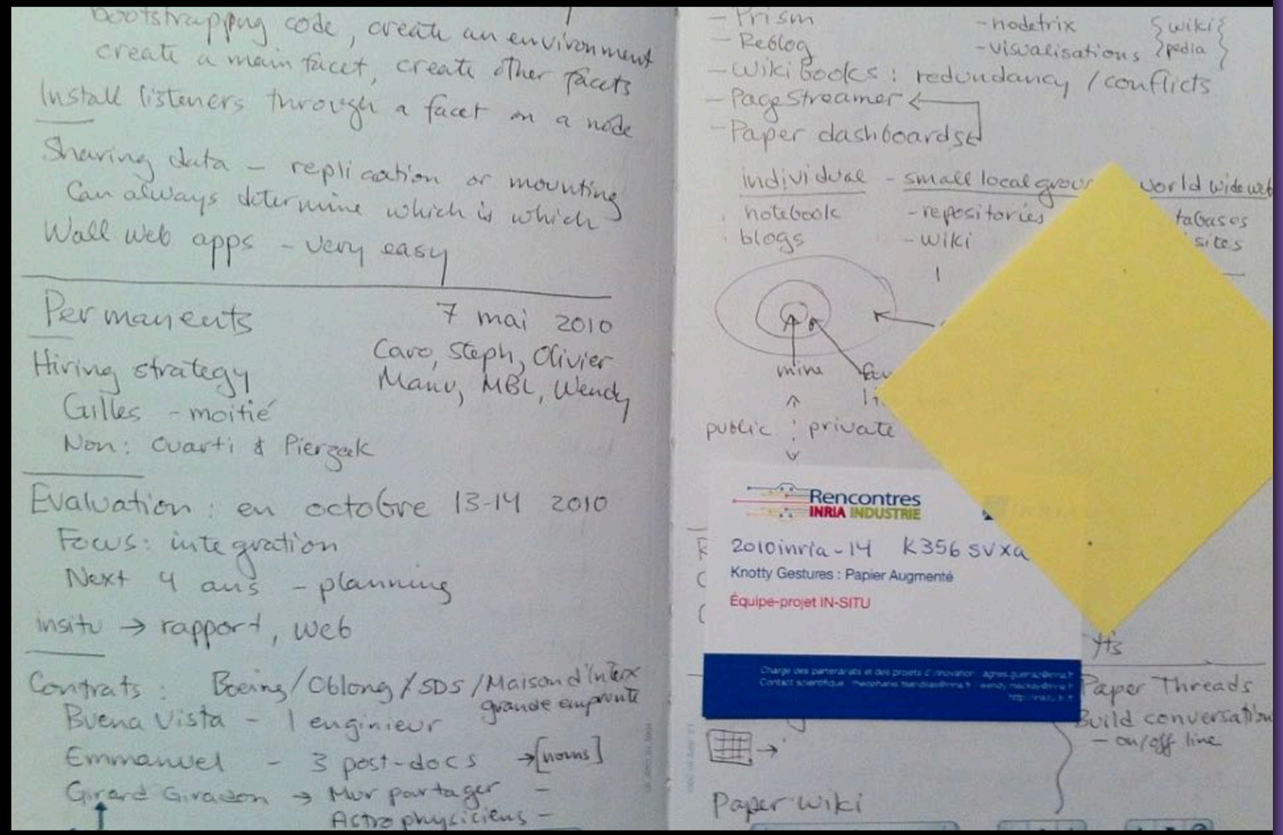
Designers assume users will use systems "correctly"

But users also adapt systems to meet personal needs

How can we make interactive systems easier to learn and easier to appropriate?

Appropriation

How can we take advantage of existing properties to solve current problems?



Appropriation

How can we take advantage of existing properties to solve current problems?

Problem:

Sue receives a business card from a colleague and does not want to lose it

Solution:

Take advantage of the glue of the sticky note to attach the business card to the notebook

EMERGENT ACTION

Routines & Rhythms	Identify use patterns	Users establish routines and spatial patterns based circadian and external influences
Selective Attention	Consider the periphery	Users vary attention and shift between focus and the periphery
Situated Action	Beyond planning	Users modify their planned activities in new, unforeseen circumstances
Distributed Cognition	Reduce cognitive load	Users rely on other people and objects “outside the head” to remember or communicate
Reciprocal	Re-interpret use	Users both learn and customize systems, while systems adapt to their behavior

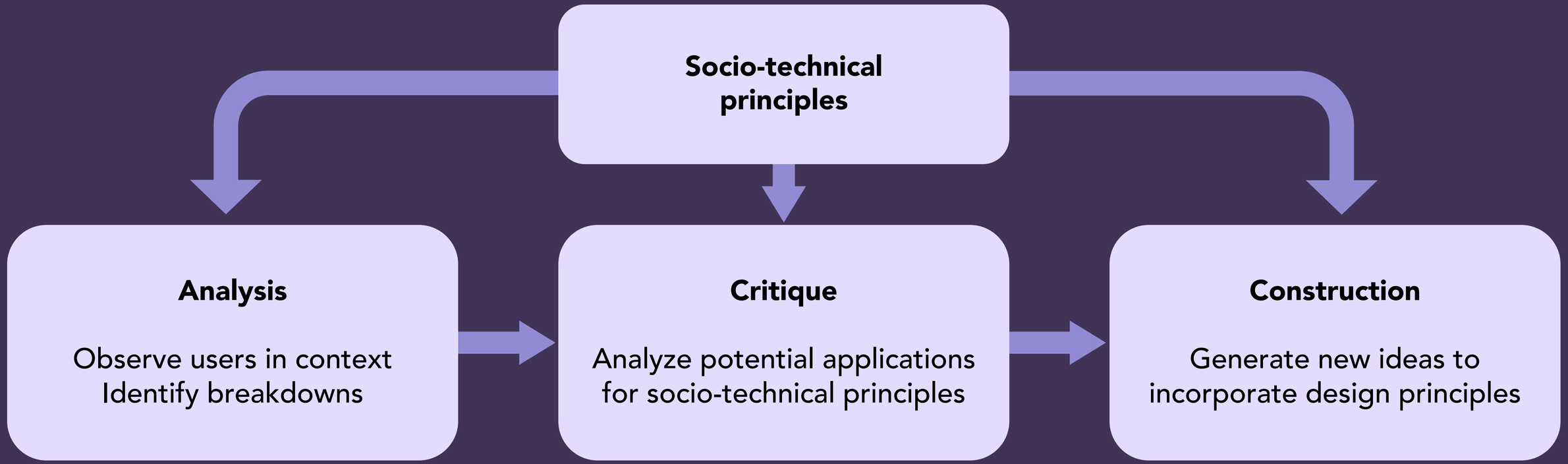
HOW DO WE INCORPORATE
SOCIO-TECHNICAL PRINCIPLES
INTO THE DESIGN PROCESS?

Process for applying socio-technical principles to inform the design

GENERATIVE DECONSTRUCTION

Generative deconstruction

Apply socio-technical principles to generate grounded designs



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

Deconstruction

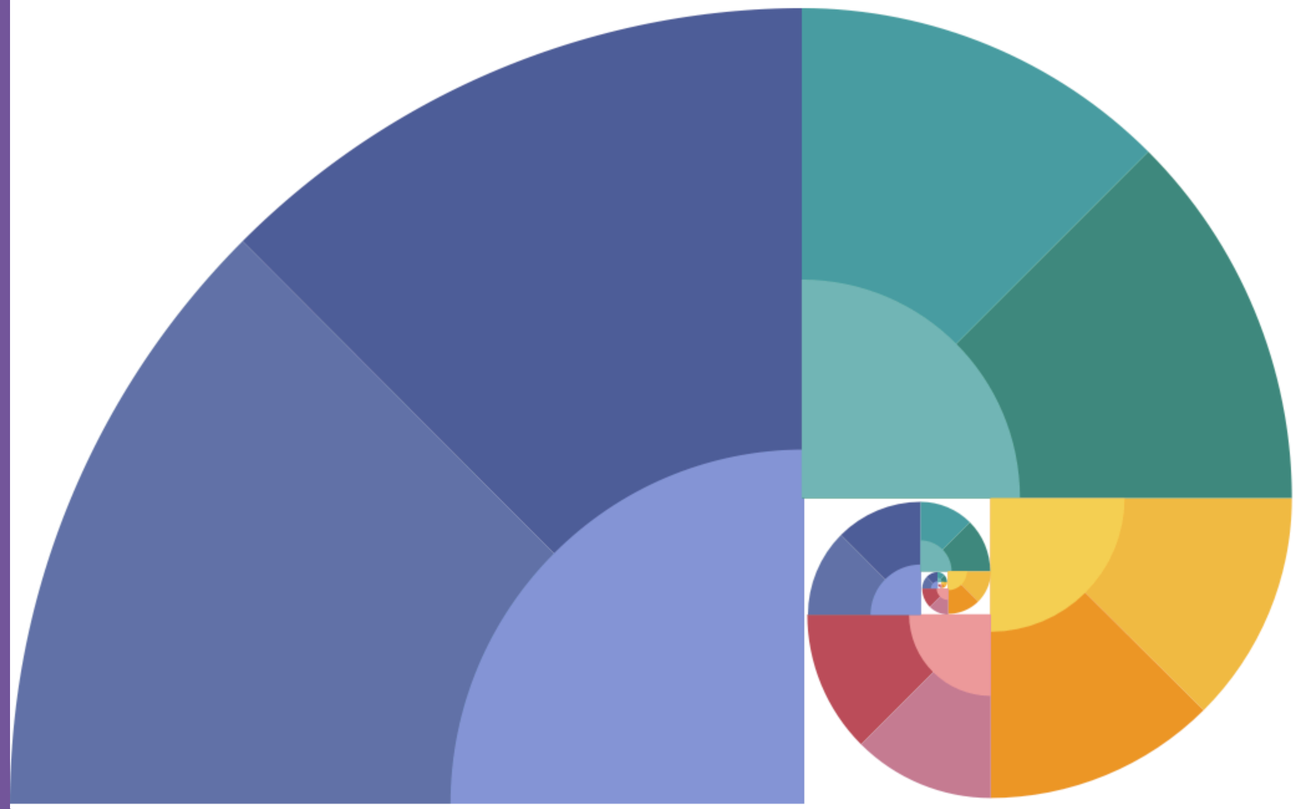
Analysis: Does the principle exist?

Critique: Should the principle exist?

Reconstruction

Construction: How could the principle improve the new system?

GENERATIVE WALKTHROUGH



GENERATIVE WALKTHROUGH

Design walkthrough

Systematic critique

of a design artifact



GENERATIVE WALKTHROUGH

Design walkthrough

Systematic critique

of a design artifact

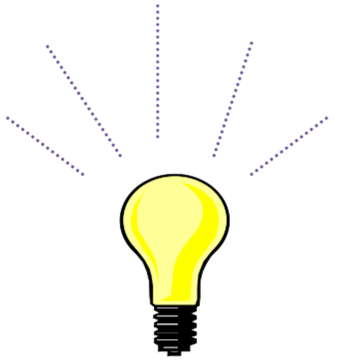


plus

Targeted brainstorming

Generate new ideas

based on a specific principle



GENERATIVE WALKTHROUGH

Examine each interaction snippet

Analyze:

Do the principles exist?

Critique:

What works well? What does not?

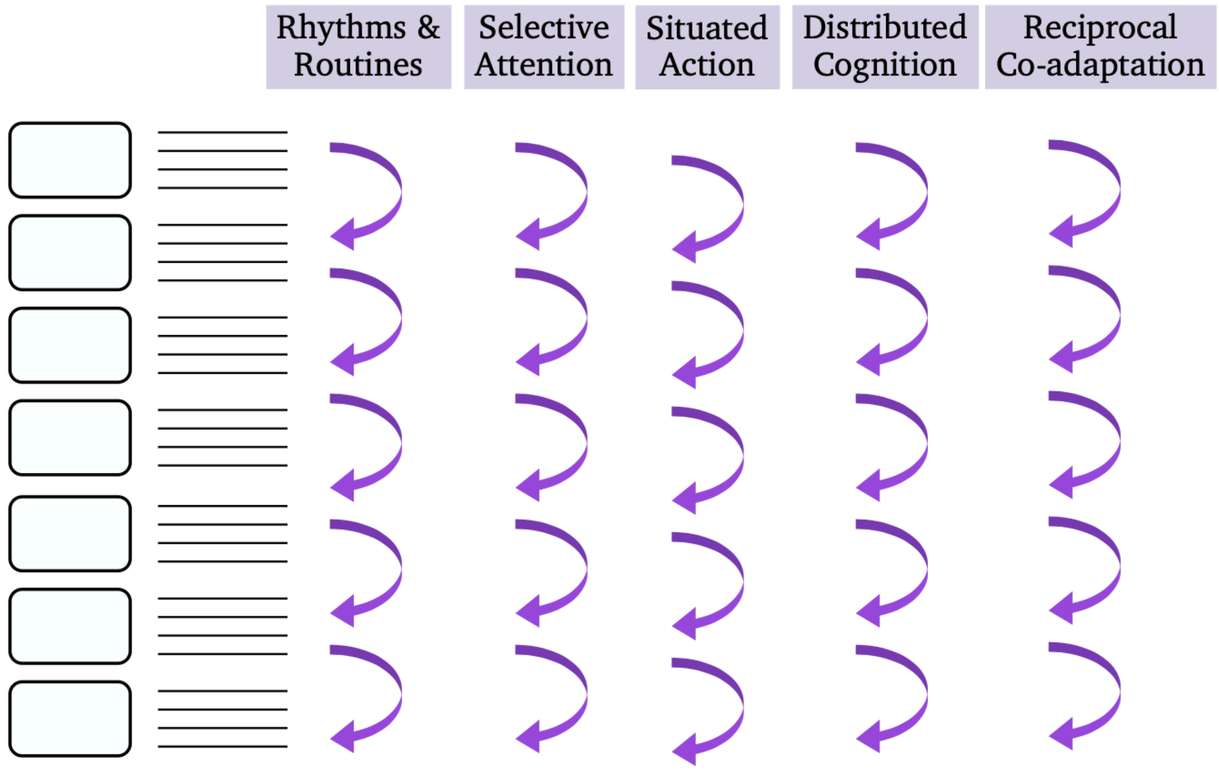
Construct:

Brainstorm new ways to apply the principle to the current interaction snippet

GENERATIVE WALKTHROUGH

Process

Analyze each interaction snippet:
are the principles relevant? useful?



Team - 80 min

EXERCISE

GENERATIVE WALKTHROUGH ___

Improve your concept through your storyboard:

For each interaction snippet

Analyze, critique, then generate ideas

using at least three principles

Moderator: Shows video, stops discussion

Scribe: Takes notes

Everyone: Contribute!

Team - 40 min

EXERCISE

GENERATIVE WALKTHROUGH ___

Round one

Present	Feedback
#1	#4
#3	#6
#5	#2

BREAK

Team - 40 min

EXERCISE

GENERATIVE WALKTHROUGH ___

Round two

Present	Feedback
#2	#1
#4	#3
#6	#5

HOMEWORK

GENERATIVE WALKTHROUGH ___

Prepare to reshoot video Friday

Revise your concept

- reassess the personas
- reasses the technology
- refine the concept

Update your storyboard

- incorporate your new concept
- include 3 new interaction snippets*
- demonstrate 2 principles

*either solve or highlight at least 3 breakdowns