

DESIGN OF INTERACTIVE SYSTEMS

15 SEPTEMBER 2027

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WELCOME

DESIGN OF INTERACTIVE SYSTEMS + TER

Lectures

Tuesday 13:30 - 17:00

Room D101

TER

Friday 13:30 - 17:00

Room E212

LECTURES 3

OVERVIEW

Category	Activity	Duration (min)	Start	End
Homework	Interviews, Personas, Current Scenario	20	13:30	13:50
Homework	Update Current Scenario	5	13:50	13:55
Lecture/ Exercise	User Profile	25	13:55	14:20
Lecture	Interpret User Data	15	14:20	14:35
Lecture/ Exercise	Breakdown Analysis	25	14:35	15:00
Lecture/ Exercise	Sketching Humans	10	15:00	15:10
Lecture/ Exercise	Interaction Snippets	10	15:10	15:20
	BREAK	10	15:20	15:30
Lecture	Collecting Ideas	15	15:30	15:45
Lecture	Review Design Brief	10	15:45	15:55
Exercise	Brainstorming	20	15:55	16:15
Homework	Idea Archive	5	16:15	16:20
Lecture	Characterizing Ideas	10	16:20	16:30
Lecture	Interpreting Design Space	10	16:30	16:40

GENERATIVE DESIGN

Discovery

— Who is the user?

Inspiration

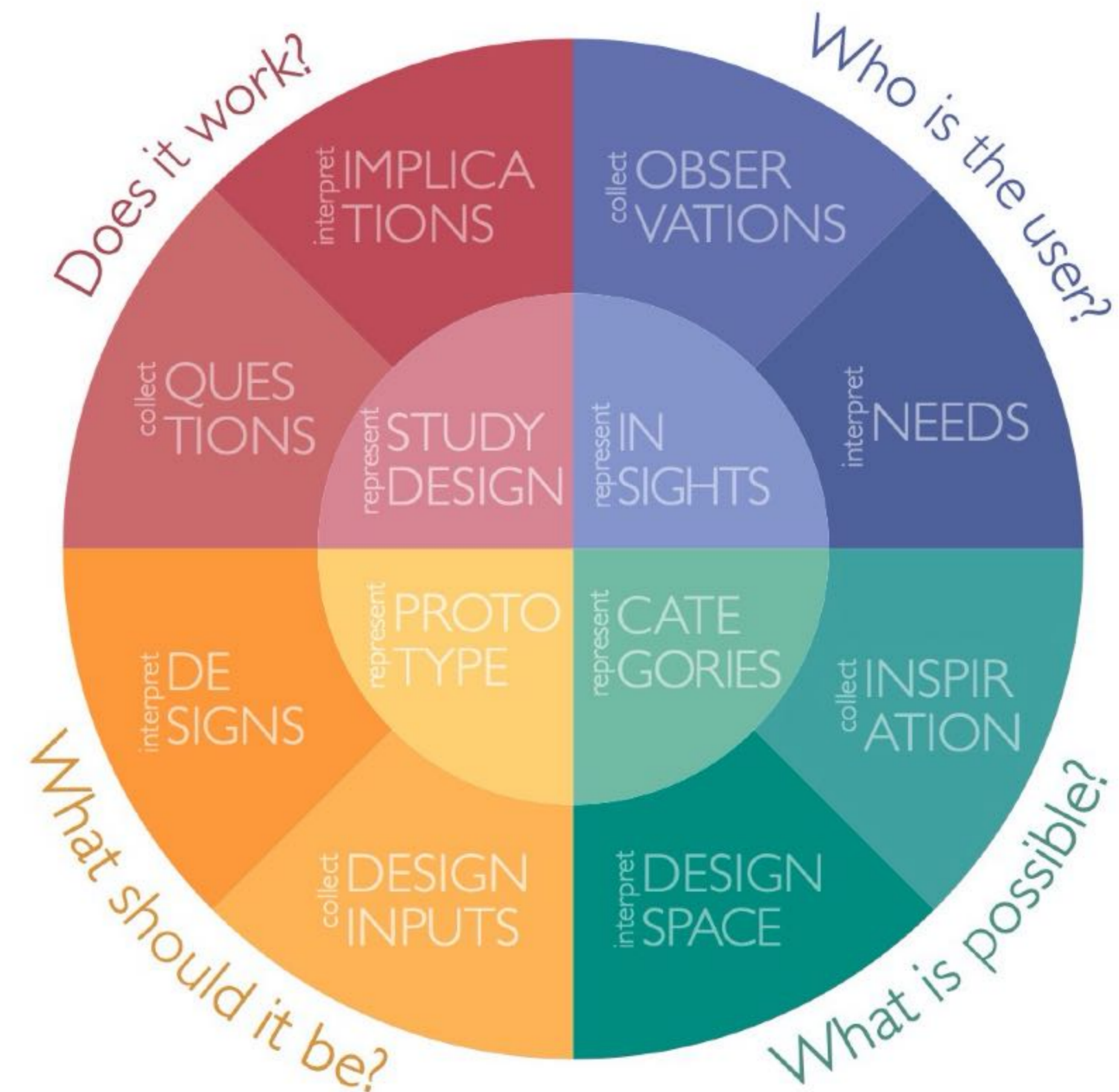
— What is possible?

Design

— What should it be?

Evaluation

— Does it work?



REVIEW HOMEWORK

REVIEW STORY INTERVIEW

Each student is responsible for (at least) **two story interviews**

Each interview:

Ask for at least one detailed, specific story
about a recent situation where they faced a problem

Probe for more information

Do not stop with a single, simple action
Capture the context

Watch out for **red flags!**

Avoid tutorial or opinion interviews

Report:

- Transcribe these interviews
- Upload the two transcripts to your personal space until Friday

PERSONAS

Imaginary person similar to a real user

Personal details:

Name, age, gender

Physical description

Occupation, relevant activities

Representative or Extreme user?

Personality: Design-relevant details only!

Likes, dislikes?

Capabilities, weaknesses?

Unusual characteristics?

Activities:

Typical, breakdowns, user innovations

Extreme relative to the design problem

Based on **personal** characteristics

Adult	➔	Child
Normal hands	➔	Arthritic hands
Takes vitamins	➔	Cancer patient
Exercises regularly	➔	Olympic athlete

Based on **context** — extreme due to situation

Copy two pages	➔	Copy a book
Lots of time	➔	Tight deadline
Simple task	➔	Complex task

Consider what turns ordinary users
into extreme characters

EXTREME CHARACTER

REVIEW

PERSONA & EXTREME CHARACTER ____

Create two personas and one extreme character drawn from your interviews to incorporate in your current scenario

Ensure that each personas' characteristics are real, based on your data

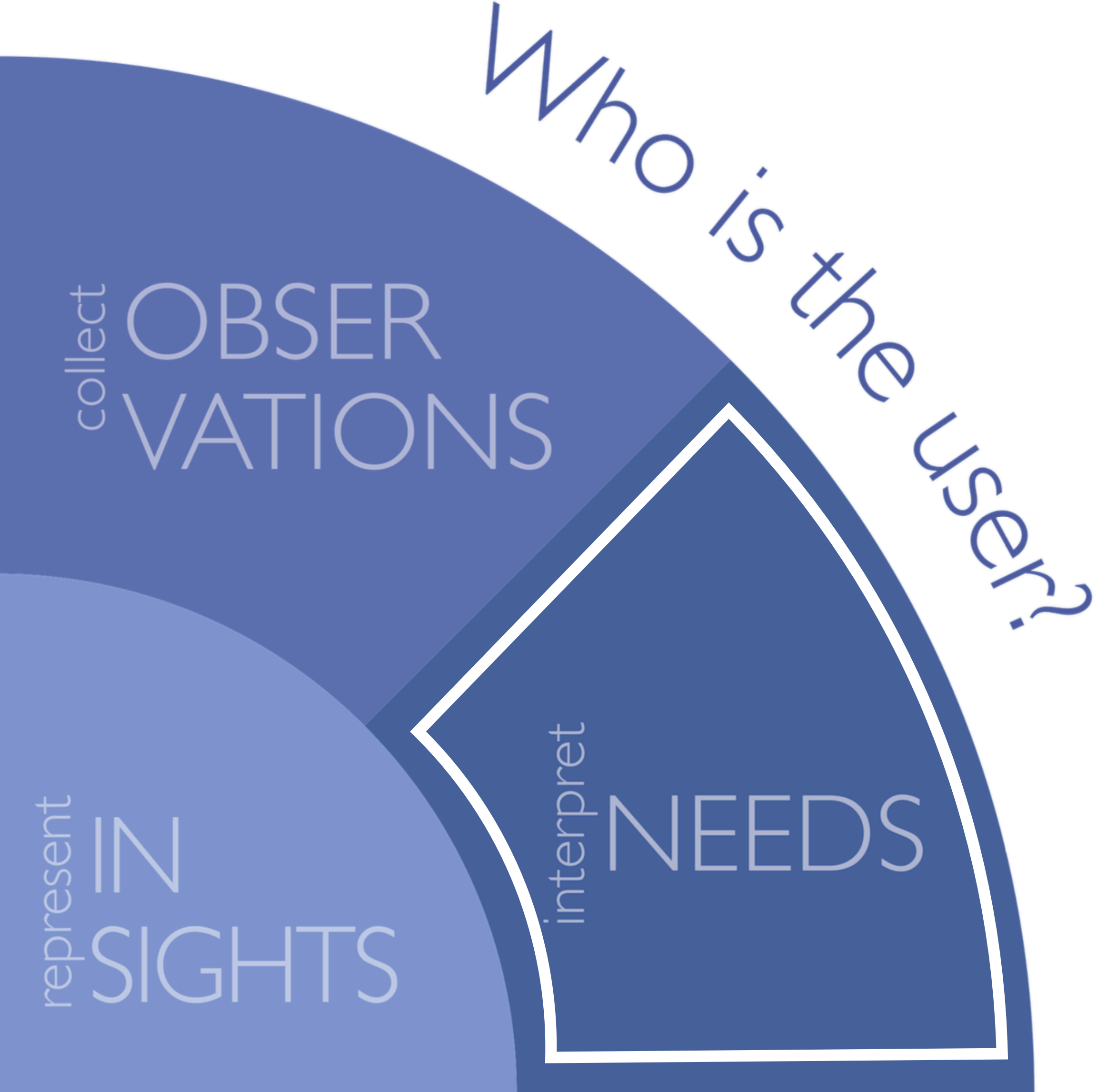
Ensure that the extreme character has a characteristic that is extreme relative to your design problem

Choose a name, personal characteristics and a situation for each character



DISCOVERY

INTERPRET NEEDS



DISCOVERY

REPRESENTING USERS

Understanding
users

	System	Action	Story
Collect	Literature review Introspection Questionnaire	READ OBSERVE ASK	Novels, films Observation Story interviews
Represent	User requirements Interaction snippets Cultural probes	LIST SKETCH ENGAGE	Persona Journey map Interactive thread
Interpret	User profile	DESCRIBE	Current scenario
	Themed video Descriptive statistics	SHOOT ANALYSE	Current video Thematic analysis

Short one-act play

Goal: Highlight problems & opportunities
do not to “sell” your idea

Draw from real, grounded observations,
interviews and introspection

Capture the details of how users
currently interact with the technology

**CURRENT
SCENARIO**

Procedure

Assemble a series of one-paragraph scenes
each describing an interaction snippet
into a single coherent story

Include:

Realistic setting(s):

date, time, place, context

Personas and extreme characters:

name, age, gender, motivation

profession, level of expertise

goals or motivation

**CURRENT
SCENARIO**

Procedure

Choose realistic users, specific day and setting

Include: normal & unusual situations

planned & unplanned activities

effective & problematic incidents

Tell the story, step-by-step:

- How does each user interact with the technology?
- Focus on breakdowns, work arounds and user innovations to highlight opportunities for design

**CURRENT
SCENARIO**

Resources

Raw data you gather yourself:

- Observation of people in real-world situations
- Stories from interviews about user experiences
- Introspection stories (if applicable)

Other sources:

- Research literature

**CURRENT
SCENARIO**

REVIEW

CURRENT SCENARIO —

Create a realistic story of the user in context that reveals opportunities for design.

See assignment sheet!



Resources

Raw data you gather yourself:

- Observation of people in real-world situations
- Stories from interviews about user experiences
- Introspection stories (if applicable)

Other sources:

- Research literature

Later, update your scenarios:

- Re-analyze user characteristics and needs
- Revise design brief / design requirements
- Make new personas and extreme characters

**CURRENT
SCENARIO**

HOMEWORK

UPDATE CURRENT SCENARIO _____

Choose a general situation related to the design brief

Choose 2 personas, 1 extreme character who participate in the same story

Assemble multiple interaction snippets
to create a single, coherent story
about the users' current situation

"Animate" the personas to show
what happens during various breakdowns



Personas & extreme characters

Specific, imaginary people who represent target users. Some are “typical”, others are “extreme characters” with extreme personal characteristics or in extreme situations

Current scenario

A realistic description of a series of events and activities experienced by personas in a realistic setting. Focuses on key relevant actions gathered from interviews and observations

User profile

General description of the needs and characteristics of users

REPRESENTING USERS

USER PROFILE

Describes the characteristics and needs of the target user group, relative to a proposed design.

Top-down analysis of target users

Who is the **audience** for your system?

What are their key **characteristics**?

What are the key **issues** to solve?

Review interviews and observations

Review the **breakdown analysis**

What are the users' key **breakdowns**,
work arounds and **user innovations**?

Which **user needs** should be addressed?

USER PROFILE

TYPES OF USERS

Consider different levels of experience

novices	unfamiliar with technology
experienced	use technology regularly
experts	extremely experienced, teach
intermittent	use technology rarely now, but formerly experienced

EXERCISE

UPDATE USER PROFILE

Team - 15min

Identify the target audience for your system based on your interviews and other user data

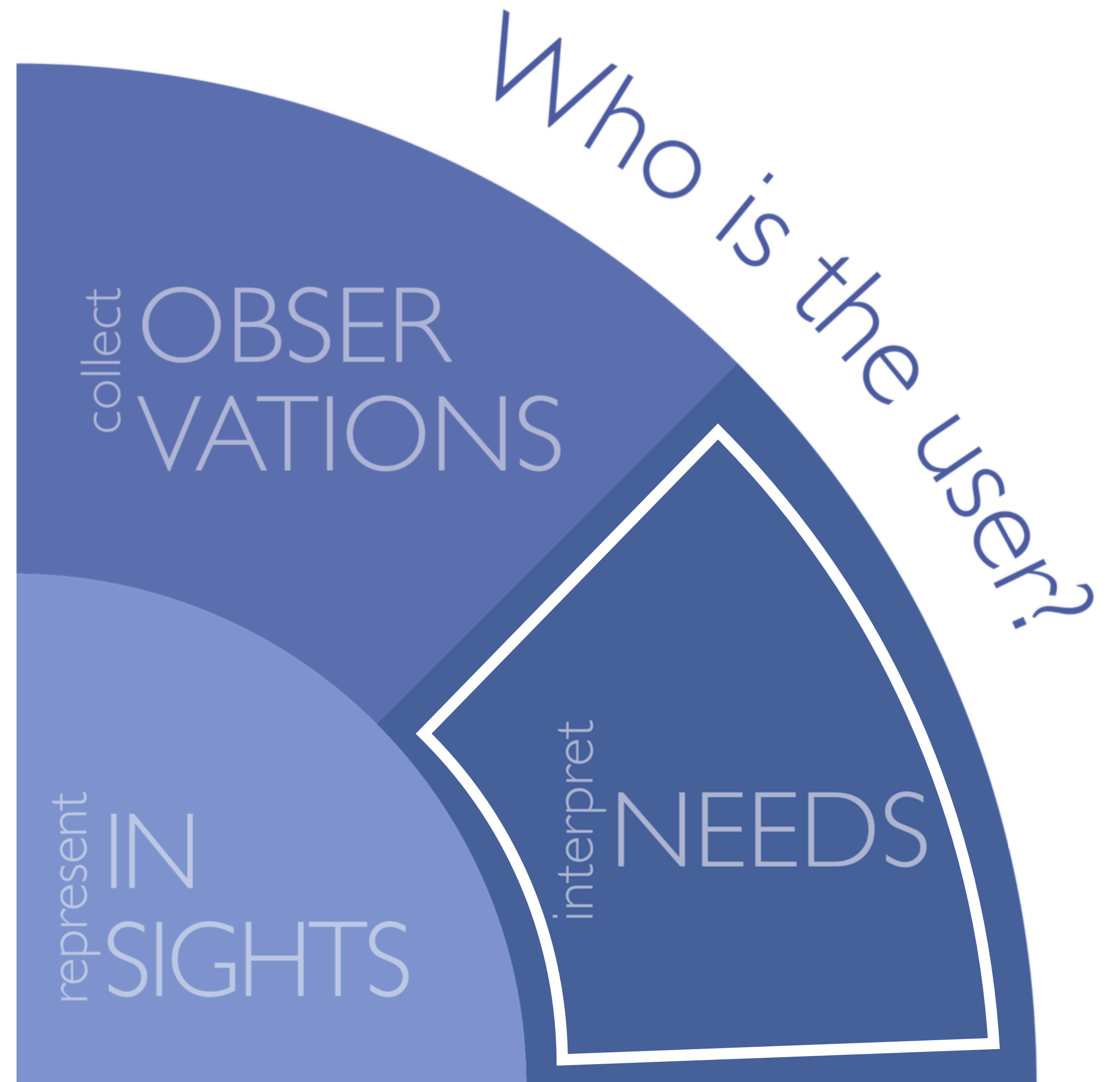
Write a high-level one-paragraph description of the target users' needs and characteristics

Ensure that the personas match the user profile
Do they lack any key characteristics?



DISCOVERY

INTERPRET USER DATA



DISCOVERY

INTERPRET USER DATA

Understanding
users

	System	Action	Story
Collect	Literature review Introspection Questionnaire	READ OBSERVE ASK	Novels, films Observation Story interviews
Represent	User requirements Interaction snippets Cultural probes	LIST SKETCH ENGAGE	Persona Journey map Interactive thread
Interpret	User profile Themed video	DESCRIBE SHOOT	Current scenario Current video
	Descriptive statistics	ANALYSE	Thematic analysis

INTERPRETING USER DATA

How to make sense of your data

Story-based design focuses on
interaction in context

Create design artifacts that help you
understand users:

- not only who they are in general
- but what they need in specific situations

STORY-BASED DESIGN

-

HIGHLIGHTS INTERACTION IN CONTEXT

INTERPRETING USER DATA

Qualitative methods

- Thematic analysis
- Breakdown analysis
- Contextual inquiry

Provide resources for:

Interaction snippets

Personas

Extreme characters

Current scenarios

User profiles

Braun & Clark (2006)

Method for identifying and analysing patterns
in qualitative data

Designed for psychologists & social scientists
Theoretically independent

Emphasis on ecological validity
(trying to discover what is 'real')

THEMATIC ANALYSIS

Recursive, not linear, process

Familiarize	Re-read and note analytic observations
Code	Create semantic & conceptual labels
Find themes	Construct meaningful & coherent patterns in data
Review themes	Check that themes tell a story
Define themes	Identify essence themes
Write up	Tell a coherent, compelling story about the data

SIX PHASES

Deductive

(top-down)

- Pre-define themes
- Reread all the quotes
- Identify which apply

Inductive

(bottom-up)

- Read the quotes
- See what themes emerge

Mixed

(both approaches)

- Start with pre-defined themes
- Also look for emergent themes

ANALYSIS APPROACH

During the interview or observation

Begin with live interviews or observations

Take real-time notes

- Highlight what surprised you

- Note the time!

Best practice:

- Review notes immediately after

- Add anything extra you remember

- Highlight anything important

- Note three key take-aways**

PROCESS

Preparation

Transform the transcript into an editable file

Excel lets you note time, code and quote

Other tools are specific to thematic analysis

Choose:

Complete transcript

Selected sample

TRANSCRIPTION

Clarify statements with minimal distortion

Common transcript conventions:

[] Added or changed words

[...] Omitted some words

... Participant didn't finish sentence
(appears at end of a sentence)

(sic) Participant wrote it exactly like this

() Added comment

TRANSCRIPTION

Capture your results in your themes

Create phrases that convey the idea

Include verbs and nouns

Less useful General topic

More useful Highlight surprises

Examples:

Theme: Writers vocalize their text

Code: Creative voicing

Theme: Writers look for tricks to force
themselves write

Code: Writing tricks

NAMING

Strategy

Create a coding scheme with partial data

Apply the codes to the rest of the data

Ask another researcher to

- verify your coding scheme

- verify your choice of quotes

CODING

BREAKDOWN ANALYSIS

HCI example: Top-down approach

Particularly useful for interaction design

Focus on:

Breakdowns or problems in context

Workarounds or alternative solutions
that reveal the problem

User innovations or clever ideas
that suggest novel design solutions

BREAKDOWN ANALYSIS

Definitions

Breakdown

User cannot solve the problem at all

Workaround

User finds an imperfect solution

User innovation*

User finds a great solution to a breakdown

User creates something new without a
breakdown

* Users are proud of innovations and may want to share them

BREAKDOWN ANALYSIS

Procedure

Roles Moderator, Scribe

Resources Interviews, Observations,
Questionnaires, Design Brief

Procedure

Reread user data

Highlight surprises, breakdowns,
work arounds & user innovations

Organize items into categories

Give each category a 1-3 word code name

EXERCISE
BREAKDOWN ANALYSIS

Describe each observation in one phrase

- Identify:
- breakdowns
 - work arounds,
 - user innovations

Highlight surprises

- Organize observations into categories
- Give each category a simple code

Name:		Team:		Due:	
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Breakdown analysis Discover Users Worksheet

ACTIVITY Identify situations where the user does not complete the desired task or activity.

	Breakdown, workaround or surprise	Code
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		

© Wendy E. Mackay DO IT: Discover Users Breakdown analysis Worksheet
Last updated 2022-11-08 05:28:53 -0500

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INTERACTION SNIPPETS

Miniature storyboards

Describe interaction between user and system

Title: Identify the user's goal

Sketch: Show user action in context

Text: Describe user action in context

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?

Find:

breakdowns, workarounds, user innovations

... and look for what surprises you

INTERACTION SNIPPETS

ABOUT DRAWING PEOPLE

Star People (Bill Verplank 2000)

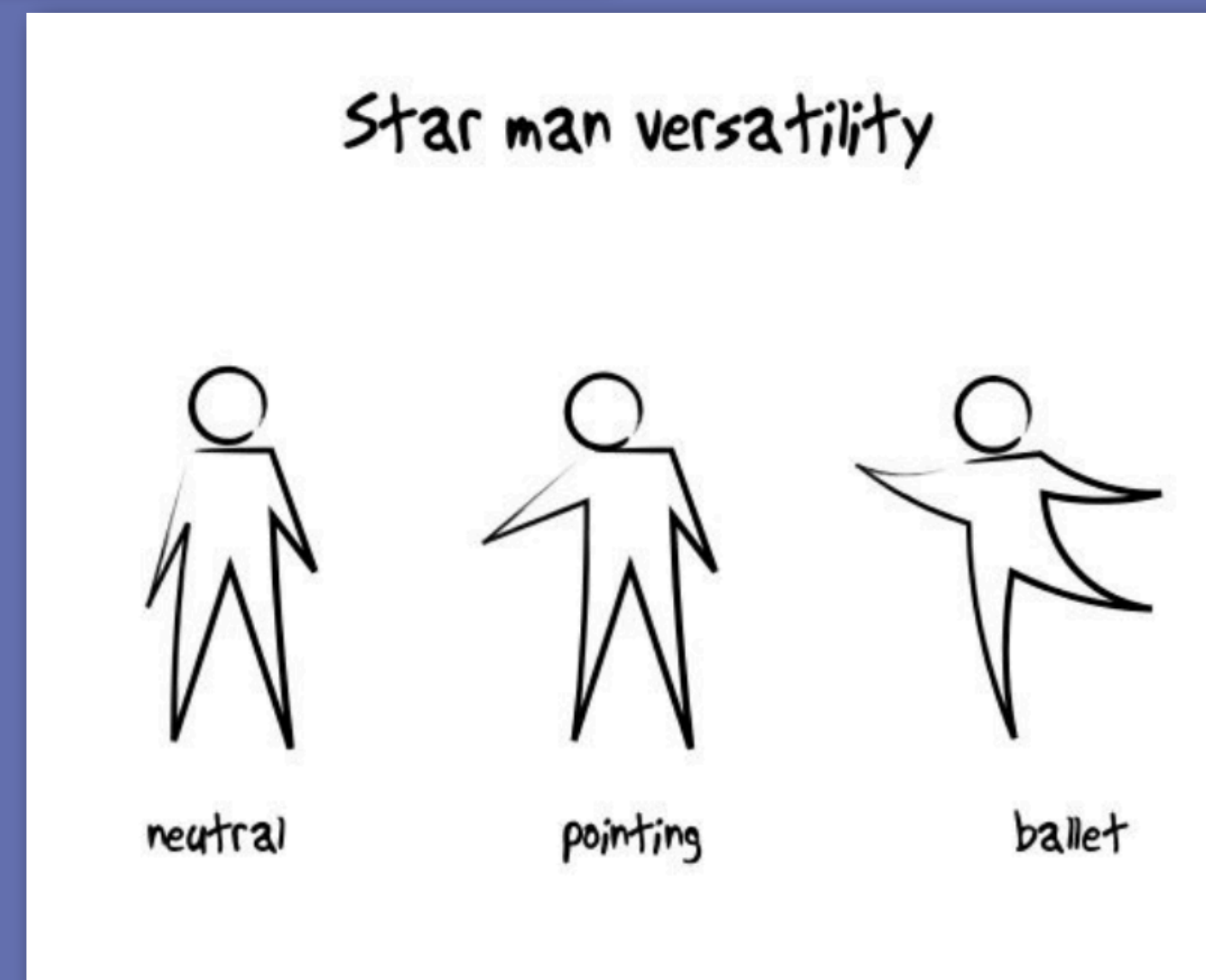
You don't have to be an artist!

Draw a person, a face or a hand
with one stroke

Sketch quickly

Discover expressivity through action

ABOUT DRAWING PEOPLE



EXERCISE

STAR PEOPLE —

Sketch 3 different star people
engaged in three different types of interaction

- pointing at a device
- drawing on a tablet
- calling someone



Miniature storyboards

Describe interaction between user and system

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**

EXERCISE

INTERACTION SNIPPET —

Create one interaction snippet to illustrate a sequence of events:

User acts – System reacts – User reacts

or

System acts – User reacts – System reacts

For each segment:

Sketch what happened

Describe what happened



BREAK

GENERATIVE DESIGN

Discovery

— Who is the user?

Inspiration

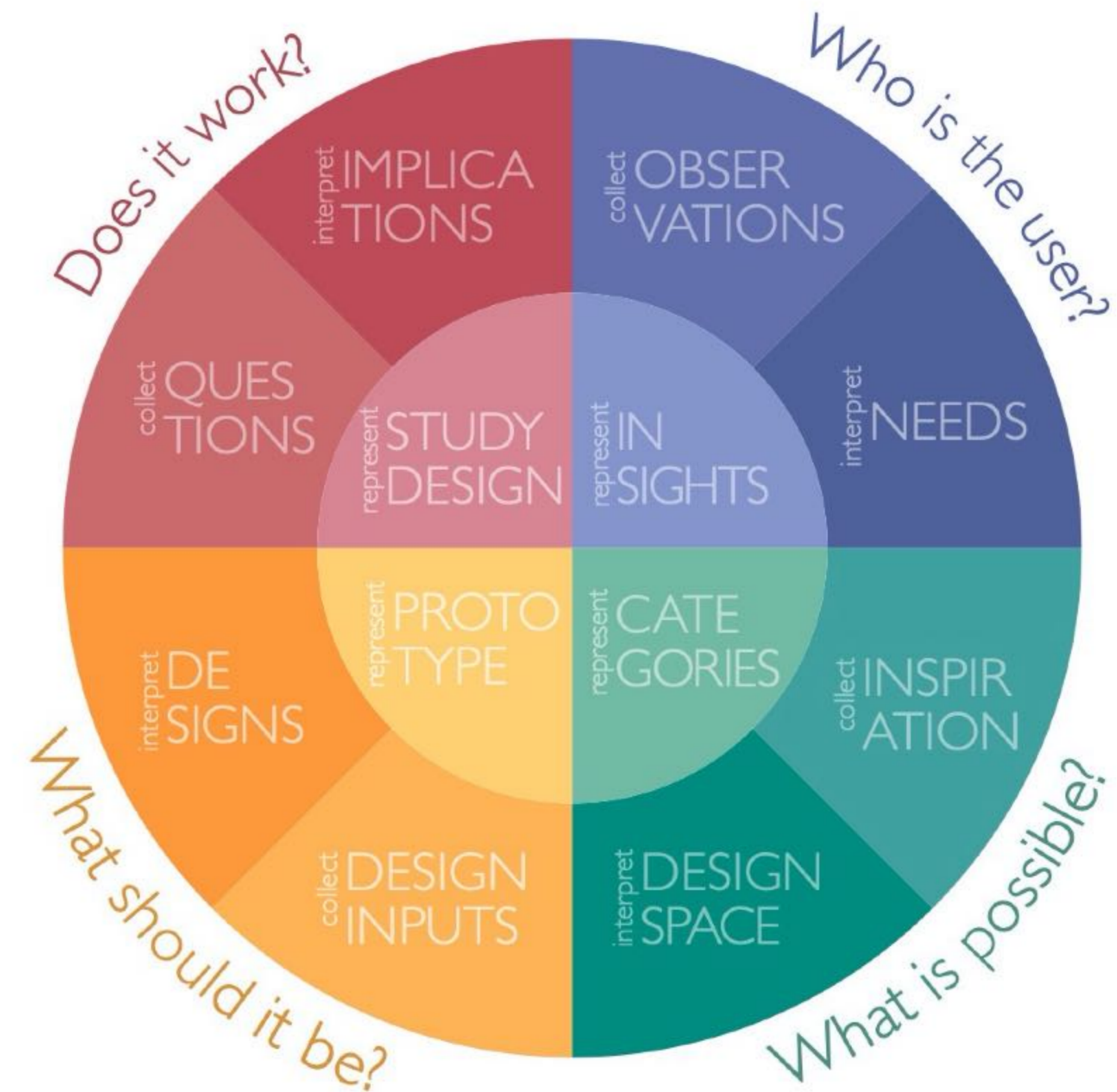
— What is possible?

Design

— What should it be?

Evaluation

— Does it work?



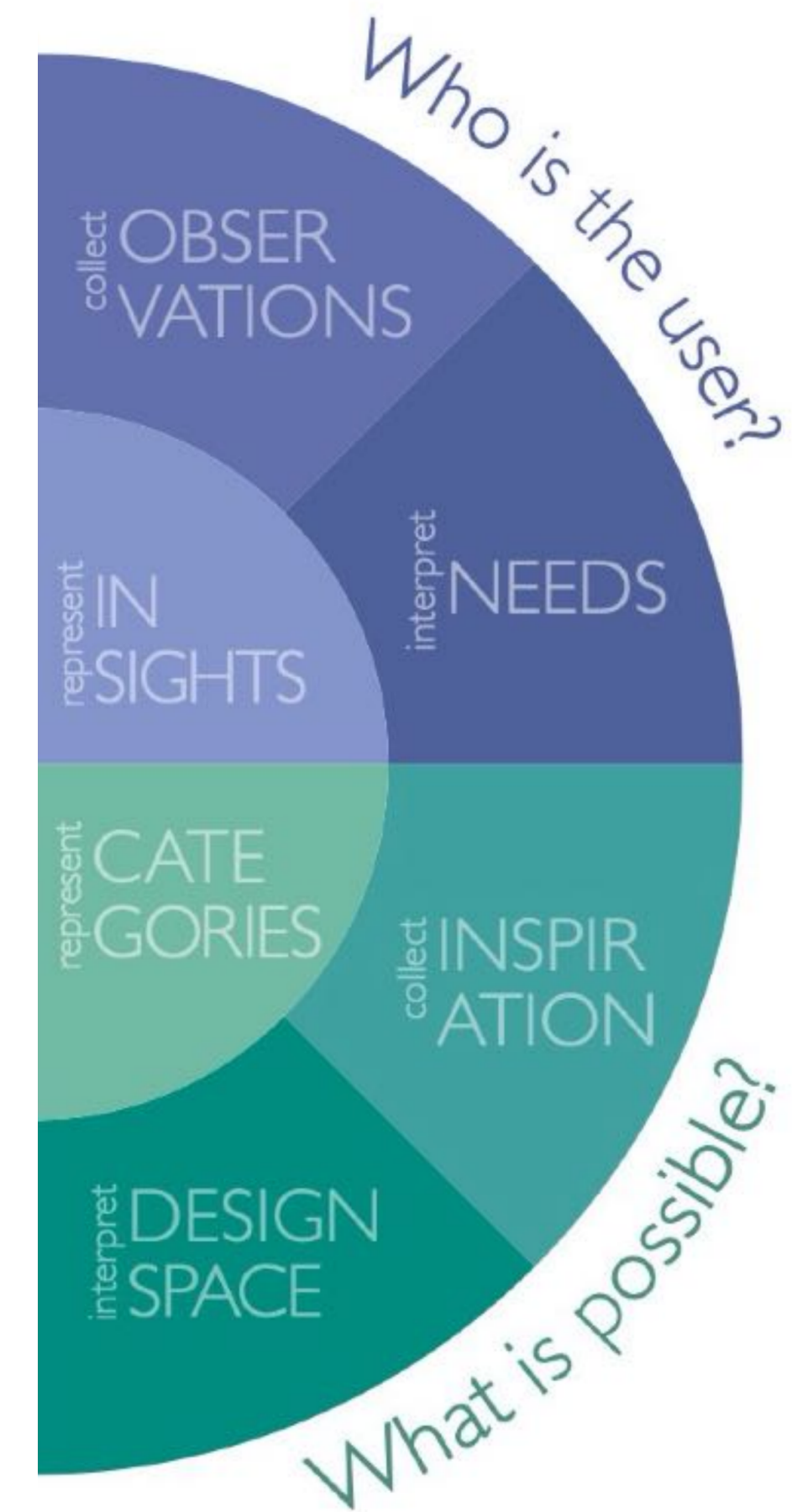
GENERATIVE DESIGN GENERATING IDEAS —

Discovery

— Who is the user?

Inspiration

— What is possible?



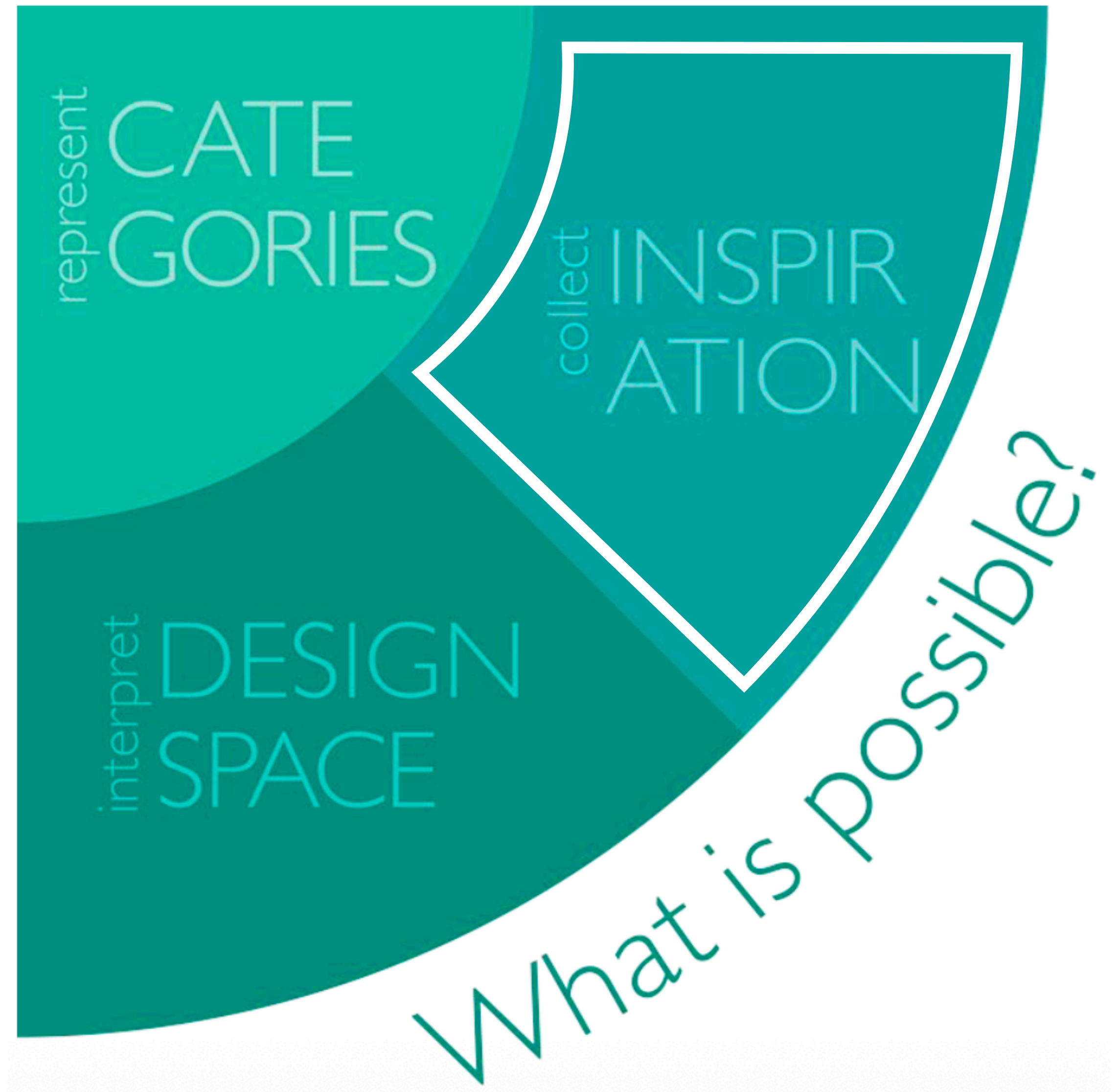
INSPIRATION

COLLECTING IDEAS

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

INSPIRATION

COLLECTING IDEAS



FINDING INSPIRATION

Find a concept

Based on your studies of users
choose a problem to solve
specific to your audience

Generate a variety of ideas
that offer potential solutions

Create a design space to
embody the set of alternatives

Choose a concept to explore
not just functionality, but also interaction
with functionality

FINDING INSPIRATION

Find a concept

Gather ideas from diverse sources

Existing systems

Other designers

Web resources, e.g. Pinterest

Generate your own ideas

Brainstorming

Video brainstorming

BRAINSTORMING

Different Version to choose from

Individual Brainstorming

Group Brainstorming

Mixed Brainstorming

INDIVIDUAL BRAINSTORMING

Phase 1:

Collect external inspiration

Re-read design brief

Set a time limit

Generate as many ideas as possible

Quantity is more important than quality

Refrain from judgment/criticism

Encourage weird and wacky ideas

Try to stay visual

Phase 2:

group idea cluster

Identify idea dimensions

GROUP BRAINSTORMING

Phase 1:

Generate at least 40 ideas

Choose a moderator and a scribe

Generate as many ideas as possible

Quantity is more important than quality

Everyone must participate

Say at least one “stupid” idea!

Record all ideas

Phase 2:

Scribe rereads all ideas

Everyone votes for 3 favorite ideas

MIXED BRAINSTORMING

Phase 1:

Individual Brainstorming

Phase 2:

Group idea cluster

Identify idea dimensions

Identify main challenges and opportunities

Phase 3:

Group Brainstorming

Phase 4:

Scribe rereads all ideas

Everyone votes for 3 favorite ideas

=> results in best outcomes!

REMINDER DESIGN BRIEF

COURSE PROJECT

RETHINK NAVIGATION

Create an interactive system
that supports navigating
through space and time

Without a smartphone

Discover problems faced by real users

Identify breakdowns, work arounds,
user innovations and surprises

Design a new interactive tool

Illustrate with realistic story in a real context
...then redesign based based on feedback

EMBED INTERACTION NO SMARTPHONE INTERFACES

Augment the person



Augment the object



Augment the environment



EMBED INTERACTION RELATIONSHIPS WITH COMPUTERS____

Tool

I use it to perform a task
I control the outcome



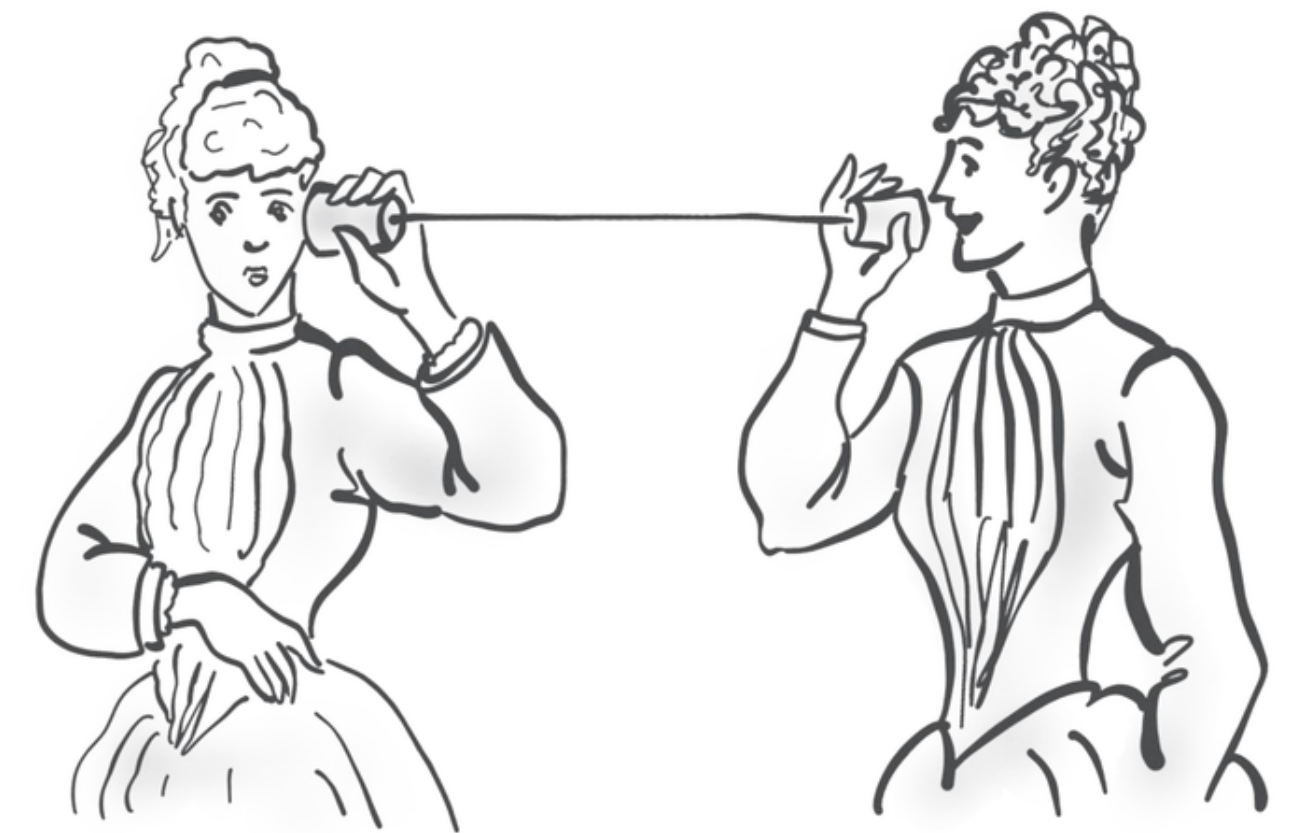
Servant

I delegate a task to you
You control the outcome



Communication medium

We communicate
We share control



EXERCISE BRAINSTORMING

Phase 1 — 5 min

Individual Brainstorming

Collect as many ideas as possible

Phase 2 — 10 min

Group Brainstorming

Generate **at least 40 ideas** (Quantity is more important than quality)

Choose a moderator and a scribe

Everyone must participate

Say at least one “**stupid**” idea!

Record all ideas

Phase 3 — 5 min

Scribe rereads all ideas

Everyone votes for 3 favorite ideas



Sketch books

Mood boards

Idea archives

ABOUT GATHERING IDEAS

CAPTURING IDEAS

HCI combines three work practices

Designers use Sketchbooks
to capture ideas

Scientists use Notebooks
to record data and ideas

Engineers are rarely trained
to use notebooks

SKETCHBOOKS

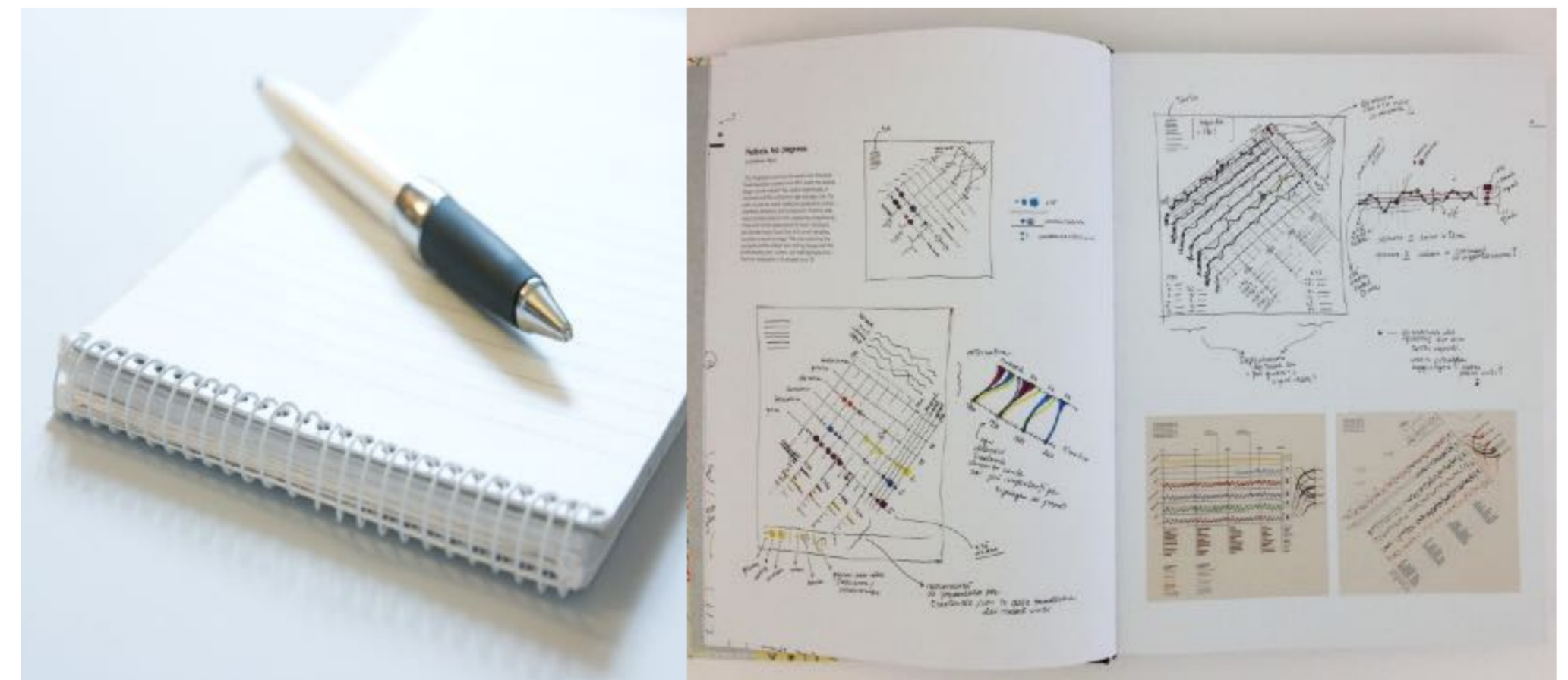
Create your own sketchbook or notebook!

Seek inspiration

Explore concepts

Record thoughts

Sketch ideas



SKETCHBOOKS

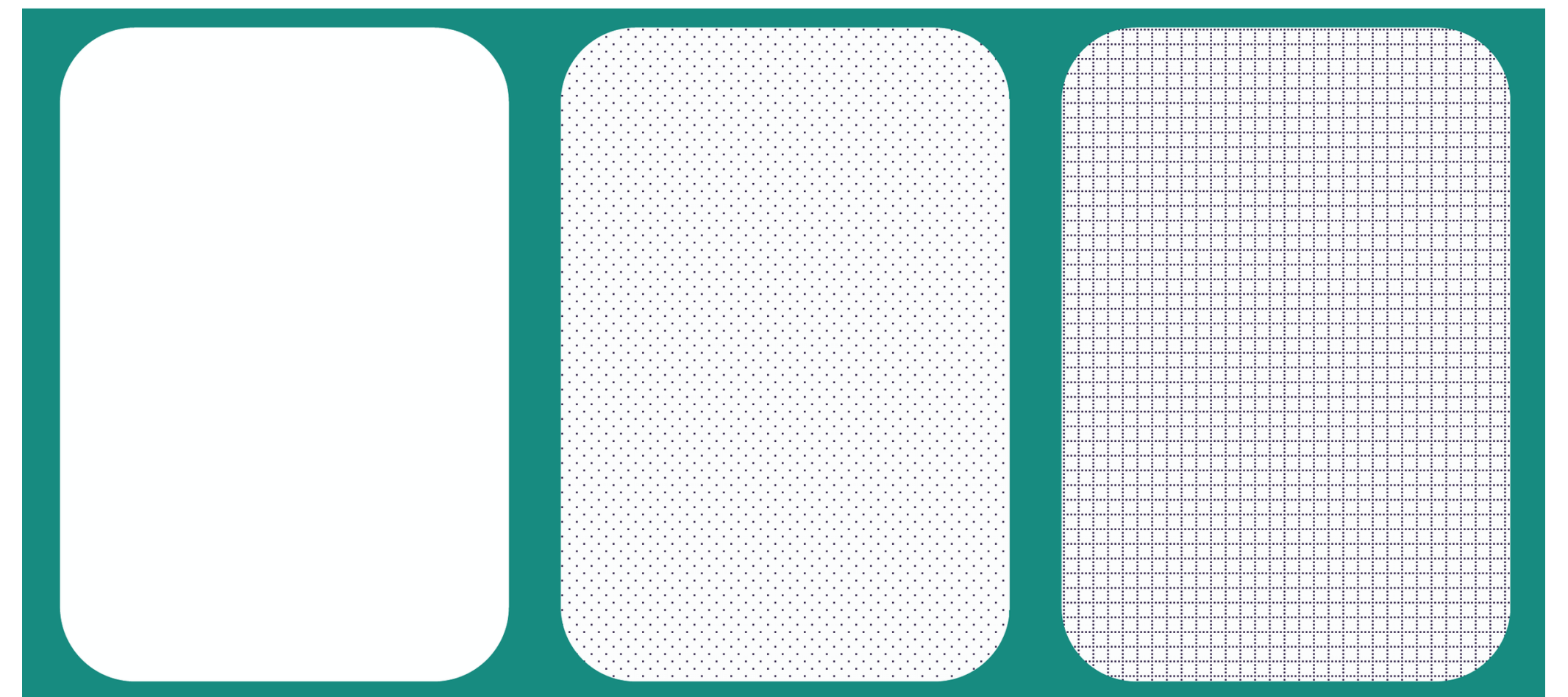
Capture observations and ideas

Keep it with you

Consider different formats

Which works best for you?

Paper? Tablet? Laptop? Phone?



Visual Ideation

Mood boards are **visual collage** of pictures, text, and objects

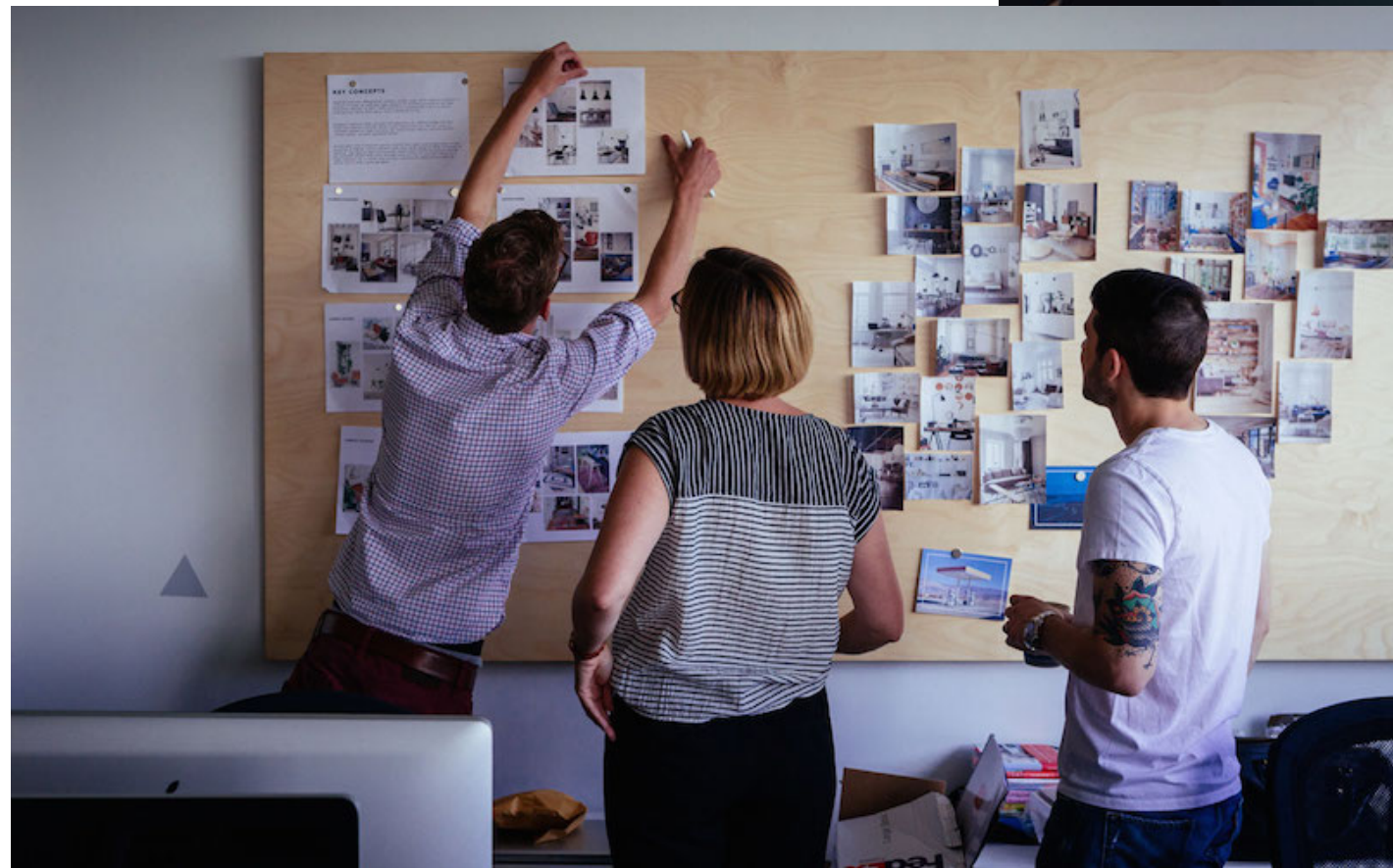
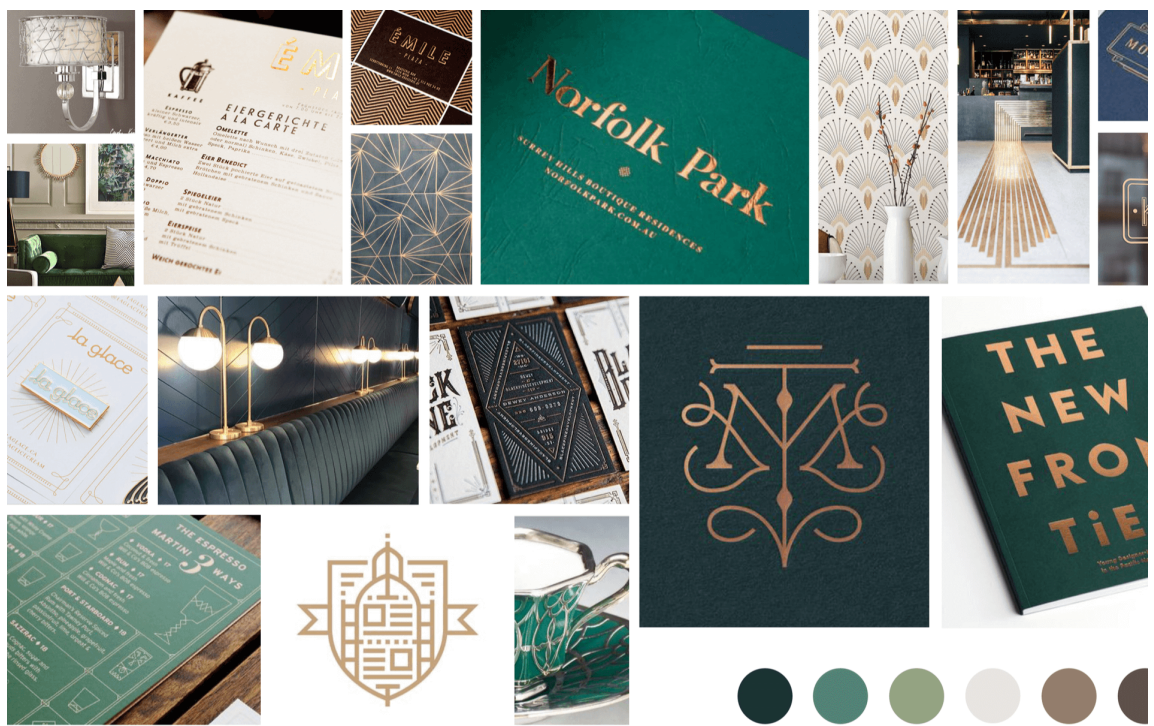
Often created collaboratively in e.g. fashion design, architecture, and marketing

Mood boards help designers
identify
select
curate visually inspiring content

Express existing ideas but also
to inspire new ideas through their
combination

MOOD BOARDS

INSPIRATION MOOD BOARDS



FINDING INSPIRATION

Sources of inspiration

User Needs that inspire solutions

Revisit your surprises! Find user innovations

FINDING INSPIRATION

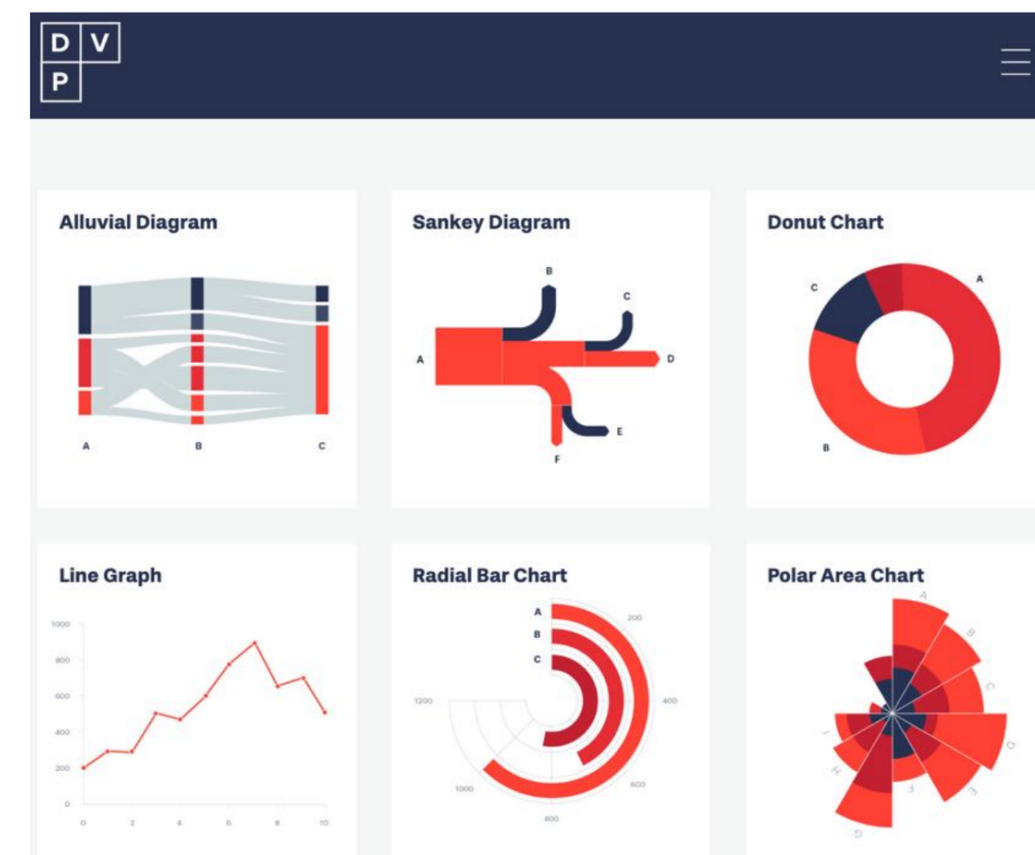
Sources of inspiration

User Needs that inspire solutions

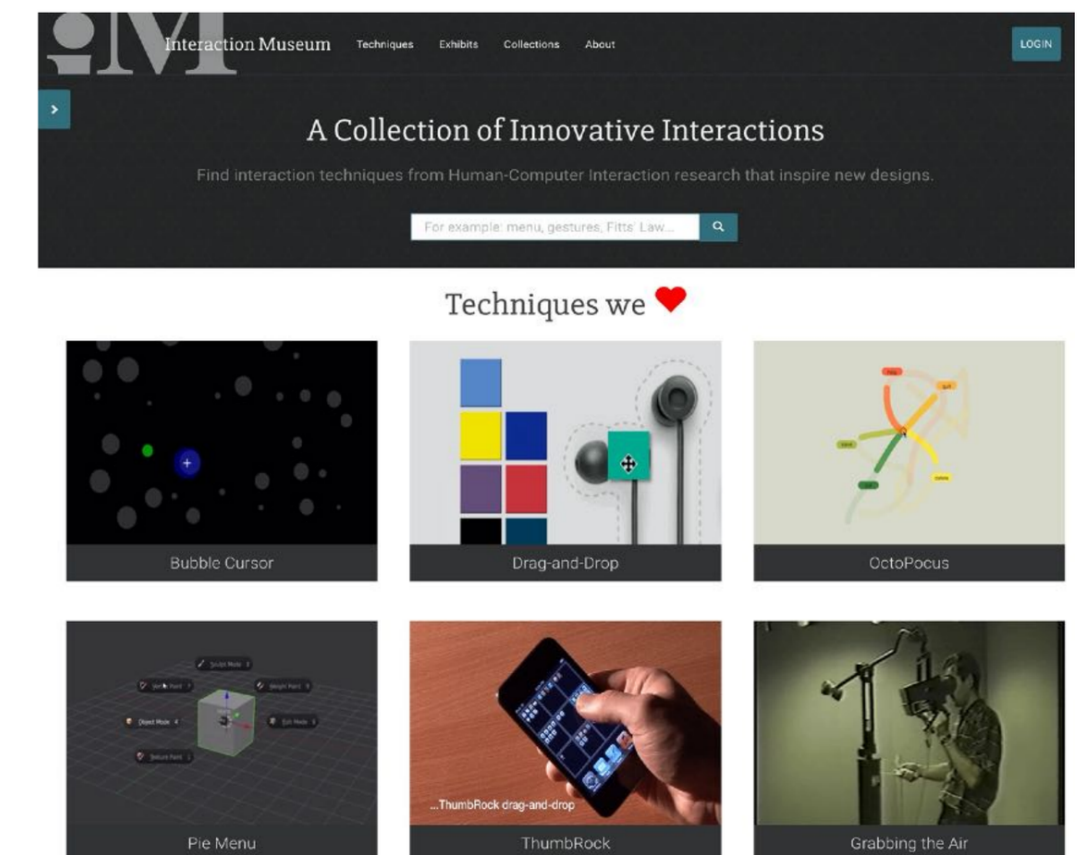
Revisit your surprises! Find user innovations

Online Design Resources

Websites that show ideas



datavizproject.com



hci-museum.lri.fr

FINDING INSPIRATION

Sources of inspiration

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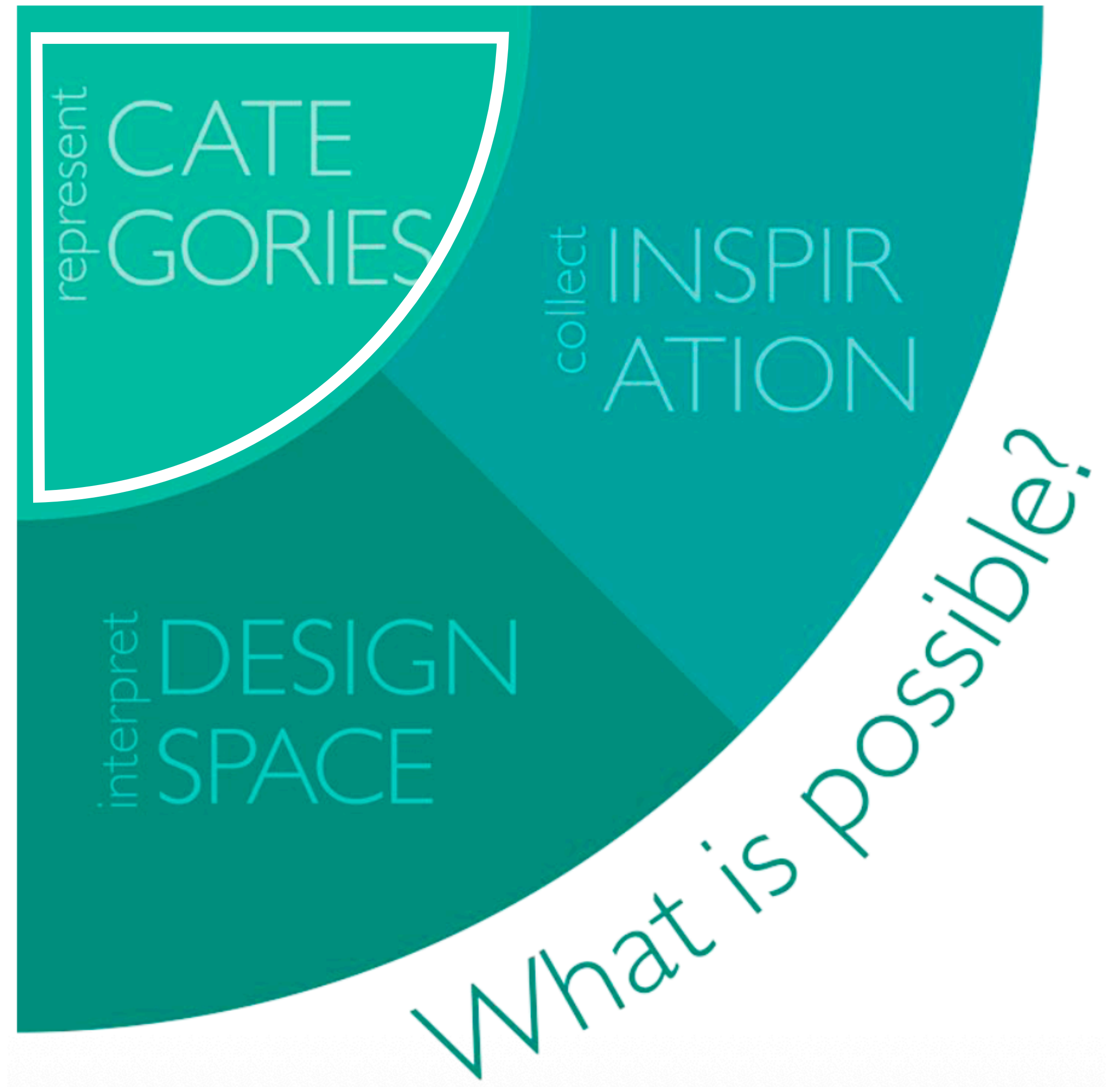
Research Literature

User challenges

Design solutions

Generative theory

INSPIRATION REPRESENTING IDEAS_____



INSPIRATION
REPRESENTING IDEAS_____

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

IDEA ARCHIVE

Create your own mood board

Take advantage of the internet to discover information about users and inspire ideas

Look for both problems and solutions related to the design brief

Look for alternatives:

Which technologies?

Which interaction techniques?

Which metaphors?

Which use settings?

IDEA ARCHIVE

For each useful page or image:

- Record the link

- Save an image

- Write a note as to why it is relevant
(or why it is a poor idea)

HOMEWORK

IDEA ARCHIVE

Search the web for inspiration

Find 10 systems or interaction techniques
that inspire ideas relevant to the design brief

For each idea, record:

URL

Screen shot

Brief description

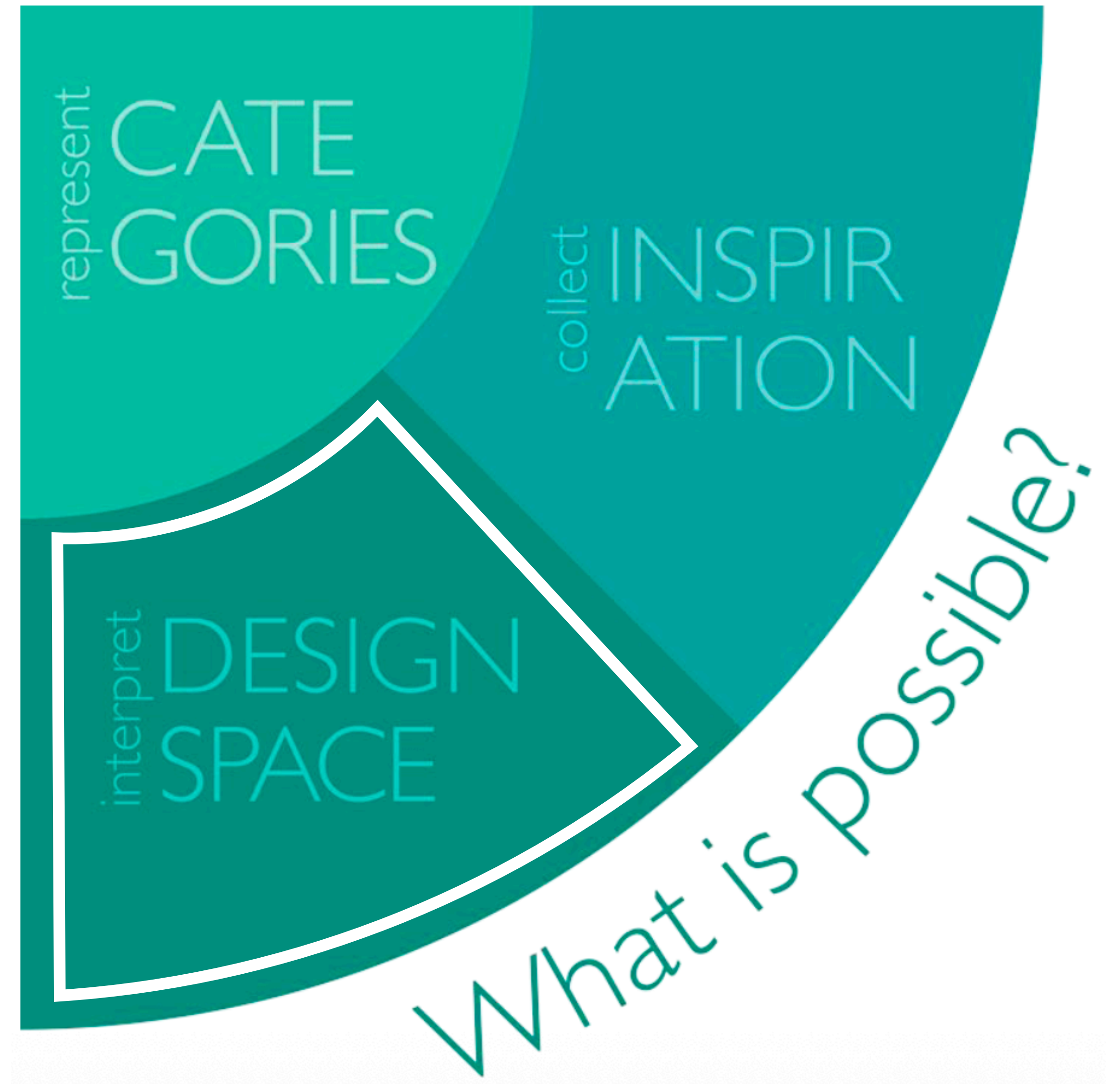


Increasing levels of depth

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

**REPRESENT
IDEA**

INSPIRATION REPRESENTING IDEAS_____



INSPIRATION
REPRESENTING IDEAS_____

Inspiring Ideas	System	Activity	Story
Collect	Web links Brainstorm ideas	GATHER IDEATE	Literature review Brainstorm interactions
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Interpret	Idea dimensions Design space	CLASSIFY SKETCH	Breakdowns Interaction snippets

DESIGN DIMENSIONS

Categorize ideas

Group ideas into different categories

Example: Pick 10 ideas

What aspects do they have in common?

How do they differ?

How can you characterize them?

DESIGN DIMENSIONS

Represent as design dimensions

Transform the characteristics into
dimensions with multiple waypoints

Draw a line for each dimension
place ideas at appropriate waypoints

Example:

“ Communication style ”

synchronous

mixed

asynchronous

Zoom call

Slack

Email

Create a multi-dimensional design space

Lay out dimensions to create a design space
Fit ideas at the intersections
of one or more dimensions

Semantic Differential (Osgood, 1957)

Rate people based on semantic opposites
Two-dimensional space displays opposites

**DESIGN
SPACE**

Methods

Necker cube

Graph

RADAR diagram

CHARACTERIZING DESIGN SPACE

Necker cube

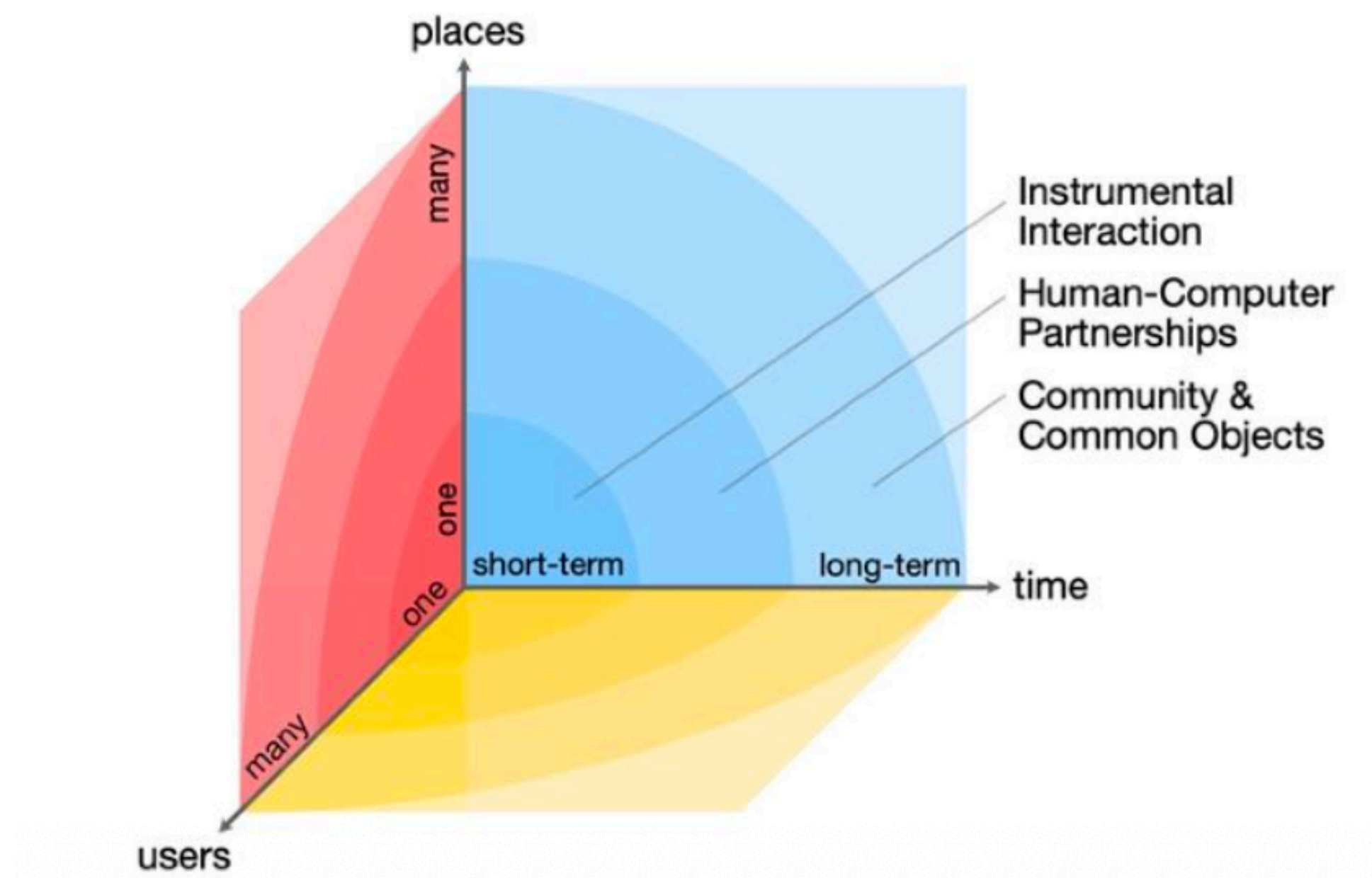
Easy to draw 3-dimensional space

Systematically extend each dimension

From one to many users

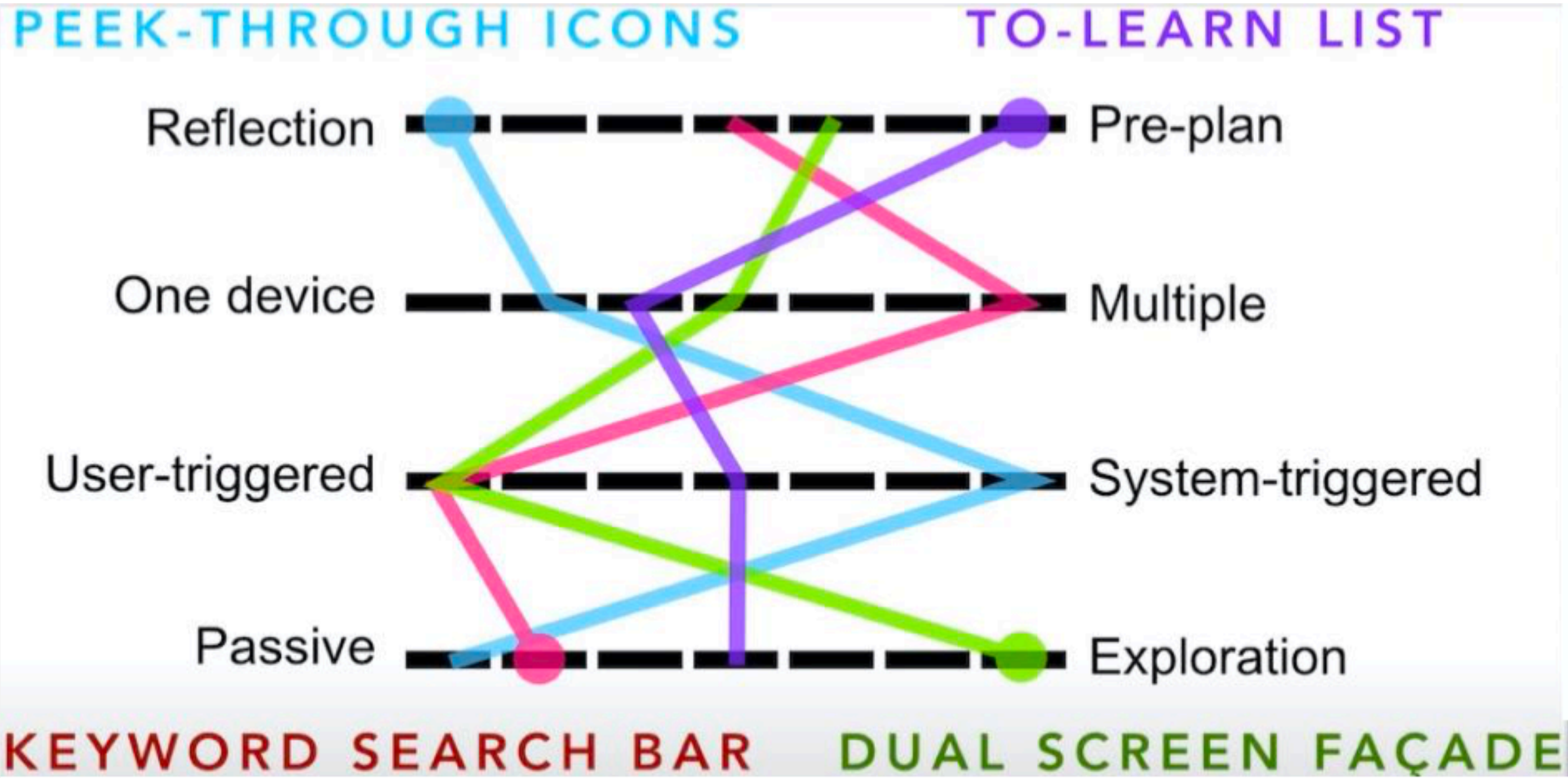
From immediate to short term to long term

From one to many places



DESIGN SPACE

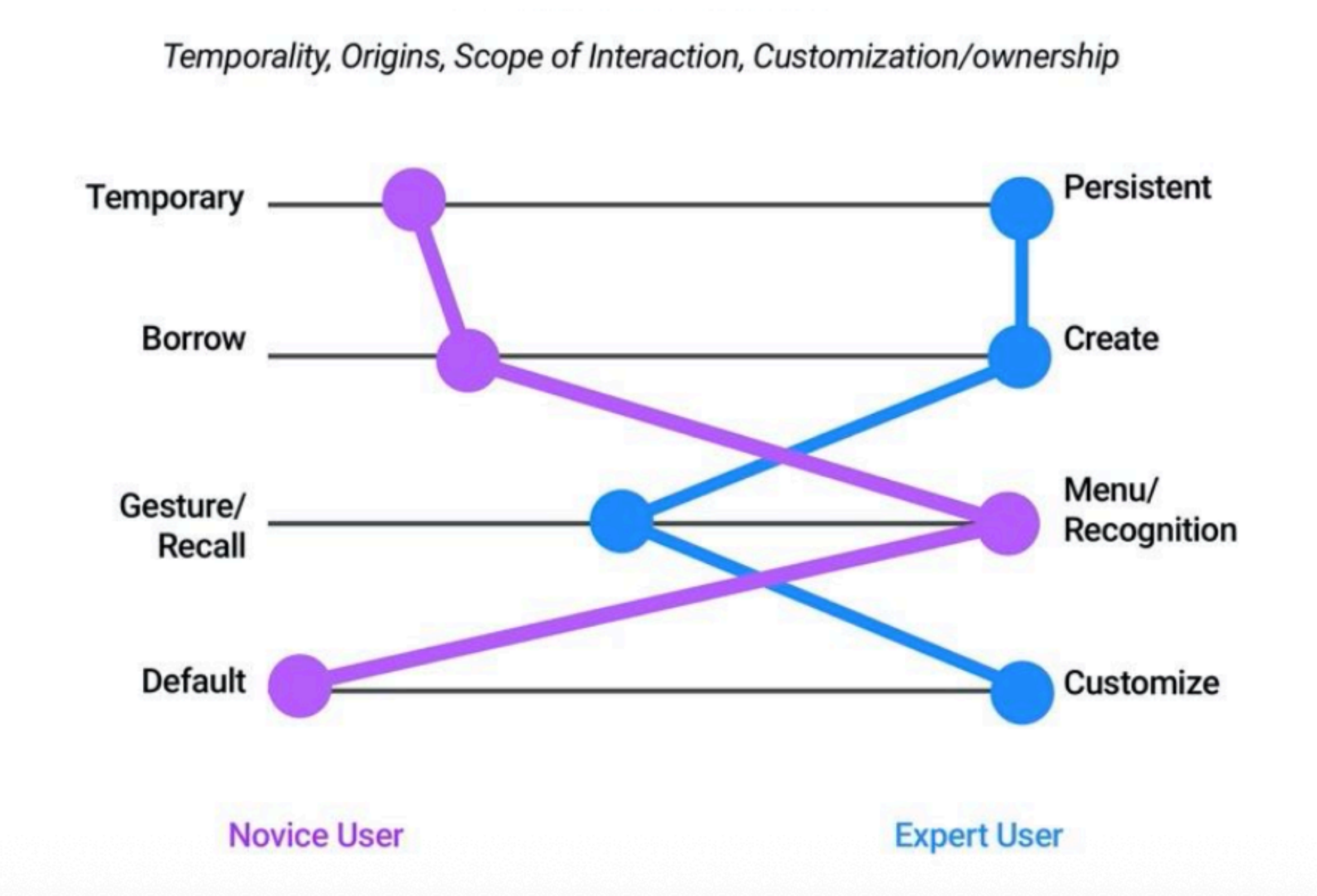
Graph



DESIGN
SPACE

Semantic Differential (Osgood, 1957)

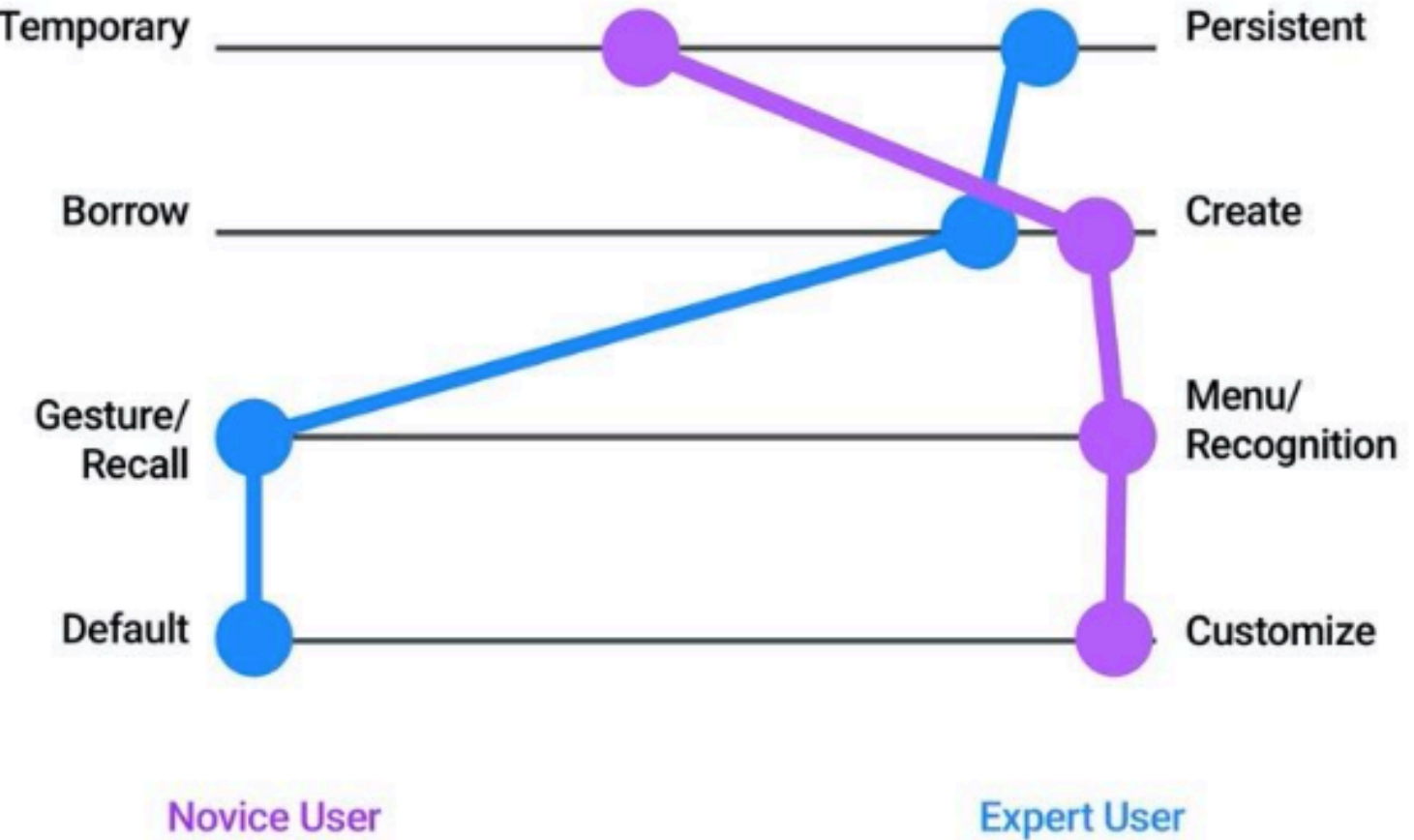
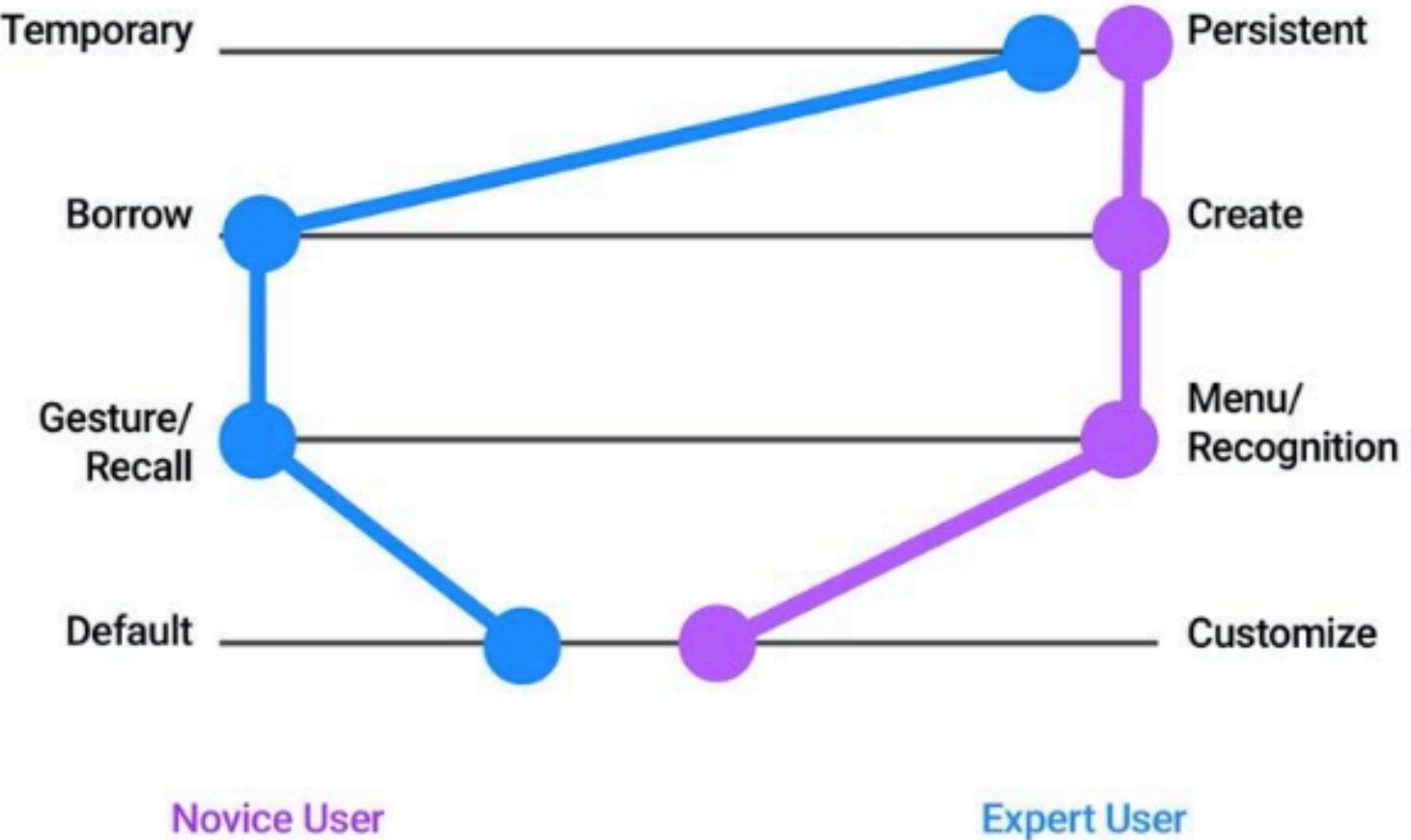
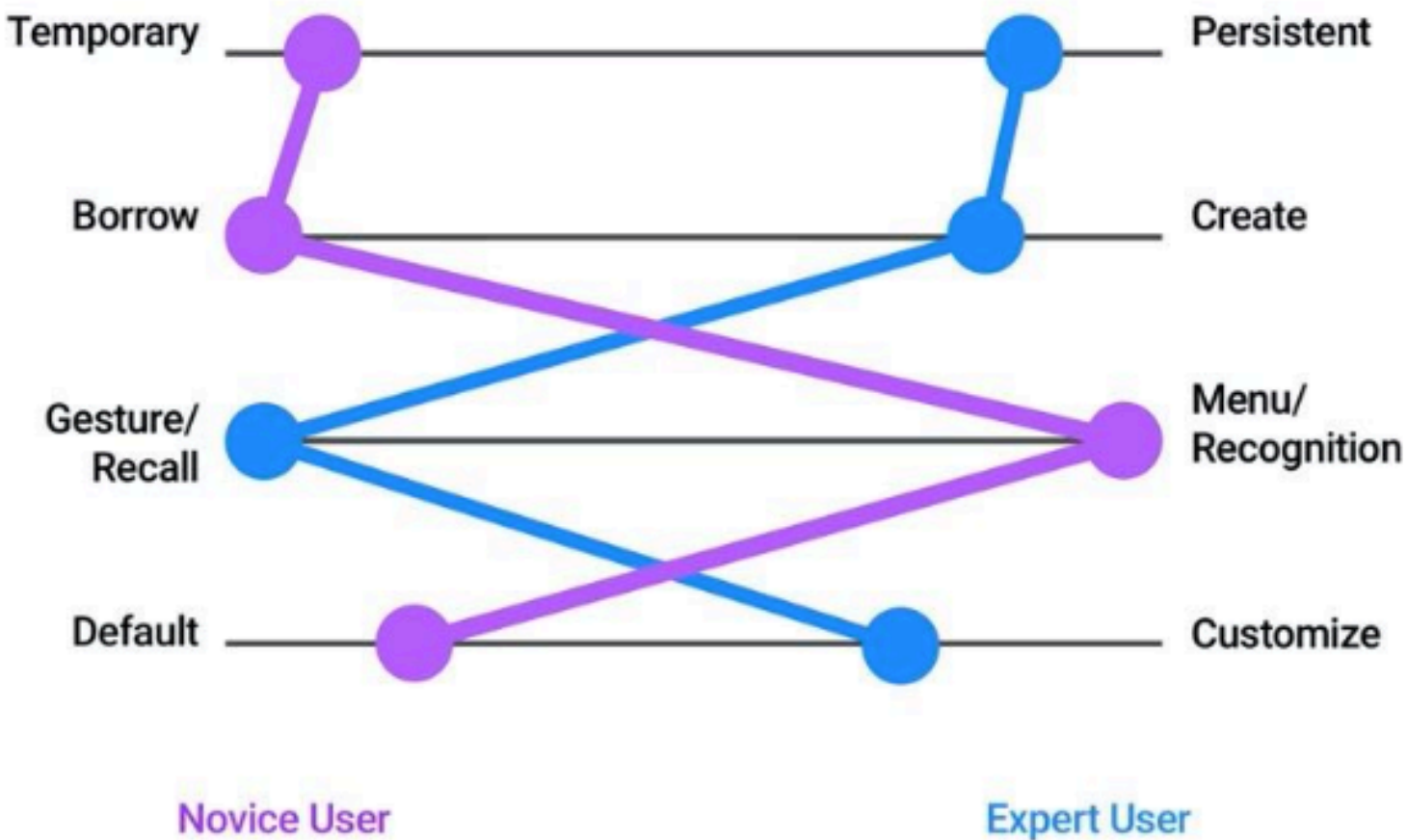
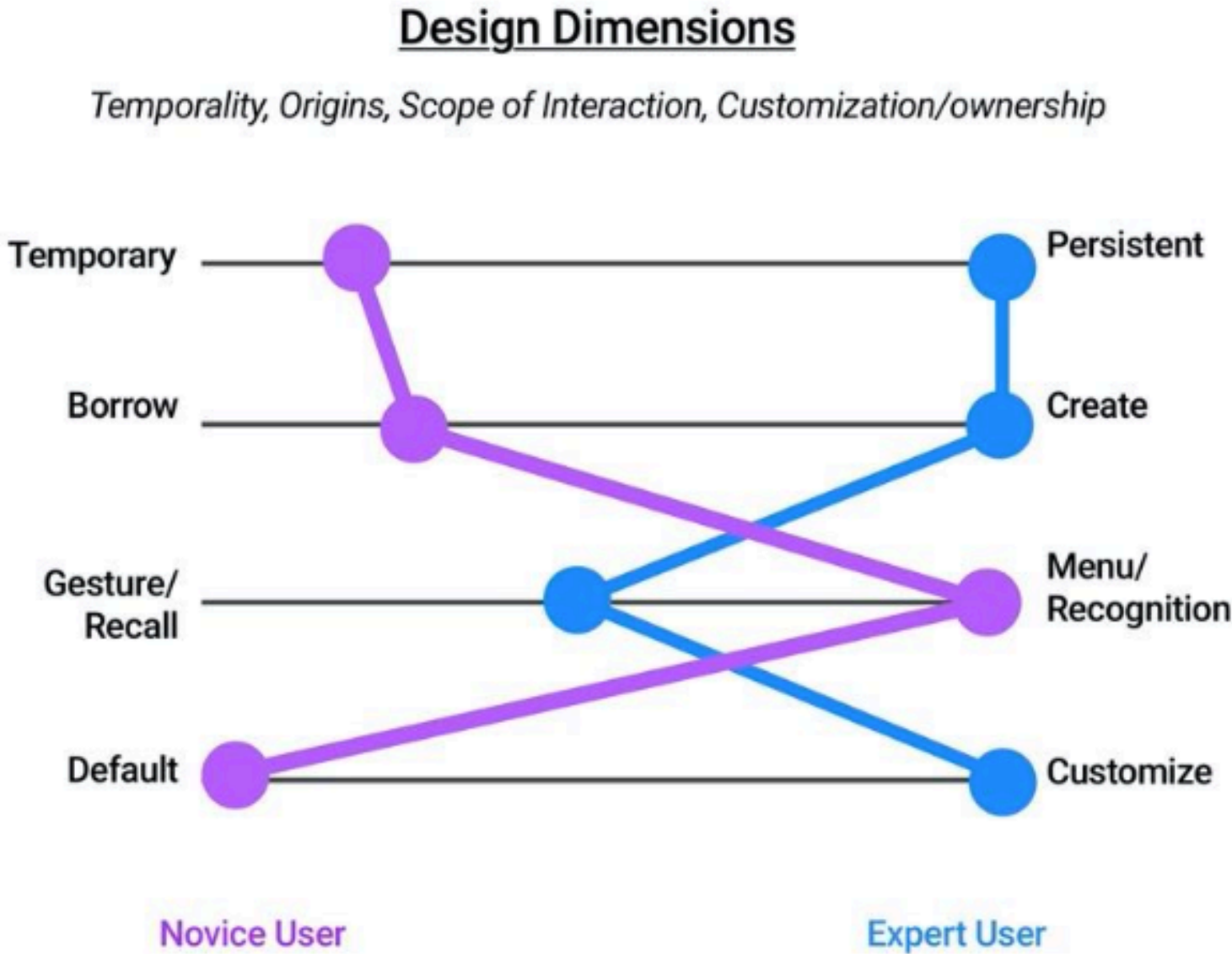
Example: compare novices vs. experts



DESIGN
SPACE

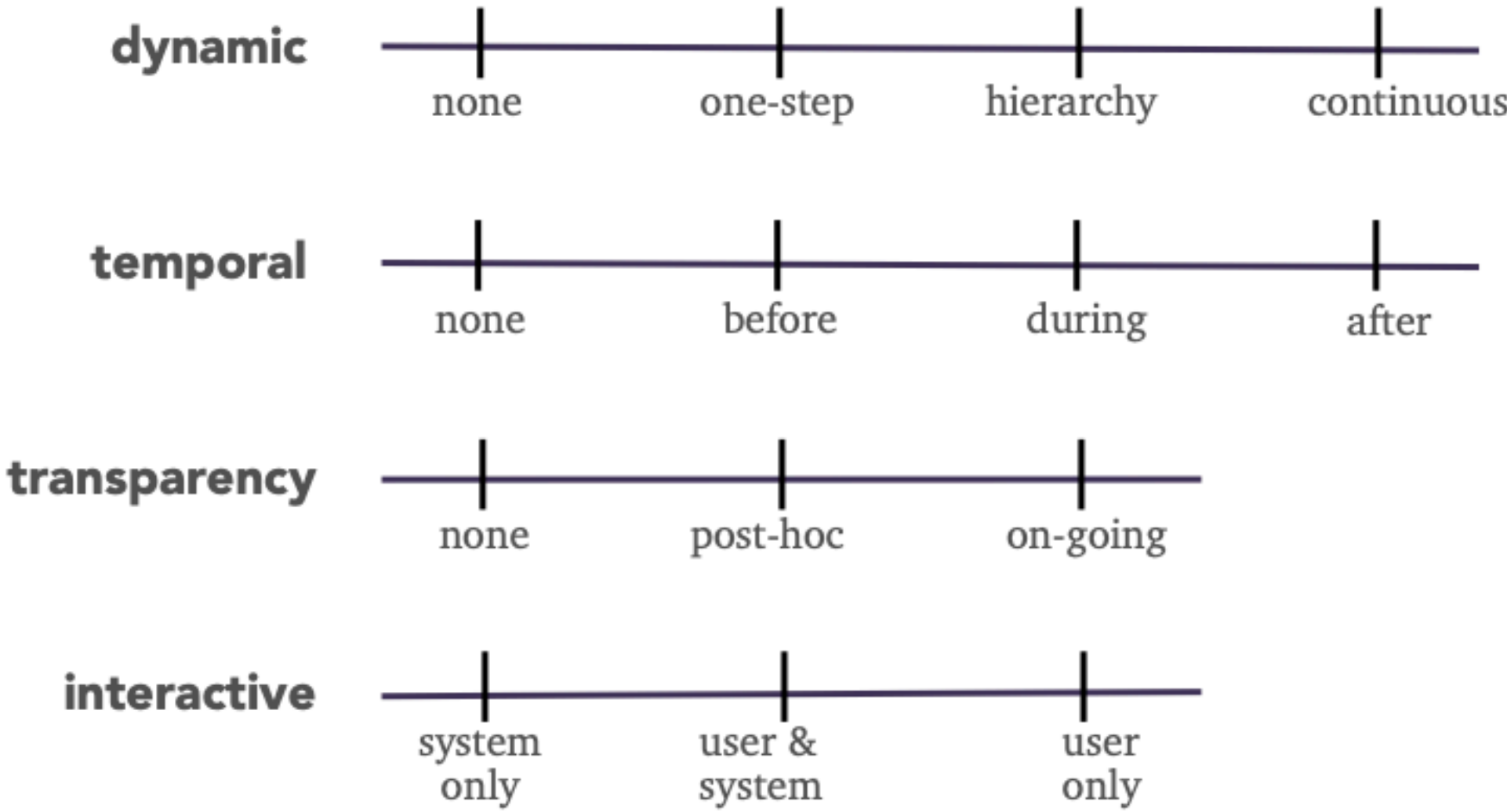
REPRESENTING IDEAS

SEMANTIC DIFFERENTIAL



Octopocus (Bau & Mackay, 2008)

Create a set of dimensions
based on the research literature

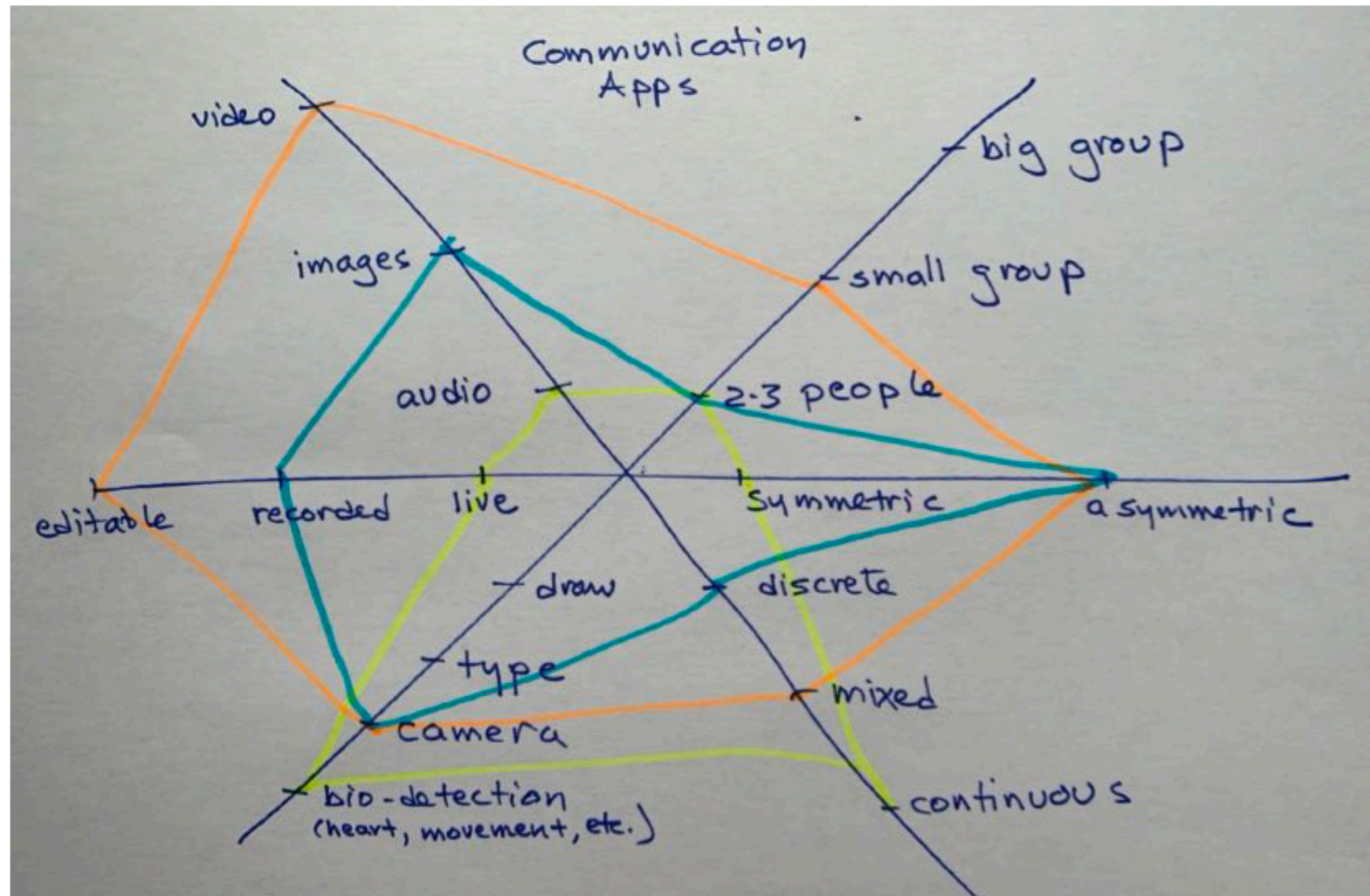


DESIGN
SPACE

RADAR diagram

Lay out dimensions in a radial pattern

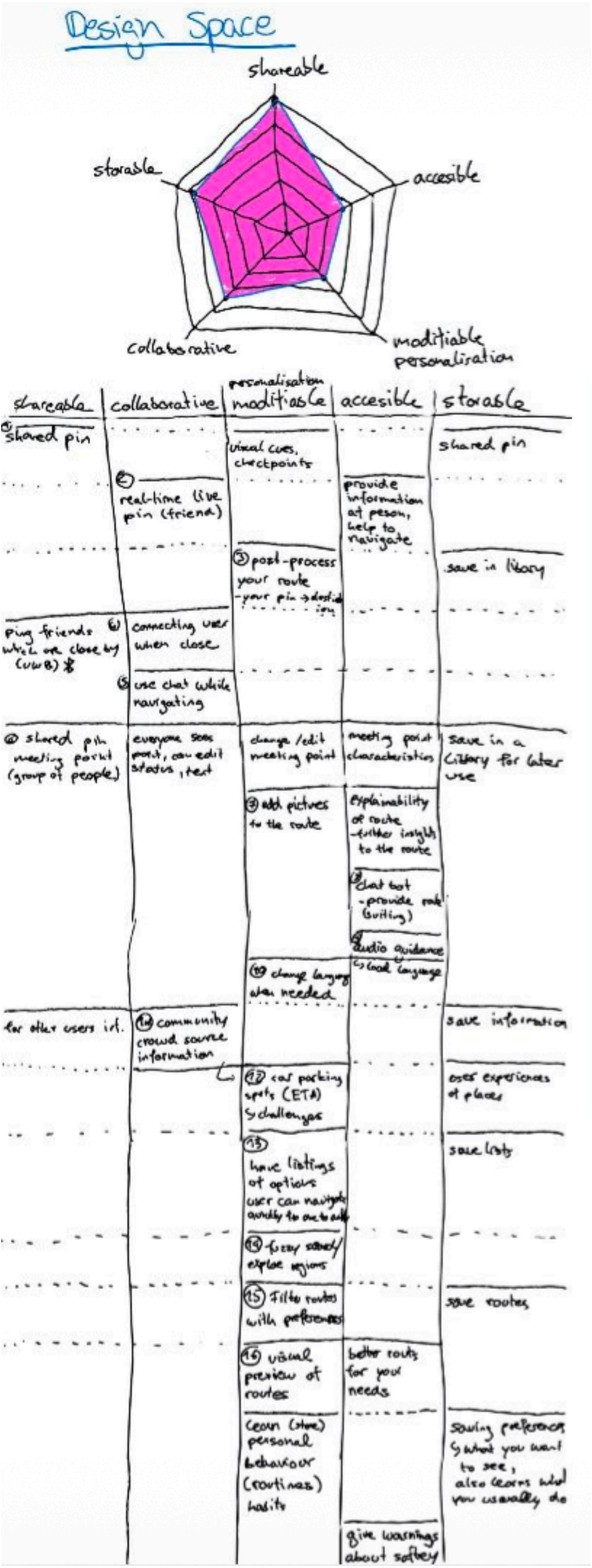
Color code and compare each idea or system



DESIGN
SPACE

RADAR diagram

Elaborated



DESIGN SPACE

How to specify a design space

Organize relevant design possibilities

Choose dimensions to design problem

- Identify way points

Lay out ideas on each dimension

Design spaces help you:

- Choose among ideas

- Generate new ideas

- Look for gaps

- Check intersections

**DESIGN
SPACE**

HOMEWORK **SUMMARY** —

Update Current Scenario — Team

Update User Profile (if necessary) — Team

Idea Archive — Solo



NEXT WEEK HCI EVENTS

PhD Defense of Xiaohan Peng

Title: Designer-Led Interaction with Generative AI

Date: 28th September, 4 pm

Location: Digiteo (660), Auditorium

Jury:

Bjoern HARTMANN - University of California, Berkeley

Nick BRYAN-KINNS - University of the Arts London

Elena L. GLASSMAN - Harvard University

Steven DOW - University of California, San Diego

Nicolas SABOURET - Université Paris-Saclay

SIGCHI Paris Talk

Nick BRYAN-KINNS - University of the Arts London

Date: 29th September, 10 am

Location: Digiteo (660), Auditorium