DESIGN OF INTERACTIVE SYSTEMS

08 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

WHO ARE WE?



Janin Koch

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Emma-Jade De Moor

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Mélodie Sanchez

PhD student, Inria Saclay

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OBJECTIVES

Design interactive **systems** from a user's perspective

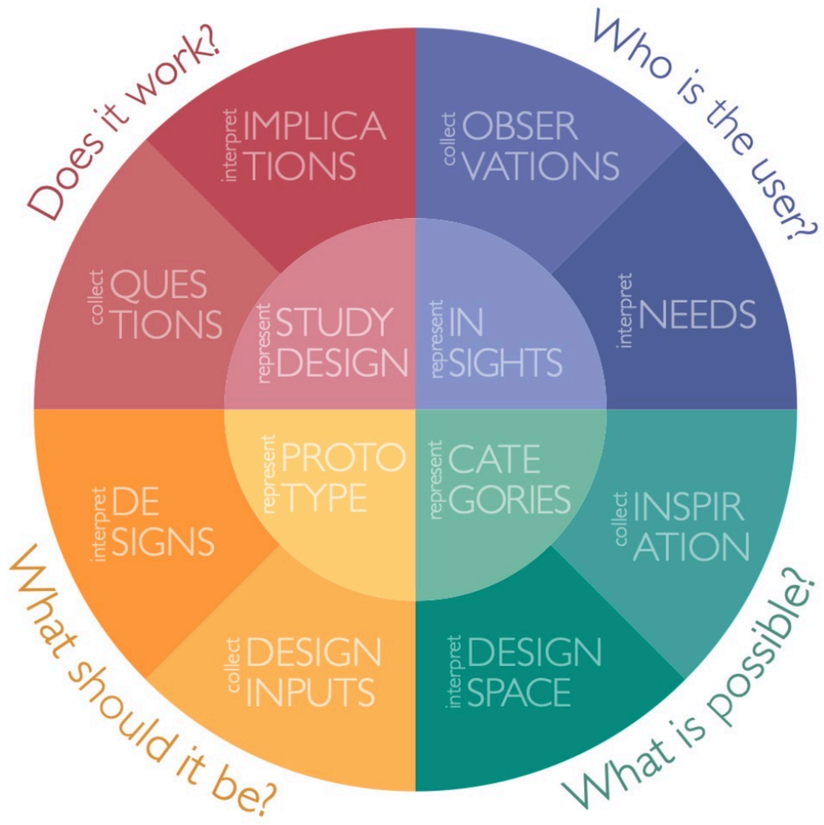
Build quick and iterative **video prototypes**

Conduct **participatory design** workshops

Evaluate and **redesign prototypes** with peers

INTRODUCTION COURSE

DESIGN OF INTERACTIVE SYSTEM___



1 Learn basic Design Methods

Many hands-on design methods

Discover needs to reflect on your design





2 Learn Design in Teams

Act quickly

Stop arguing

'Just do it!'

3 Design for user needs

Identify user needs
Design for user needs
Iterate on design ideas

LECTURES 1

OVERVIEW

Category	Activity	Duration (min)
Lecture	Course Overview	20
Exercise	Project Setup	15
Lecture	Collecting Data + Observations	40
Exercise	Introspection	5
	—- BREAK —-	10
Lecture	Interviews	25
~~Exercise~~	~~Peer Interview~~	~~16~~
Exercise	Story Interview Questions	5
Homework	Story Interviews	5
~~Lecture~~	~~Representing User data and Users~~	~~10~~
~~Lecture~~	~~Capturing Stories~~	~~15~~

COURSE OVERVIEW

Work in teams

- Some solo activities
- Mostly group activities

Exercises

- Mix of solo (individual) and team exercises
- Some performed in class, others as homework
- All must be completed!
- Homework review at the start of class
- Team exercises: Decide who will upload it!

Homework

- For group (team) credit:
  - Include your name & team #
  - Upload to your team page
- For individual (solo) credit:
  - Include your name & team #
  - Upload to your personal page

Uploading homework:

- by 1 pm on the day of the next class
- late homework will reduce grading!

COURSE OVERVIEW

Grading:

- Participation (individual) — 10%
- Story Interviews (individual) — 20%
- Prototypes (group) — 20%
- Participatory Design Workshop — 20%
- Final Presentation (group) — 30%

Projects involve in-class exercises and homework

Attendance is essential for both — DOIS and TER!

Missing class

- Write an email to me: Janin.Koch@inria.fr
- Get in contact with your group and discuss how you can help them

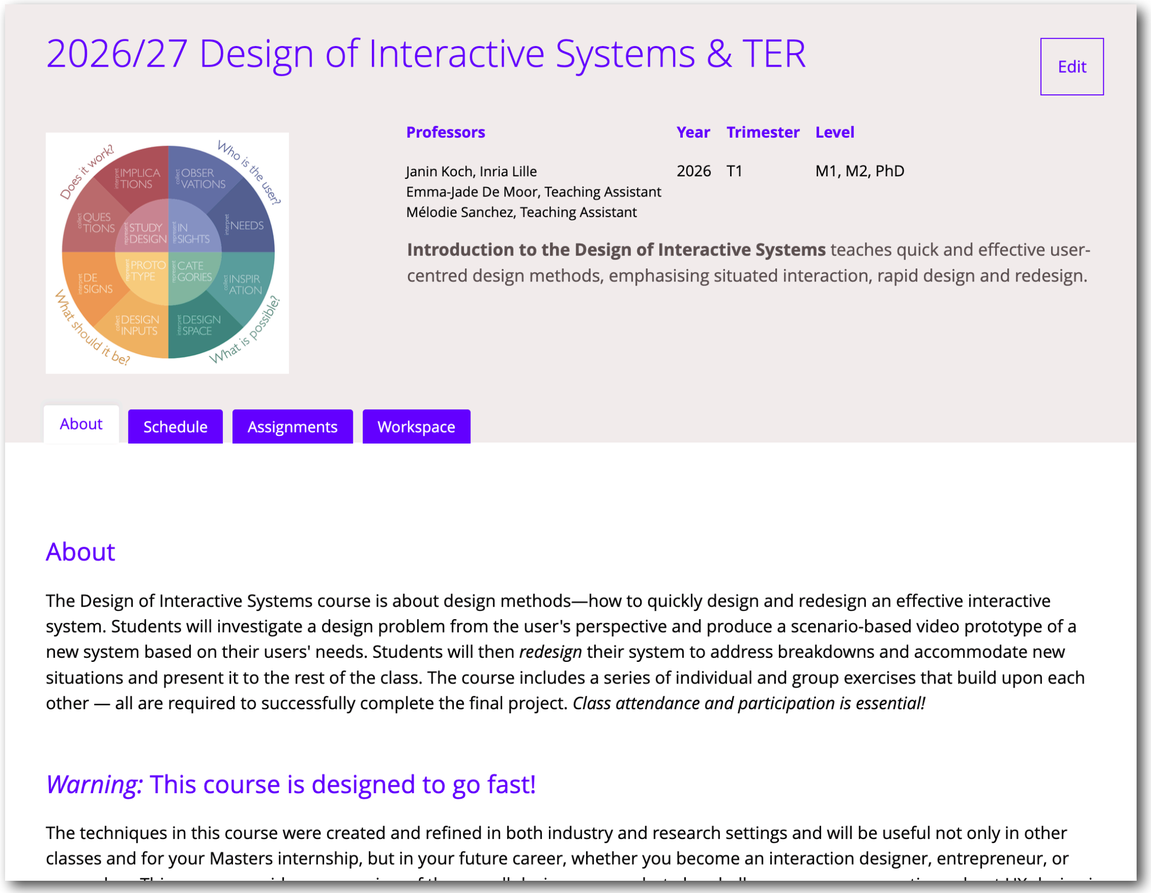
COURSE OVERVIEW

General Communication

Registration (until tomorrow)

- Send email to Mélodie (melodie.sanchez@inria.fr) including:
  - Subject: DOIS 26/27
  - Your First and Last name
  - Your email address

- You will receive an email with username and password
  - Check that your account works

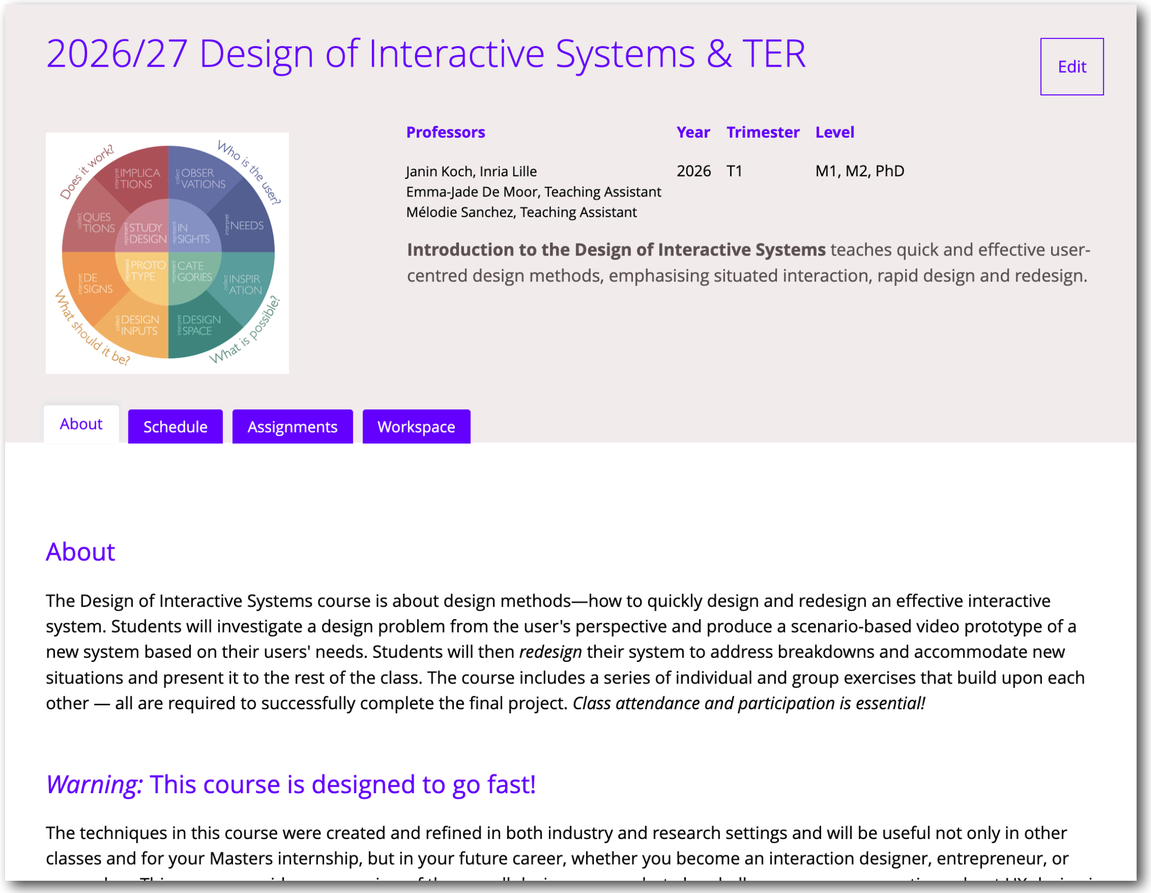


COURSE OVERVIEW

General Communication

Website

- One group member creates in ‘Student’s Workspace’:
  - A group page (+) in the left column under page
  - Using template: Advanced design Report (private)
  - Add information about group members and target groups




Educational Background
Expectations
WHO ARE YOU?
Experience with Design
Future Plans
Technical capabilities

ABOUT

GENERATIVE DESIGN

FIRST ...

THE “DO IT” CYCLE

GENERATIVE DESIGN

COHERENT ITERATIVE DESIGN PROCESS

Discovery

— Who is the user?

Inspiration

— What is possible?

Design

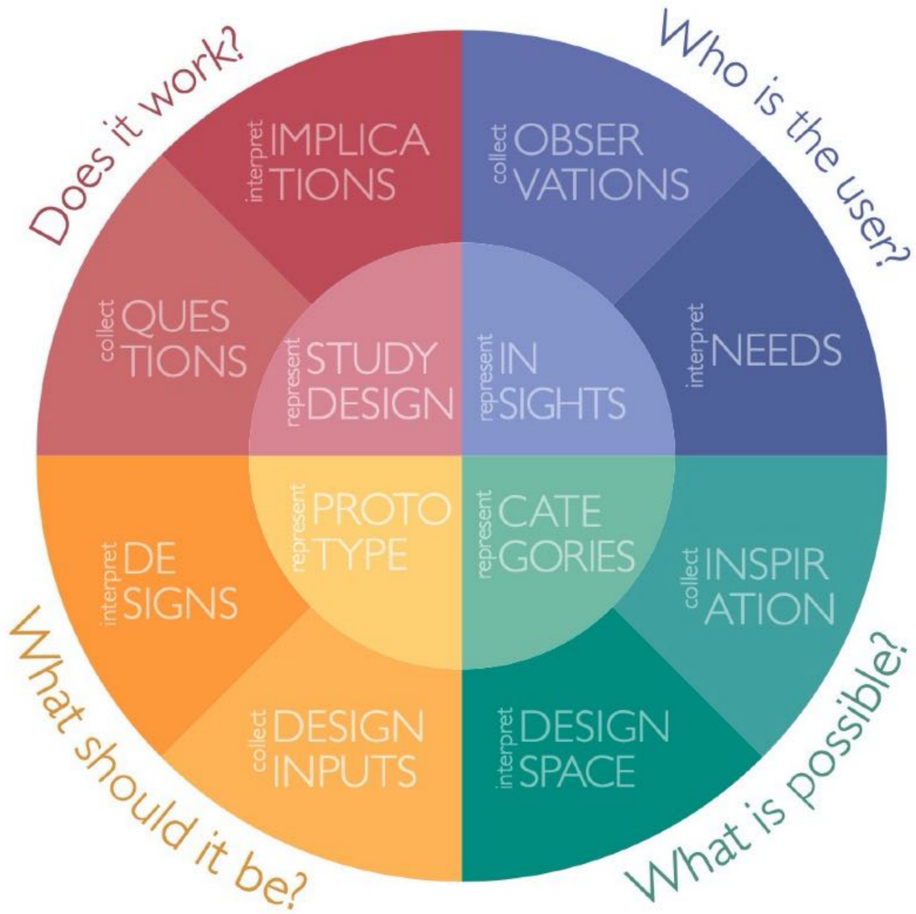
— What should it be?

Evaluation

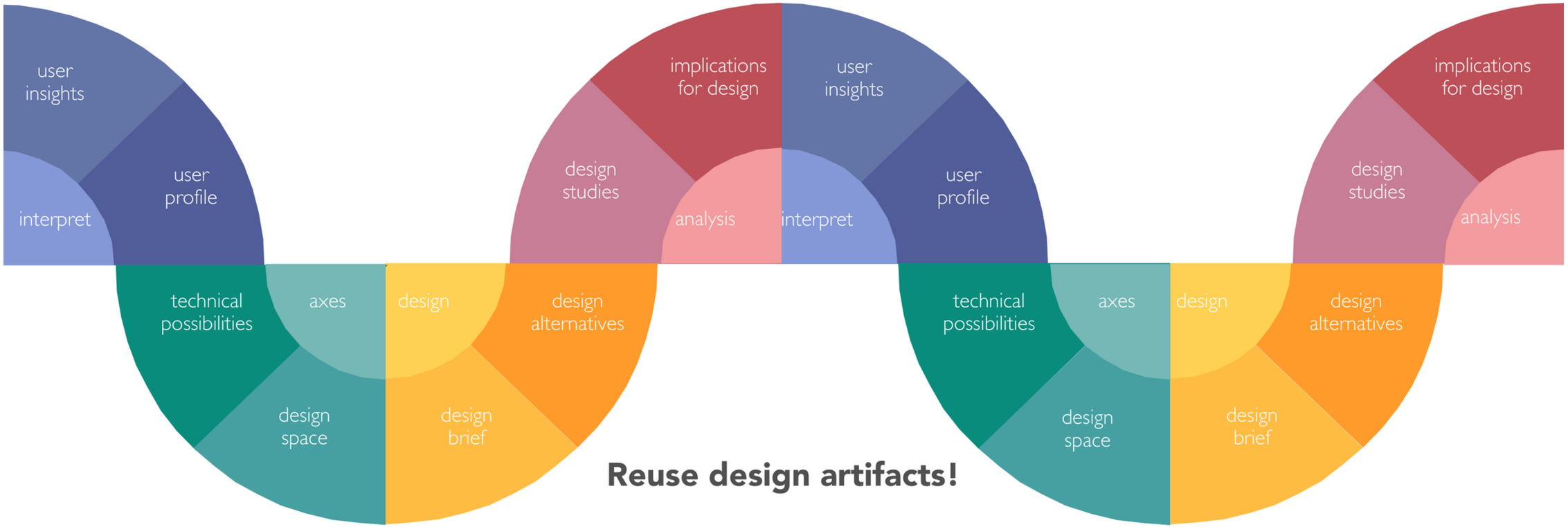
— Does it work?

Redesign

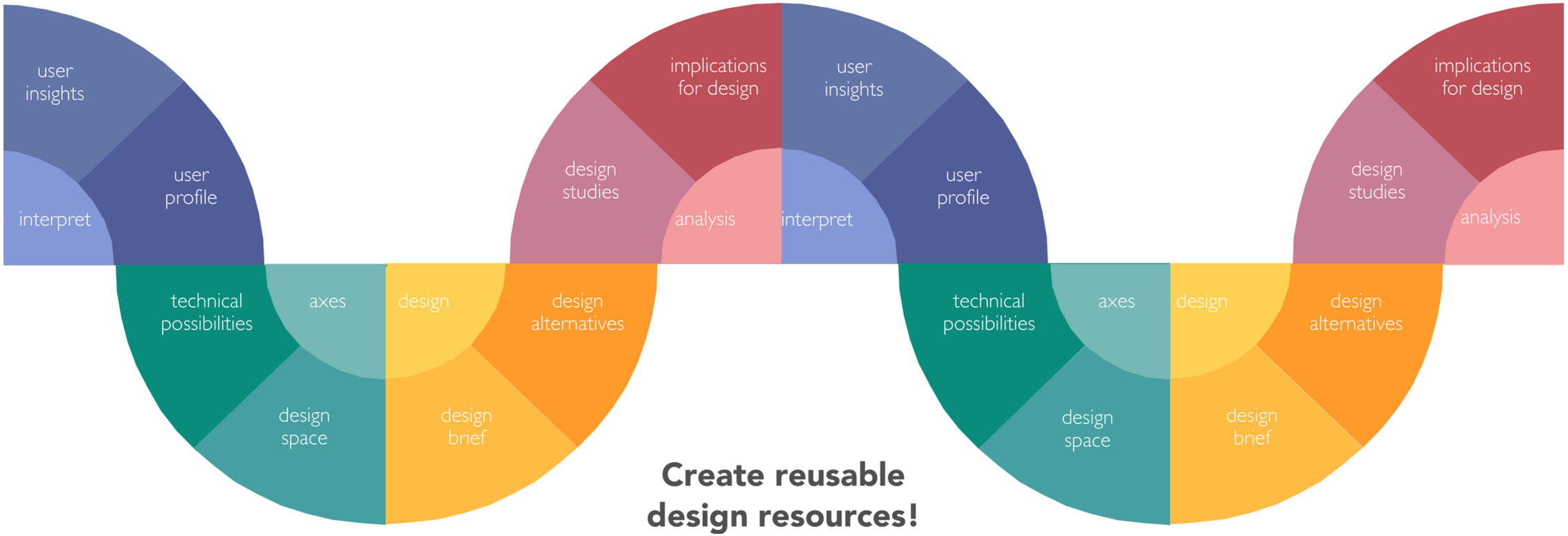
— Make it better!



ALL DESIGN IS REDESIGN___



INTERACTION DESIGN IS ITERATIVE ___



Create reusable design resources!

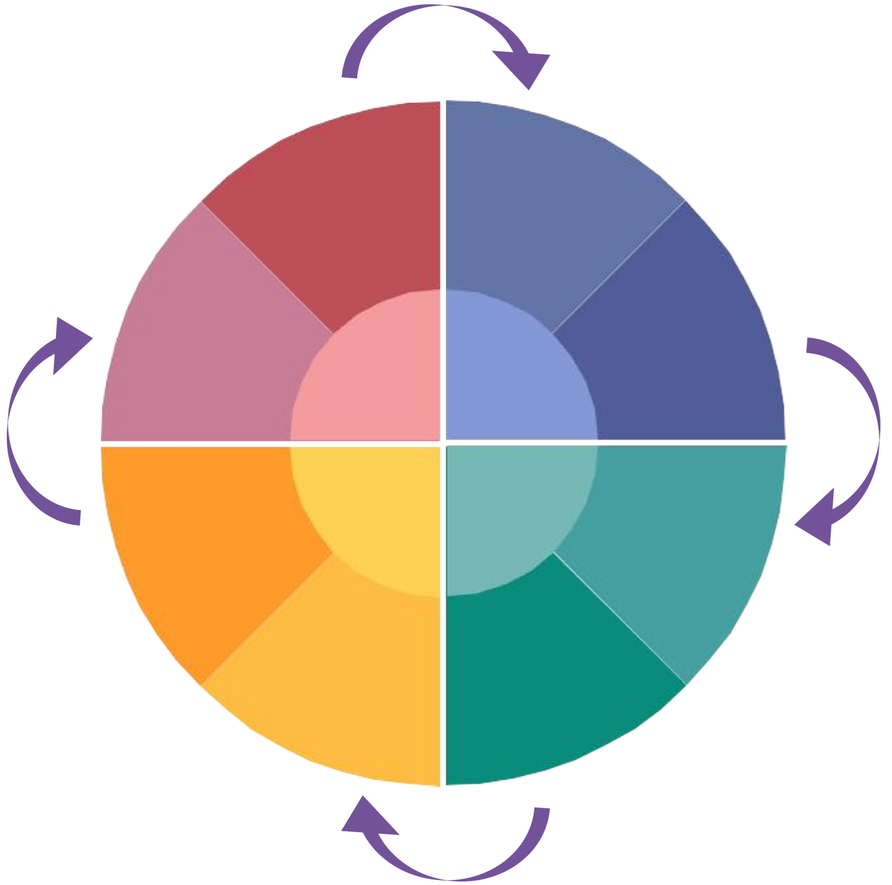
DESIGN AS PRACTICE

INTERCONNECTED DESIGN PROCESS

Design is iterative

Every design phase contributes to every other phase:

Jump from any phase to any other phase as needed



DESIGN PROCESS___

Before

Prepare activity

- set up workspace
- select materials & tools
- reuse design artifacts

During

Collect data

- Sample or generate

Represent data

- Transform, condense or expand

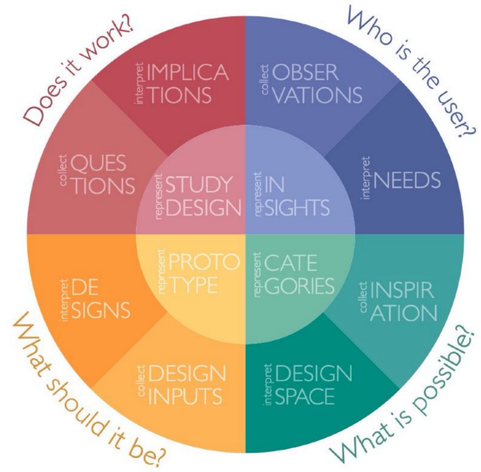
Interpret data

- Analyse, make sense

After

Produce take aways

- Make reusable artifacts for (re)design



GENERATIVE DESIGN

DIVERSE METHODS

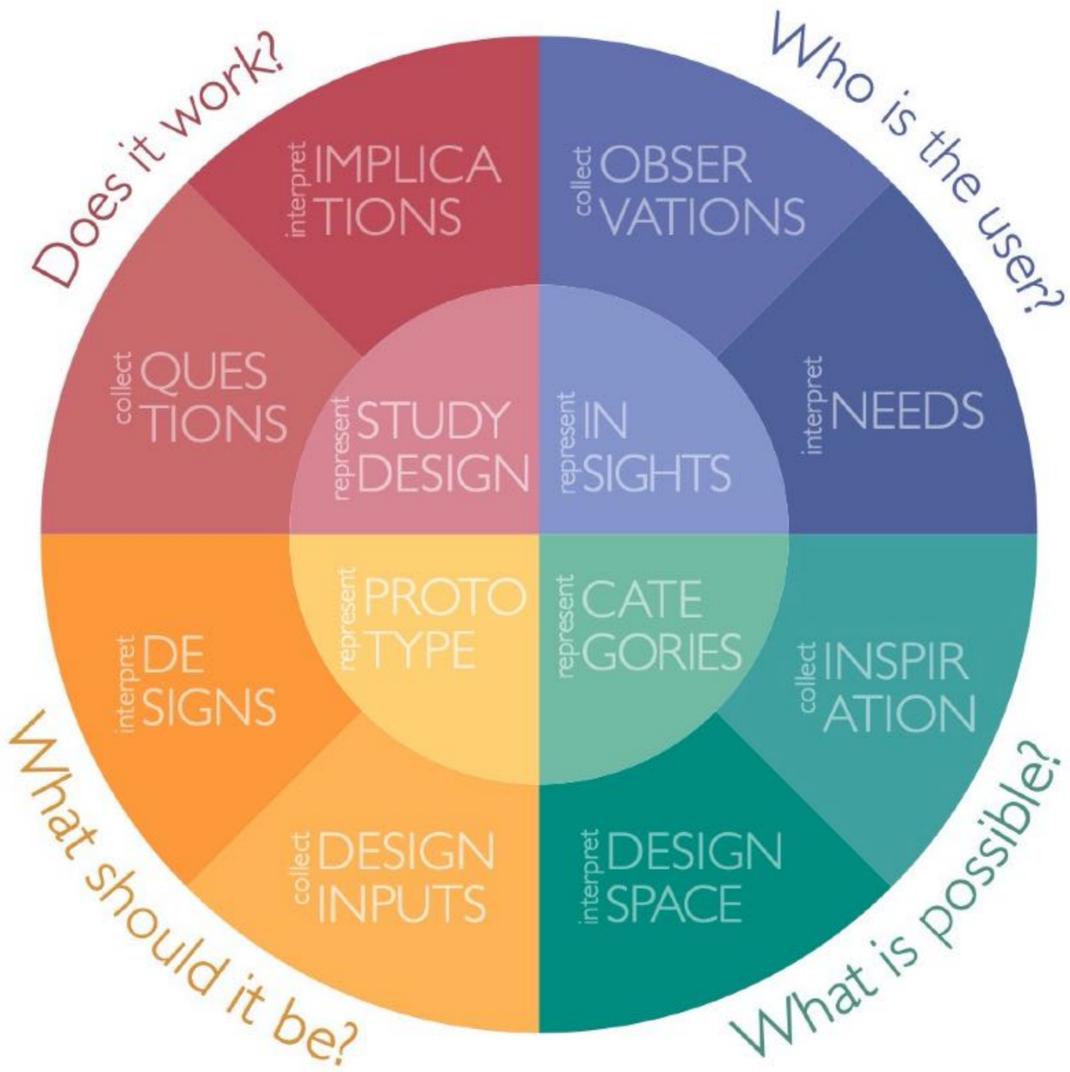
Divergent or convergent

Critical or generative

User focused or system focused

Story-based or system-based

General or specific



GENERATIVE DESIGN

MULTIDISCIPLINARY DESIGN METHODS

Discovery Who is the user?	**Inspiration** What is possible?	**Design** What should it do?	**Evaluation** Does it work?	**Redesign** Do it bettter!
Direct observation *Anthropology*	Standard brainstorming *Business*	Paper prototyping *Design*	Task analysis *Ergonomics*	Generative walkthrough *HCI*
Critical incident technique *Psychology*	Video brainstorming *HCI*	Future scenario *Theater*	Controlled experiment *Psychology*	Culturel probe *Design*
Questionnaire *Sociology*	Idea archive *Design*	Video prototyping *Cinema*	Design walkthrough *Engineering*	Structured observation *HCI*
Video snippets *HCI*	Bodystorming *Theater*	Interaction table *HCI*	Diary study *Anthropology*	Interactive thread *HCI*
Thematic analysis *Psychology*	Design space *Design*	Wizard of Oz *HCI*	Field study *Anthropology*	Technology probe *HCI*

TOPICS & EXERCISES

SOLO, PAIR OR TEAM___

Discover users	Introspection, Peer interview, Story interview, Object table, Breakdown analysis, Personas, Current scenario
Inspire ideas	Idea archive, Brainstorming, Video brainstorming, Design dimensions, Design space
Design prototypes	Concept, Alternatives, Design diagram, Interaction table, Future scenario, Storyboard, Video prototype
Evaluate systems	Design walkthrough, Experiment design, Design improvements
Redesign	Generative walkthrough, Revised concept, Revised video prototype, Poster, Presentation

COURSE

ESSENTIAL EXERCISES

Story interviews (two) — (solo)

Capture detailed interaction stories

Video prototype #1 — (team)

Illustrate how users interact in a real context, including breakdowns

Participatory Desin Workshop — (team)

Improve your design by including users actively in the design process

Video prototype #2 — (team)

Significantly improve the design based on feedback and analysis

Final presentation — (team)

Present project (oral & poster)

COURSE

ESSENTIAL EXERCISES

Grading:

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Video prototype #2 — (team)

Significantly improve the design based on feedback and analysis

Final presentation — (team)

Present project (oral & poster)

GOAL

ESSENTIAL EXERCISES

Experience a complete, user-centered design & re-design process

Learn to work quickly...
- Do not argue – design something !
- You do not have time for perfection!

If you turn in each exercise on time
- You can try again for a better grade

This is a hands-on class...
participate!

DESIGN PROJECT__

COURSE PROJECT

Create an original design to support Interactive Navigation

Rethink Navigation

- 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 on feedback

Examples of Navigation

- Public Transport
- Museum visit
- Tourism/ City exploration

Limitation:

- without a smartphone!
- without a laptop!

CONSIDER INTERACTION

BEYOND THE DESKTOP___

Augment the person



Augment the object



Augment the environment



Use course design methods to:

- discover user issues
- generate new ideas
- design mockups
- create a video prototype
- evaluate your design
- redesign for major improvement

PROJECT



GROUPS...

Group 8 minutes

EXERCISE

PROJECT SETUP

Groups of 4 Students will Form one Team

Create a Team

- Get up …
- We count from 1-8 iteratively
- REMEMBER YOUR NUMBER!
- No change of group!

Setup a Team

- Move 2 tables together
- Sit together with your teammates
- From now on this is the default setup

Find a joint navigation you are all familiar with!

Design is about *doing*
not just thinking

DESIGN THINKING

Good interaction design requires
taking the *user's* perspective

Who is the user?
What do they want to do?
What is the current context?

You cannot **"design the user experience"**
You can control some (but not all) of
the user's experience

DESIGN ARTIFACT

Diverse goals

Quick or elaborate
Formal or informal
Qualitative or quantitative
Story-based or system-based
Contextual or non-contextual
Concrete or abstract

Every design activity should generate a reusable result

ARTIFACTS

DIVERSE APPROACHES

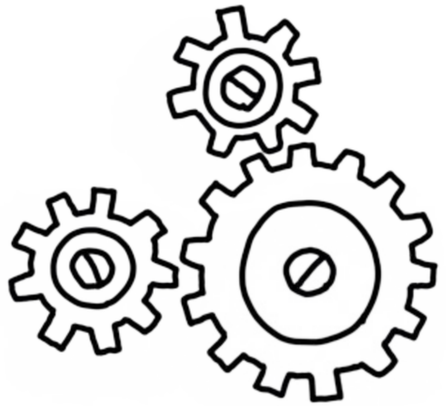
Science

- Collect data about users
- Analyze data
- (qualitative, quantitative)
- Inform designers



Engineering

- Collect functional
- specifications
- Implement functionality
- Test functionality



Design

- Inspire ideas
- Consider context
- Question the design brief



GENERAL DESIGN ADVICE

Find real users with a real problem to solve

Collect specific stories of current interaction
- What went wrong?
- What worked well?
- What surprised you?

Consider the context of interaction
- How does that change the user experience?

Start as specific as possible — generalize later

You can always abstract from details but never get details from abstractions

ABOUT WORKING IN TEAMS

BECOME A SUCCESSFUL INTERACTION DESIGNER

Respect your teammates
  Everyone should contribute

Don’t argue
  Stop talking and **do it!**

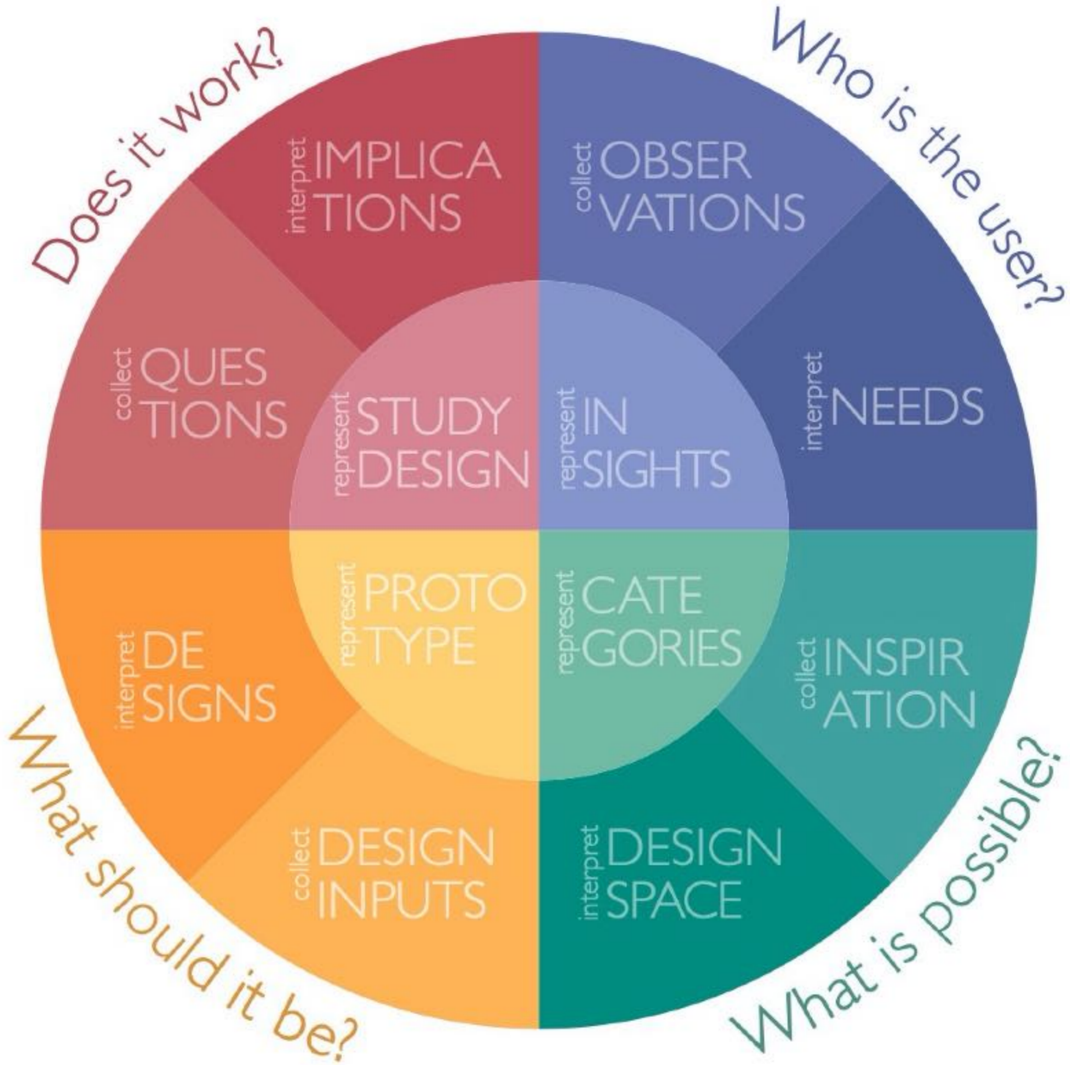
Work fast
  Sketch ideas, avoid perfection

Try at least 3 alternatives
  no more than 5

Take the user’s perspective
  not the technology’s

Create, reflect upon and reuse artifacts
  Focus on the interaction

THE DESIGN OF INTERACTIVE SYSTEMS



GENERATIVE DESIGN

DIVERSE METHODS

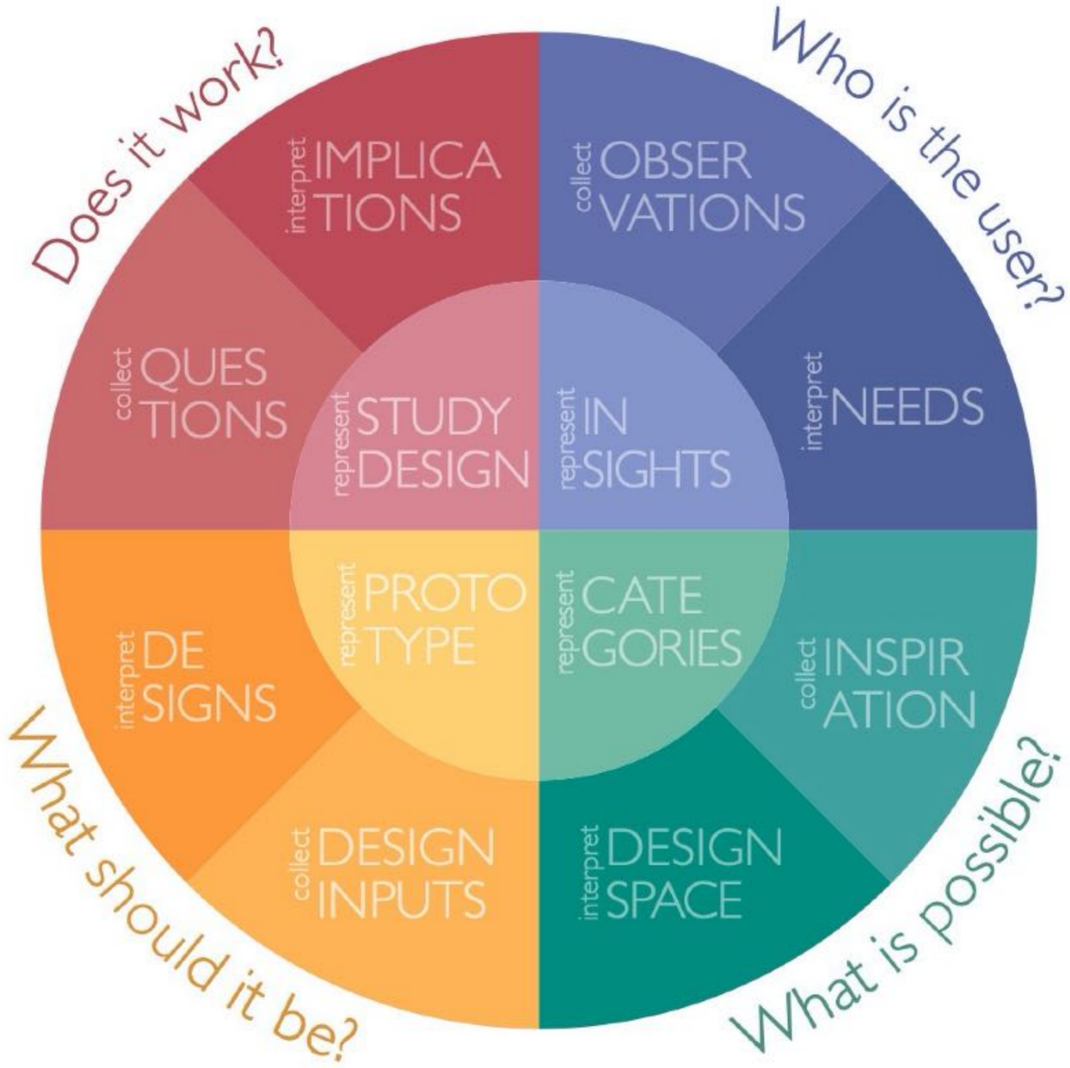
— Collecting information —

— Representing information —

— Interpreting information —

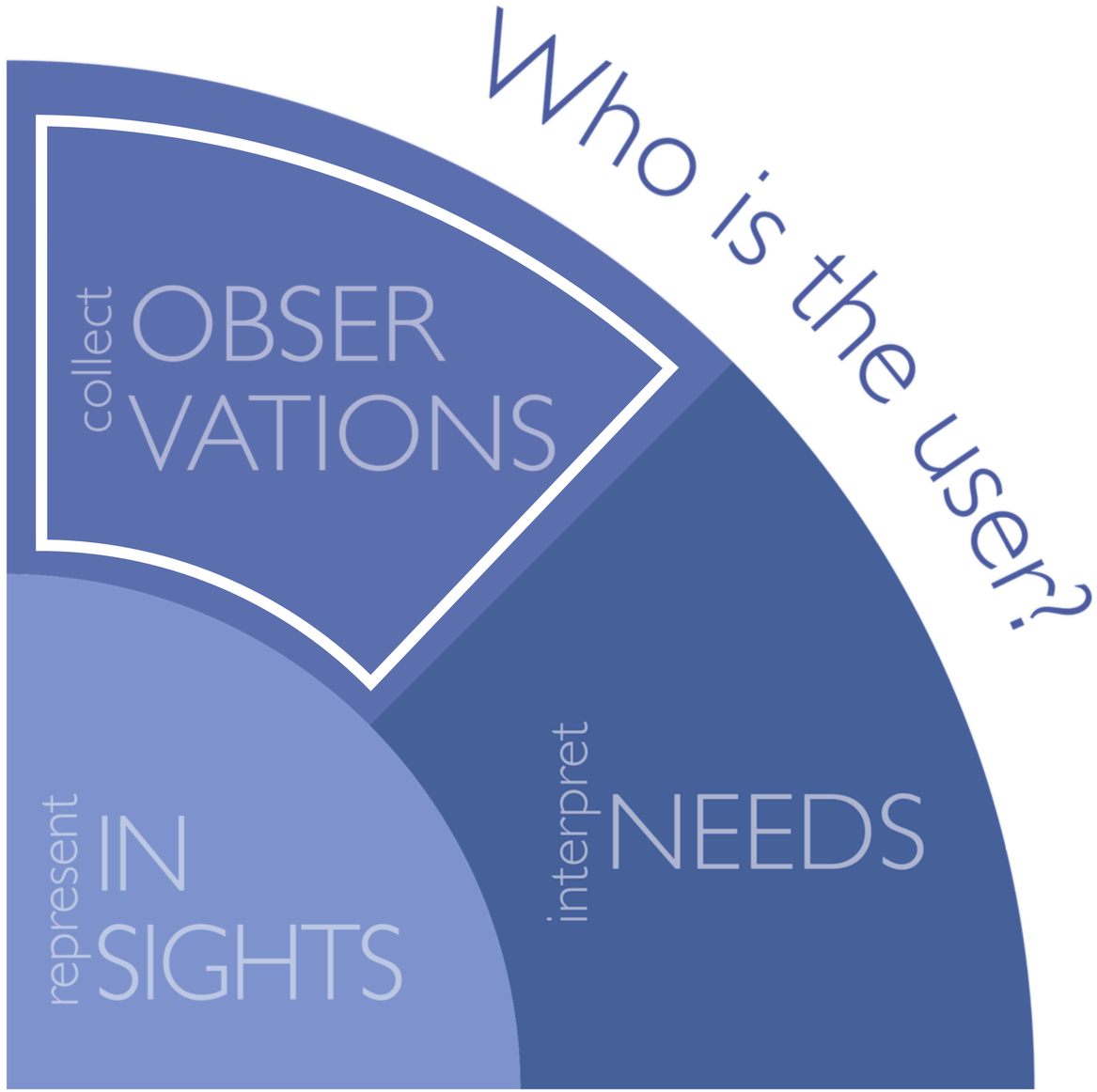
ALL design methods

should produce design artifacts that serve as resources for future design activities



DISCOVERY

WHO IS THE USER



DISCOVERY

WHO IS THE USER___

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 Descriptive statistics	DESCRIBE SHOOT ANALYSE	Current scenario Current video Thematic analysis

DISCOVERY

WHO IS THE USER

Understanding users

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

OBSERVE INTERACTION

Learn to see interaction!

To play the violin
first learn to hear the music

To paint a portrait
first learn to see a face

To design interactive systems
first learn to observe interaction

OBSERVE INTERACTION

“In situ” means “in context”

Observe how users perform tasks in situ

Remember

- All observation is subjective
- “Validity” depends upon the details
- Observing ≠ interacting with users

OBSERVE INTERACTION

ETHICS

Always ask for permission!

Accept ‘no’ for an answer!

The user may stop at any time without giving a reason

Anonymize personal data

Never distribute personal data — follow GDPR

Follow ethical guidelines from the IRB*

*Institutional Review Board

OBSERVE INTERACTION

Scientific approach

Ask user to perform specific tasks:
- Execute a series of tasks
- Solve a problem
- Follow a scenario

Always provide standard instructions
- Choose at least three real users

Code your data:
- Define categories
  - discrete or continuous events
- Measure the degree of confidence

OBSERVE INTERACTION

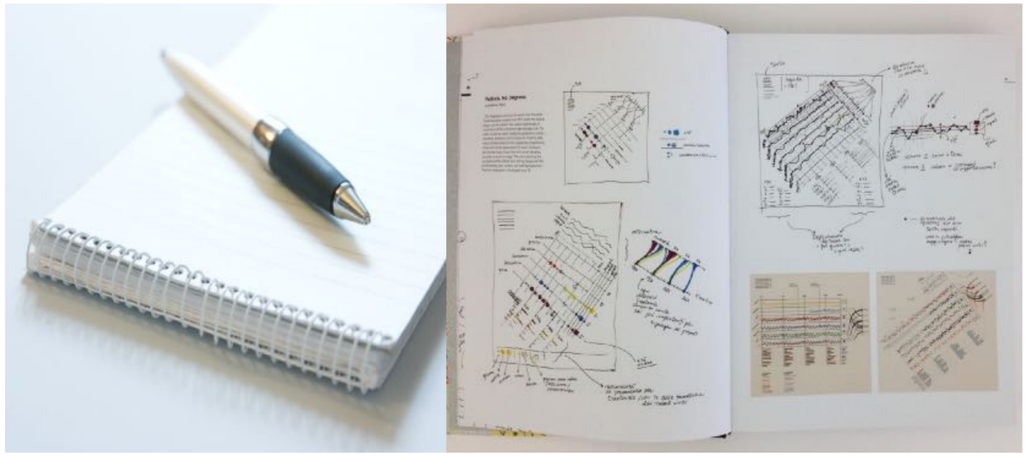
How to record data?

Paper — Cheap, fewest details, incomplete
Audio — Often useful, but hard to analyze
Video — Very detailed, may be too intrusive
Long analysis process
Facilitates later re-analysis
Logs — Record all keystrokes/mouse clicks
Requires a computer
Facilitates statistical analysis

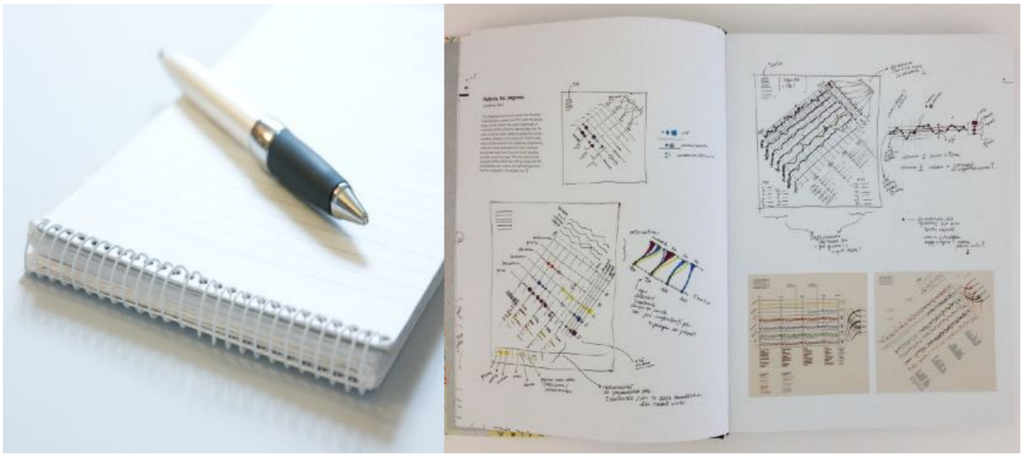
OBSERVING INTERACTION

DESIGN NOTEBOOK

- Capture observations about people and interactions with technology (What works? What doesn’t?)
- Highlight breakdowns
- Write or sketch new ideas
  - Seek inspiration and explore ideas

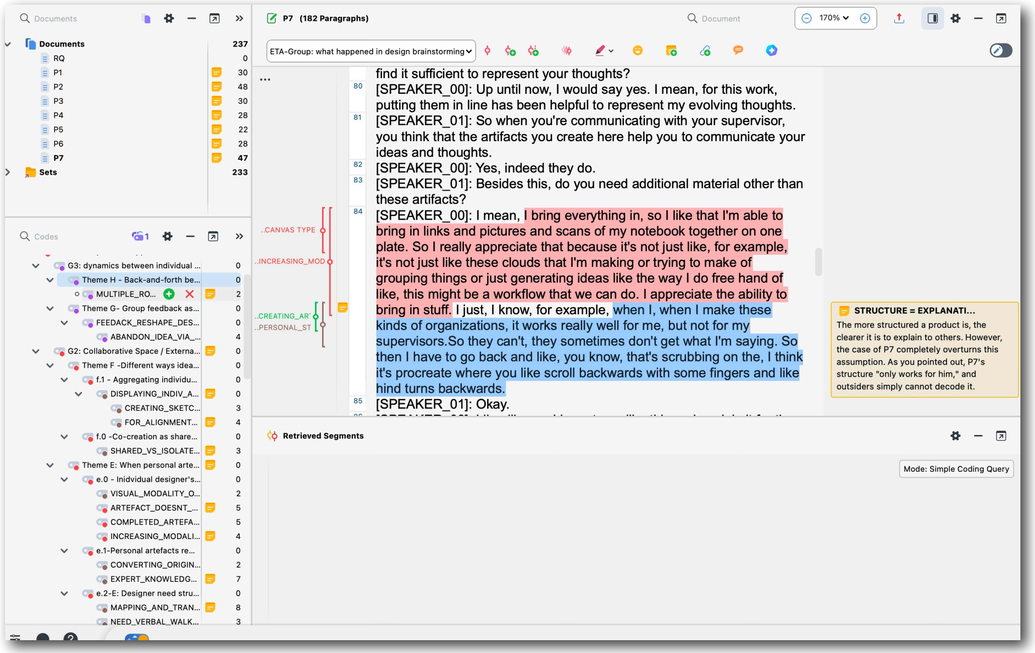


OBSERVING INTERACTION
USING NOTEBOOKS



HCI combines three work practices:

- Designers: Sketchbooks explore ideas
- Scientists: Notebooks record data and ideas
- Engineers: Logs capture data and ideas



OBSERVE INTERACTION

Choices

Where — Lab or Field setting
Experiment vs. Log study

What — Direct or indirect observation
“Fly on the wall” vs. Diary

Duration — Short or long-term
Experiment vs. Field study

Intervention — Open-ended or constructed
Direct observation vs.
Structured observation

Record — Notes, audio, video, data logs

Try the system yourself

Observe your actions systematically:

- Begin with a clearly defined, real task
- Set aside a limited amount of time
- Avoid getting interrupted
- Begin the task
- Record while you talk aloud or take notes

Analyze what you did:

- What does not work? (breakdowns)
- What works? (work arounds)
- What is surprising?
- What would make it better?

INTROSPECTION

Warning!

Introspection is very, very common
but very susceptible to misunderstandings

Treat it as a design method not a scientific research method

Advice:
always follow a protocol (pre-defined steps)

Keep in mind:
your opinions and experiences
may not match other users
seek insights and inspiration, not “truth”

INTROSPECTION

Solo 5 minutes

EXERCISE

INTROSPECTION___

Describe your interaction with an application, step by step, as you perform a task.

For each step, record:

- What was your goal?
- How did you accomplish it?
- How did the system respond ?

Include comments and especially any breakdowns or surprises.

Example: Look for the Digiteo building on your phone and get directions from PUIO.

Introspection

Name:

Team:

Instructions Look for the Digiteo building on your phone and get directions from PUIO.
Record every step: What did you do, how did the system respond?

Solo **5 min.**

DISCOVERY

WHO IS THE USER

Understanding users

	System	Action	Story
Collect	Literature review Introspection	READ OBSERVE	Novels, films Observation
	Questionnaire	ASK	Story interviews
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Interpret	User profile Themed video Descriptive statistics	DESCRIBE SHOOT ANALYSE	Current scenario Current video Thematic analysis

ASKING QUESTIONS

How you ask the question matters!

ASKING QUESTIONS

HUMAN MEMORY

Overview

Long-term memory is organized into:

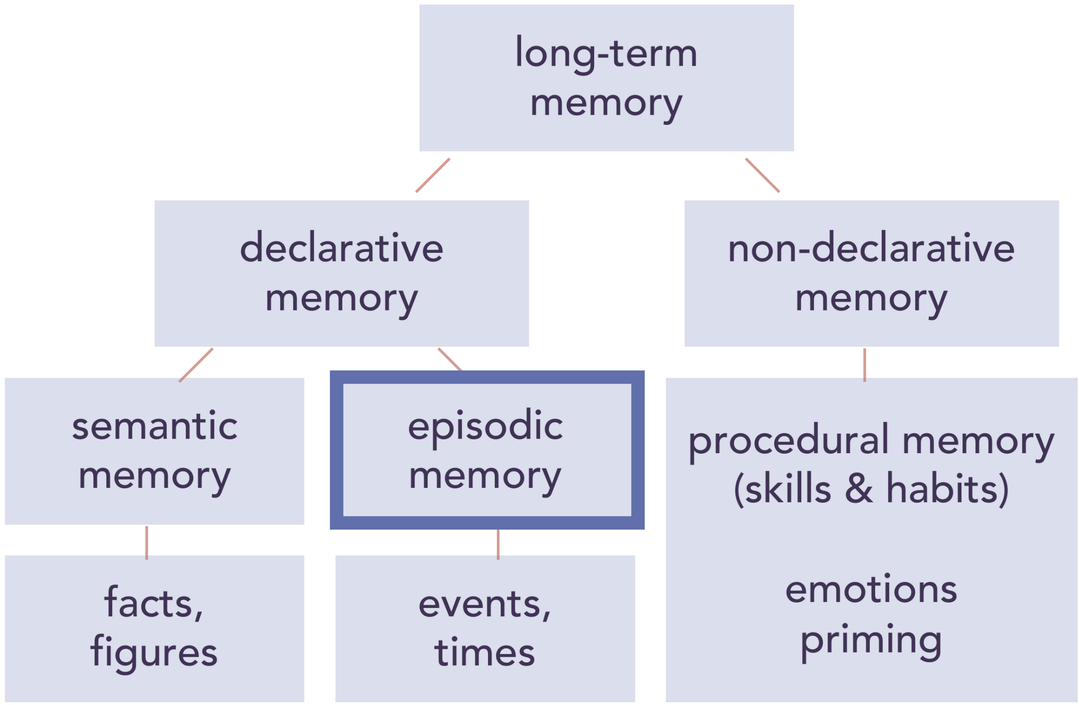
- declarative
- non-declarative

Declarative memory involves:

- semantic memory (facts & figures)
- episodic memory (events & times)

Non-declarative memory involves:

- procedural memory (skills & habits)
- emotional responses (can be primed)



Why ask for user stories?

Capture episodic autobiographical memory
event-specific knowledge related
to past personal experiences

Detailed user stories capture the user's:
conceptual objects
desired functionality
interaction with the technology
specific context

Most useful input to inspire design

HUMAN
MEMORY

ASKING QUESTIONS

How you ask the question matters!

The **form of the question**
directs the form of the response

To get specific, real answers,
you must ask the questions correctly
If not, you will get vague general answers
that do not help your design

Careful! Avoid marketing surveys!
Understanding users better
leads to better system design

ASKING QUESTIONS

Example: Ask about a recent email message

Poor question

How do you manage your email?

Why?

Encourages general statements and non-grounded opinions

Rarely results in a detailed story

ASKING QUESTIONS

Example: Ask about a recent email message

Good question

Think of the last time you wanted
to find an email message
but forgot the sender's name.

Tell me what you did to find it, step-by-step.

Why?

Encourages the person to tell a recent,
specific story and lets you probe for details

ASKING QUESTIONS

Example: Ask about a recent email message

Probe for details about the interaction

- What did you do first?
- How did the system respond?
- Was that OK?
- What did you do next?

Probe for more context

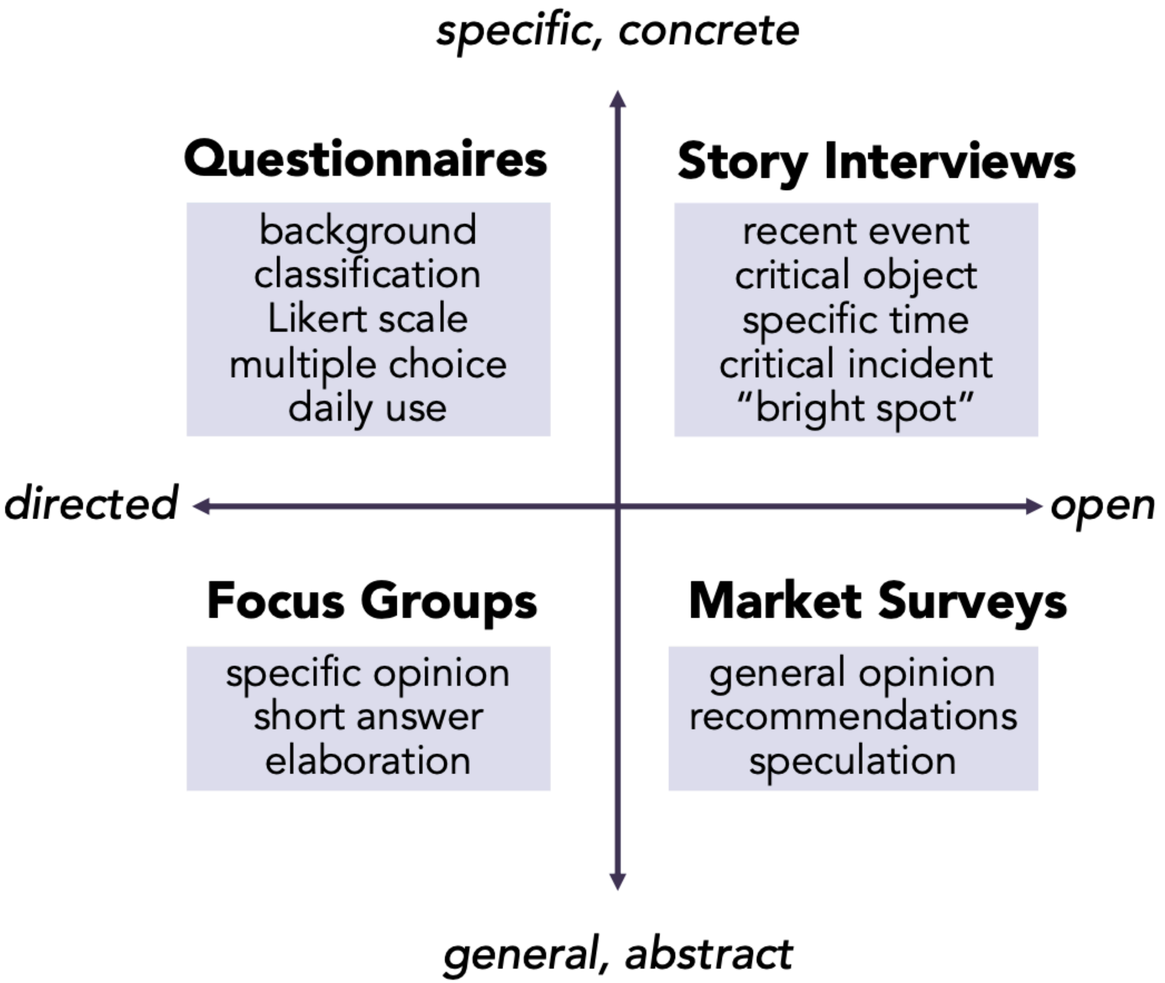
- Why did you need that message?
- Why couldn’t you find it?

ASKING QUESTIONS

Question order matters!

First **specific**	then **general**
First **concrete**	then **abstract**
First **directed**	then **open-ended**
First **facts**	then **opinions**

ASKING QUESTIONS



You can always abstract from details
but never get details from abstractions…

TYPES OF INTERVIEWS

Descriptions

What does this technology look like?

Explanations

How does this technology work?

Stories

What happened to you that specific time?

Opinions

What do you think or feel about it?

Data

How many times did you use it?

ASKING QUESTIONS

TYPES OF INTERVIEWS

Story interviews
Elicit real stories in real contexts
including breakdowns and surprises

Best for design

Tutorial interviews
Describe how it is supposed to work,
not how it actually works

Best for understanding

Opinion interviews
Highlights ‘pain points’
Lack detail, often too general for design

Best for marketing

Designing better systems requires
understanding real-world user interactions

Story interviews produce specific stories
- **not** opinions (market surveys)
- **not** tutorials (how it should work)

Story interviews
- preserve context
- identify breakdowns
- reveal patterns over time
- may uncover user innovations

STORY INTERVIEWS

Goal: get a detailed story of interaction

Extremely recent event
"Describe what happened at 9:00."

Flashbulb or negative memory
"xxx."

Bright spot or positive memory
"xxx."

Critical object
"Describe how you made this"

Critical incident
"Exactly what happened that time?"

STORY INTERVIEWS

RED FLAGS!!!

If you hear these …
Usually …
Sometimes …
Normally …
When I do this, …

Save your interview!

Ask more questions
probe for a specific story,
NOT how they usually do things

STORY INTERVIEWS

The form of the question directs
the form of the response

For specific, detailed answers,
always start with a recent, specific question
never start with a general question

Avoid yes/no questions or short answers

Probe for details
What happened next?
Get them to tell you a story

REMEMBER

~~Pair - 2 x 8 minutes~~

EXERCISE

PEER INTERVIEW

Interviewer

Record your names

Record phone type, language(s), typing style (thumbs? gesture-typing?)

Record every step of what happened (ask them to slow down, if needed)

Performer

Reenact a recent transportation problem

Use a talk aloud protocol to describe:

what you did

how the system responded

did it do what you wanted it to do?



Solo - 2 x 15 min

HOMEWORK

STORY INTERVIEW

Record **a** step-by-step account of how a user interacted with a particular system at a particular time.
Record as much detail about the user's interaction as possible.

Never start with general questions

Probe for more interaction details

Past tense: answers should describe what actually happened not what should happen

Look for breakdowns, workarounds, innovations

Report:

- 2 Story Interviews with Target users
- Transcribe these interviews
- Upload the two transcripts to your personal space until Friday