

# **Design Thinking**

**CS571: Building User Interfaces**

**Cole Nelson**

# Announcements

- Please email [cs571@cs.wisc.edu](mailto:cs571@cs.wisc.edu) with all class-related questions, including grading, deadlines, etc.
- The Git & GitHub Workshop will be on Friday at 3 pm in CS1240.

# In-Class Activities

- Are due on Fridays at 12:00 pm.
- You may work in groups of 1, 2, or 3.
  - You can switch groups for each ICA, if you choose.
- You may utilize Piazza "search for teammates"
- Group work **IS** working simultaneously on an ICA.
- Group work **IS NOT** "I take ICA A, you take ICA B."

Once you decide your group, **make a copy of today's ICA here!**

# What will we learn today?

- What is design thinking?
- How do we empathize with users?
- How can we turn this empathy into insight?

# The engineering and design processes...

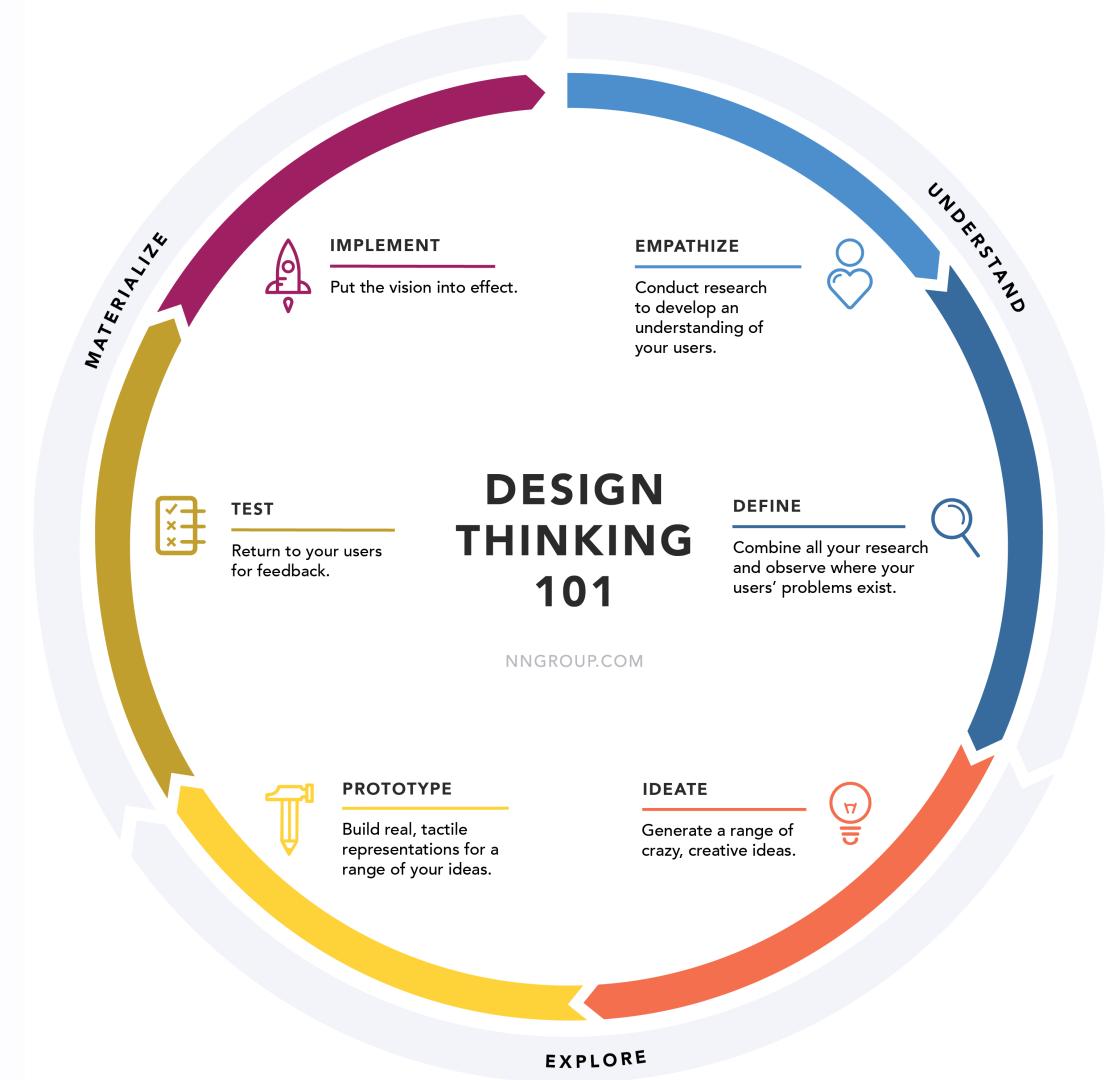
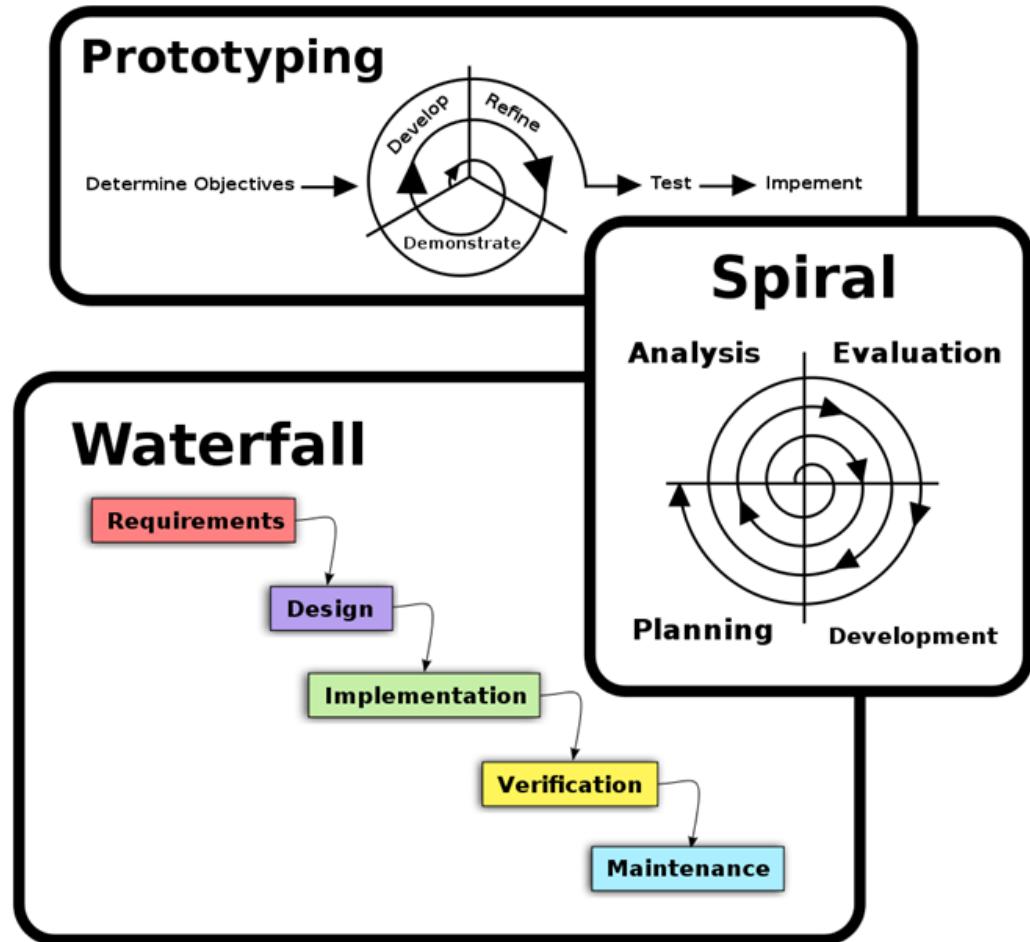


Image Source | NN/g Design Thinking

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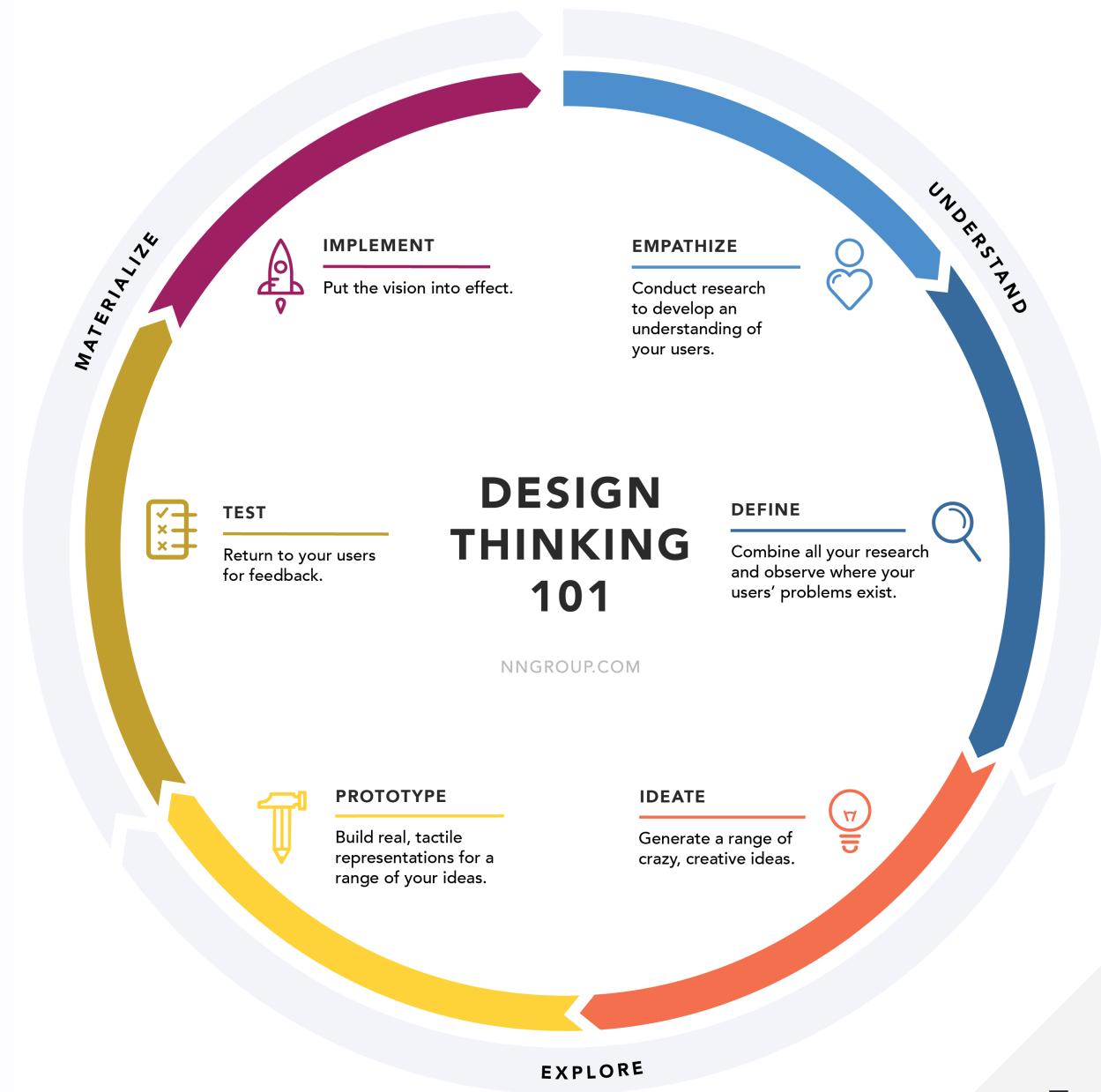
# NN/g Design Thinking 101

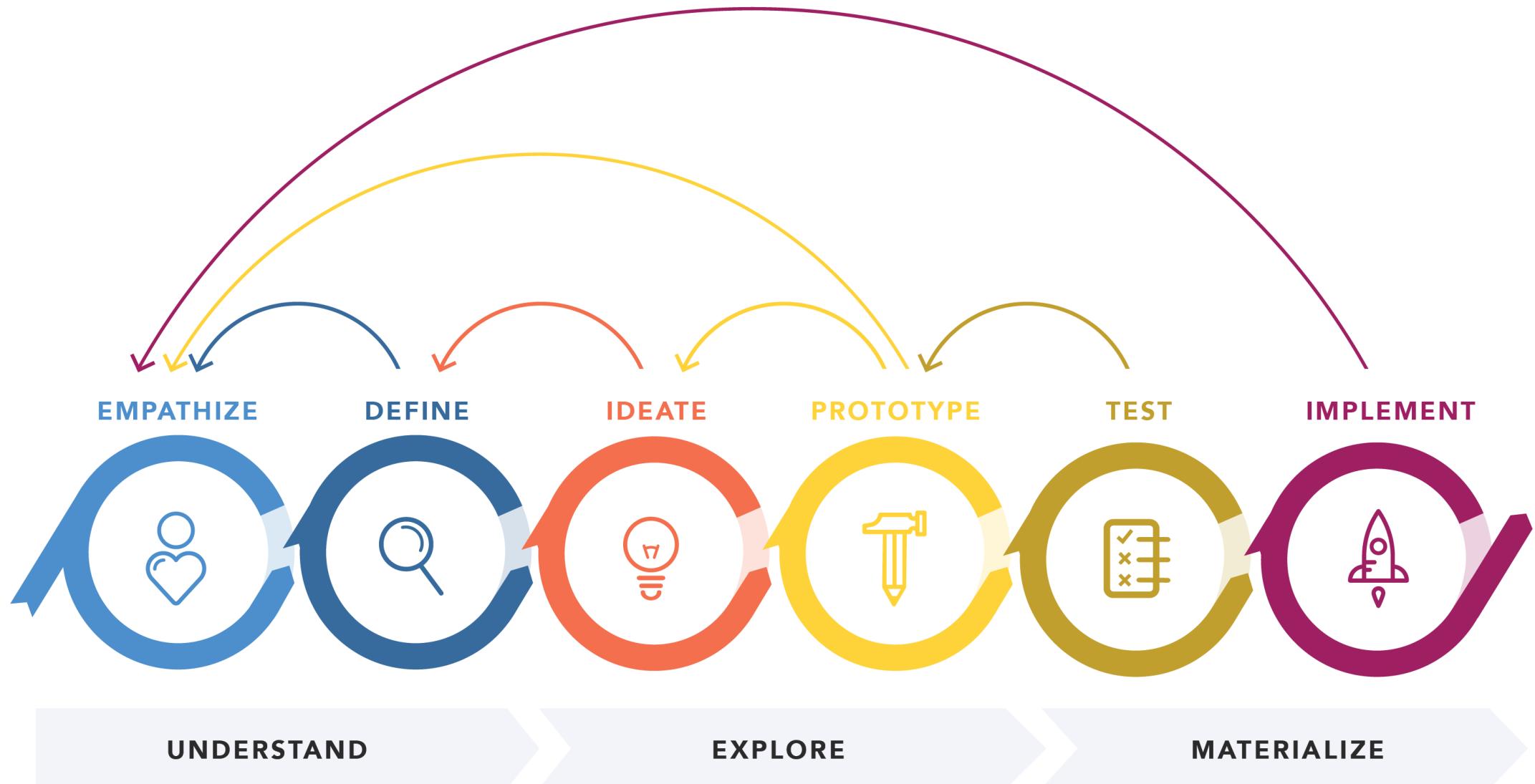
# Design Thinking

1. An **approach**: a hands-on, user-centric approach to innovative problem solving
2. A **process**.

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02: Design Thinking





# Empathize

Conduct research to develop an understanding of your users.

# How do we empathize with users?

Understanding user needs, preferences, and expectations by studying what users do, say, think, and feel.

There are many methods to build empathy: we will explore using **contextual inquiries**.

Others may include: ethnography, diary studies, cultural probes... See CS570!

# Conducting a Contextual Inquiry

A contextual inquiry is a method for gathering and representing data about the user and his/her work.

1. Go where the customer works or lives.
2. Observe the customer as he or she works.
3. Talk to the customer about their work.

# Your Turn!

Take notes as an observer of the following contextual inquiry. These can be direct quotes, general observations, notes about the environment, or anything else of interest and valuable to your research.

Take notes individually, consult afterwards as a team.

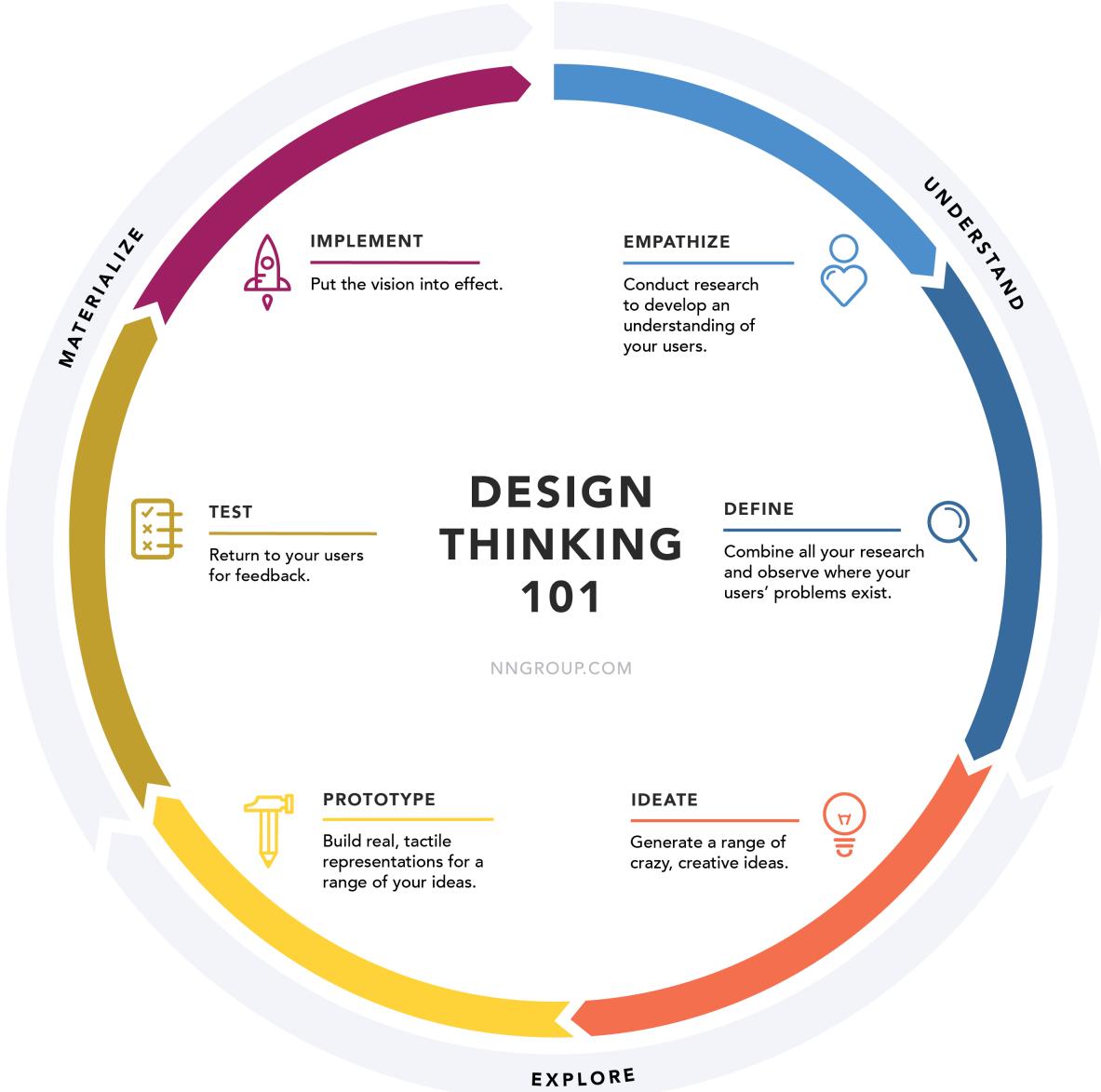
**Reminder:** Make the college grocery shopping experience better!



## Contextual Inquiry: Grocery Shopping

# Contextual Inquiry Tips

- This is an inquiry, not an interview.
- The client is the master, you are an apprentice.
- Ask questions, but don't distract from the task.
- Focus on the context in which the user acts.



# Define

Combine all your research and observe where your users' problems exist.

# What does that mean?

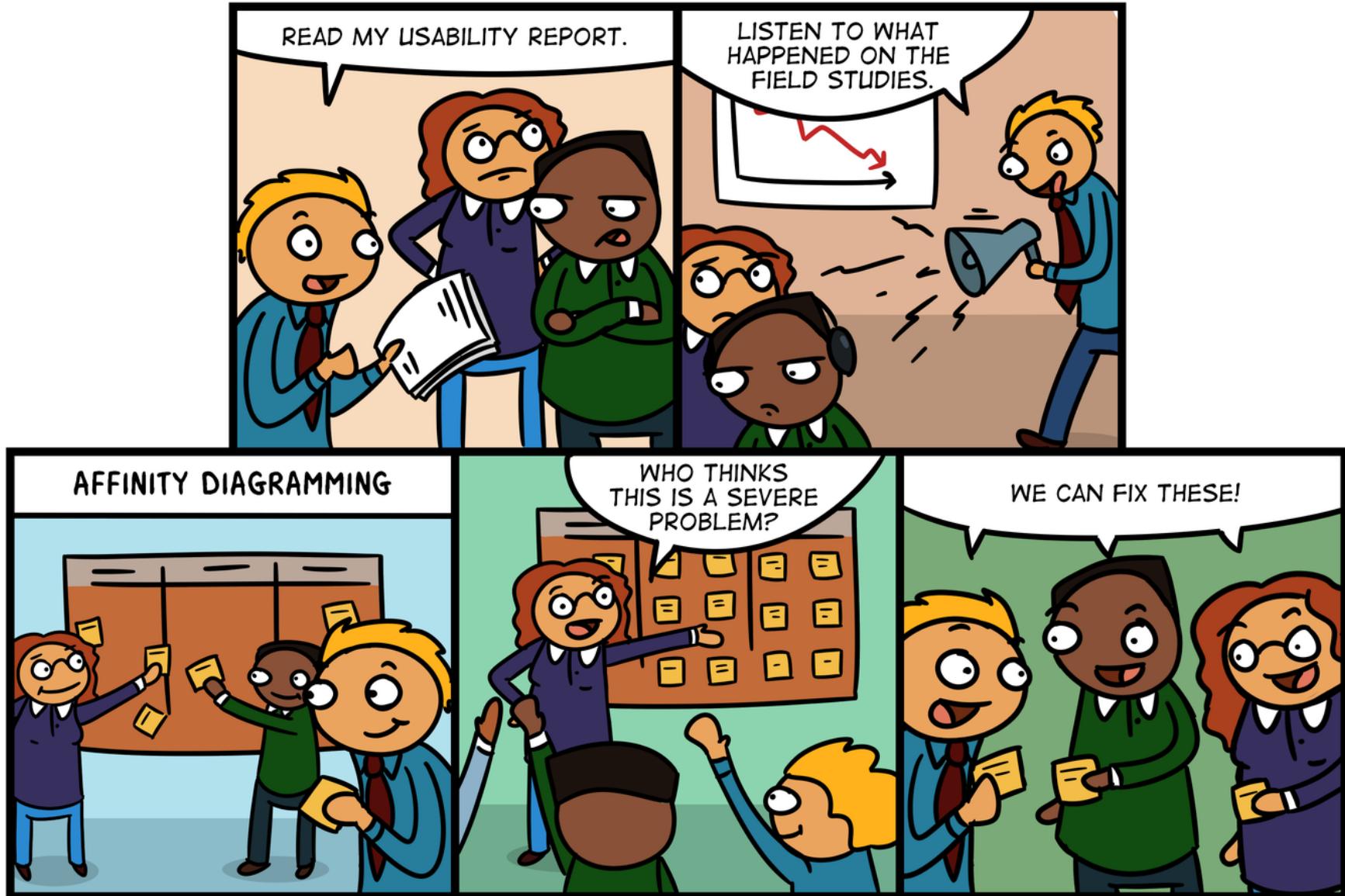
- Gathering all findings — **gather**
- Consolidating, categorizing, distilling — **analyze**
- Translate into insight — **recommend**

## But how do we go about this?

- Again, there are many methods for analysis.
- The simplest and most powerful method is *affinity diagramming*.

# Affinity Diagramming

- **Definition:** Organizing data into clusters based on "affinity."
- It helps you make sense of qualitative, messy data.
- Also known as *affinity mapping, collaborative sorting, snowballing*.
- Used across the board in creative, generative industries.



# NN/g Affinity Diagramming

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NNGROUP.COM NN/g

# How do we go about it?\*

To do *bottom-up* affinity diagramming...

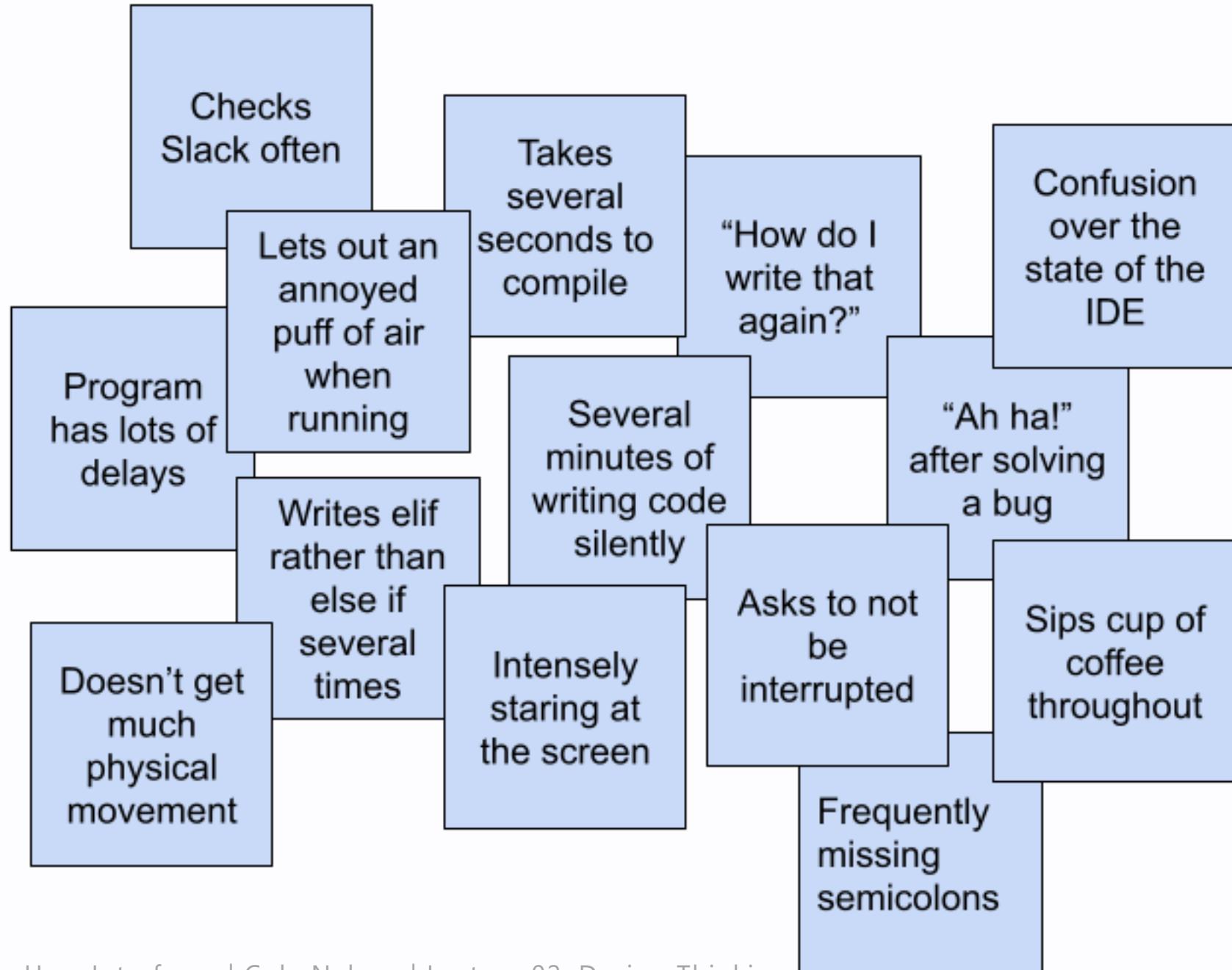
1. Start with many disorganized notes.
2. Group notes together based on "likeness".
3. Consult groupings with team.
4. Re-organize if necessary!
5. Identify a common theme for each group.

\*There are many ways to do affinity diagramming!



# Affinity Diagramming

A day in the life of a Software Engineer



### Misunderstanding the syntax

Frequently missing semicolons

"How do I write that again?"

Writes elif rather than else if several times

### In a state of flow

Several minutes of writing code silently

"Ah ha!" after solving a bug

Asks to not be interrupted

Intensely staring at the screen

### Issues with speed

Takes several seconds to compile

Confusion over the state of the IDE

Program has lots of delays

Lets out an annoyed puff of air when running

### Parking Lot

Checks Slack often

Sips cup of coffee throughout

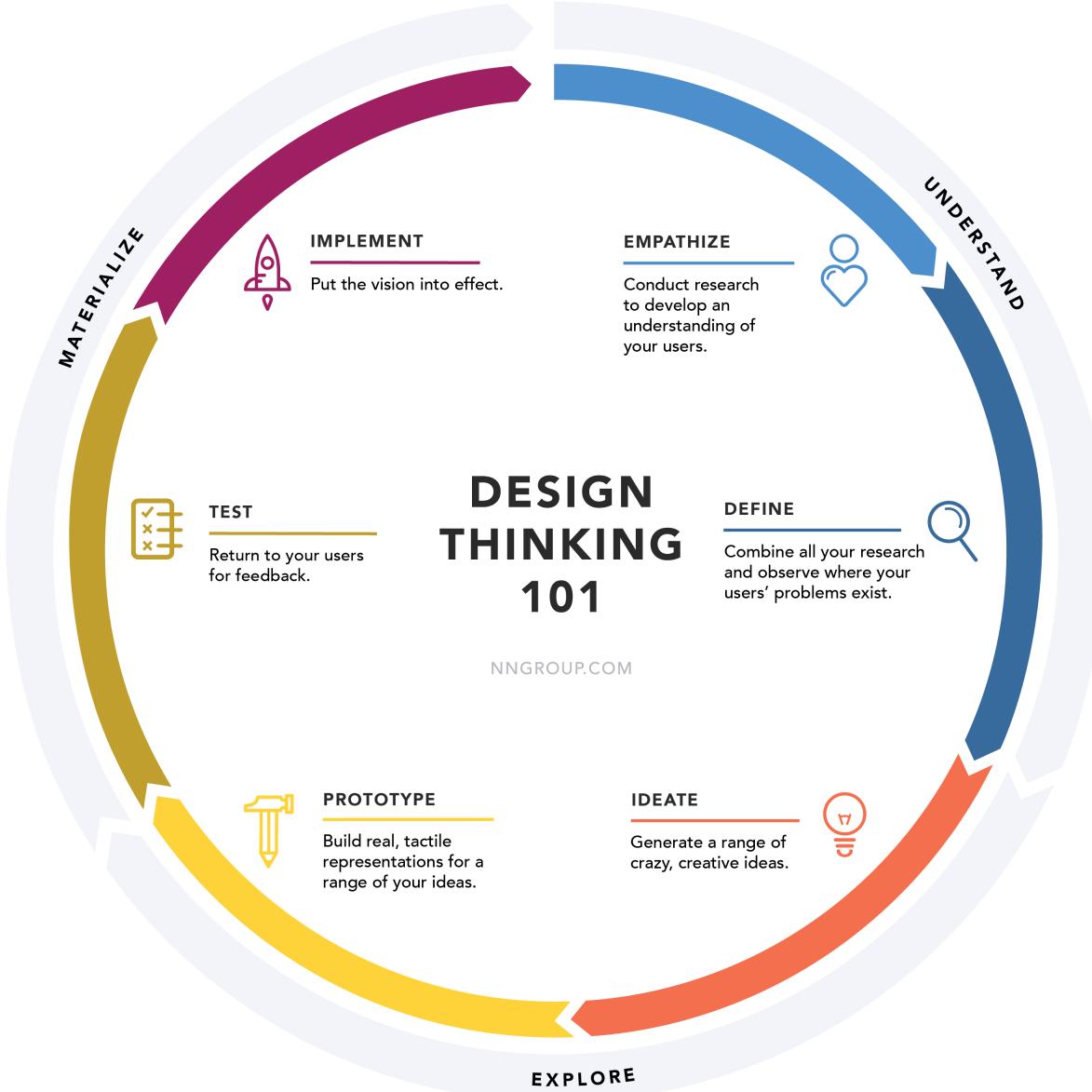
Doesn't get much physical movement

# Voilà!

Your findings will serve as *design insight*.

# Your Turn!

Use affinity diagramming to organize your notes and identify common themes. To do this, I recommend creating [a Google Drawing](#) and representing each sticky note with a square.



# Ideate

Generate a range of crazy, creative ideas.

# Ideation

**Definition:** An active, creative, exploratory, highly iterative, fast-moving collaborative process for forming ideas for design.

Ideation can be done *individually or collaboratively*.

# Key Considerations

- Workspace
- Team
- Process
- Rules of engagement
- Method of capturing ideas

GlassDoor



# IDEO's Rules of Engagement

1. Defer judgment.
2. Encourage wild ideas.
3. Build on the ideas of others.
4. Stay focused on the topic.
5. One conversation at a time.
6. Be visual.
7. Go for quantity.

# **What do we do with ideas?**

Sketching. Storyboarding.

Sketching & storyboarding exhibit *conceptual designs*.

# What is Conceptual Design?

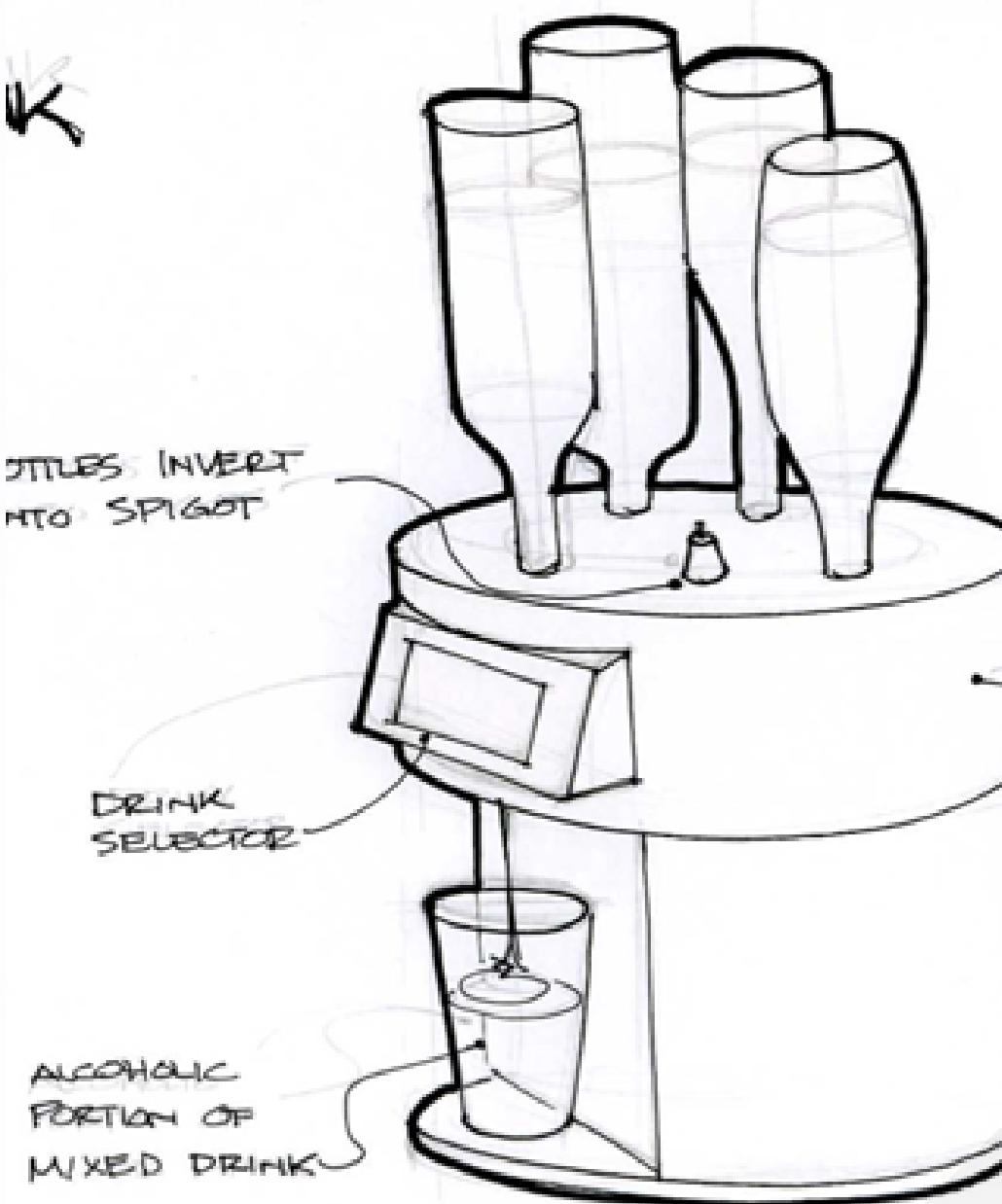
**Definition:** An abstract characterization of the context, use, or experience with an envisioned design solution that highlights the main premise of the solution.

# Sketching

- Everyone can sketch.
- Sketching is more effective than words for most ideas.
- Quick and inexpensive sketches do not inhibit exploration.
- Sketches are disposable.

Buxton, 2007

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# Sketching

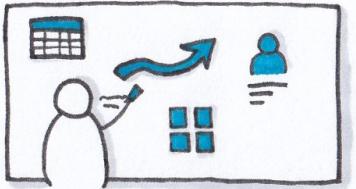
- Sketches are made just-in-time, in-the-moment, when needed.
- Sketches should be plentiful, entertain a large number of ideas, and include multiple sketches of each idea.
- Textual annotations can explain what is going on in the sketch.

Buxton, 2007

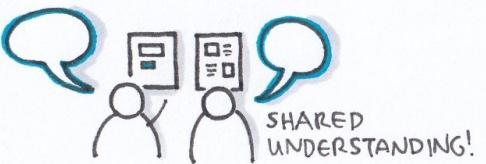


YOU CAN DRAW,  
IT IS NOT ABOUT  
BEING ARTISTIC!

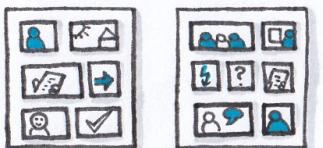
JUST START IT, YOU'LL  
BECOME MORE CONFIDENT  
OVER TIME!



① FACILITATING MEETINGS &  
DESIGN WORKSHOPS,  
PROJECT PLANNING



⑤ TEAMWORK, ANY KIND OF  
COLLABORATION  
(E.G.: „TALKING SKETCHES“)



Medium  
⑨ STORYBOARDING  
VALIDATING  
ASSUMPTIONS

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# UX Knowledge Base Sketch #52

# SKETCHING

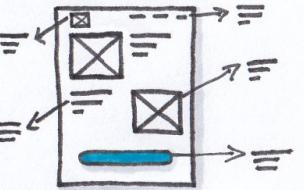
FOR UX DESIGNERS

TOOLS:  
JUST GRAB THE NEAREST  
PEN & PAPER!

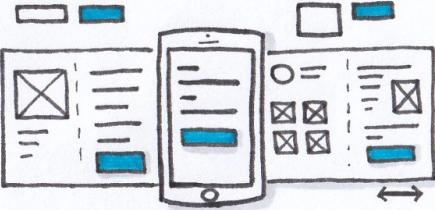


IN CASE OF USER INTERFACES:  
VARY THE FIDELITY /  
DETAIL LEVEL BASED ON  
YOUR GOAL  
(DELIVERABLE?  
QUICK CONCEPT?)

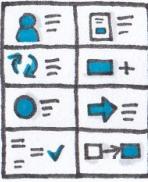
YOUR  
AUDIENCE  
(CLIENT? TEAM?  
YOURSELF?)



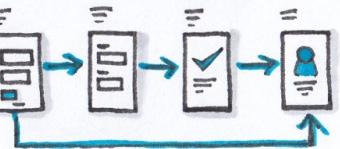
② WIREFRAMING  
DON'T FORGET:  
ANNOTATIONS ARE GREAT!



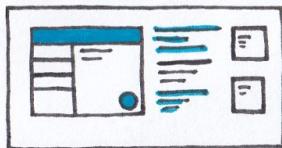
③ PAPER PROTOTYPING -  
VALIDATING IDEAS,  
TESTING OUT CONCEPTS



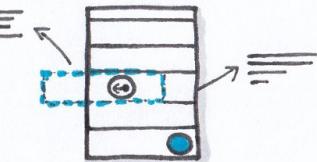
④ IDEATION  
QUICK IDEA GENERATION  
(E.G. DURING A DESIGN SPRINT,  
OR JUST ON YOUR OWN)



⑥ USER FLOWS  
SITEMAPS  
INFORMATION ARCHITECTURE



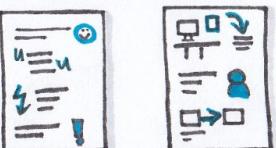
⑦ MAPPING: EMPATHY MAP,  
JOURNEY MAP,  
PRODUCT ROADMAP ETC.



⑧ UI ANIMATIONS  
WHAT CHANGES, HOW,  
WHAT THE TRIGGER IS



⑩ APPLYING ICONS, VISUALS  
IN UX RESEARCH NOTES  
(E.G. USER INTERVIEW,  
CONTEXTUAL INQUIRY)



⑪ DOCUMENTATION,  
PRESENTATION  
TO CLARIFY &  
TO MAKE IT MORE ENGAGING

⑫ SKETCHNOTING  
-CONFERENCE TALKS  
-BOOKS  
-MEETINGS

# Storyboarding

**Definition:** A sequence of visual frames that illustrate user interaction with the envisioned system, capturing social, environmental, and technical factors that shape user experience.

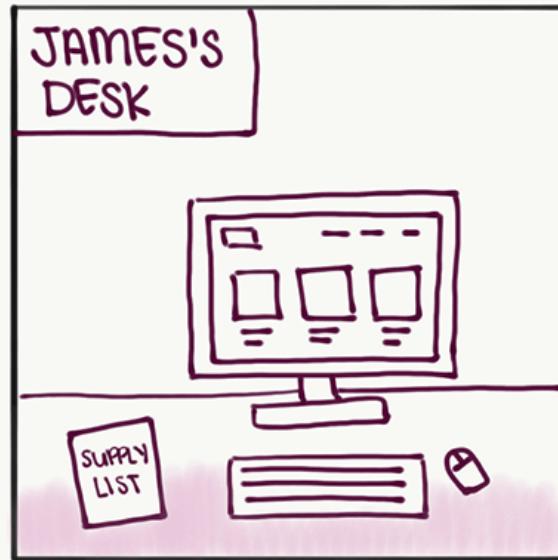
Take your sketches and impose them on a storyboard.

## STORYBOARD



- MAKES NOTE OF SUPPLIES NEEDED ON CLIPBOARD
- PHYSICAL INVENTORY

PERSONA:  
CORPORATE BUYER,  
JAMES



- SELECTS ITEMS FROM FAVORITES LIST
- USES DESKTOP & SUPPLY LIST AS TOOL

SCENARIO:  
REPLENISH OFFICE SUPPLIES



- RECEIVES SHIPMENT WINDOW W/ ORDER SUBMISSION
- SETS PLAN FOR RESTOCK

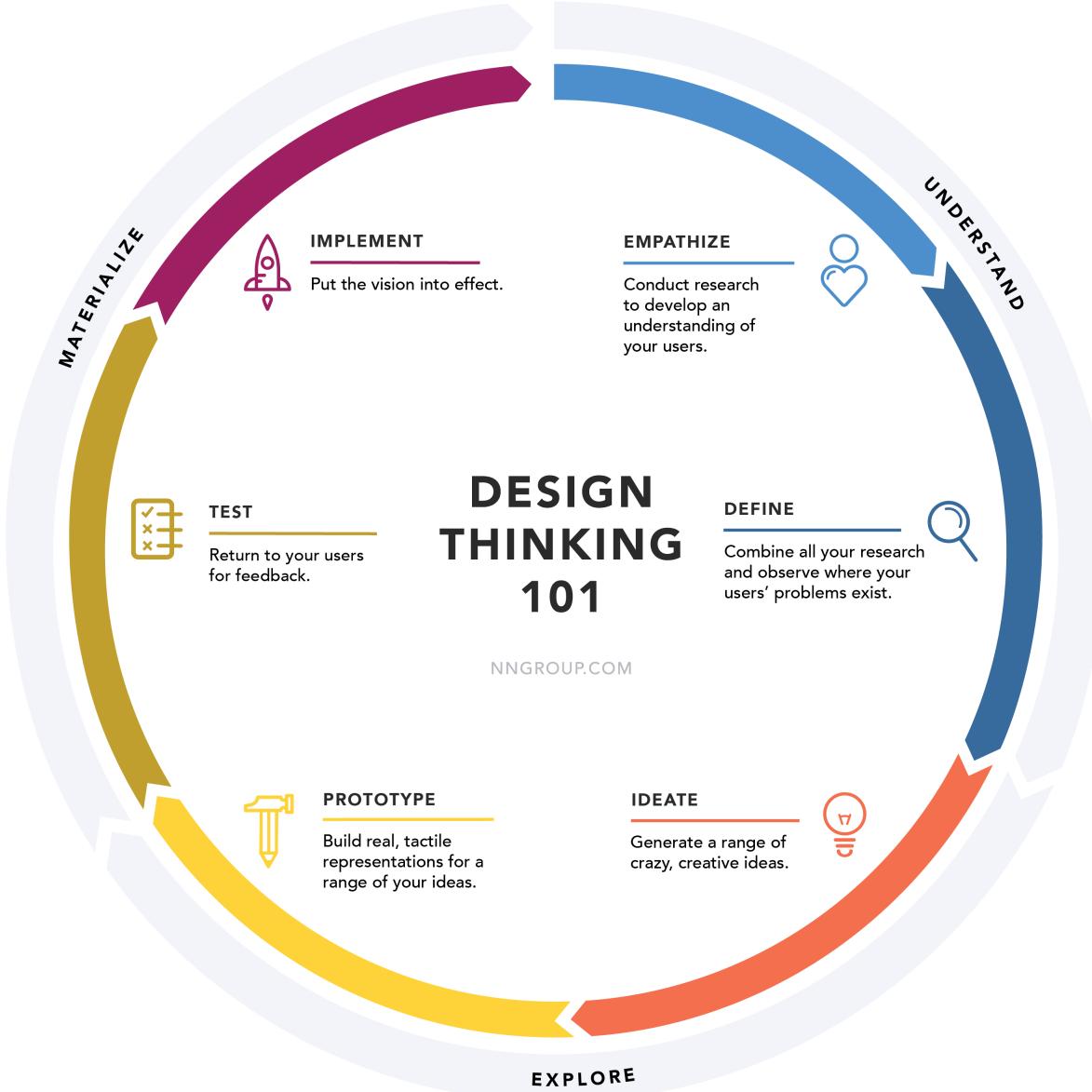
NN/g: Storyboards Help Visualize UX Ideas

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# Your Turn!

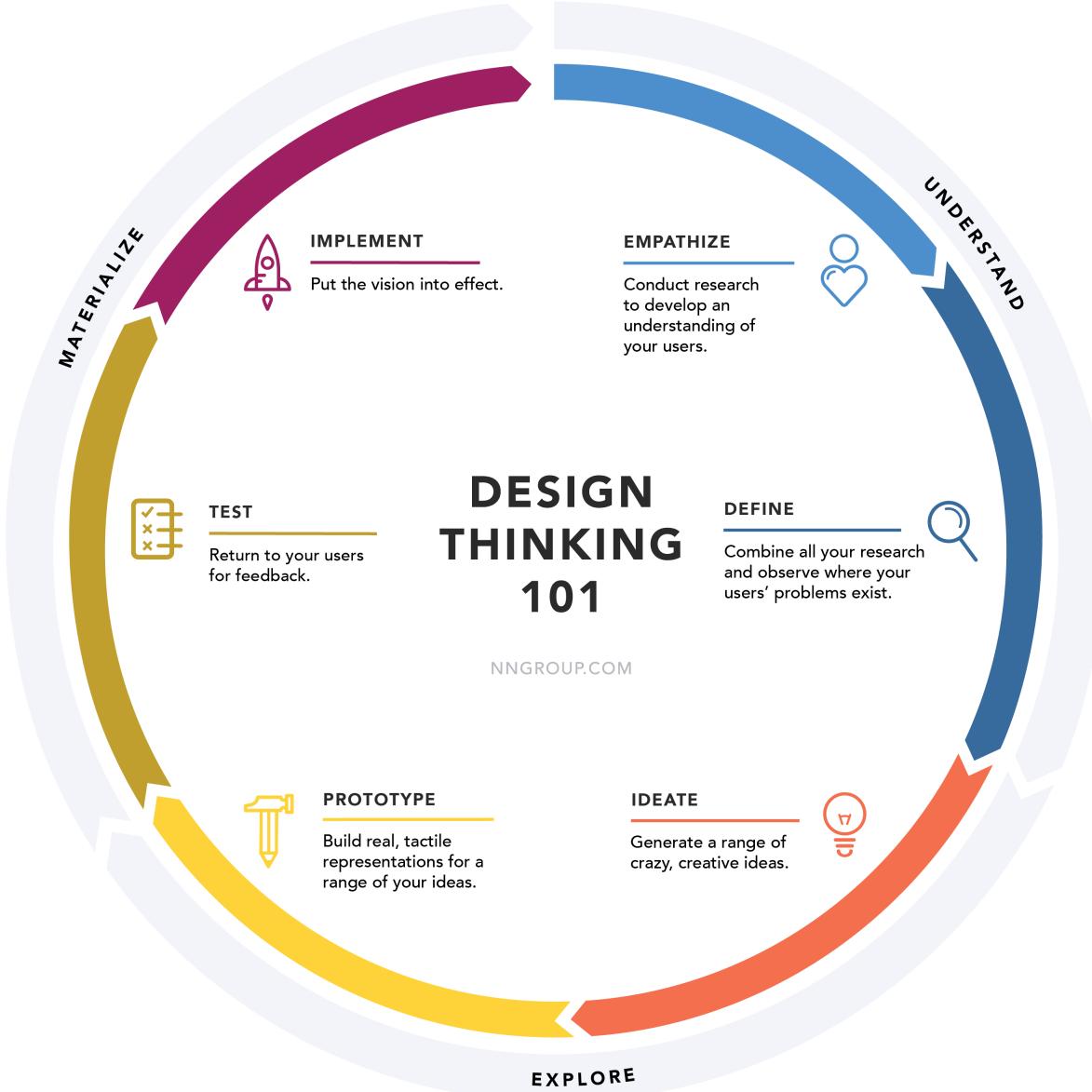
Ideate what a solution could look like! Generate many crazy, wild ideas of what could make the college grocery shopping experience better.

Finally, choose 3 of your top ideas from above and sketch what each of these solutions would look like.



# Prototype

Build real, tactile representations for a range of your ideas. We'll visit this in more detail in a later lecture.



# Test

Return to your users for feedback.

# Testing Methods

1. **Expert-based** review
2. **User-based** testing

Today we'll visit one form of *user-based testing* called a *think-aloud usability test*.

In future lectures, we will explore other methods..

# Conducting a Think-Aloud

1. Identify representative users.
2. Ask users to perform representative tasks.
3. Observe and record what they say and do, noting obstacles, pain points, and failures.

A think-aloud can be *moderated* or *unmoderated*.

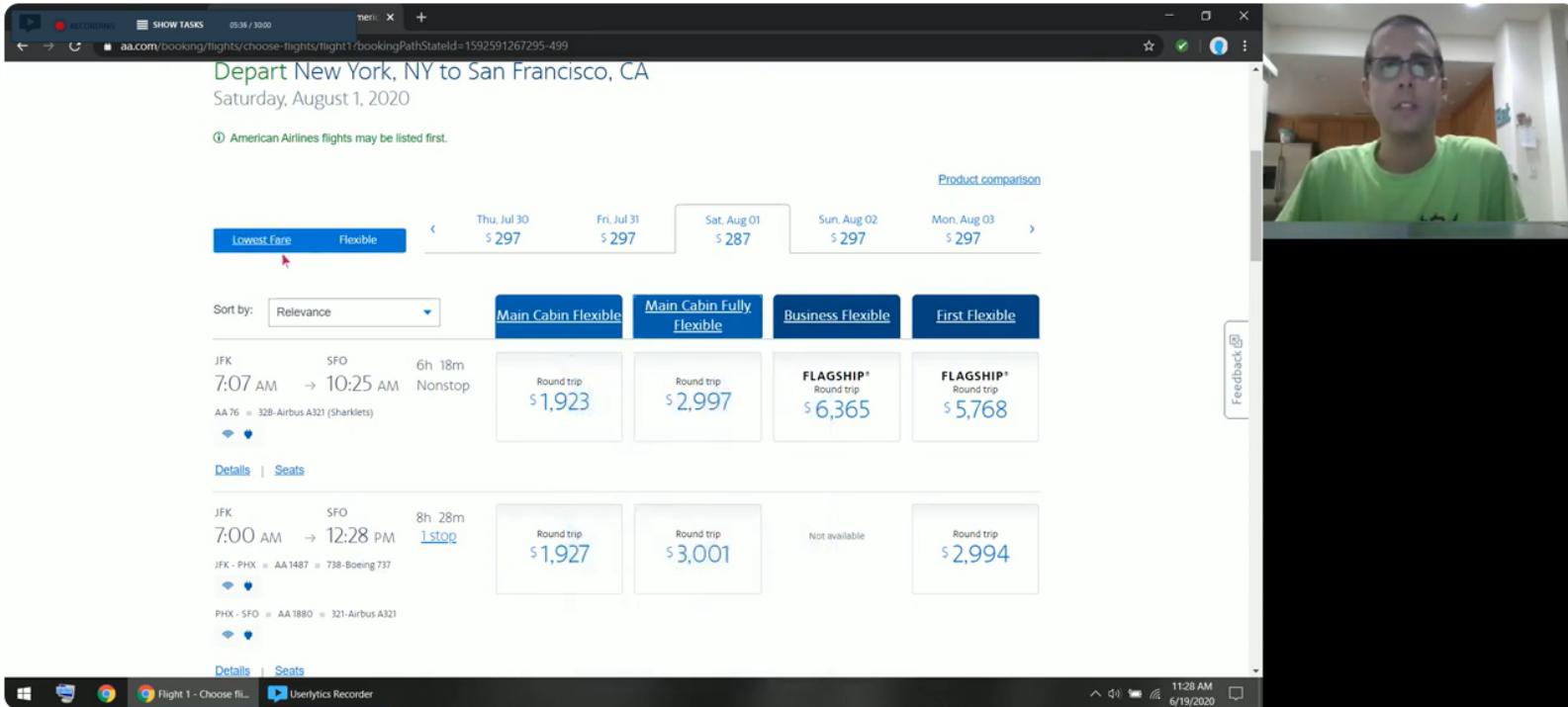
A think-aloud can be done in *field* or in *lab*.

A think-aloud can be done *presently* or *retrospectively*.

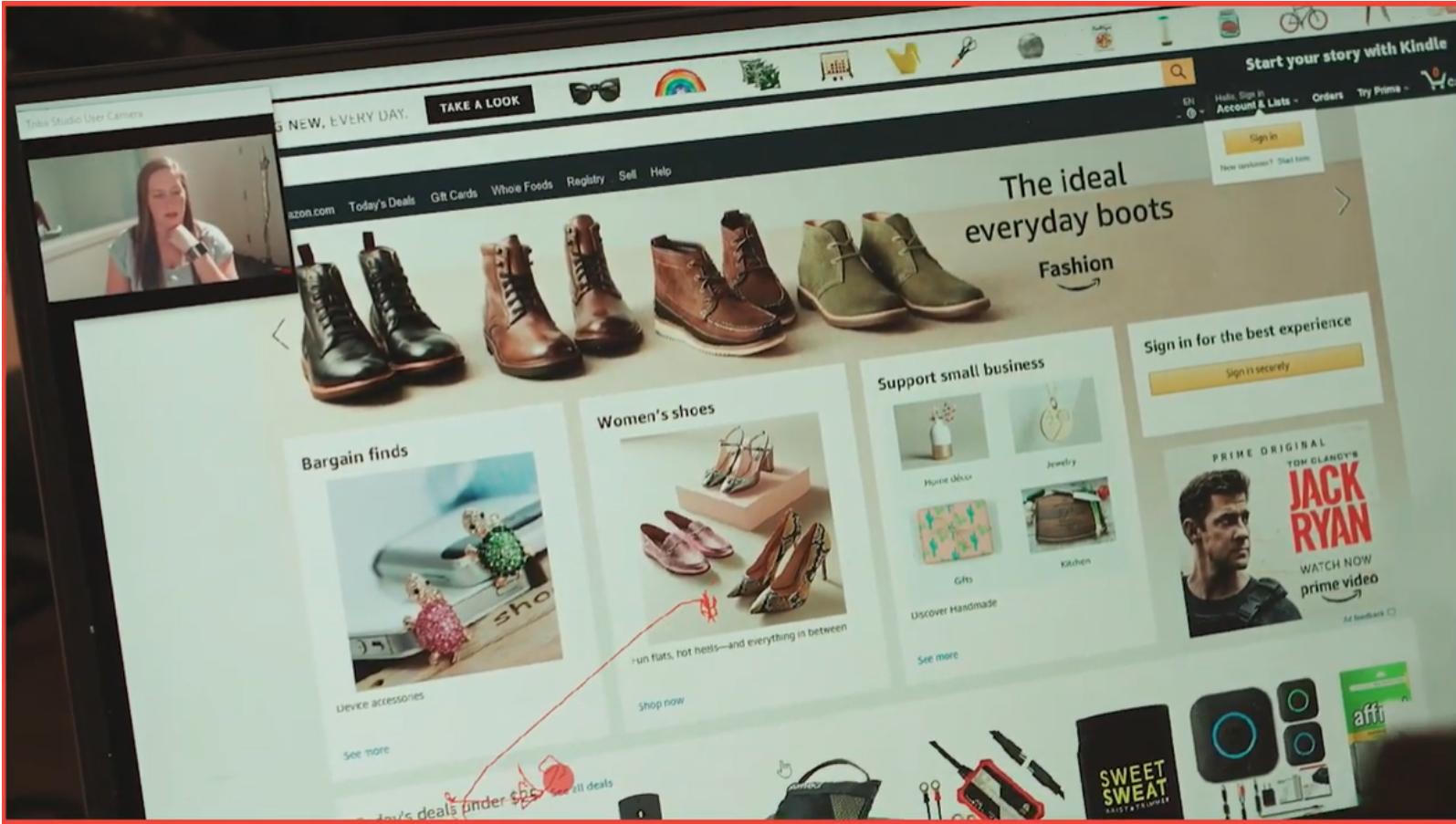


-...and try and say it outloud  
as much much as you can.

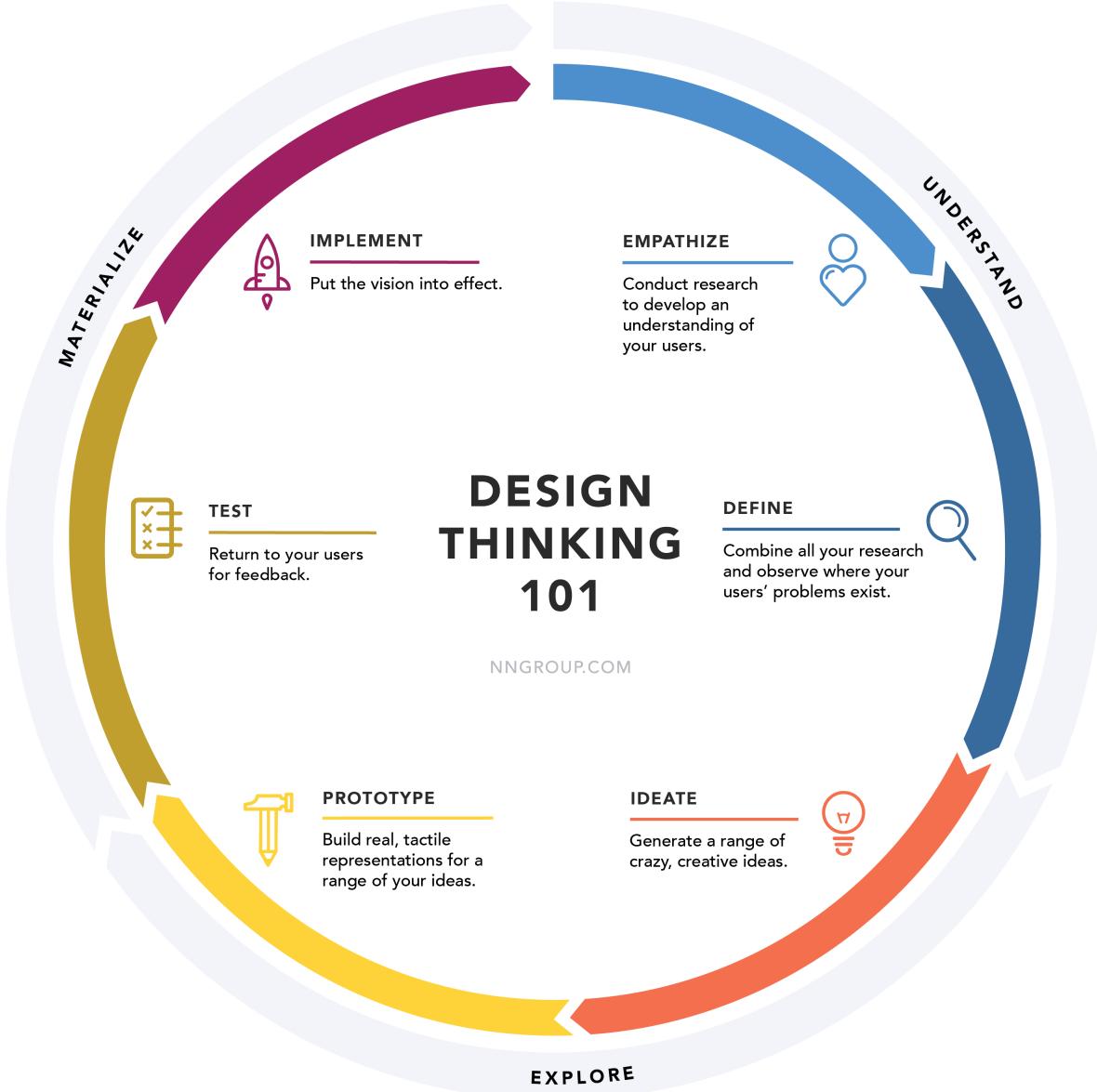
## Think Aloud: Factory (Moderated, Field, Presently)



## Think Aloud: Airlines (Unmoderated, ?, Presently)

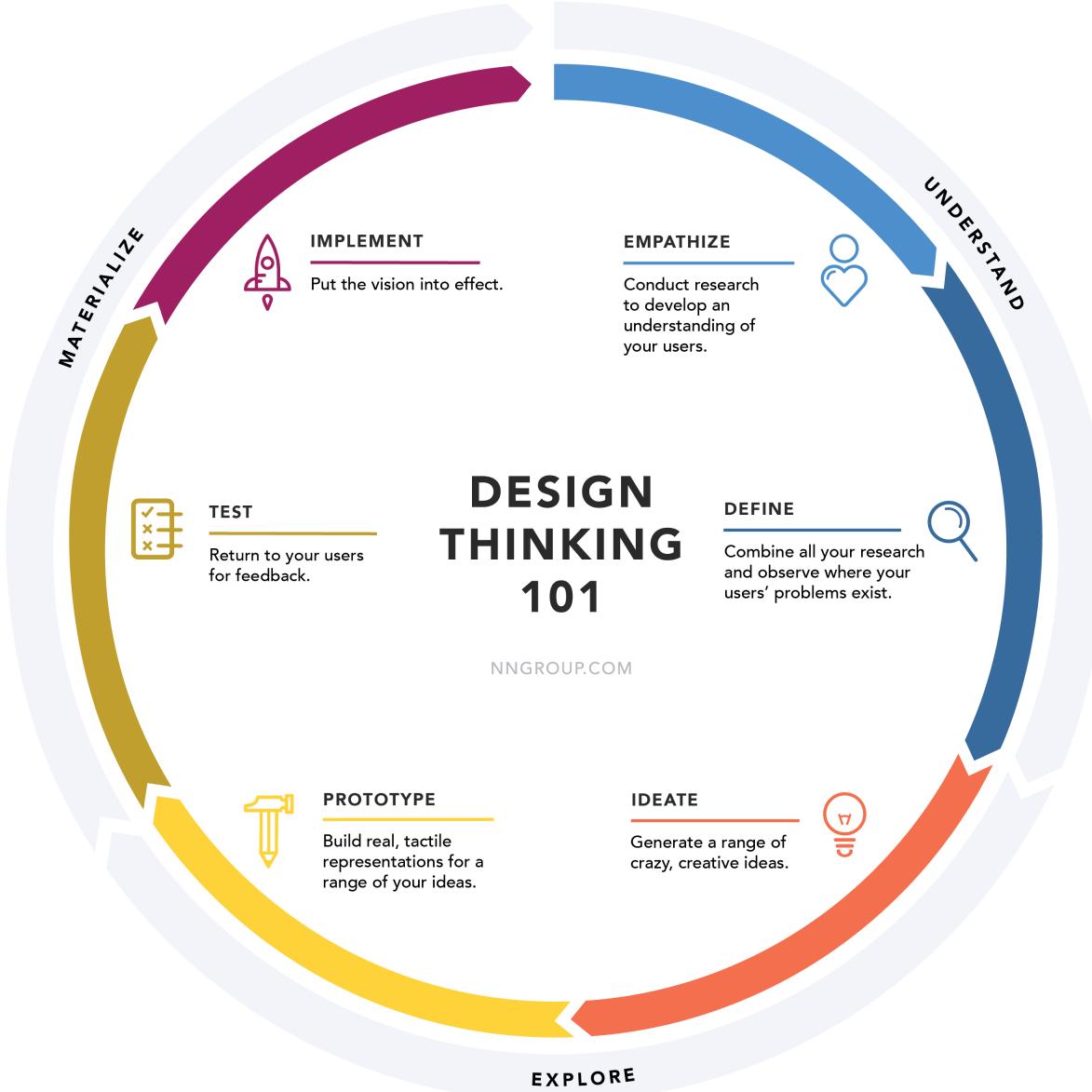


## Think Aloud: Tobii (Moderated, Lab, Retrospectively)



# Implement

Put the vision into effect.



# Up Next

## Material

- Git & GitHub Workshop on Friday @ 3 pm in CS1240
- Web Dev Basics 1 w/ HTML, CSS, and JS on Tuesday!

## Deliverables

- ICA A due tomorrow at **noon!**
- HW0 due Monday at 11:59 PM