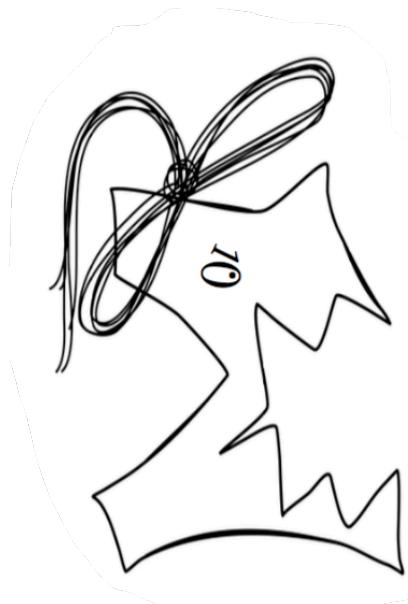


DESIGN THINKING

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McMaster
University
ENGINEERING



DESIGN

- Design is associated with
 - Architecture
 - Fashion
 - Requiring genius or inspiration

NEED MORE INSPIRATION

- Information Technology is speeding everything up
- Apps can be developed faster
 - Deployed instantly
- Incredible pressure to be fast
- Can we also be good at app design?

HUMAN COMPUTER INTERFACES

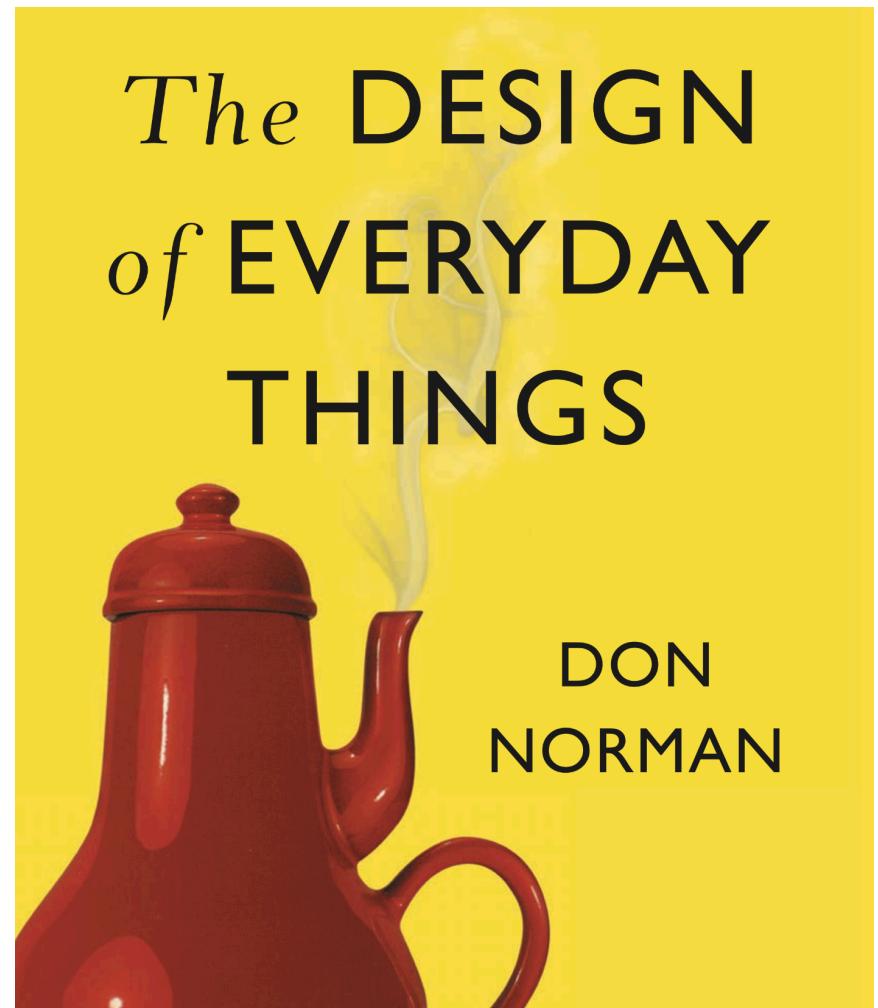
- Interface
 - “between two faces” = communication
 - NOT the skin of the application

COMMUNICATION

- Interaction is about communication
 - facts
 - possibilities
 - progress
- Know what your message is
- Find out what your user understood

APPLIED PSYCHOLOGY

- Great ~~text~~book
 - personal perspective
 - Norman reimagined HCI
 - “human-centered design”
 - Set a new standard
 - Not just for software

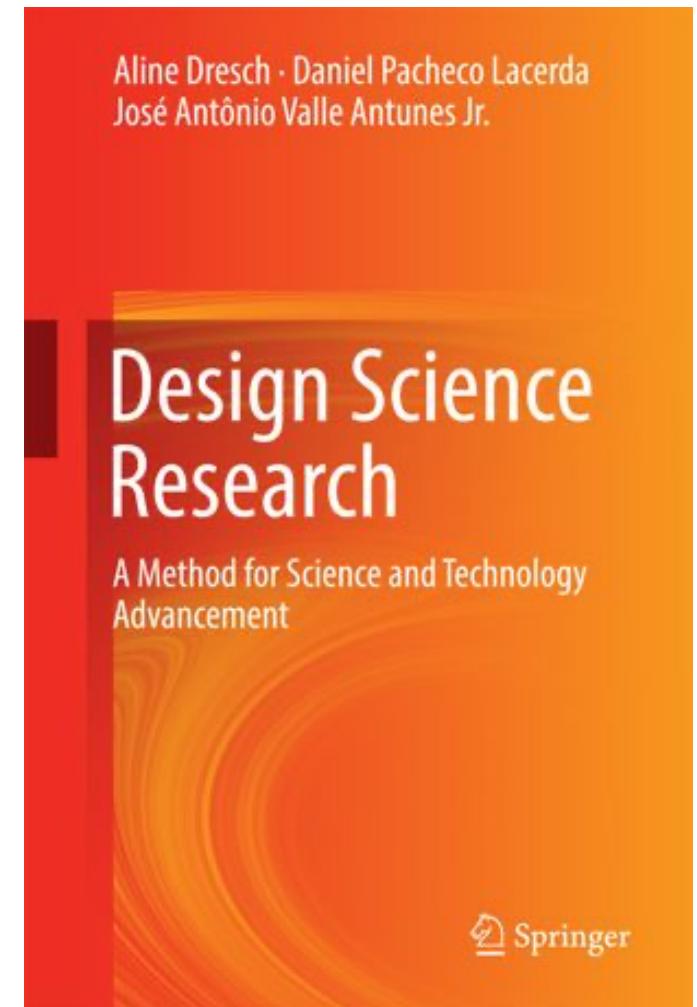


IT CAN BE LEARNED

- Norman showed that design can be taught
- Biggest step is to develop empathy
 - Already built in (look up Mirror Neurons)
 - Like a muscle we never exercise
- Not taught in Science and Engineering

SCIENCE OF THE ARTIFICIAL

- Herbert Simon, 1969
 - Nobel Prize
 - Multiple Modes
 - Deduction
 - Induction
 - Abduction



DESIGN SCIENCE

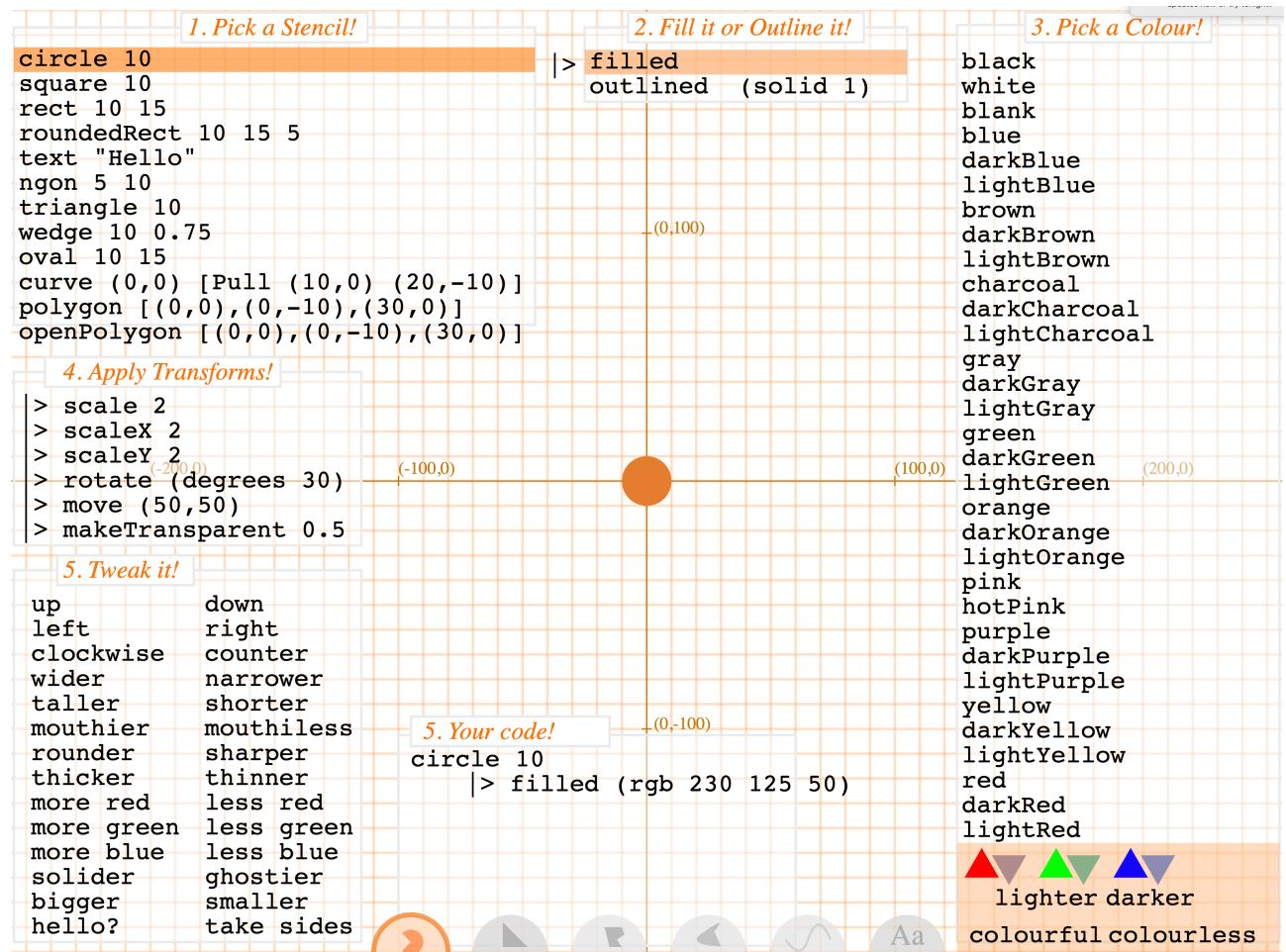
- Two branches of development
- Design Science
 - How to do research on human artifacts
- Design Thinking
 - How to implement this science

UNDERSTANDING THE USER

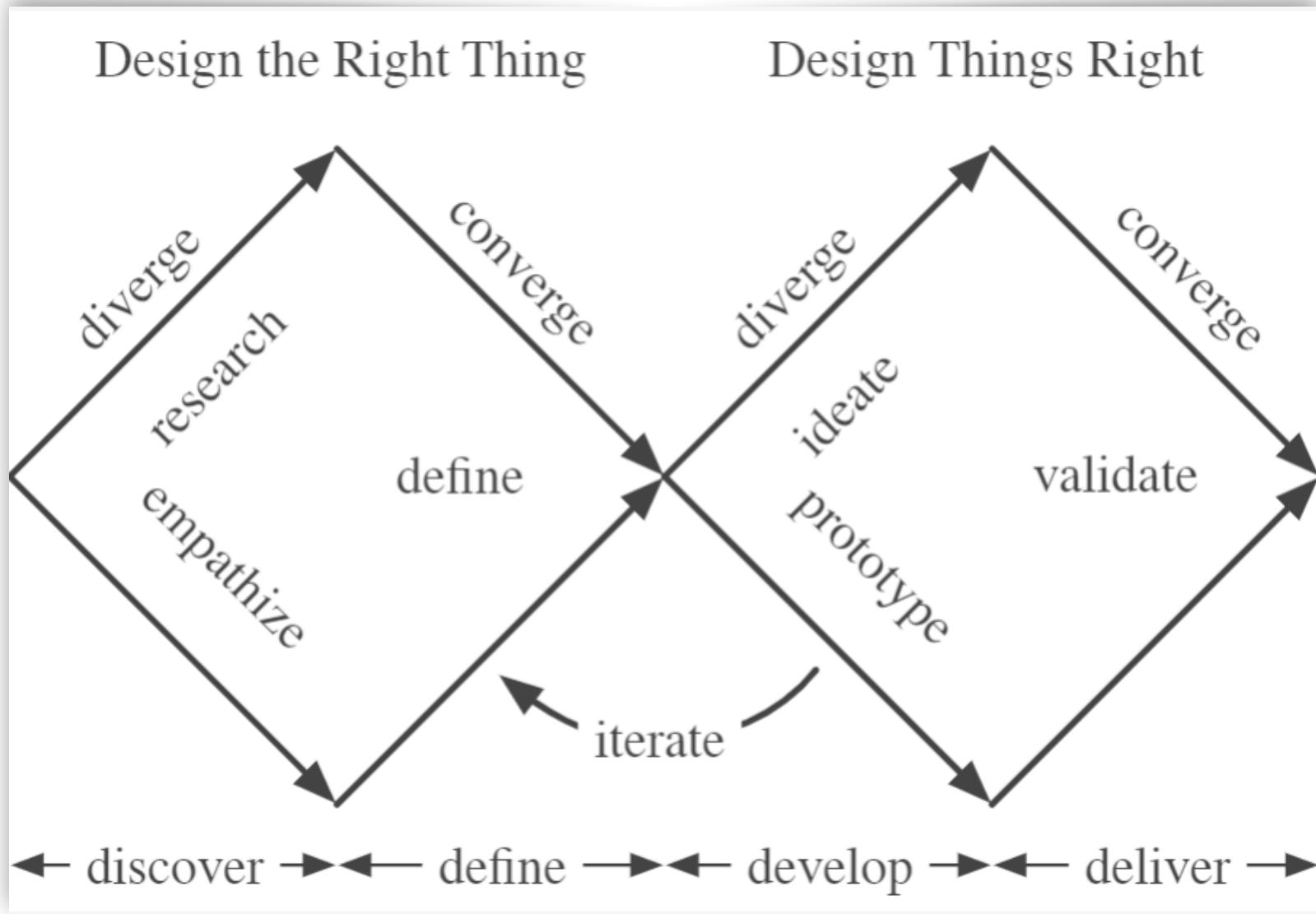
- “Science” is about understanding the world
 - Do experiments in the world
 - Failures cause us to refine our theory
- Design Thinking is about understanding the user
 - Make prototypes and let people try them
 - Failures help us discover real user needs

EXAMPLE: DOCUMENTATION

- We wrote lots of documentation
 - APIs
 - Tutorials
- Too boring!
- Eventually we designed the Shape Creator!

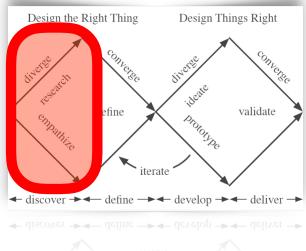


DOUBLE DIAMOND



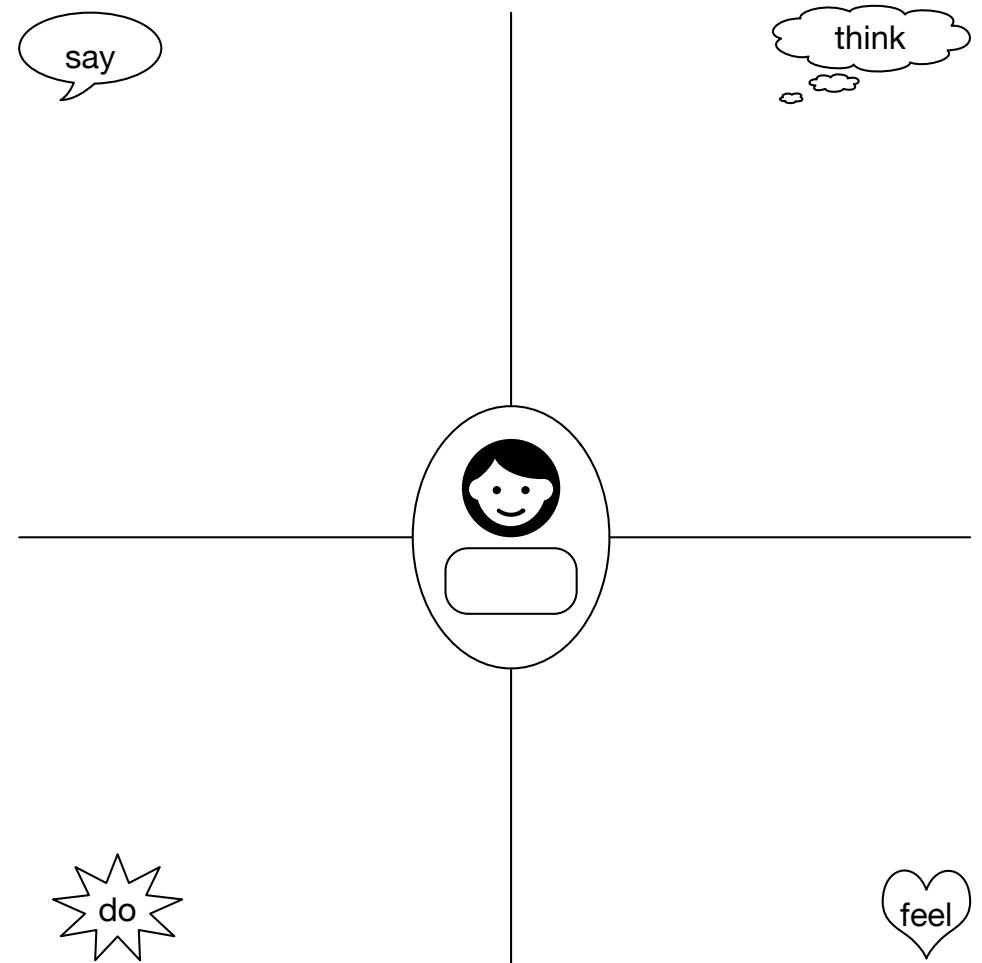
MINDSETS

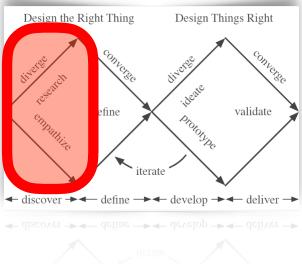
- Empathy
- Optimism
- Iteration
- Learning from Failure
- Embracing Ambiguity
- Creative Confidence



EMPATHY MAP

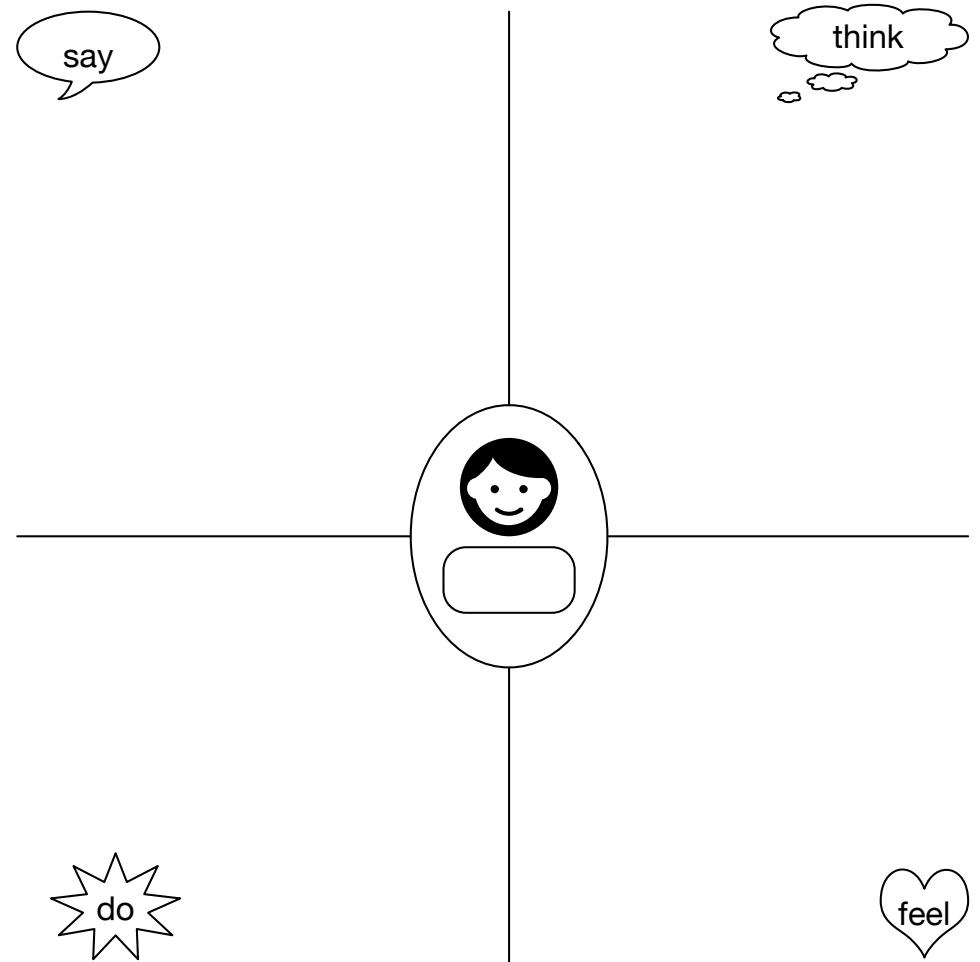
- Interview users
 - Individuals or small groups
 - Problems
 - Motivations
- One notetaker / team
- Quadrants so you cover everything

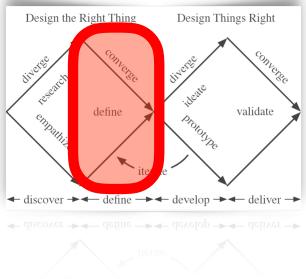




ITERATE

- Based on what you learn about your users
 - May do internet research
 - May reformulate Qs
 - May interview new users
- Then, make an *empathy map* for an *ideal user*





HOW MIGHT WE

1. Formulate the problem
2. Write ideas on paper



6. Crazy ideas too!
7. Combine similar ideas and enter on list
8. Plot Desirability/Feasibility
9. Write need statement

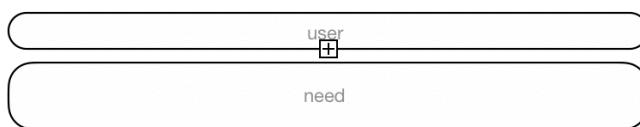
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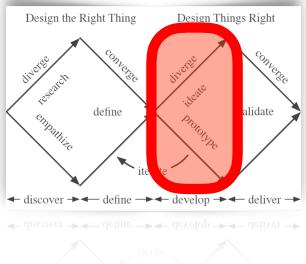
How Might We?

1. As individuals in the group, write five to ten different ideas on a piece of paper, for how we could make our users' lives better by reducing a problem or giving them a new opportunity.
2. As a group, take turns reading your ideas, and if they are very similar to other ideas, merge them together and write down one version of the idea in the table.
3. Again as a group, discuss the ideas in reverse order, and assign them Desirability and Feasibility scores by plotting the number on the scatter plot.
4. Pick the best overall statement or statements, and combine them into your goal, in the box below.

We want to find
a way to help

with





IDEATION

1. Formulate the solution
2. Write ideas on paper
3. Crazy ideas too!
4. Combine similar ideas and enter on list
5. Plot Desirability/Feasibility
6. Describe technical solution

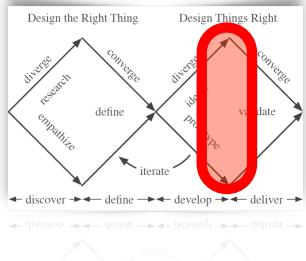


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Ideation:

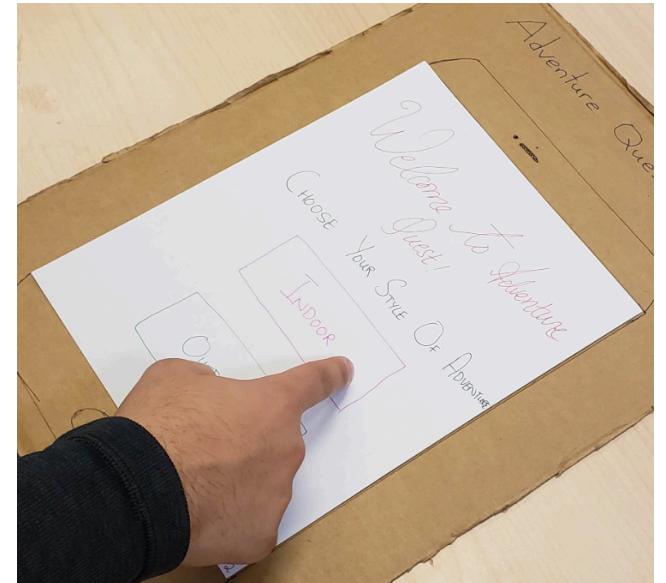
1. As individuals in the group, write five to ten different solutions on a piece of paper.
2. Include an idea costing less than 1000 Rs, and one costing a crore, include one using an app, and one without an app.
3. As a group, take turns reading your ideas, and if they are very similar to other ideas, merge them together and write down one version of the idea in the table.
4. Again as a group, discuss the ideas in reverse order, and assign them Desirability and Feasibility scores by plotting the number on the scatter plot.
5. Pick the best overall idea, and combine them into your goal, in the box below.

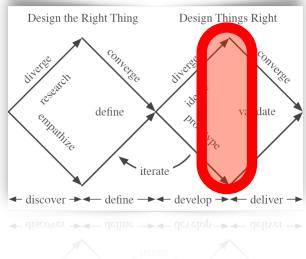
Desirability	Feasibility



PROTOTYPING

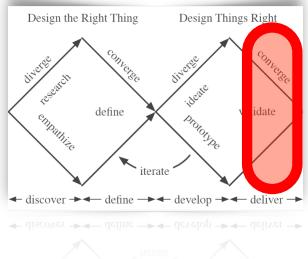
- Make your first prototypes simple (e.g. paper)
- Collect user feedback
 - Until you know the next step
 - Usually 2 to 5 users
 - Repeat





WHAT IS A PROTOTYPE?

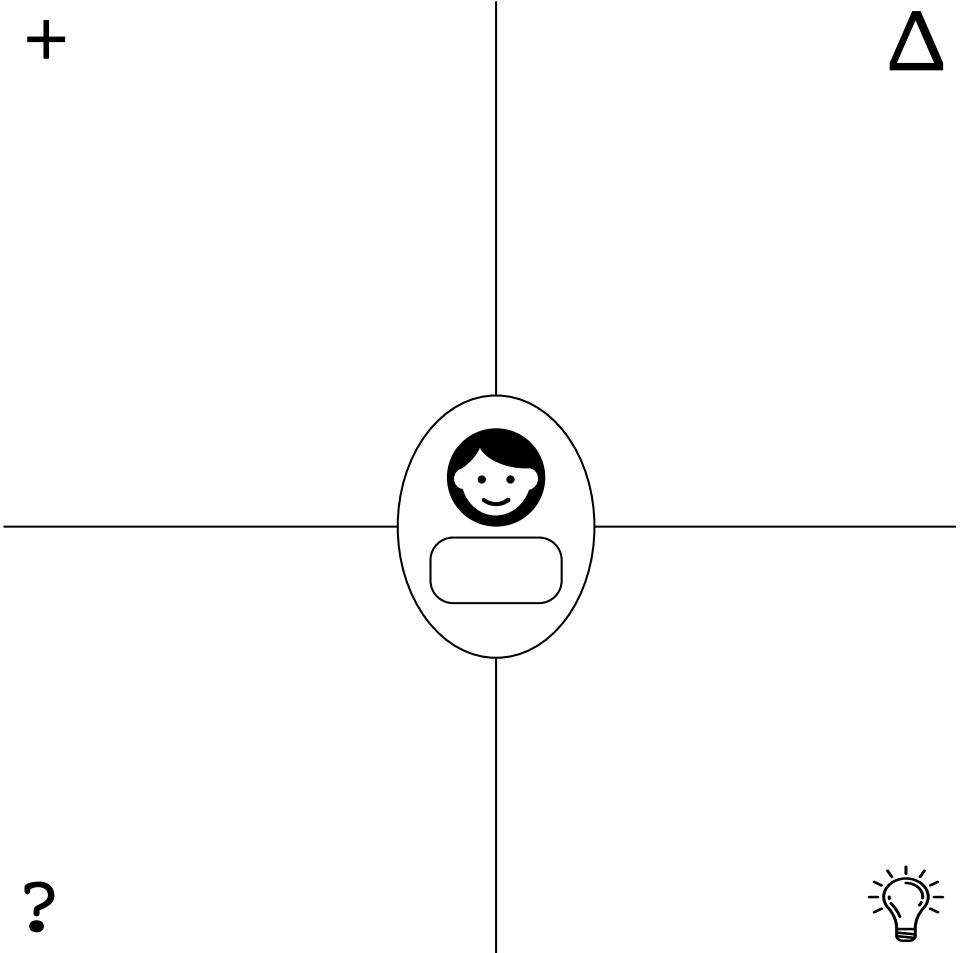
- An App
 - Takes a long time to develop, save for later
- A cardboard mock-up
 - Draw the UI elements you need
 - Move them around based on user “taps”
- A script
 - Simulate voice or textual chatbot
 - Have a person read a script/flowchart
 - Person can improvise when user doesn’t “follow the script”

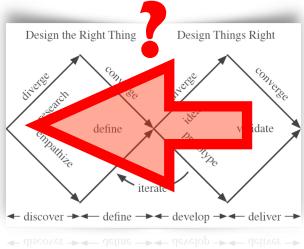


USER FEEDBACK

- Interview users
 - Prototype
 - Liked
 - Want to change
 - Questions
 - Ideas
- One notetaker / team
- Quadrants so you cover everything

+





FINISHED?

- At any time, you may need to go back.
- User feedback tells you something you should have learned in the Empathy Map stage.
- Implementation is impossible, re-ideate.
- Improvement is always possible,
- but budget and schedule are not!

LEVELLING UP

- We have covered DT!
- The next slides are for improving
 - 1. Practice
 - 2. Perspective

REFLECTION

- The first time will be hard.
- Get better faster
 - Reflect on what you could have done better
 - More empathy?
 - Generate more ideas?
 - Start with simpler prototypes?
 - Type faster?

IDEA BEHIND TEMPLATES

- Working memory is divided
 - Visual
 - Speech (external and internal planning)
 - Facts
 - We can remember 7
- How to cope?
 - Save space by putting Knowledge in the World (a Norman principle)
 - Use multiple working memory components
 - Templates do both!

JUST ONE USER?

- Norman says we make apps for people
- think about who that person is
- only way to understand from the user point of view
 - user background
 - emotional response
- problem:
 - there are 7 billion users!

ACTIVITY-CENTRED DESIGN

- think of it as a solution to the 7-billion problem
- design for “a person who wants to X”
- make a persona for that person
- don’t add features
- add capabilities

TWO 5S

- Five Whys - Toyota
 - When you think you know the cause, ask for that cause.
 - Repeat 5 times.
 - Get to Root Cause
- Five People - Jakob Nielsen
 - Marketing and Big Data:
 - User surveys
 - A/B Testing
 - Designers do in-depth interviews
 - Understand user answers
 - Not evaluating a product
 - Only finding path to next prototype

NORMAN ON QUESTIONS

- **Question everything.** I am particularly fond of “stupid” questions. A stupid question asks about things so fundamental that everyone assumes the answer is obvious. But when the question is taken seriously, it often turns out to be profound: the obvious often is not obvious at all. What we assume to be obvious is simply the way things have always been done, but now that it is questioned, we don’t actually know the reasons. Quite often the solution to problems is discovered through stupid questions, through questioning the obvious.