Applying Design Thinking

A Workbook for Academics and Researchers in Higher Education

Christian Bruchatz, Robert Fischer, Janine Stelzer

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Authors: Christian Bruchatz, Robert Fischer, Janine Stelzer

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Content

**Design Thinking Introduction**

**Design Thinking Methods**

Partners

What is Design Thinking?

Based on design procedures

Design Thinking originates from working processes and organizing principles related to designing. It has been adapted and applied to other fields although there is not yet a fixed definition of Design Thinking today. Hence, it is rather a way of thinking than a set program.
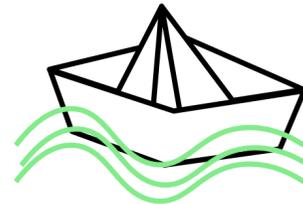
## Focus on innovation and a user-centered approach

Understanding the habits, culture, social context and motivation of users is crucial. Thus, the user and her needs are at the center of the Design Thinking process. To reach a somewhat complete understanding, participants must become immersed in the users' world(s) via a variety of tools and processes. From this standpoint on innovative ideas can be created.
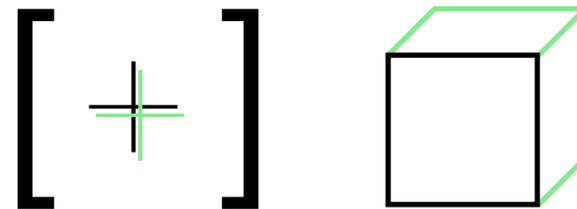
Interdisciplinary teams and collaboration

Various stakeholders with different backgrounds participate in Design Thinking processes. They all should contribute by creating a common language and exchanging thoughts and ideas to co-create new products or services. A good team process requires knowing the role(s) you play on your team, the rules of engagement and assessing your own strengths and weaknesses.

Evidencing

Design Thinking is based on evidence. Opinions, facts, and trends are processed before developing ideas. Once you create a solution, you again test it with a prototype and revise the solution if necessary. This way you are constantly engaged in a dynamic to adjust the results and redo the processes.
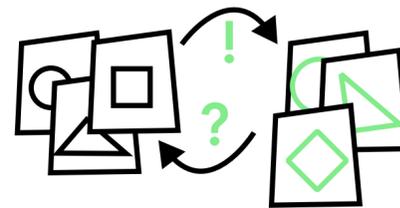
What is Design Thinking?

Co-creating new ideas

In order to co-create successfully, participants need to be able to express their thoughts and accept different perspectives. Rather than focus on a single idea, the Design Thinking approach harnesses the individual input from the team members to produce an array of ideas which may be dismissed or further developed as a group.

Sequencing and iterative processes

The Design Thinking process works in repeatable sequences within a specified itinerary. Thus, the participants are set in a frame which can be interpreted as loose – because of the possibility of various loops – or fixed – because of this predefined route.
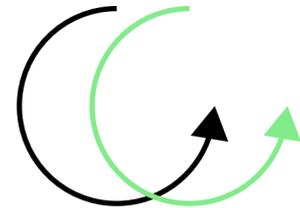
Identify unused potential/A holistic approach

Design Thinking enforces a holistic way of thinking. This ideal can be approximated by sequencing the various aspects of research, creation, and evaluation of ideas/products which together form a whole. Thus, by analyzing the problems deeply in the various stages, the Design Thinking process creates opportunities to identify unused potential and create unanticipated solutions to formerly unknown problems.
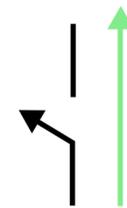
Design Thinking Process

A Design Thinking process usually starts with a challenge which gives focus and direction. There are several different approaches to structure a Design Thinking process whereas we are working with four different interconnected phases:

Explore:
The phase on exploration helps to get to know the users and their needs. Here you also develop important insights into unsolved problems based on analysis.

Create:
In the phase dedicated to creation, you design solutions to the identified problems. In addition to formulating hypotheses about problems to be solved, you also conceptualize and organize them.

Prototype:
The prototyping phase awakens your haptic creative part that favors kinesthetic and tactile communication by introducing actual prototypes to implement your hypothetical solutions.

Evaluate:
The evaluation phase is reserved for testing the prototype and evaluating how well it worked with the users. This is also the starting point for changes that can begin the process anew to improve and/or to redevelop ideas.

need analysis

conception and design

test and evaluation

implementation and introduction
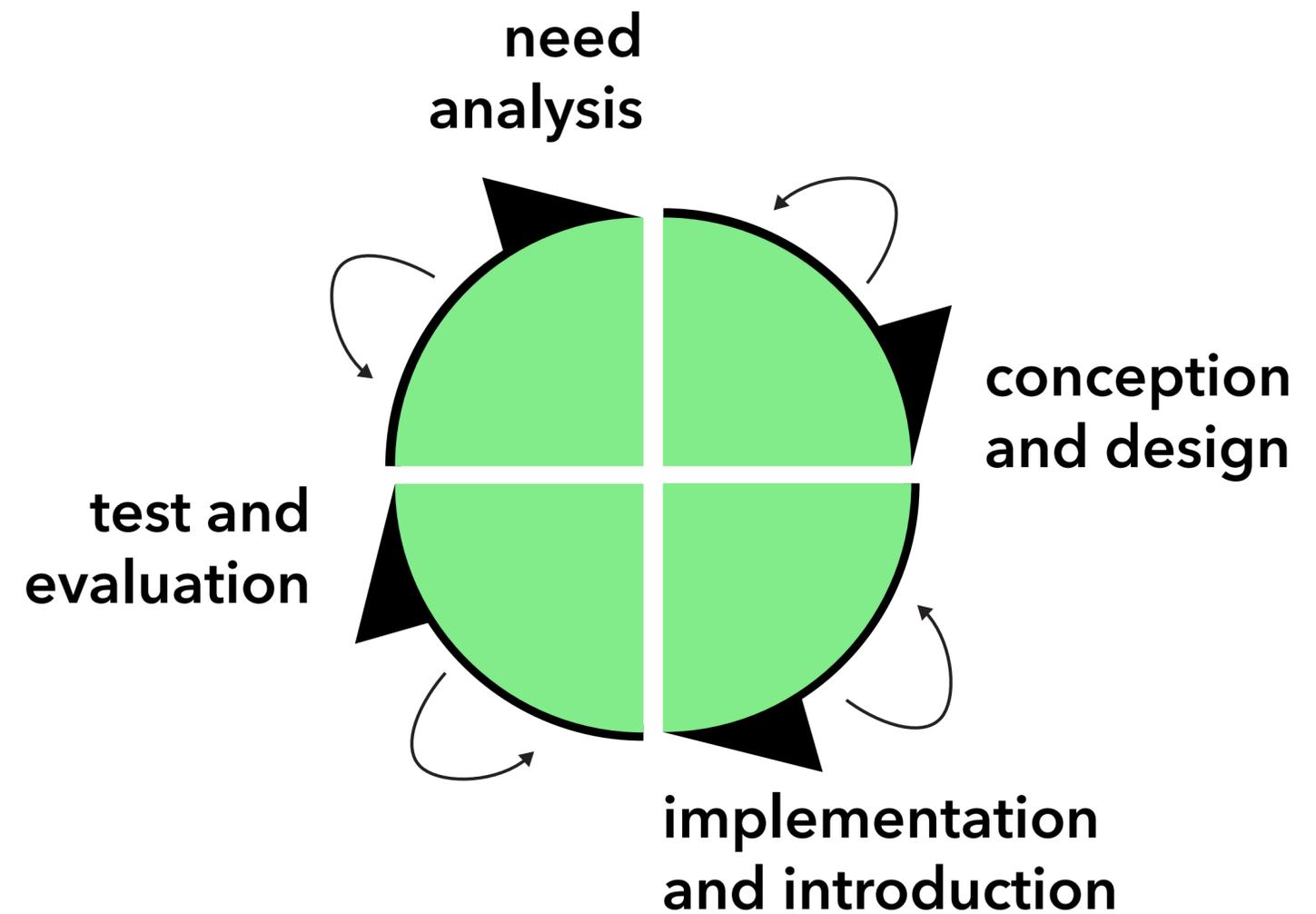
Challenge
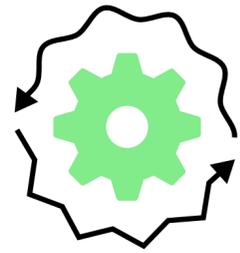
complex and/or
tricky problem
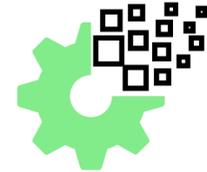
real life problem

unknown/open-ended

Characteristics

problem that needs
clarification/ shaping
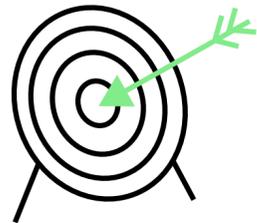
fits to the targeted user group
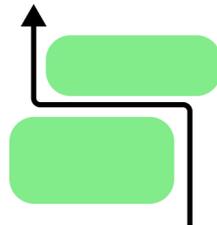
considers the possible constraints,
e.g realistic for the workshop frame
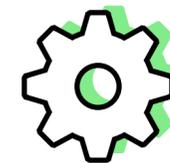
recognizes the situation
behind the problem
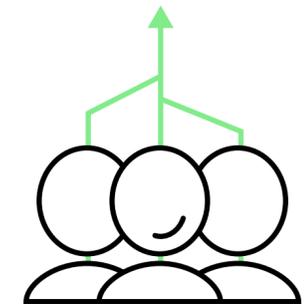
decided by the group

Mindset

work visually

only one
person speaks at a time

encourage WILD ideas

Working Culture

go for quantity

fail often.
fail fast.
fail cheap.

stay on topic

error culture,
not zero tolerance

don't be a perfectionist (Pareto principle)
80:20 rule (result:effort)

build on the ideas of other
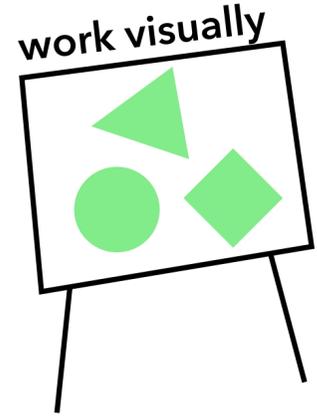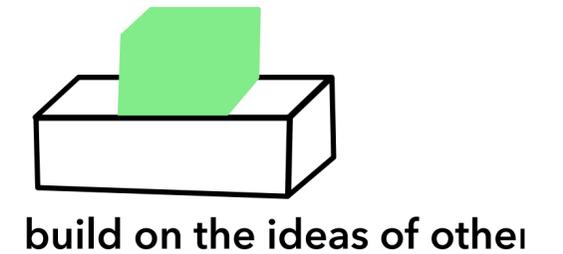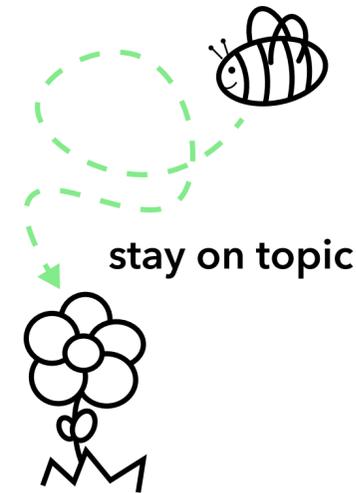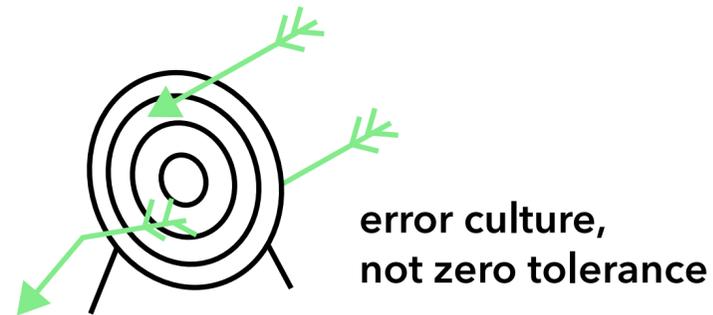
Mindset
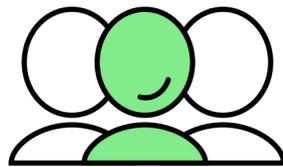
small groups of 4-6 people
ideally with on facilitator
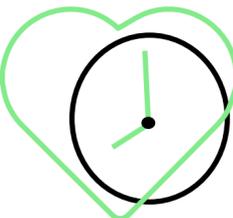
be reliable and punctual
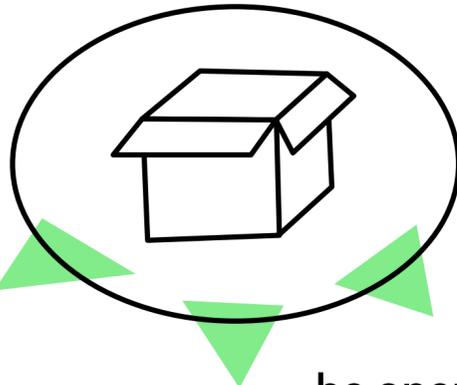
defer judgement

don't hesitate to ask
ridiculous and stupid questions

trust each other

be open and talk a lot

Teamwork
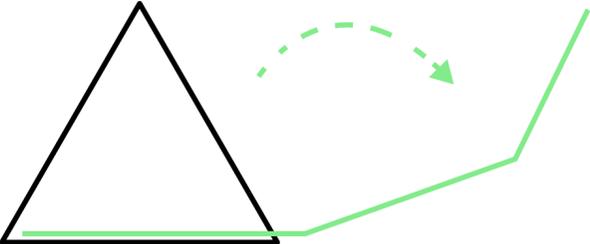
no hierarchy differences in the team
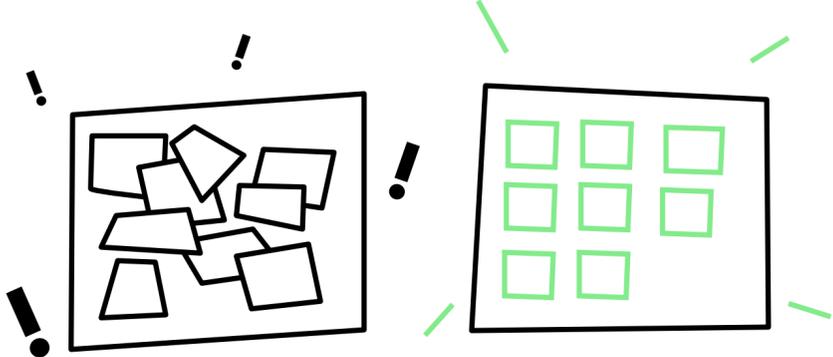
develop a reasonable team schedule

=)"=   ??##++'
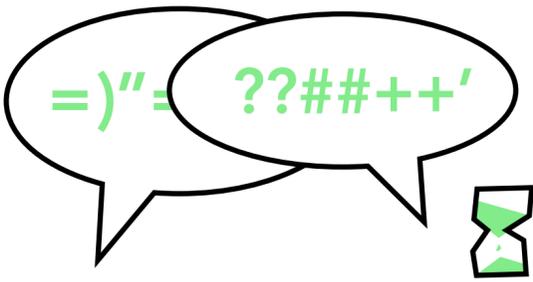
interdisciplinary teams = different languages
be patient and ask a lot of questions

Working Mode

Use sticky notes!

Sticky notes – available in different sizes, shapes and colors – help you to share your thoughts within the team and visualize knowledge. Use them to bundle information as chunks, each on one sticky note. They are flexible and re-arrangeable so the team does not always have to write new notes, but can transform the old ones into a new scheme.

• Minimum 2, maximum 5 words on one sticky note
• Draw & write
• Everyone writes & draws, not just the one with the most beautiful handwriting
• Capital letters are easier to read
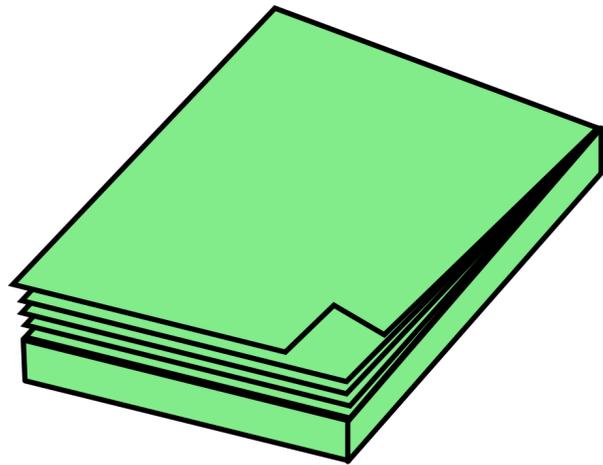
Keep your eye on the clock!

Diamonds are created under pressure. Without time pressure, you may work less effectively. Keeping time forces the group to work more intensely, make decisions, or even have a creative coffee break while talking with other teams.

• One hour is the longest time unit
• Larger steps have to be broken down into manageable smaller units
• Simple and visual clocks, that show the countdown are the best
• Decide according to the group how strict you want to keep the time schedule (tight, semi-open, loose)
• Also consider creating time for reflection
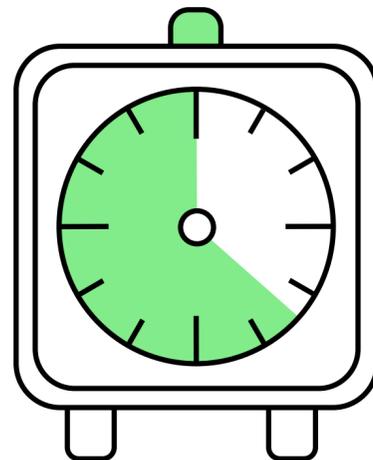
Working Mode

Warm-up games

- People Bingo
- Spaghetti Marshmallow Challenge
- Newspaper Bridge Challenge
- Jump-In, Jump-Out
- Robot Game
- etc.
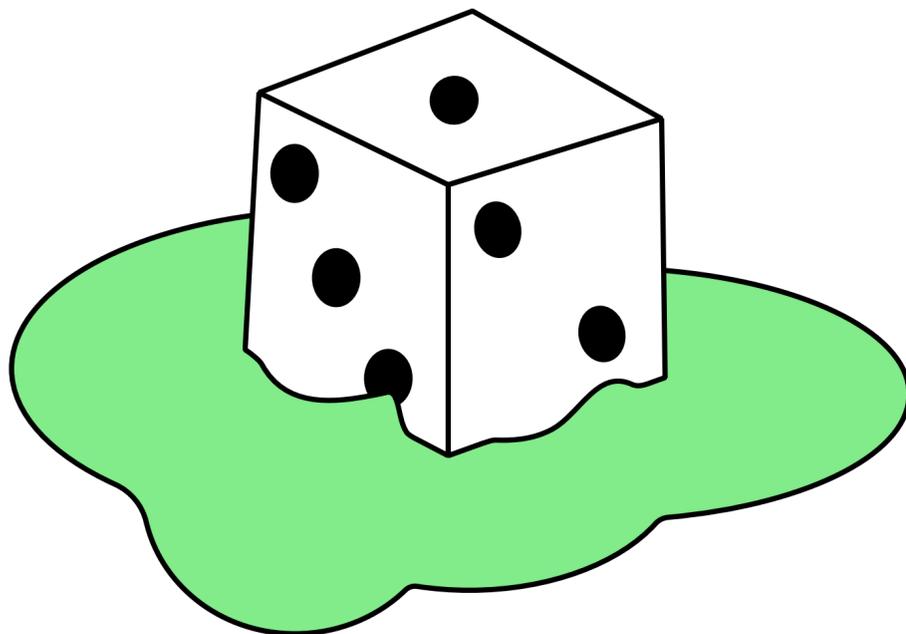
Group work

- Individual work (Let the introverted speak!)
- Group work (alternate groups if possible)
- Workshop auditorium (instruction and feedback)
- Wider auditorium (e.g. for prototype presentations)
- Expect group dynamics
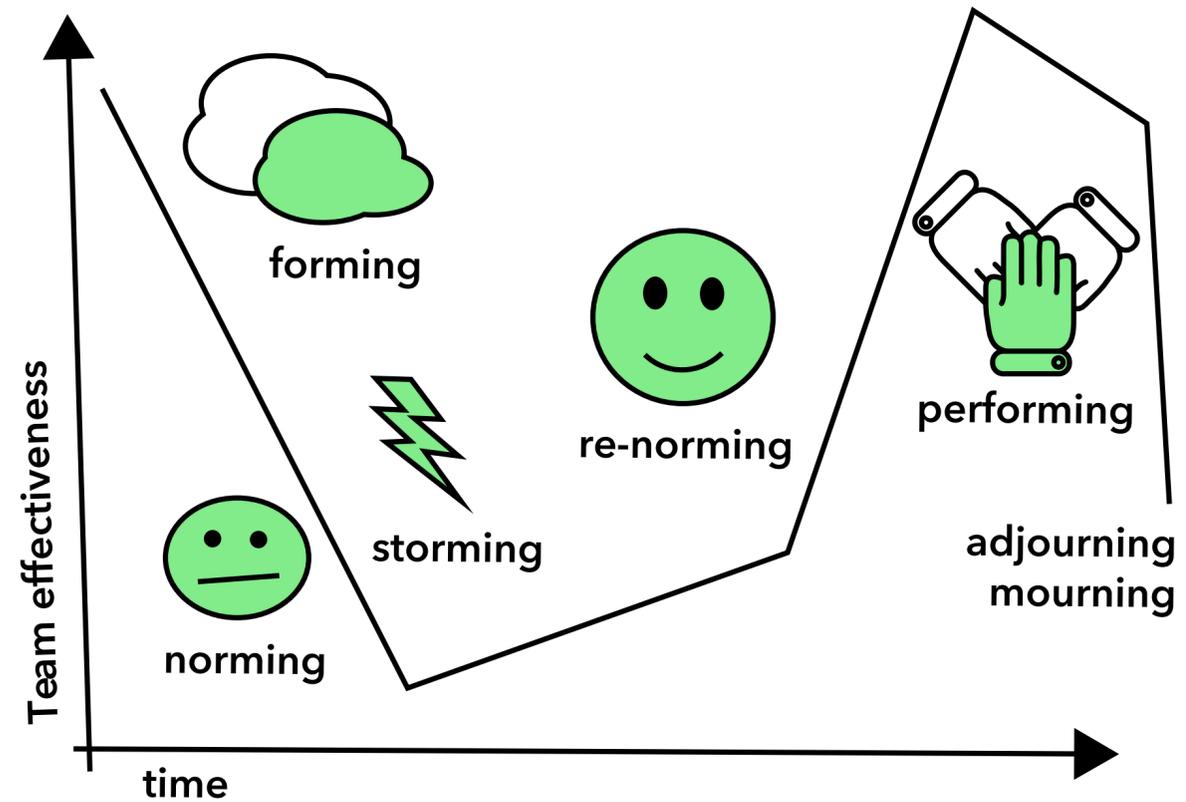
Source: Tuckman, B. (1965). Developmental sequence in small groups.
American Psychological Association. Psychological Bulletin, 63(6), 384–399.

Working Mode

Decision making

- Dot-voting
- Discussion
- Democratic decision
- Nonlinear voting (e.g. Fibonacci weighting)
- Scaling according to different dimensions
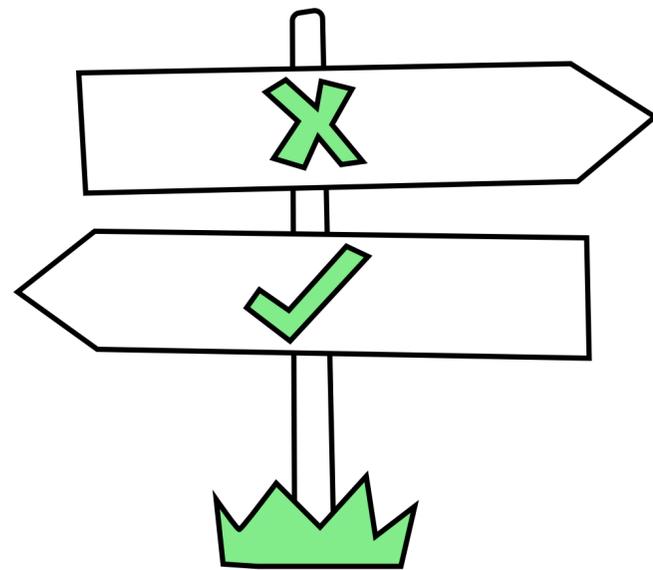
Feedback to end the day

- Clustering: keep, kill, try, learn
- Clustering: positive, negative, important
- Flashlight (ball & circle)
- In line (yes vs. no)
- Out of group visits
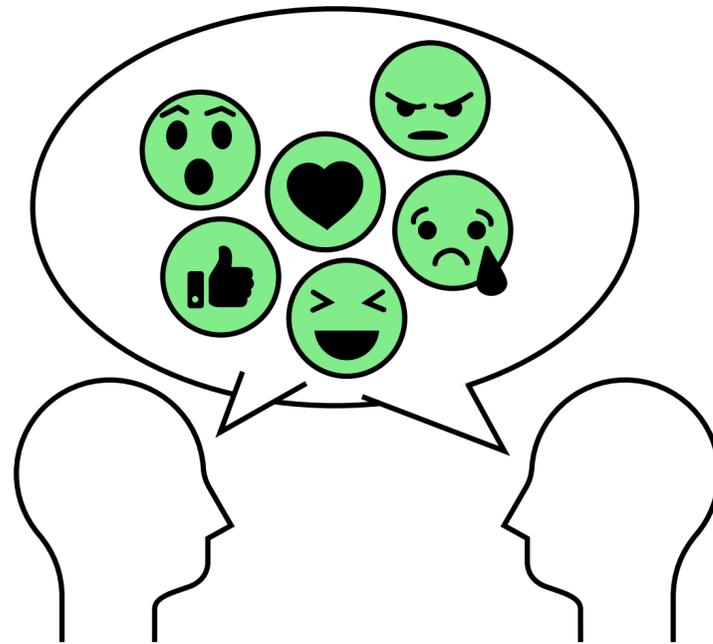
Design Thinking and Teaching

Why establish Design Thinking in educational system?

- All forms of cognitive activities are present (remembering, understanding, applying, analyzing, evaluating, and creating)
- Challenging real world problems
- Design is central in an increasingly artificial world
- Knowledge transfer is shifting to knowledge production
- Improvement of creative and adaptive capacities

Develop Design Thinking competencies

- Skills for locating resources
- Undertaking iterative design circles
- Designing for innovation
- Persistence and adaptation
- Knowledge of patterns across design problems
- Knowledge of roles in a team
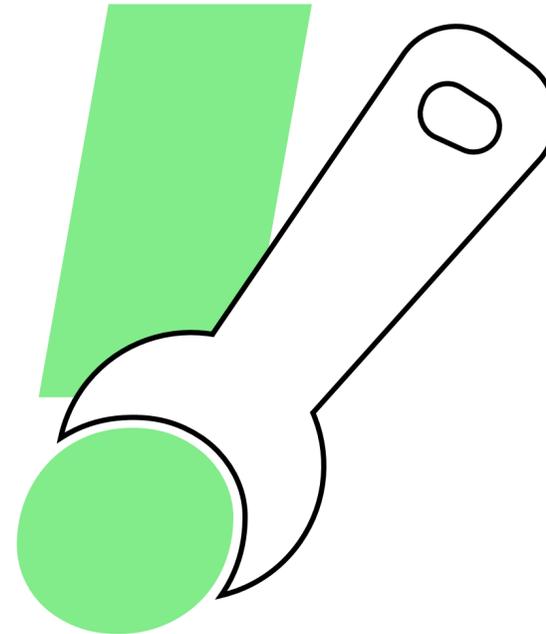
Design Thinking and Teaching

Effects on students

- Multiplicity of approaches: Cognitive, metacognitive, socio-cultural, productivity, technological approaches
- No prescribed set of knowledge and skill plans > interdisciplinary learning
- Building dispositions for complex problem solving
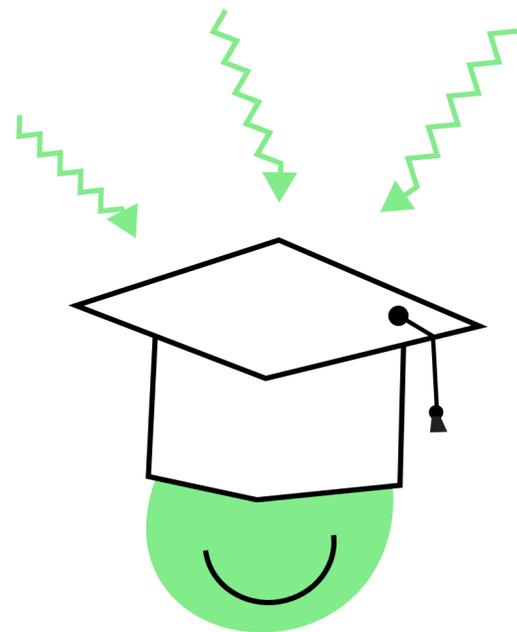
Teacher's perspective

- Reasoning processes that are being used to formulate lesson strategies
- Fostering peer collaboration: shifting from didactic-oriented material to constructivist-oriented material
- Design a design experience as critical competency for teachers
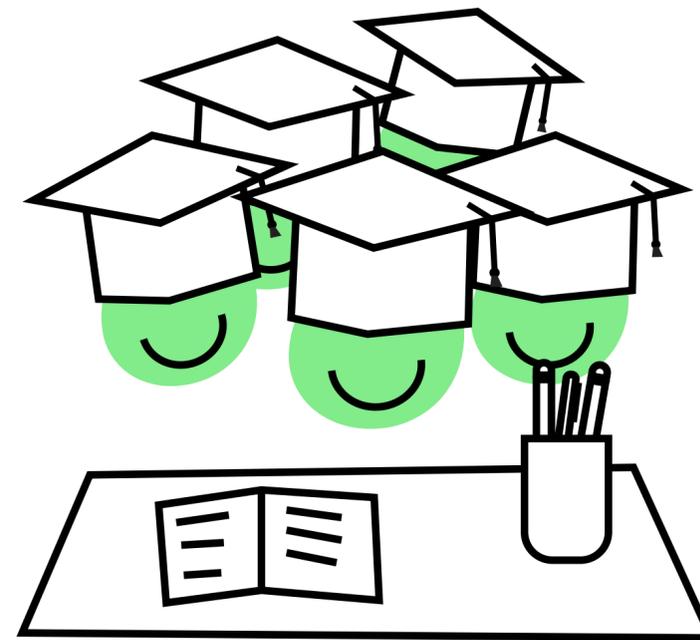
Design Thinking and Teaching

Useful tips to start Design Thinking with students

- Introduce the audience to Design Thinking using one of the DT schemes (e.g. see pages 6 "Design Thinking Process", 18 "Method Overview" and the images shown below, the Double Diamond or the d.school Design Thinking Process, etc.)
- Visualise and explain at which point you are in the workshop process

- Explain methods using fitting examples, visuals or a workbook
- Create a wall displaying Design Thinking principles and team work rules and always set the focus on it
- Take enough time for each phase, especially do not shorten the Explore phase
- Don't be afraid of using iterations and jumping back

Double Diamond

START

DIVERGE   CONVERGE   DIVERGE   CONVERGE

DISCOVER   DEFINE   DEVELOP   DELIVER
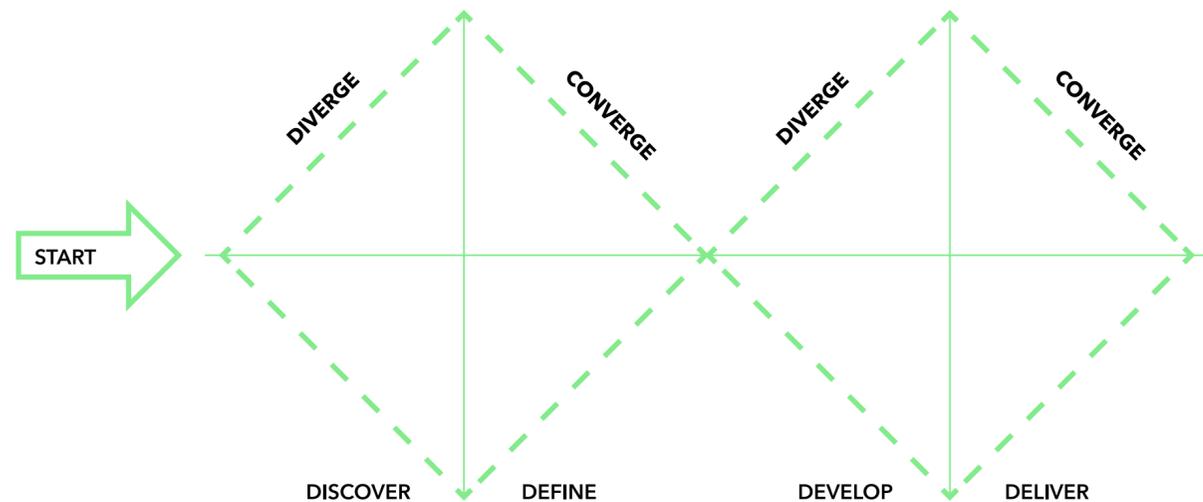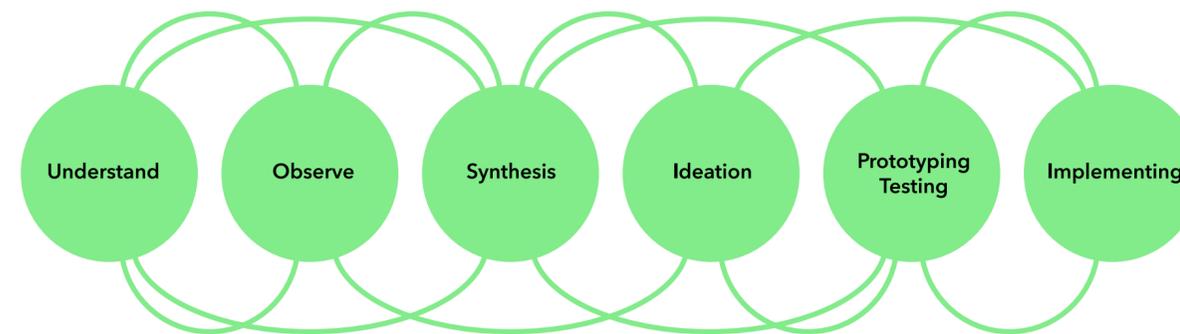
d.school Design Thinking Process (Stanford University)

Understand   Observe   Synthesis   Ideation   Prototyping Testing   Implementing

Design Thinking and Teaching

Choose an appropriate challenge

In order to start with a working challenge you should look for a specific and intentional problem to challenge. Formulate your challenge according to your state of knowledge and related hypothesises. It´s possible to challenge distinct, specific challenges you´ve noticed in daily or working life as well as questions which are more general and unspecific. What have you noticed during the last weeks or months that should be changed? Or change your perspective and reflect about what you wish for? Try to be as specific as possible when you feel comfortable with your hypothesis.

In the following you should reframe the problem where you want to see change and create a challenge that opens opportunities rather than builds barriers. Be flexible at the beginning as you might want to reframe and specify your choosen challenge again during the process within the team.
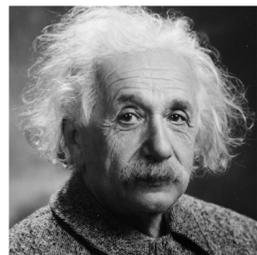
"We can't solve problems by using the same kind of thinking we used when we created them."

Challenge examples

How might we create a 21st century learning experience at our university?

How might my seminar room be redesigned to better meet my students' needs?

How might we redesign our approach to curriculum development and delivery to center around the needs and desires of our teachers and students?

How might we redesign our university to elevate student engagement and academic outcomes?

How might we engage students more deeply in reading?

How might we support a more well-rested campus?

See also on characteristics of Design Thinking challenges.

This is the exemple challenge that we will use throughout the ebook.

Design Thinking and Teaching

Recommended Literature

IDEO, Riverdale: *Design Thinking for Educators + Toolkit, 2nd version.* URL: https://designthinkingforeducators.com/ (03/2019)

Koh, Joyce Hwee Ling, Ching Sing Chai, Benjamin Wong and Huang-Yao Hong: *Design Thinking for Education Conceptions and Applications in Teaching and Learning.* Singapore et al.: Springer, 2015.

Luka, Ineta: *Design Thinking in Pedagogy*, Journal of Education Culture and Society, 2 (2014), 63-74.

Schell, Julie: *Design Thinking has a Pedagogy Problem … And a Way Forward*, Journal of Design and Creative Technologies (2019). URL: https://designcreativetech.utexas.edu/design-thinking-has-pedagogy-problem-way-forward (03/2019)

Wrigley, Cara and Kara Straker: *Design Thinking Pedagogy: The Educational Design Ladder, Innovations in Education and Teaching International*, 54:4 (2017), 374-385.

Elwood, K., W. Savenye, M. E. Jordan, J. Larson, C. Zapata: *Design Thinking: A New Construct for Educators.* In: Simonson, Michael (ed.): Annual Proceedings of Selected Research and Development Papers Presented at the Annual Convention of the Association for Educational Communications and Technology, vol. 1. Bloomington: Association for Educational Communications and Technology, 2016. URL: https://members.aect.org/pdf/Proceedings/proceedings16/2016/16_08.pdf (05/2019)

Overview Phases & Methods
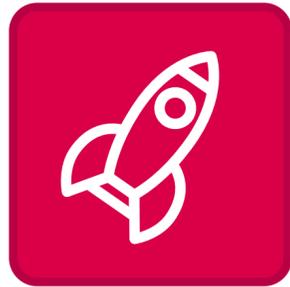
Explore

What can the team discover about the challenge and the users affected by it?

Research Mindmap
Who? What? How? Why?
Stakeholder Map
Interview
Persona
User Motivation Analysis
Customer Journey
Value Proposition Canvas
How might we... to solve...

Create

How can the team create a useful idea that might solve the challenge?

Brain Storming
Brain Writing
Kill your Idea
Interview
Matrix Scale
Send a Postcard

Prototype

How can the team represent the idea in a haptic format so that the solution can be tested?

What is a prototype?
How does a prototype look?
Prototype: Papercraft
Prototype: LEGO
Prototype: Storyboard
Prototype: Video
Prototype: Wireframing

Evaluate

How well did the prototype of the solution resonate with the users affected by the challenge?

Test Grid Planning
Interview
Brain Storming
How might we... to solve...

Explore

Research Mindmap
Sort and visualize knowledge

Who? What? How? Why?
Spot on the situations when the challenge appears

Stakeholder Map
Identify stakeholders and visualize their connections

Interview
Get to know the users

Persona
Get a holistic impression of the user

User Motivation Analysis
Extract needs and obstacles from the collected data about the user

Customer Journey
Shows processes and reveals improvements

Value Proposition Canvas
Identify the needs of the user

How might we... to solve...
Connect the challenge, the user and a possible solution

Research Mindmap

Sort and visualize knowledge

Benefit

The research mindmap is a method to sort (un)known knowledge, visualize it, and simultaneously consider "the big picture". It can be used as a starting point to divide the initial challenge into manageable research fields for revealing opportunities.

All team members can contribute their individual knowledge and harmonize their language and terminology. The research mindmap can be extended at any time and serves as a reference point for further research.

Description

All the terms relating to the challenge are collected and sorted in clusters of known/unknown terms (see Template 1). These serve as the knowledge basis for finding different associations and categories for the underlined topics on Template 2 for the question, "How can we find/design a solution for user groups without the previous obstacles?" In the next step, the associations are found and then categorized, and finally prioritized. The results help the team to decide where to start with the exploration and on which solution/user group/obstacle to focus (see Template 3).

Tips

• This tool is useful for developing a common language in interdisciplinary projects.
• It helps to define a starting point in any project.
• Do not spend too much time on this tool since more mental energy will be needed later.
• You may prepare a template for this method to collect knowledge as a preparation for a workshop meeting.

> **Empty Template**

> **Explore Methods**

Difficulty level:

★★★★★

Material:
Templates
Marker
Sticky Notes

Research Mindmap 1

KNOWN KNOWNS

STEADY COURSES

TRADITIONAL WAY OF TEACHING

Things we know we know ++

UNKNOWN KNOWNS

HIGHLY FORMALISED STRUCTURE

HIGHLY THEORETICAL LECTURES

TRADITIONAL WAY OF TEACHING

Things we don't know we know -+

KNOWN UNKNOWNS

STUDENTS' MINDSET

LIMITED FRAMEWORKS

SELFCONFIDENCE

Things we know we don't know +-

UNKNOWN UNKNOWNS

UNIVERSTIY + PROFESSION REQUIREMENTS

STUDENTS' ABILITIES

OCCUPATIONAL FUTURE

Things we don't know we don't know --

> **Empty Template**

> **Explore Methods**

Research Mindmap 2

"How can we find a <u>solution</u> for <u>user groups</u> without the previous <u>obstacles</u>?"

associations & categories

- LOCAL STUDENT LEARNING SPACES
- INTERNSHIP PROGRAM TO GET A FIRST IMPRESSION OF FUTURE REQUIREMENTS
- FURTHER EDUCATION IN DIGITAL TEACHING METHODS
- ONLINE PLATFORM FOR INTERACTION

associations & categories

- STUDENTS
- PARENTS
- ADMINISTRATORS
- TEACHERS

associations & categories

- FORMALIZED STRUCTURES
- TECHNICAL ORIENTATION OF UNIVERSITIES
- NO MONEY FOR NEW EQUIPMENT
- STUDENTS NOT WILLING TO GO BEYOND LIMITED FRAMEWORK
- TEACHER HAS NO TIME

Research Mindmap 3

1. Online platform for interaction

2. local student learning spaces

3. further education in digital teaching methods

4. internship program to get a first impression of further requirements

---

1. students

2. teachers

3. administrators

4. parents

---

1. students not willing to go beyond limited framework

2. formalized structures

3. technical orientation of universities

4. no money for new equipment

5. teacher has no time

> **Empty Template**

> **Explore Methods**

Who? What? How? Why?

Describe and interpret the user situation and motivation

Benefit

This method helps to understand the user situation. It is a means to discover relevant and potentially hidden user problems. The basis for this information is an exact user observation.

Description

You should describe the visible elements of user actions with this method and possibly derive how this influences the emotional state of the user – is it positive or negative? Have a look at the users and observe who does what in which way and why? For observation using phrases like "I see that…" helps to identify the visible actions of the user. It may also be of assistance to actually talk with the target group. Regarding the point of motivation (why) you have to make assumptions. These assumptions can be the starting point for new observations. You should interpret the motives and even try to discover hidden motives behind the actions of the user.

Tips

• Use "I see that…" phrases for "what".
• The template helps to collect, order and interpret the observations made.
• You may double check your findings/assumptions with interviews. See page 29 on interviews.
• "What" and "how" may be used in one category. "How" then describes circumstances and hidden processes.
• Use several templates in case of more than one user group.

> Empty Template

> Explore Methods

Difficulty level:

★★☆☆☆

Material:
Sticky Notes
Marker

Who? What? How? Why?

	Who? Who is acting as a user?	What? What exactly is the user doing?	How? How does the person do it? How does the user proceed?	Why? Why does the person do this? In what ways is the user motivated? How is the user driven?
INTERNAL	Students	Collecting credits Instrumental learning	Doing the minimum	No trust in themselves + system's reliability
	Teachers	Delivering knowledge Training skills attitudes	Doing just the duty Handling priority (system requirements)	No time to meet unrealistic demands
	Researchers	Publish or perish Difficult to find grants	Redundant activities	No freedom in choosing research problems No publication no grants
EXTERNAL	Administrators	Bureaucracy Monetarize research + teaching	Being bureaucratic (rules and sustainability)	Low funding + excessive rules
	Parents	Investing in future	Being overprotective	Demographic trend improved quality of life
	Employers	Finding adequate candidates/employees	Outside of education system	Formal cooperation

> **Empty Template**

> **Explore Methods**

Stakeholder Map

Identify stakeholders and visualize their connections

Benefit

By using the Stakeholder Map tool, all the stakeholders who are involved in the problem or affected by it will be identified and visualized for a better overview. This will help to develop a solution for the problem/challenge by describing not only the stakeholders but also their connections and (inter)dependencies.

Description

First, the team must create a list of all the stakeholders. These can be individuals, institutions, companies or groups that are somehow important for the whole project. After that, it is important to get to know the stakeholders a bit better by filling out an information sheet (see Template 1). Hang these information sheets on a wall for a better overview. Next step the team analyzes each individual connection between two stakeholders on Template 2. For every connection a separate template has to be completed. All the stakeholders and their connections will generate the completed Stakeholder Map. Finally, assumptions can be generated from the connections between the stakeholders by completing the categories on Template 2. Formulated as questions, these assumptions will help to follow through in the next tools to be applied.

Tips

- The Stakeholder Map is a flexible system with several iterations so you may need to return to the beginning of the process and extend the list of stakeholders.
- The team should decide how to arrange the Stakeholder Map based on the number of stakeholders and connections. To keep track of the connections, you can connect the stakeholders with string or by drawing lines.
- Sometimes it can be helpful to draw a mini version of the map for the more relevant stakeholders to find more detailed insight.

> Empty Template

> Explore Methods

Difficulty level:

★★★☆☆

Material:
Templates
Marker
Sticky Notes

Stakeholder Map 1

Stakeholder: **STUDENT**

Basic facts:

- FINANCIAL DEPENDENT
- UNDERGRAD
- LOOKING FOR PRACTICAL EXPERIENCES

Personal interests:

- DIGITAL DEVELOPMENT
- PRACTICAL ORIENTED STUDIES

Role in the project:

- PLATFORM USER

Biggest Motivator:

- GOOD GRADES
- PRESTIGIOUS INTERNSHIP
- RECOGNITION FROM PEERS

Self-perception:

- OVERWHELMED BY OBLIGATIONS
- MOTIVATED, CURIOUS
- AMBITIOUS, PATH OF LEAST RESISTANCE
- DIGITAL PROGRESSIVE

Rules the stakeholder has to follow:

- UNIVERSITY RULES
- -> GOOD GRADES + ACADEMIC DISCOURSE
- -> COMPLIANCE WITH ORDER OF STUDY
- JOB MARKET -> MEET EXPECTATIONS
- SOCIAL RULES FROM PEERS + FAMILY
- FOLLOW SOCIAL CONVENTIONS

Stakeholder Map 2

Connection

Common goals:

GETTING IN TOUCH WITH EACH OTHER

DIGITAL / PROGRESSIV

AMBITIOUS / INNOVATIVE

Emotional connection:

PRESTIGE

ABILITY TO BE INNOVATIVE

What they do not tell each other:

PERSONAL DIFFERENCES

DOING THE JOB FOR THE MONEY (STUDENT)

COULDN'T FIND A BETTER CANDIDATE (COMPANY)

Conflicts:

DIFFERENT EXPECTATIONS

SALARY

WAY OF WORKING

STATUS

Hidden animosities:

COMPANY FOCUS -> TOO CAPITALISTIC -> WRONG TRENDS

STUDENT FOCUS -> NO RESPECT FOR ORGANIZA- TIONAL STRUCTURE

Other facts:

CONSERVATIVE WORKING ATMOSPHERE

COMMUTING

Interview

Get to know the users

Benefit

The method of a semi-structured qualitative interview gives you the opportunity to get into direct contact with the individual users. You are able to immerse yourself into the thoughts and problems of this user in order to identify expectations, certain needs or values of the user group.

Description

Preparation

A good interview should be structured with an introduction, a middle section and an end. Also, the interviewer should prepare questions which work as a guideline but not as a fixed path. Formulate open questions and use follow-up questions to dig deeper.

Who is to be interviewed?

The selection of a relevant interview partner is an important process as we would like to interview relevant people. Also, it is easier to get insights from interviewees who are outside the mainstream. Their extreme perspective may help to uncover hidden needs that would not be addressed by mainstream users.

Categories of needs

Needs can be categorized in an interdependent dynamic system. Somewhat consecutive needs are physiological, social, safety, and individual needs as well as the need for self-actualization. In order to ease the question process for the interviewee, ask through all the different categories of needs, like layers of an onion, to get to the core:
- Initially, changes, preference or expectations
- Then the needs, gains, benefits, and requested features
- And finally, goals, values, and motives (emotions)

> Empty Template

> Explore Methods

Difficulty level:

★★★★☆

Material:
paper and pen or recording device template

Interview

Get to know the users

What questions to ask?

There are different levels of questions to gain access to the different levels of needs:
• The **meta level** comprises the topics you would like to discuss.
• **General questions** function as an entry point into the interview.
• **Experimental questions** circle around the topic to ask about incidents, stories, or experiences which are later translated into obstacles and needs. Dig deeper if you discover contradiction.
• **Specific questions** may be used to ask about specific experiences connected to your research.
• **Wish questions** may be asked at the end of an interview. Try to gain inspiration from their wishes but do not make them produce solutions.

The role of the interviewer and documentation

A qualitative interview should be conducted with two interviewers. It is vital to assume roles in the interview. The "best friend" tries to empathize the most with the interviewee, trying to be as curious as possible. The "inspector" behaves as neutral as possible during the interview, taking notes and observing body language. This distance helps to evaluate the statements more critically later on. After the interview, the interviewers should exchange thoughts and note down the most important aspects.

Tips

• Before beginning the actual interview, you should build up trust and start with getting to know each other.
• The interview as a starting point helps to identify insights you know you don't know. During the interview, you may even discover aspects you didn't know you didn't know. This in part also depends on how well the interview is conducted and how well the interview partner is selected.
• Prepare to divert from your original plan and follow the user's viewpoint.
• Don't be afraid of silence during the interview. This may just be a pause for the interviewee to think about a fitting response.
• Do not document the interview yourself but bring another person or use a device to record the interview. Remember to ask for permission if you choose to record anything.

> Empty Template

> Explore Methods

Difficulty level:

★★★★☆

Material:
paper and pen or
recording device
template

Interview

Gerneral Questions
What does ... mean for you?
What do you associate with ...?

Experimental Questions
Everyday, positive, negative and
surprising experiences

Meta Level
Here is room for the meta-level
of the topic

> Empty Template

> Explore Methods

Specific Questions
When did you ... the last time?

Wish Questions
What do you wish regarding...?

Interview

User: _____	
What caught your eye at once?	
Key sentence?	
Peculiarity?	
Was honest about...?	

> Empty Template

> Explore Methods

Persona

Get a holistic impression of the user

Benefit

The Persona is a method used to identify all conditions connected to our potential user(s). A completely filled out persona template represents the complete synthesized knowledge (profiles) about a specific fictional user. By creating different personas, the team will be able to characterize the specific needs, circumstances, joys, challenges, desires and passions of users within a user group or across user groups to focus on further project goals.

Description

To fill out a persona template, the team has to imagine a fictional but typical user as a representative for a user group. For each user group fill in a different persona template. In general, a persona is the essence of the interviews. This means all the actual results from the interviews should be included in the persona template categories. Countless categories can be defined in the design thinking process, but see the exemplary template below.

Tips

- The best time for filling out personas is after having conducted a few interviews with potential users.
- If it is not possible to perform interviews use other sources (e.g. literature research) as input for the Persona method.
- Some insights into a user written down on a persona will be very important while others will play a minor role.
- The more time you take to fill out a persona, the more detailed it can be.
- Use the persona in later steps of the process to review your solutions.
- Make your description lively yet concise.

> Empty Template

> Explore Methods

Difficulty level:

★★☆☆☆

Material:
Templates
Marker
Sticky Notes
Pictures of fitting persons

Persona

Name:
Age:
Job:

SEBASTIAN, 21
ENGINEERING
STUDENT

Goals:

RECIVE A GOOD
DEGREE FROM A
PRESTIGIOUS
TECHNICAL
UNIVERSITY

Values:

INDEPENDENCE,
DETERMINATION,
HELPFULNESS,
LOYALITY,
BALANCE,
CONFIDENCE

Motivation:

SEEKING A
GOOD JOB
WITH GOOD
SALARY

GETTING
RECOGNITION
FROM PEERS +
FAMILY

FINISHING
AS SOON AS
POSSIBLE

Sees:

BAD
POWER POINT
PRESENTATIONS
IN CLASS

SOCIAL MEDIA
APPS ON HIS
PHONE

Hears:

BORING AND
LONG
LECTURES

WITH TOO MUCH
USELESS
INFORMATION

CHATTER
DURING
CLASSES

Thinks:

INFORMATION
IS NOT
RELEVANT

NEW IN TOWN
AND STILL
DOESN'T KNOW
PEOPLE

Says & Does:

"IT IS
BORING!"

HE MAKES
A LOT OF
NOTES AND
STUDIES

BEING
STRESSED
OUT

Is afraid of / Is angry about:

THEORETICAL
CLASSES

TOO LITTE
PRACTICE IN
HIS STUDIES

BEING
LONELY

A MEANINGLESS
LIFE

Is happy about / wishes for:

GOOD
GRADES +
EXAMS

GOING OUT
WITH FRIENDS

HAVING LOW
RESPONSI-
BILITIES

PRACTICALLY
ORIENTED
CLASSES

> **Empty Template**

> **Explore Methods**

User Motivation Analysis

Extract needs and obstacles from the collected data about the user

Benefit

This method is another tool to help extract needs and obstacles from the information about the user. Then, the user motivation analysis can provide more information for other DT tools, like persona or for expressing the "How might we…?" question.

Description

User motivation analysis pairs needs with corresponding obstacles by asking specific questions, as follows, that the team must answer.

Needs
• What kind of appreciation does the user aim for? Who are the relevant contacts to do this?
• How does the user measure appreciation?
• What kinds of things does the user like to spend time on?
• For what things does the user take responsibility?
• How does the user define success?

Obstacles
• How is the user compensated for her efforts?
• Who or what controls the user?
• Under which circumstances does the user fulfill her tasks or satisfy her needs?
• How autonomous is the user? What kind of support does she get?
• What influence does she have?

The responses to these questions should be collected on Template 1. After that, the team must consciously form pairs of needs and corresponding obstacles on Template 2. In the last step of this method, pairs are ranked and the strongest need-obstacle pair is chosen simply by (dot-)voting or discussion within the team.

Tips

• On Template 2, the team can rank the pairs beginning with the strongest one while discussing which needs and obstacles belong together.
• Sticky notes make it easy to move your ideas (e.g. needs or obstacles) around as you make pairs.

> **Empty Template**

> **Explore Methods**

Difficulty level:

★★☆☆☆

Material:
Templates
Data from the interviews
Marker
Sticky Notes

User Motivation Analysis 1
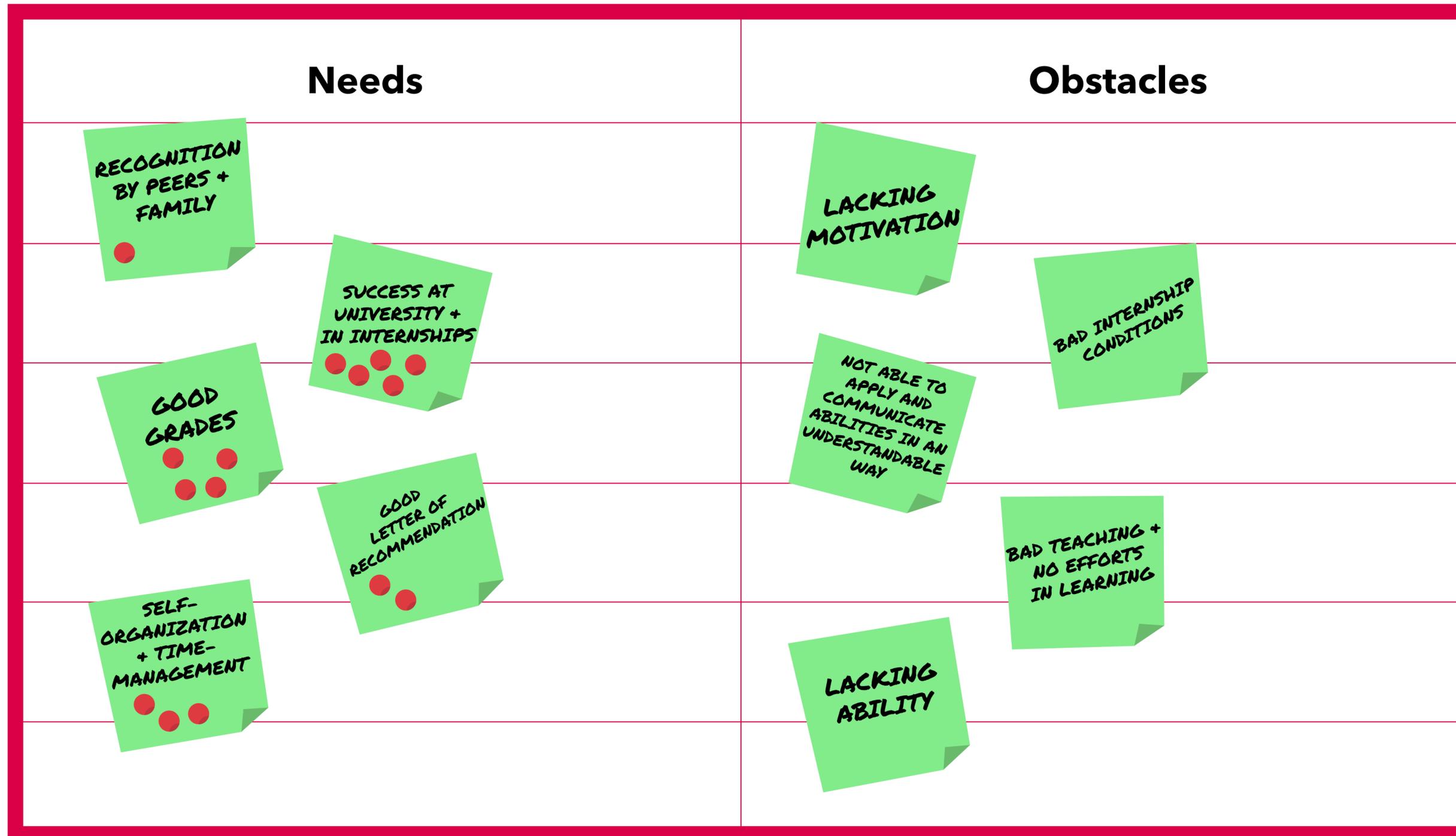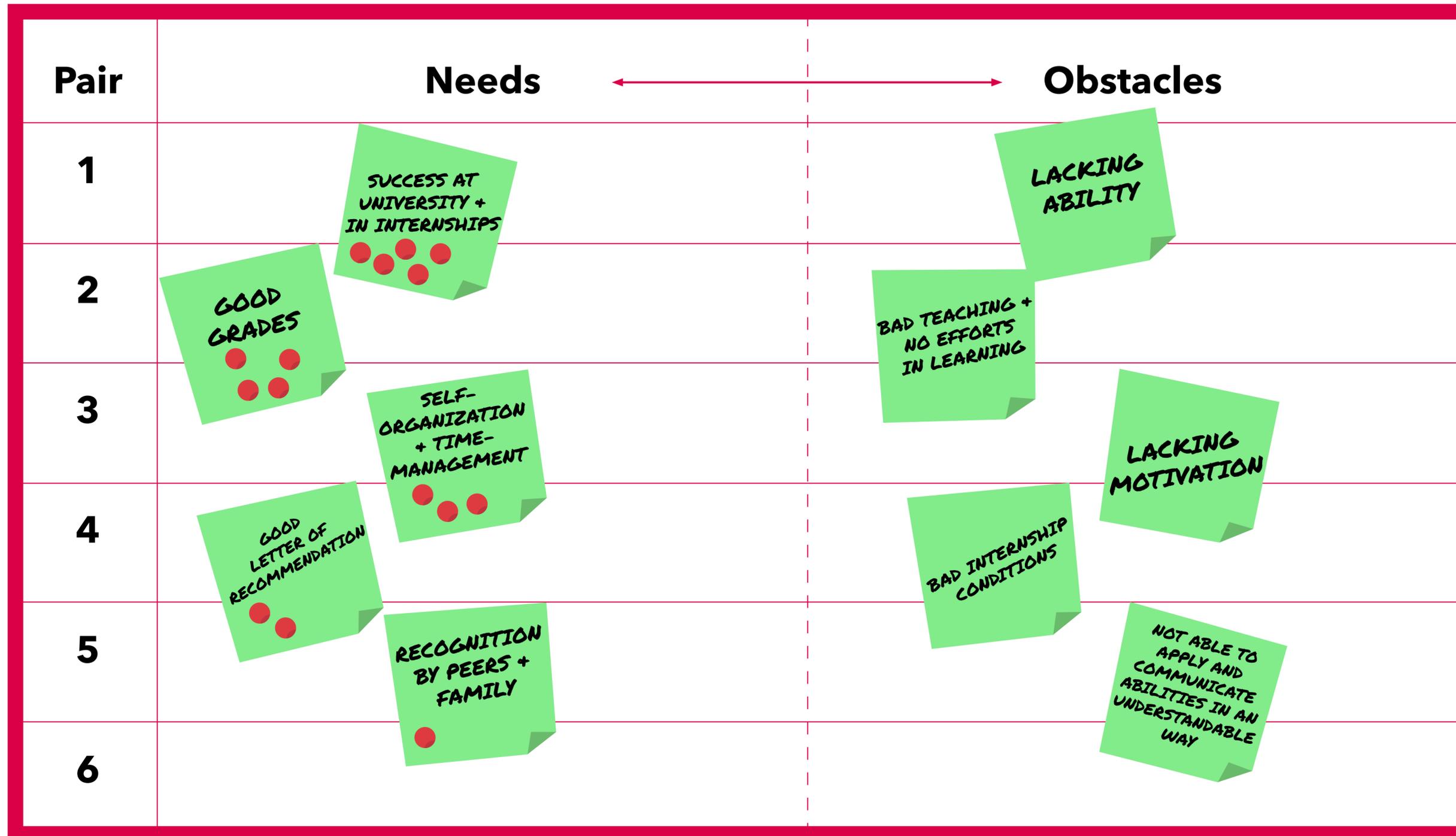
Needs

Obstacles

RECOGNITION BY PEERS + FAMILY

LACKING MOTIVATION

SUCCESS AT UNIVERSITY + IN INTERNSHIPS

BAD INTERNSHIP CONDITIONS

NOT ABLE TO APPLY AND COMMUNICATE ABILITIES IN AN UNDERSTANDABLE WAY

GOOD GRADES

GOOD LETTER OF RECOMMENDATION

BAD TEACHING + NO EFFORTS IN LEARNING

SELF-ORGANIZATION + TIME-MANAGEMENT

LACKING ABILITY

> **Empty Template**

> **Explore Methods**

User Motivation Analysis 2

Customer Journey

Shows processes and reveals improvements

Benefit

The customer journey shows unnecessary as well as missing sub-processes and enables assessment of the user's initial effort and mood. It also reveals which parts need improvement.

Description

In order to shed light on the implementation of the challenge from a purely customer perspective, the journey is presented chronologically based on the contact points (see template). To fill in the template, list contact points between your user group and the product in the service process. In the next steps, examine which actions the customer has to perform and how she feels about them. Finally, consider where there is room for improvement. The whole process is divided up in before, during, and after the customer journey.

Tips

• Consider all contact types
• Use the persona template to put yourself into the position of the user group(s).
• Clarify the contact points or emotions with simple sketches.
• You may also consider background processes if necessary.

> **Empty Template**

> **Explore Methods**

Difficulty level:

★★★☆☆

Material:
Templates
Marker
Stick Notes

Customer Journey

Customer journey map

user group: STUDENTS

description:

LOOKING FOR AN INTERNSHIP VIA APP

process

	before	during	after
Contact points	OVERVIEW OF SUITABLE APPS / VISITS THE APP FOR THE FIRST TIME	SEARCH FUNCTION + CONTACT FORM	RATING + RECOMMENDING THE APP / EXPLORING OTHER PARTS
User action	STUDENT IS LOOKING FOR AN ONLINE PORTAL OFFERING INTERNSHIPS	STUDENT FINDS SEVERAL SUITABLE COMPANIES AND MAKES CONTACT	LOOKING INTO OTHER FEATURES OF THE APP
Feelings Thoughts	SURPRISED THAT THE PORTAL OFFERS MORE THAN INTERNSHIPS	DIFFICULTY IN LOOKING FOR KEY WORDS / SURPRISED TO FIND SO MANY COMPANIES	HESITATES TO RATE THE APP, BECAUSE IT'S TO TIME CONSUMING / HAPPY ABOUT FINDING THE APP + PLANS TO USE IT AGAIN
Emotions			
Actions for improvement	CLEARLY STRUCTURED STARTING SCREEN	SHOW SIMILAR KEY WORDS / MAINTAIN EXTENSIVE DATABASE	EASY RATING FORM / WELL STRUCTURED APP ARCHITECTURE

Value Proposition Canvas

Identify the needs of the user

Benefit

This method is used to identify the needs of your user groups and analyses the benefit or added value that a customer associates with this service.

Description

The Value Proposition Canvas describes to what extent products, ideas, and services can solve the customer/user's problem. Each user group will require separate templates. For example, when a team is working on a complex project, focus not only on the end user but also on the other relevant players/agents or networks.

First, the needs of the customer/user must be met by describing an idea that tackles these needs. Describing related ideas will reveal the expectable "gains and pains" that come along with that task. These gains and pains are to be collected in the template. You may have a look at previous solutions to compare the gains and pains of the possible solutions.

Tips

- When evaluating the utility of the new idea, the focus should be on both rational and emotional aspects.
- Think problem-oriented and do not focus too much on your new idea.

> **Empty Template**

> **Explore Methods**

Difficulty level:

★★★★☆

Material:
Templates
Marker
Sticky Notes

Value Proposition Canvas

Project	INTERNSHIP & SOFT SKILLS APP	User (group)	STUDENTS (COMPANIES)

Idea	Gain creators	Gains	Job-to-be-done
• APP THAT SUPPORTS STUDENTS SEARCHING FOR INTERNSHIPS & SOFT SKILLS COURSES • IN GENERAL OFFERING SERVICES FOR STUDENTS	• OPTIMIZING DAILY STUDENT LIFE • SUPPORT PRAGMATIC APPROACHES • NETWORKING	• SAVING TIME • GETTING AN OVERVIEW • IT'S FREE • GET TO KNOW OTHER STUDENTS WITH THE SAME MINDSET	• DEVELOP THE APP • FIND AN APP DEVELOPER • FIND THIRD PARTY FUNDING • BUILD AND MAINTAIN COMPANY DATABASE • BUILD AND MAINTAIN SOFT SKILL COURSE DATABASE • ADVERTISE & EVALUATE THE APP
	Pain relievers	**Pains**	
	• REDUCING BARRIERS TO FIND A SUITABLE INTERNSHIP • EASY ACCESS TO SOFT SKILL COURSES	• EXTENSIVE SEARCHES FOR INTERNSHIPS • HAVING LITTLE CONTACT WITH OTHER STUDENTS • STUDYING THEORETICAL KNOWLEDGE IS BORING • TEACHERS	

How might we... to solve...

Connect the challenge, the user, and a possible solution

Benefit

This method connects knowledge about the user and the challenges to produce several problem hypotheses, one for each scenario (several user groups, several problems).

Description

In preparation for the "How might we" question, gather information about the user, technologies, markets, and/or trends. The "How might we" question describes a user need that is still unsolved according to your research. Define which challenge you would like to work with for each user group.

Tips

- You can produce suitable and innovative solutions that lead to the next step in the Design Thinking iteration: the creative phase.
- The question should be difficult to respond to. The tension felt here is important and good.

> Explore Methods

Difficulty level:

★★★☆☆

Material:
Large Sticky Notes
Marker

Create

Brain Storming
Collect as many ideas and associations as possible

Brain Writing
Generate a high number of ideas within minutes

Kill your Idea
Expose weak points of your idea

Interview
Test your idea with the user / Refine your idea

Matrix Scale
Rank your ideas

Send a Postcard
Explain the issue with simple words

Brain Storming

Collect as many ideas and associations as possible

Benefit

"Brain storming" is a Design Thinking tool that activates the creative process, fosters free associations with certain rules, and helps the team to explore solutions beyond the known and unusual that otherwise would never have been found. In addition, a lot of ideas are developed in a brain storming session. These have to get out of your head to make more room for new, unconventional ideas.

Description

Use the "How might we" question from the EXPLORE module to brainstorm. Write the question in big letters in the middle of your brain storming wall. On a single sticky note, write or draw each idea that your team produces in an established time period and arrange these ideas around the "How might we" question.
There are some rules that make it easier to use the brain storm tool successfully:

- No criticism is allowed. It will take too much time and potentially exciting ideas may be blocked.
- Develop as many "stupid" and "crazy" ideas as possible to extend your range of possibilities.

- Feel free to modify ideas from others.
- Visualize as many ideas as possible because sketches and stick figures are inspiring.

An independent facilitator who ensures that all the rules are followed and that every team member has a say could be helpful. After all the ideas are collected on sticky notes, cluster them by topic.

Tips

- You may use different perspectives for different brain storming rounds, such as realistic, innocent, evil, or efficient.
- All templates that had been filled out in the EXPLORE phase can be used as a basis for brain storming.
- Try brain storming standing up. Some people feel that sitting means input while standing means output.
- When a cluster gets too extensive, create subdivisions.

> Create Methods

Difficulty level:
★★☆☆☆

Material:
Marker
Sticky Notes

Brain Storming

Step 1: develop as many ideas as possible

How might we question
in bold big letters
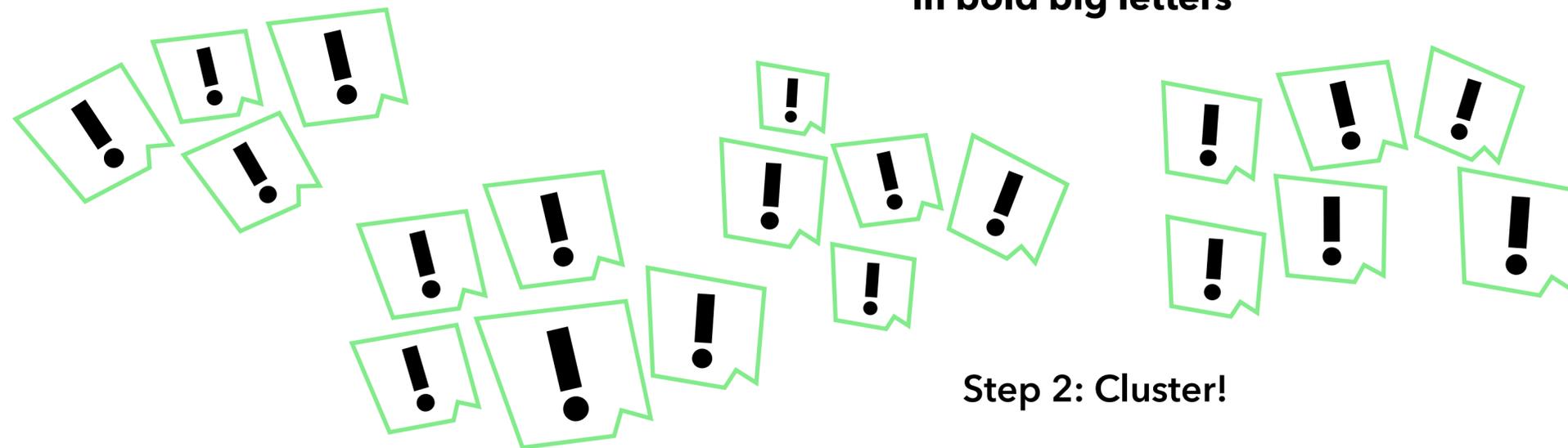
Step 2: Cluster!

Brain Storming

ENGAGEMENT

BECOMING A REPRESENTATIVE OF STUDENTS OF CLASS

WRITING ABOUT NEW TRENDS IN ENGINEERING FOR THE JOURNAL OF UNIVERSITY

OFFER MENTORING TO FIRST YEAR STUDENTS

STARTING PLAYING VOLLEYBALL IN A MIXED GENDER TEAM

TRAVELLING TO INTERESTING CITIES (WITH A DIVERSE GROUP OF STUDENTS)

HAVE MORE FREE TIME AVAILABLE EVERY DAY

ACHIEVE A BALANCED LIFE

BEING IN THE UNIVERSITY VOLLEYBALL TEAM

BECOMING A YOGA TEACHER

BEING LESS DISTRACTED BY WATCHING FOOTBALL

COPING WITH CONCENTRATION DEFICIENCIES

REDUCE SOCIAL MEDIA TIME

SOLVING MONEY PROBLEMS

STUDY AT A UNIVERSITY IN ANOTHER CITY

UNIVERSITY LIFE

HE HAS A PERSONAL COACH EVERY WEEK FOR TIME MANAGEMENT AND PERSONAL GROWTH

FREE TUTORSHIP AT UNIVERSITY

GET CERTIFICATE FOR EACH SEMESTER

PREPARE FOR ECONOMIC CRISES IN THE WORLD

REDUCE THE DEADLINES IN THE LAST WEEK OF THE PROGRAM

HE CAN SIGN UP FOR CLASSES WITH THE PEOPLE HE LIKES

HE CAN STUDY WHATEVER HE WANTS

HE CAN CHOOSE BETWEEN SPECIALIZED COURSES, SKILL COURSES ETC.

ENHANCING CURRICULUM

FREE ONLINE COURSES FOR IMPROVING SOFT SKILLS

PHILOSOPHY OF SCIENCES EXAMS IN CV

MORE FEEDBACK ON HOMEWORK

PROFESSIONAL LIFE

SWITCHING TO ONLINE COURSE TO BALANCE LIFE AND STUDY

DOING ONLINE COURSES IN IT / SOFTWARE DEVELOPMENT

HARD WORKING JOB WHILE STUDYING

INTERNSHIP ON SOFTWARE PROGRAMMING

ERASMUS + INTERNSHIP (IN ENGINEERING)

GOOD ONLINE JOB

DELIVERING PIZZA AS A JOB

APPLICATION FOR CEO POSITION

APPLY FOR A JOB OFFER AT THE BEST ENGINEERING ENTERPRISE

*Step 2 after Clustering

Brain Writing

Generate a high number of ideas within minutes

Benefit

The brain writing tool is an improved and more efficient approach to traditional Brain Storming. It generates many ideas within a few minutes. Even with many participants, it guarantees that every participant, including the introverts, will deliver the same number of ideas. Without ownership of ideas, the best ideas can be better selected.

Description

The first part of the brain writing happens in silence. Each participant gets three templates, on each of which there are six open boxes for ideas. Each person writes one idea in the first box of each template and hands the template to the next person in a clockwise manner. Then, you read your neighbor's ideas for inspiration to further develop them and write down a next, adapted idea. This process is repeated until each participant has contributed to the development of each template. Collect and redistribute the templates so the ideas can be analyzed more anonymously to choose the best ideas to be presented to the team.

Tip

The results of the brain writing improve and the ideas become more diversified with more participants. In contrast, traditional oral brain storming gets more chaotic with bigger groups.

> **Empty Template**

> **Create Methods**

Difficulty level:

★☆☆☆☆

Material:
Pencil
Templates

Brain Writing

#1

♥

BEING ON THE UNIVERSITY VOLLEYBALL TEAM

#2

FIND A VOLLEYBALL TEAM AND TRAIN HARD TO BECOME A FIRST TEAM PLAYER

#3

BEING ON A VOLLEYBALL TEAM COULD HELP TO DEVELOP SOCIAL STATUS, IMPROVE HEALTH CONDITIONS, HAVE A LIFE

#6

#5

#4

...
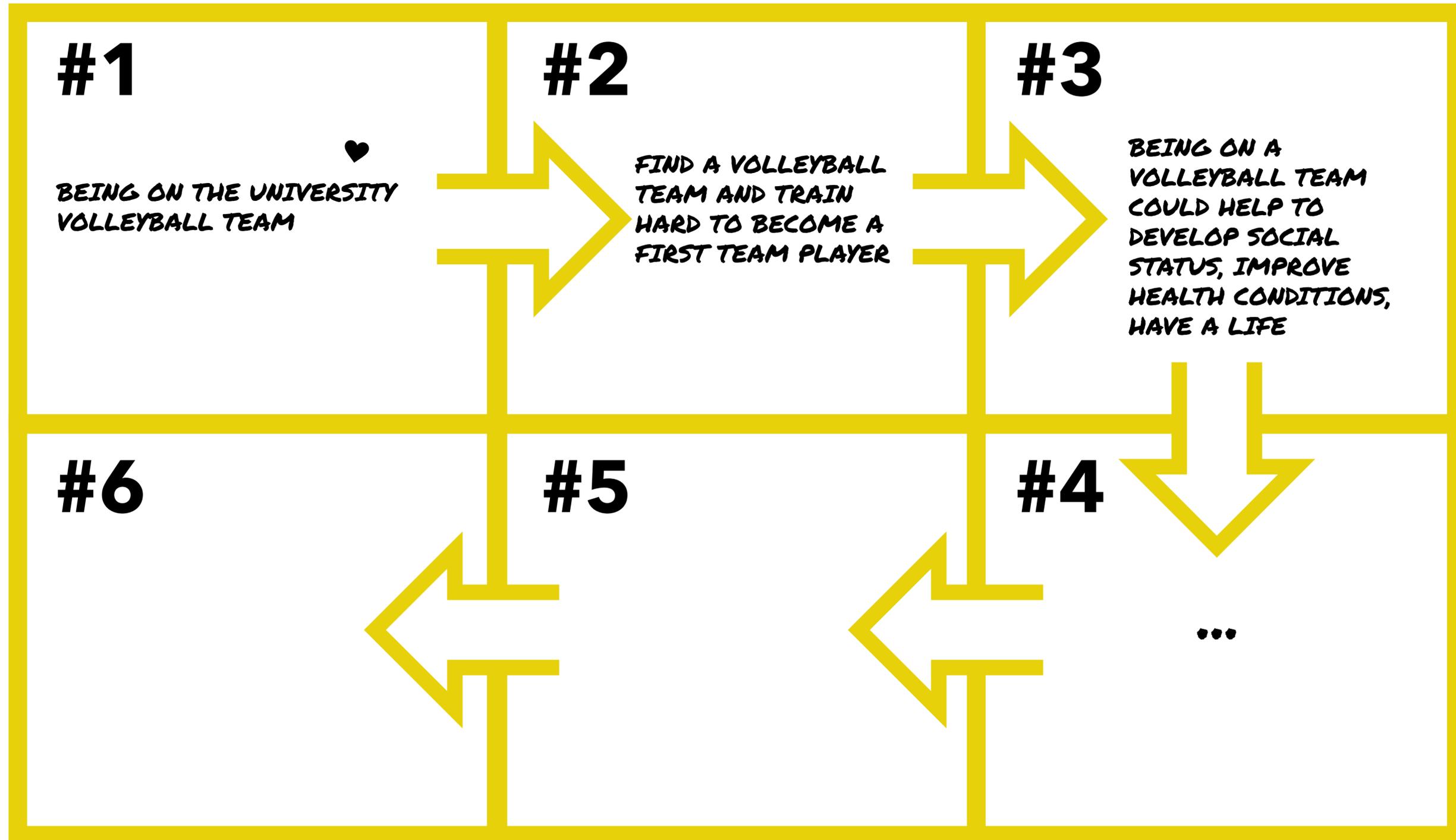
> Empty Template

> Create Methods

Brain Writing

BECOMING A REPRESENTATIVE OF STUDENTS

CANDIDATE FOR STUDENT REPRESENTATIVE, WIN AND COLLECT OPINIONS AND IDEAS TO ENHANCE STUDENTS LIFE AT UNIVERSITY

FREE TUTORSHIP AT UNIVERSITY: FIND THE "RIGHT" TUTOR (PROFESSIONALLY AND ALSO PERSONALLY) AND WORK WITH HIM SYSTEMATICALLY

UNIVERSITY VOLLEYBALL TEAM

FOUND A VOLLEYBALL TEAM AND TRAIN HARD TO BECOME A FIRST TEAM PLAYER

BEING IN THE UNIVERSITY VOLLEYBALL TEAM ♥

BEING IN VOLLEYBALL TEAM COULD HELP TO DEVELOP SOCIAL STATUS, RISE HEALTH CONDITIONS, HAVE LIFE BALANCE AND MAKE NEW FRIENDS (MAYBE MEET NEW GIRLFRIEND)

COACHING ON PRIVATE ISSUES

COACH HELPS SEBASTIAN TO HAVE A BALANCED AND SATISFYING LIFE, FOCUSSING ON HIS GOALS AND TIME MANAGEMENT

ENHANCING THE CURRICULUM

SEBASTIAN HAS SEMINARS EVERY WEEK WHERE HE TRIES TO INTEGRATE ALL HIS KNOWLEDGE AND NEEDS

CHOOSING SPECIALISED CLASSES / EXAMS

CHOOSING MOOC COURSES IN ENGINEERING AND LOBBYING FOR HAVING NEW MOOC COURSES PROMOTED BY ENTERPRISES

ONLINE COURSES FOR DEVELOPING SOFT SKILLS

* WHAT ARE MY WEAKNESSES IN MY SOFT SKILLS? * ONLINE COURSES (FREE ONES) * MAKE A DATABASE

* COMPARE OPTIONS * FIND REVIEWS * CHOOSE THE BEST * APPLY

ONLINE EDUCATION * FIND SPECIAL COURSES VALUEABLE FOR HIM * CHECK REVIEWS OF THIS COURSES AND FRIENDS OPINION

COMPANY INTERNSHIPS

FIND A GOOD COACH TO ASK FOR INTERNSHIPS / ASK FRIENDS / ONLINE / UNIVERSITY STAFF FOR GOOD COMPANIES AND OFFER

BLOGGING ABOUT THE COURSE LIKE A "MISTERY SHOPPER"

WRITING IN THE JOURNAL SEBASTIAN CAN USE HIS SKILLS FOR ECTS. HIS ARTICLES CAN BE USED FOR ACADEMIC WRITING SEMINAR A TUTOR CAN HELP

> **Empty Template**

> **Create Methods**

Kill your Idea

Expose weak points of the idea

Benefit

Using this tool, the team takes an outside perspective to expose vulnerabilities or weaknesses of the idea. A playful approach helps the team to break down barriers to consider worst case scenarios that you may not think about otherwise to improve your idea in unexpected ways.

Description

In order to tune in to the negative reflection of our idea, we destroy it by filling out template 1. For that we take a look at possible opponents of our idea as well as the negative aspects that come along with it. In a second step we focus on a worst case scenario by filling out template 2. It helps to focus on what can happen if everything goes wrong. By filling out template 3 we already have the worst case scenario in our mind and we can concentrate in the positive aspects and wishes regarding our idea. The best case scenario is a perfect starting point for proceeding to a concrete imagination of our idea or the situation around.

Tip

Attacking your own idea can be a lot of fun and should not be taken too seriously. We do not want any trouble on the team!

**> Empty Template**

**> Create Methods**

Difficulty level:

★★★☆☆

Material:
Templates
Marker
Sticky Notes

Kill your Idea 1: Idea Destruction

Who are potential opponents?

- SOCIAL MEDIA (E.G. FACE-BOOK)
- MEDIA (E.G. VIDEO STREAMING PLATFORMS)
- PRIVACY REGULATIONS (PLATFORM)
- CONSERVATIVE UNIVERSITY
- OTHER SIMILAR ACTIVITIES
- POLICE

Then our idea is worth nothing, because...

- BETTER COMPETITORS
- LOW STUDENT MOTIVATION
- UNIVERSITY NOT ON OUR SIDE
- SHITTY CODING
- EMPTY NETWORK
- ALLROUNDER / SWISS ARMY KNIFE (TOO MANY FEATURES

Our Idea falls apart when our opponent manages to...

- BETTER QUALITY + QUANTITY
- BETTER LEVEL OF GAMIFICATION
- DISCREDIT OUR PLATFORM
- BETTER NETWORKING IN DIVERSE LANDSCAPE OF FURTHER EDUCATION
- KNOWLEDGE IN PRIVACY REGULATIONS (BETTER LAWYERS)

What is our strategy, when this scenario occurs?

- LOCAL STAKEHOLDER / MARKET
- CONCENTRATION ON CORE FEATURES
- SPEND MONEY FOR LEGAL ADVICE
- CO-INNOVATION WITH UNIVERSITY
- MARKETING / NETWORKING STRATEGY

> **Empty Template**

> **Create Methods**

Kill your Idea 2: Worst Case Scenario

What must happen so that:
> The users complain

What must happen so that:
> Our idea fails

What must happen so that:
> No one wants to use our idea anymore

> Empty Template

> Create Methods

BAD MOBILE PERFORMANCE, TECHNICAL DIFFICULTIES

TOO LITTLE CONTENT, ADVERTISE- MENTS, CONFUSING STRUCTURES

NOT ENOUGH USERS

NOT ENOUGH COURSES

SUGGESTION ALGORITHM IS WORKING INSUFFICIENTLY

CANNOT MEET EXPECTATIONS OF INDUSTRY PARTNERS (IN- TERNSHIPS, COURSES...) > NO MONEY > NO STAFF

UNIVERSITY WITHDRAWS IT'S SUPPORT

CYBER MOBBING ON PLATFORM LEADS TO SCANDALS

BAD REVIEWS FROM INFLUENCERS

UNIVERSITY PIRATES THE IDEA AND OFFERS THE SERVICES BY ITSELF

NO INTERESTS IN FURTHER EDUCATION (SHIFT OF SOCIETY)

SUPER HUMAN ARTIFICIAL INTELLIGENCE DESTROYS THE PLANET

Kill your Idea 3: Best Case Scenario

What must happen so that:
> The users are satisfied

FINDING HIDDEN OFFERS FOR SPECIFIC INTERNSHIPS

ENRICHMENT OF SOCIAL LIFE

INCREASING SOCIETAL STATUS

EASY USAGE, INCLUDABLE IN DAILY ROUTINE

What must happen so that:
> Our idea becomes a full success

WHEN EVERYBODY IS USING IT

WHEN ATTRACTIVE PARTNERS ARE COOPERATING

WHEN UNIVERSITY SUPPORTS PLATFORM WITH MARKETING TOOLS

INFLUENCERS INSPIRE USERS ON OTHER PLATFORMS

What must happen so that:
> everyone wants to use our idea

SUCCESS STORIES IN (SOCIAL) MEDIA

WHEN ALUMNI ARE PROMOTING THE PLATFORM

GOOD RANKING RESULTS FOR CAMPUS LIFE

POSITIVE FINANCIAL BALANCE

> Empty Template

> Create Methods

Interview

Test your idea with the user / Refine your idea

Benefit

The method of a semi-structured qualitative interview gives you the opportunity to get into direct contact with the individual users. You are able to immerse yourself into the thoughts and problems of this user in order to identify expectations, certain needs or values of the user group. Different to the interview method in the explore phase you may use the interview tool in the create phase to refine your ideas and adjust them to the needs of the interviewed users. Hence the first template should be updated regarding the questions.

Description

Preparation

A good interview should be structured with an introduction, a middle section and an end. Also, the interviewer should prepare questions which work as a guideline but not as a fixed path. Formulate open questions and use follow-up questions to dig deeper.

Who is to be interviewed?

The selection of a relevant interview partner is an important process as we would like to interview relevant people. Also, it is easier to get insights from interviewees who are outside the mainstream. Their extreme perspective may help to uncover hidden needs that would not be addressed by mainstream users.

Categories of needs

Needs can be categorized in an interdependent dynamic system. Somewhat consecutive needs are physiological, social, safety, and individual needs as well as the need for self-actualization. In order to ease the question process for the interviewee, ask through all the different categories of needs, like layers of an onion, to get to the core:
- Initially, changes, preference or expectations
- Then the needs, gains, benefits, and requested features
- And finally, goals, values, and motives (emotions)

> Empty Template

> Create Methods

Difficulty level:

★★★★☆

Material:
paper and pen or recording device template

Interview

Test your idea with the user / Refine your idea

What questions to ask?

There are different levels of questions to gain access to the different levels of needs:
- The **meta level** comprises the topics you would like to discuss.
- **General questions** function as an entry point into the interview.
- **Experimental questions** circle around the topic to ask about incidents, stories, or experiences which are later translated into obstacles and needs. Dig deeper if you discover contradiction.
- **Specific questions** may be used to ask about specific experiences connected to your research.
- **Wish questions** may be asked at the end of an interview. Try to gain inspiration from their wishes but do not make them produce solutions.

The role of the interviewer and documentation

A qualitative interview should be conducted with two interviewers. It is vital to assume roles in the interview. The "best friend" tries to empathize the most with the interviewee, trying to be as curious as possible. The "inspector" behaves as neutral as possible during the interview, taking notes and observing body language. This distance helps to evaluate the statements more critically later on. After the interview, the interviewers should exchange thoughts and note down the most important aspects.

Tips

- Before beginning the actual interview, you should build up trust and start with getting to know each other.
- The interview as a starting point helps to identify insights you know you don't know. During the interview, you may even discover aspects you didn't know you didn't know. This in part also depends on how well the interview is conducted and how well the interview partner is selected.
- Prepare to divert from your original plan and follow the user's viewpoint.
- Don't be afraid of silence during the interview. This may just be a pause for the interviewee to think about a fitting response.
- Do not document the interview yourself but bring another person or use a device to record the interview. Remember to ask for permission if you choose to record anything.

> Empty Template

> Create Methods

Difficulty level:

★★★★☆

Material:
paper and pen or recording device template

Interview

Gerneral Questions
What does ... mean for you?
What do you associate with ...?

Experimental Questions
Everyday, positive, negative and
surprising experiences

Meta Level
Here is room for the meta-level
of the topic

Specific Questions
When did you ... the last time?

Wish Questions
What do you wish regarding...?

> **Empty Template**

> **Create Methods**

Interview

User: _____	
What caught your eye at once?	
Key sentence?	
Peculiarity?	
Was honest about…?	

> **Empty Template**

> **Explore Methods**

Matrix Scale

Rank your ideas.

Benefit

Matrix Scale can be applied when you have a certain numbers of solutions that need to be ranked according to certain criteria. This methods helps you to make a selection.

Description

To rank ideas, apply three different criteria: user value (How big is the impact for the user group?), scalability (To how many (different) user groups can this solution be useful?), and feasibility (How quick and easy can you realize this solution?). We use our intuition to rank the ideas. The first ranked idea will have the highest points for low feasibility (hammer and nail) and best user value (shark attack). The second will have the most points on average. The third will have the best user value and the highest scalability (climate change).
Possible other dimensions in a matrix are:

- Competency: refers to how the idea/ product will compete in a market
- Cost: refers to the cost required to adopt the new idea
- Viability: determines if the idea is applicable in real life
- Desirability: refers to how the consumer will accept and interact with the idea

- Alignment: refers to how the idea aligns with the concept of the organization

To rate the criteria, sort them according to importance and assign numbers - the lowest number represents the least important the highest number the most important criteria. The criteria rating of each idea is then multiplied with the respective criteria score. The results are then added to give the overall score of the idea.

Tips

- If you feel like you should include other criteria or split up criteria do not hesitate to do so.
- The three top ranked ideas are prototyped in the following steps.
- If there is still time in the process, you can test ideas that did not make the final list.

> **Empty Template**

> **Create Methods**

Difficulty level:

★★☆☆☆

Material:
Sticky Notes
Marker
Template

Matrix Scale
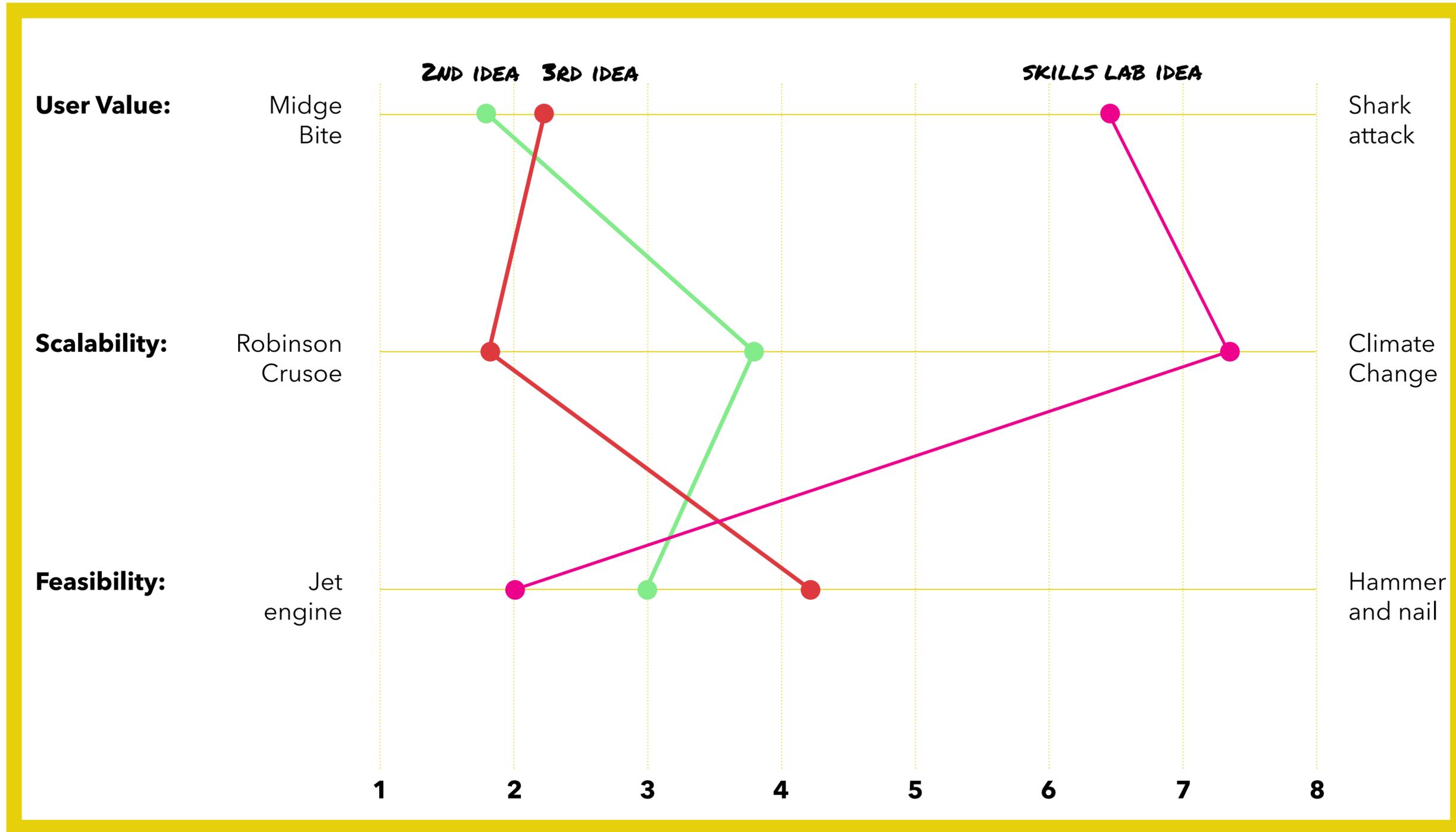
Send a Postcard

Explain the issue with simple words

Benefit

This method is used to identify the essentials of the idea. Additionally, you can consider a view from outside of your team.

Description

Writing postcards is something that almost everyone on the team has probably done. Briefly describe the relevant content of the previous steps in the process using simple language without too much complication so that anyone can understand the complex process, the goal of the challenge and what you have done so far. The essential points should be summarized as bullet points and/or communicated in just a few lines. Firstly, everyone in the team may start with a postcard of his/her own. Secondly, the team may synthesize one postcard out of the different produced postcards.

Tips

• A postcard emphasizes that the message should be short and clear.
• Do not use specific terminology but explain the plan in accessible terms.
• Do not include too many details.

> **Empty Template**

> **Create Methods**

Difficulty level:

★★★☆☆

Material:
Post cards
Pencil

Send a Postcard

Hello,

I am part of a group of teachers who are thinking about how to improve the students' practical skills. We realized that studying theoretical knowledge at universities is not sufficient but we need to enable students to train their practical real life knowledge. So we thought about a platform for the university where students can exchange knowledge e.g. about internships, get mentoring or be trained in soft skills like digital tools, creativity, social skills, working in groups or with people from different backgrounds as well as leadership competency.

Yours, ...
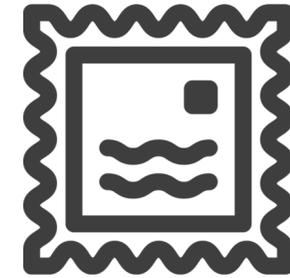
> **Empty Template**

> **Create Methods**

Prototyping

What is a prototype?

What does a prototype look like?

Papercraft

Lego

Storyboard

Video

Wireframing

What is a prototype?
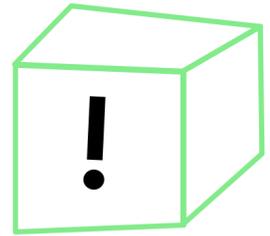
a model of an idea
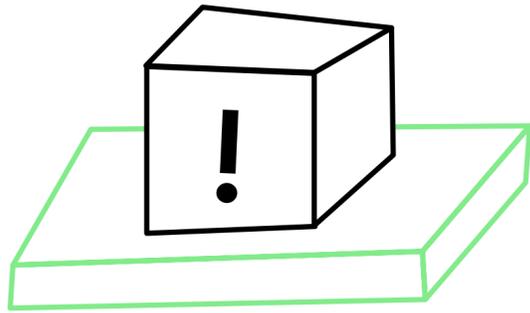
the basis of further iteration
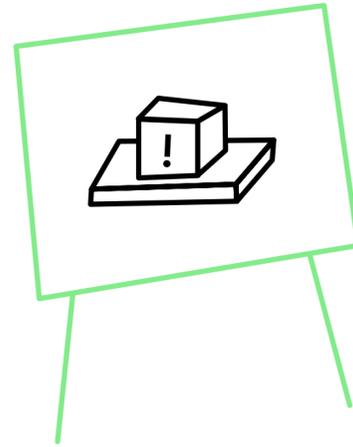
a visual presentation of an idea that can be tested on real users in an early phase
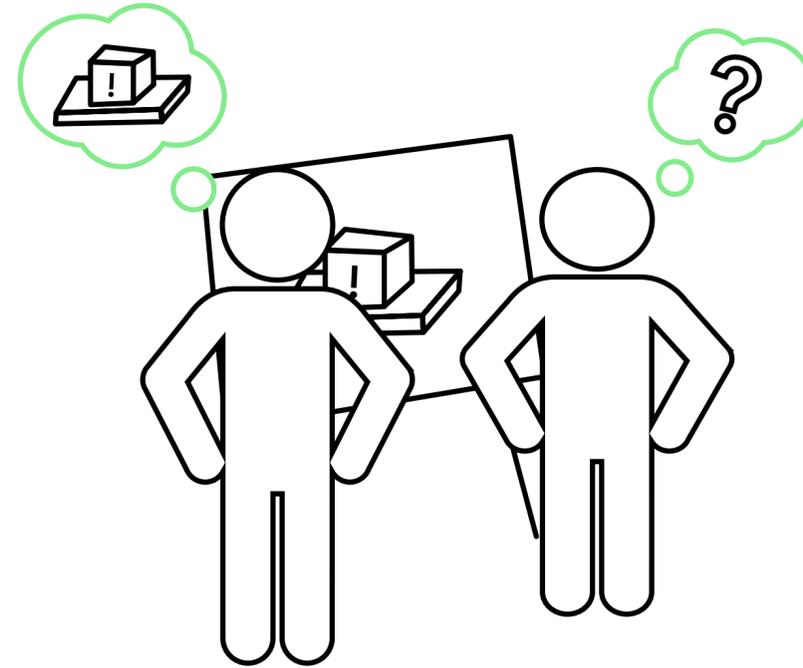
self-explanatory

fail early and fail cheap

What does a prototype look like?
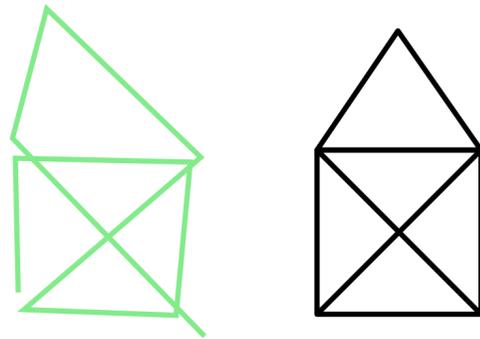
It already posesses the basic features of the final idea.
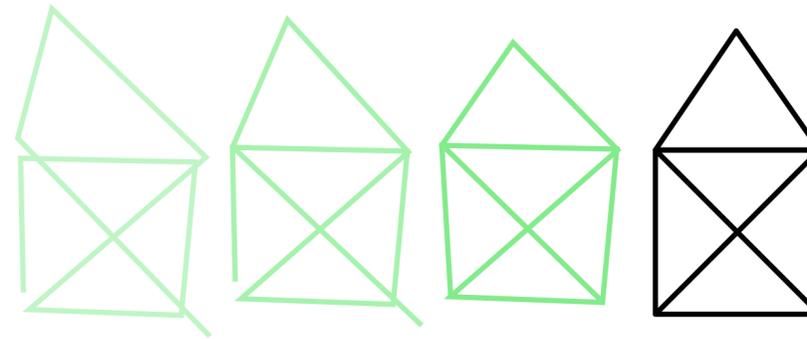
It roughly shows characteristics of the idea and becomes more and more detailed over time.

Prototype: Papercraft

Easiest way to create a prototype

Benefit

You may use this quick and cheap solution to make a first model.

Description

The idea is presented as a 2D or 3D model. A 2D model is usually represented as phases. A 3D model is mostly used as a scene to represent processes. It can be helpful to start with idea sketches of your papercraft.
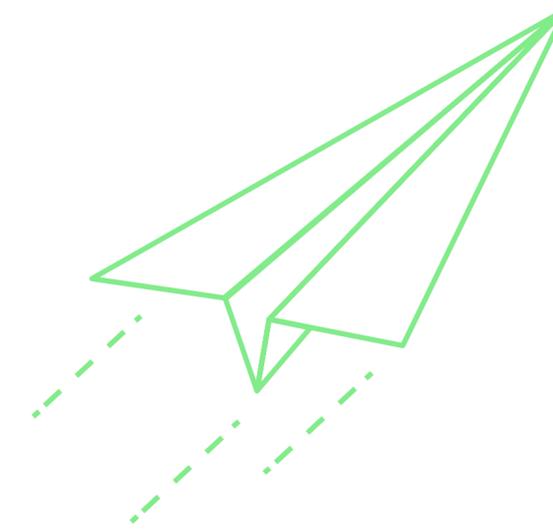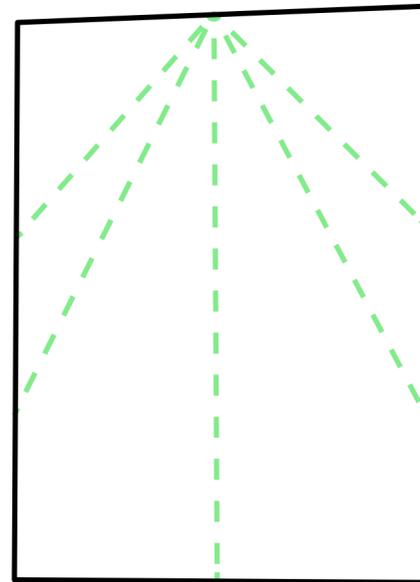
> Prototype Methods

Difficulty level:

★★☆☆☆

Material:
paper
cardboard
styrofoam
cold foam

Prototype: Papercraft

> Prototype Methods

Prototype: LEGO

Build a prototype of a system quickly

Benefit

You can use Lego to quickly construct and again reconstruct a prototype. It works well with a model or a process and is very tangible.

Description

The Lego prototyping offers the possibility to quickly and play-fully build prototypes or go through processes. Active modeling makes processes comprehensible. It also encourages creativity and innovation by "playing" with hands, improving communication through the Lego scenarios, incorporating the knowledge and experience of all team members and promoting a common understanding of the issues.
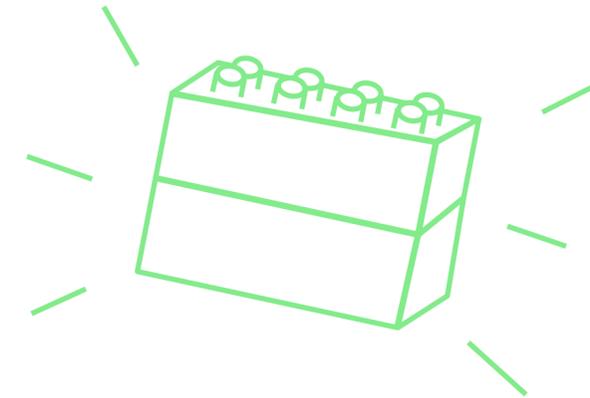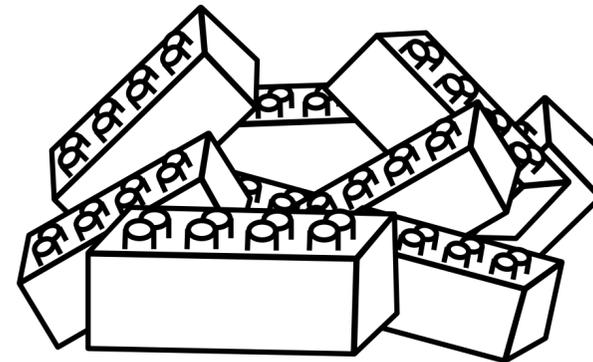
> Prototype Methods

Difficulty level:

★★★☆☆

Material:
Lego-bricks
Lego-plates
Lego-characters

Prototype: LEGO

> Prototype Methods

Prototype: Storyboard

Design the user experience with image and text in a story

Benefit

Use this to create descriptions and find loopholes and logical errors in your solution. You may use the storyboard as a script and voting material for a video production.

Description

A storyboard is a sequential description of scenes in text and image on different levels of detail and style. From rough sketches to scene photos, anything is possible. Comic balloons, full scene descriptions or production instructions can also be added.

> **Prototype Methods**

**Difficulty level:**

★★★☆☆
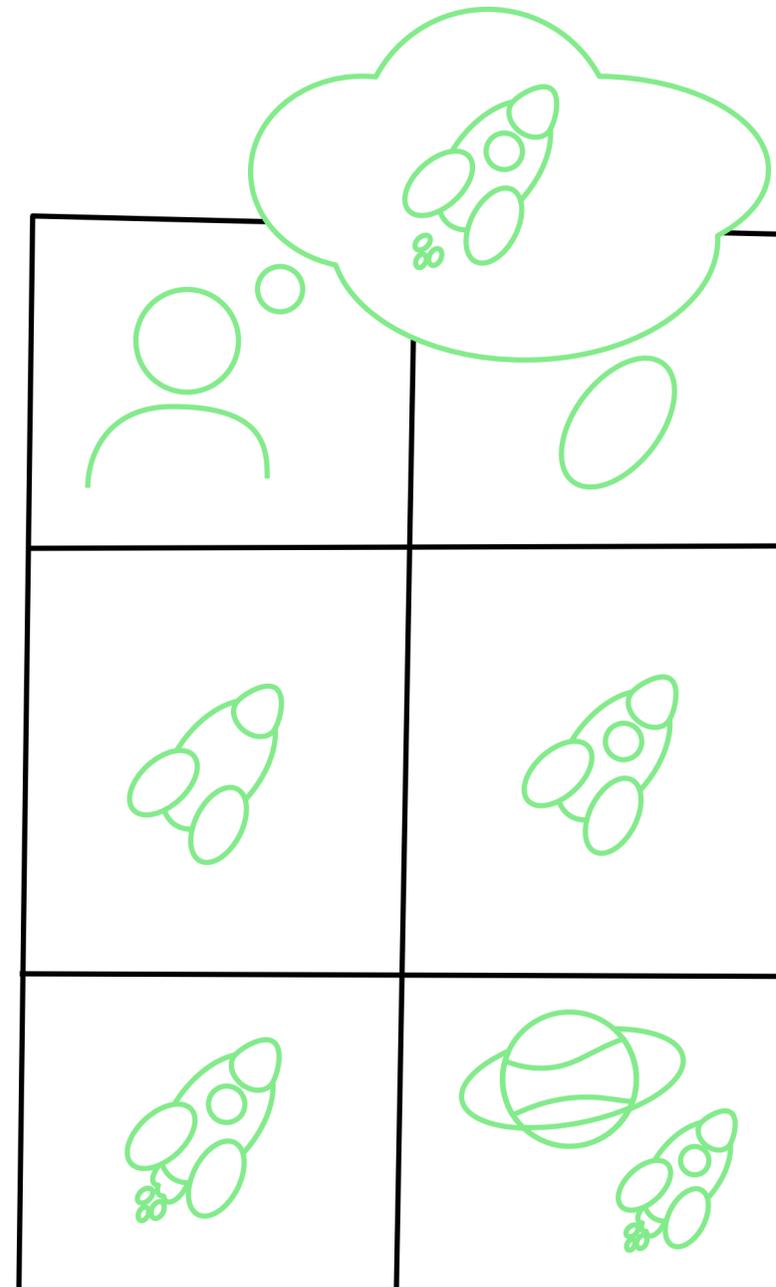
Material:
pen
pencil
marker
paper
cardboard

Prototype: Storyboard
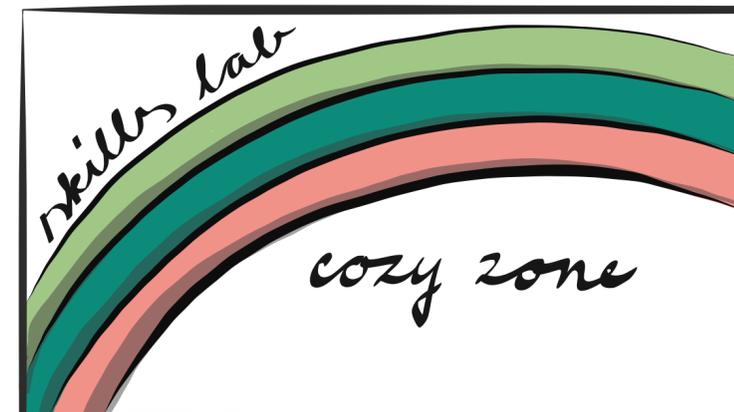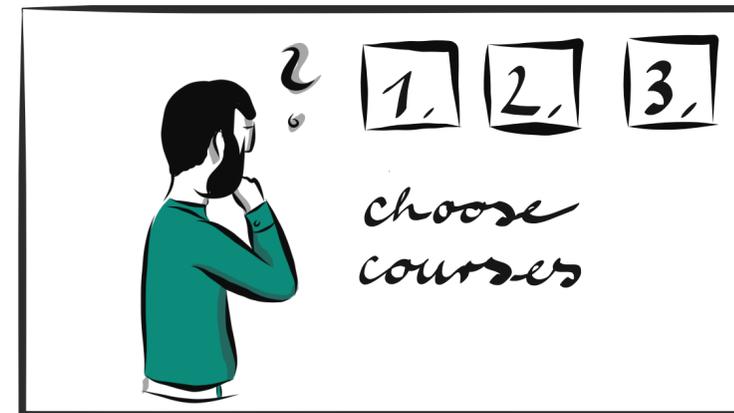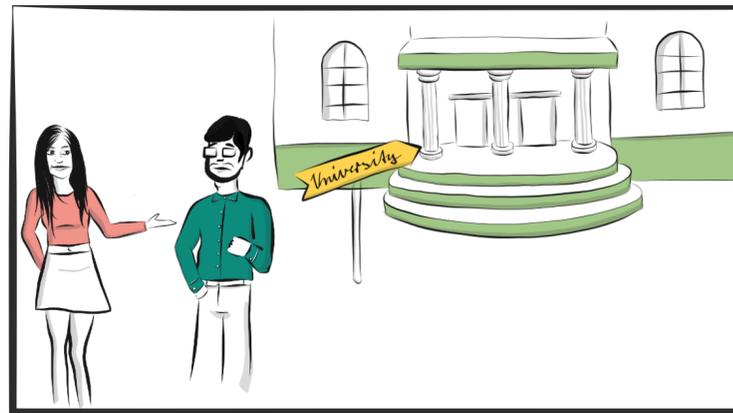
> Prototype Methods

Prototype: Video

Build a video to present your solution easily

Benefit

Use this to present an idea across different scenes with sound to tell the story.

Description

A video is an optimal prototyping tool for early project phases. You can show scenes with several locations and different users. The sound or voice additionally transports information about the idea. A video can be distributed quickly and generates fast feedback.
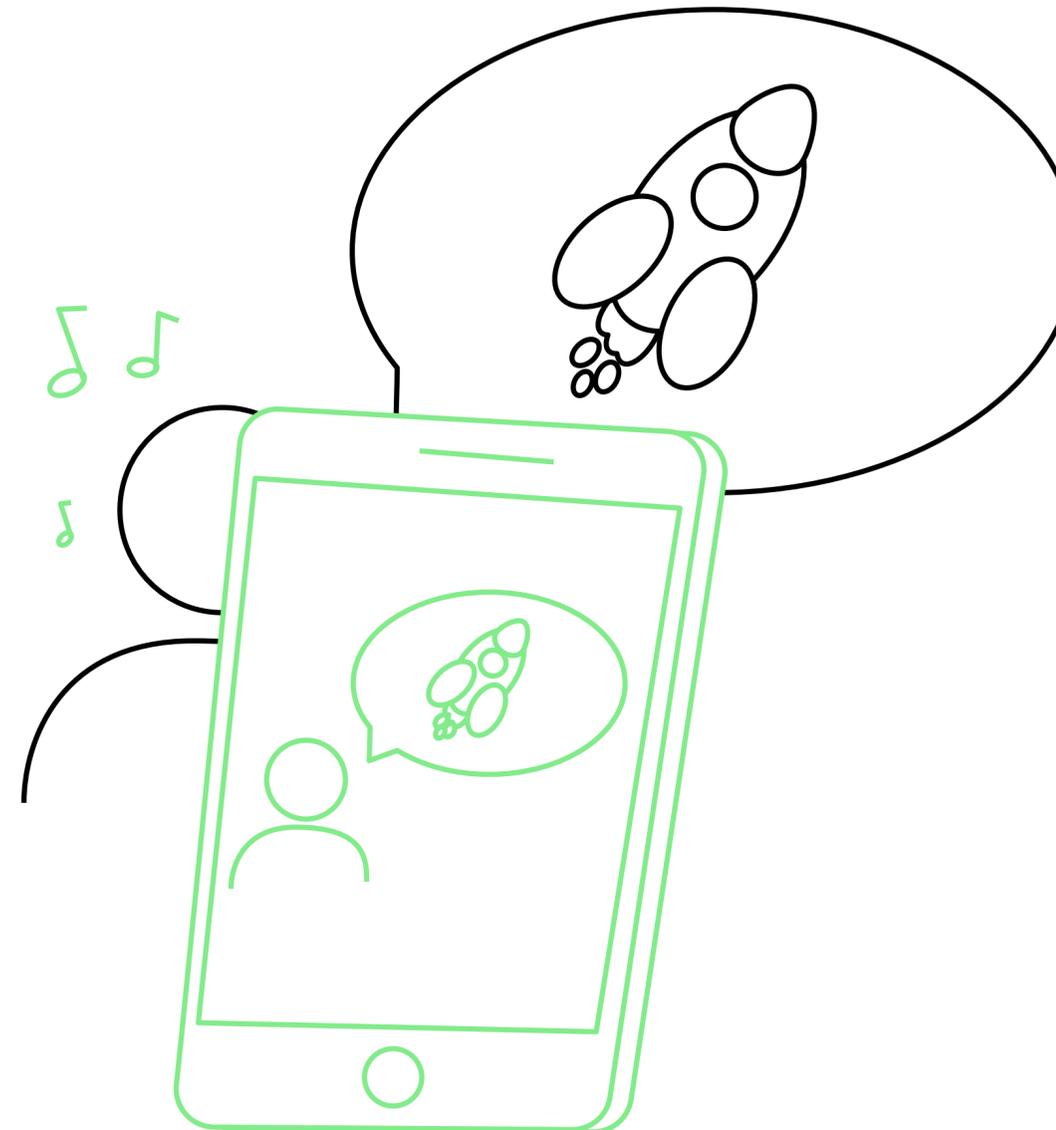
> Prototype Methods

Difficulty level:
★★★★☆

Material:
smartphone
computer or tablet
audio dubbing or
animation software

Prototype: Video

> Prototype Methods

Prototype: Wireframing

Design the information flow digitally

Benefit

Use this to make the first interactive presentation of an app or website.

Description

Wireframing is a state-of-the-art method in the IT development process. All content components and interaction elements of an app are roughly represented. Wireframing is available from first sketches to fully designed prototypes that are used as a guideline for development and usability testing.

Tips

• Choose the prototyping method according to available time budget and your technological and technical skills
• Starting with a simple wireframe you may add more features to build a mockup
• Be careful to respect video, music, and image rights.
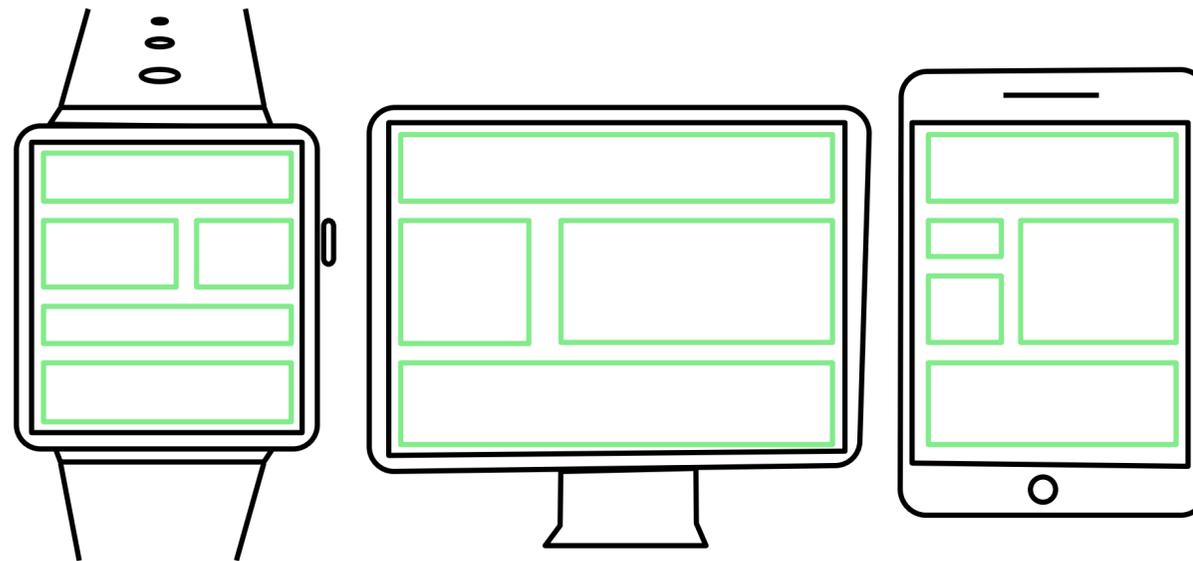
> **Prototype Methods**

Difficulty level:
★★★★★

Material:
pen
pencil
marker
paper
cardboard
wireframing software

Prototype: Wireframing
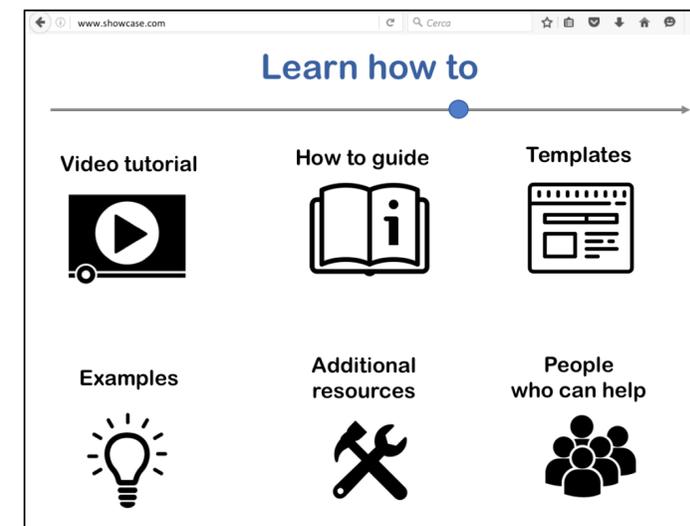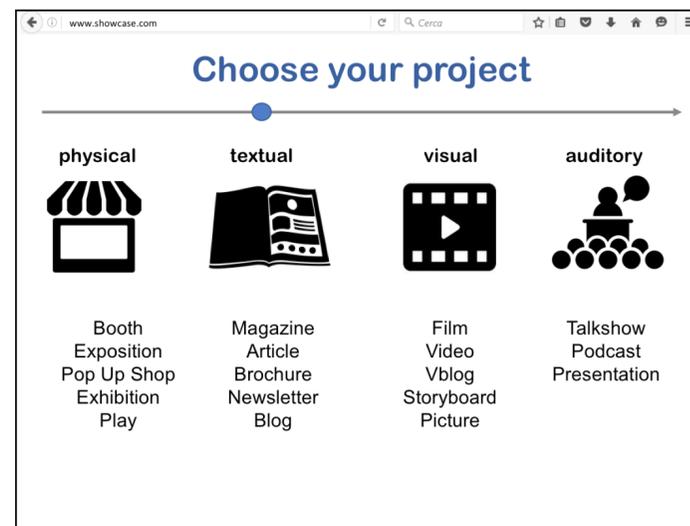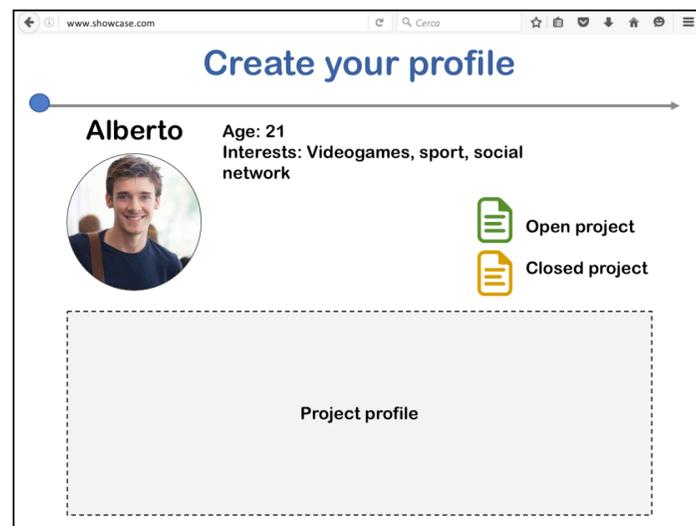
Evaluate

Test Grid Planning
Test the prototype and assess the results

Interview
Test your prototype

Brain Storming
Collect as many ideas and associations as possible

How might we... to solve...
Reframe/specify the challenge

Test Grid Planning

Test the prototype and assess the results

Benefit

Depending on which aspects the team wants to focus on in the evaluation, a modified test grid framework can be created. The Test Grid is filled out while the team is observing the users. Initiate the next iteration step based on the observations and resulting conclusions.

Description

The typical course to test our ideas and prototypes consists of preparation, execution in a field test and evaluation. As a first step we have to find test users that are willing to try out the idea in their natural environment. This means for the team it has to venture out into unknown territory. While the users test the prototype the team can observe them. Afterwards or meanwhile the users can be questioned about their experiences. In the template you can fill out in the top fields what they liked and what they criticized. The bottom fields in the template are reserved for new ideas that come along while observing the interaction of the users with the prototype as well as new problems that have not been noticed before. In a last step the team has to evaluate the individual fields and as a result modify the idea and prototype.

Tip

• Ideas can be tested best in an authentic environment where the subjects are as little aware as possible that they are being watched, but its also possible to test them in an artificial "lab" situation.

> **Empty Template**

> **Evaluate Methods**

Difficulty level:

★★☆☆☆

Material:
Template
Marker
Sticky Notes
The prototype

Test Grid Planning

What was good?

MANY POSSIBILITIES

BIG DATABASE

SEARCH FUNCTION

What was bad?

NOT WELL STRUCTURED

WAS HARD TO GET IN CONTACT WITH STUDENTS VIA APP

APP TOO SLOW

> **Empty Template**

> **Evaluate Methods**

New ideas?

CHAT FUNCTION

CHAT BOT TO IMPROVE SEARCH FUNCTION

New problems?

LINKS TO EXTERNAL SITES WERE NOT UPDATED

PERFORMANCE STRUGGLES
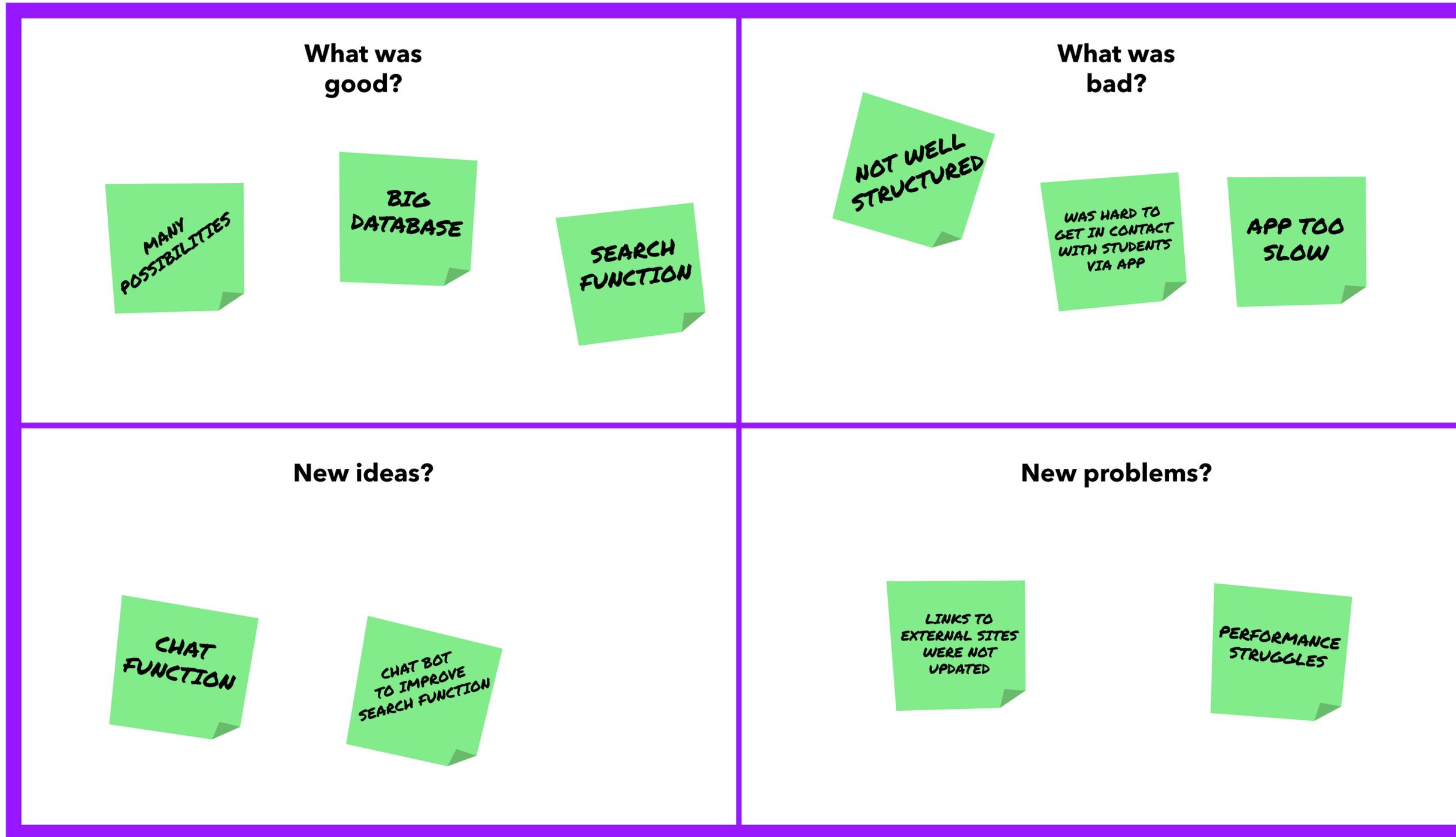
Interview

Test your prototype

Benefit

The method of a semi-structured qualitative interview gives you the opportunity to get into direct contact with the individual uses. You are able to immerse yourself into the thoughts and problems of this user in order to identify expectations, certain needs or values of the user group. The interview method in the evaluation phase is used to gain insight from the users regarding the benefits of the prototype. Please adjust the questions in the first template to the situation accordingly.

Description

Preparation

A good interview should be structured with an introduction, a middle section and an end. Also, the interviewer should prepare questions which work as a guideline but not as a fixed path. Formulate open questions and use follow-up questions to dig deeper.

Who is to be interviewed?

The selection of a relevant interview partner is an important process as we would like to interview relevant people. Also, it is easier to get insights from interviewees who are outside the mainstream. Their extreme perspective may help to uncover hidden needs that would not be addressed by mainstream users.

Categories of needs

Needs can be categorized in an interdependent dynamic system. Somewhat consecutive needs are physiological, social, safety, and individual needs as well as the need for self-actualization. In order to ease the question process for the interviewee, ask through all the different categories of needs, like layers of an onion, to get to the core:
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• Then the needs, gains, benefits, and requested features
• And finally, goals, values, and motives (emotions)

> **Empty Template**

> **Evaluate Methods**

Difficulty level:

★★★★☆

Material:
paper and pen or recording device template

Interview

Test your prototype

What questions to ask?

There are different levels of questions to gain access to the different levels of needs:
- The **meta level** comprises the topics you would like to discuss.
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A qualitative interview should be conducted with two interviewers. It is vital to assume roles in the interview. The "best friend" tries to empathize the most with the interviewee, trying to be as curious as possible. The "inspector" behaves as neutral as possible during the interview, taking notes and observing body language. This distance helps to evaluate the statements more critically later on. After the interview, the interviewers should exchange thoughts and note down the most important aspects.

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- The interview as a starting point helps to identify insights you know you don't know. During the interview, you may even discover aspects you didn't know you didn't know. This in part also depends on how well the interview is conducted and how well the interview partner is selected.
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> Empty Template

> Evaluate Methods

Difficulty level:

★★★★☆

Material:
paper and pen or recording device template

Interview

Gerneral Questions
What does ... mean for you?
What do you associate with ...?

Experimental Questions
Everyday, positive, negative and
surprising experiences

Meta Level
Here is room for the meta-level
of the topic

> Empty Template

> Evaluate Methods

Specific Questions
When did you ... the last time?

Wish Questions
What do you wish regarding...?

Interview

	User: _____
What caught your eye at once?	
Key sentence?	
Peculiarity?	
Was honest about...?	

> **Empty Template**

> **Evaluate Methods**

Brain Storming

Collect as many ideas and associations as possible

Benefit

"Brain storming" is a Design Thinking tool that activates the creative process, fosters free associations with certain rules, and helps the team to explore solutions beyond the known and unusual that otherwise would never have been found. In addition, a lot of ideas are developed in a brain storming session. These have to get out of your head to make more room for new, unconventional ideas. In the evaluation phase the brain storming is used to update ideas and prototypes according the test grid planning. Also, you may return to the create phase and reiterate several processes in order to adapt and refine your ideas and prototypes.

Description

Use the "How might we" question from the EXPLORE module to brainstorm. Write the question in big letters in the middle of your brain storming wall. On a single sticky note, write or draw each idea that your team produces in an established time period and arrange these ideas around the "How might we" question.
There are some rules that make it easier to use the brain storm tool successfully:

• No criticism is allowed. It will take too much time and potentially exciting ideas may be blocked.
• Develop as many "stupid" and "crazy" ideas as possible to extend your range of possibilities.
• Feel free to modify ideas from others.
• Visualize as many ideas as possible because sketches and stick figures are inspiring.

An independent facilitator who ensures that all the rules are followed and that every team member has a say could be helpful. After all the ideas are collected on sticky notes, cluster them by topic.

Tips

• You may use different perspectives for different brain storming rounds, such as realistic, innocent, evil, or efficient.
• All templates that had been filled out in the EXPLORE phase can be used as a basis for brain storming.
• Try brain storming standing up. Some people feel that sitting means input while standing means output.
• When a cluster gets too extensive, create subdivisions.

> **Evaluate Methods**

Difficulty level:

★★☆☆☆

Material:
Marker
Sticky Notes

Brain Storming

> Evaluate Methods

Step 1: develop as many ideas as possible

How might we question
in bold big letters
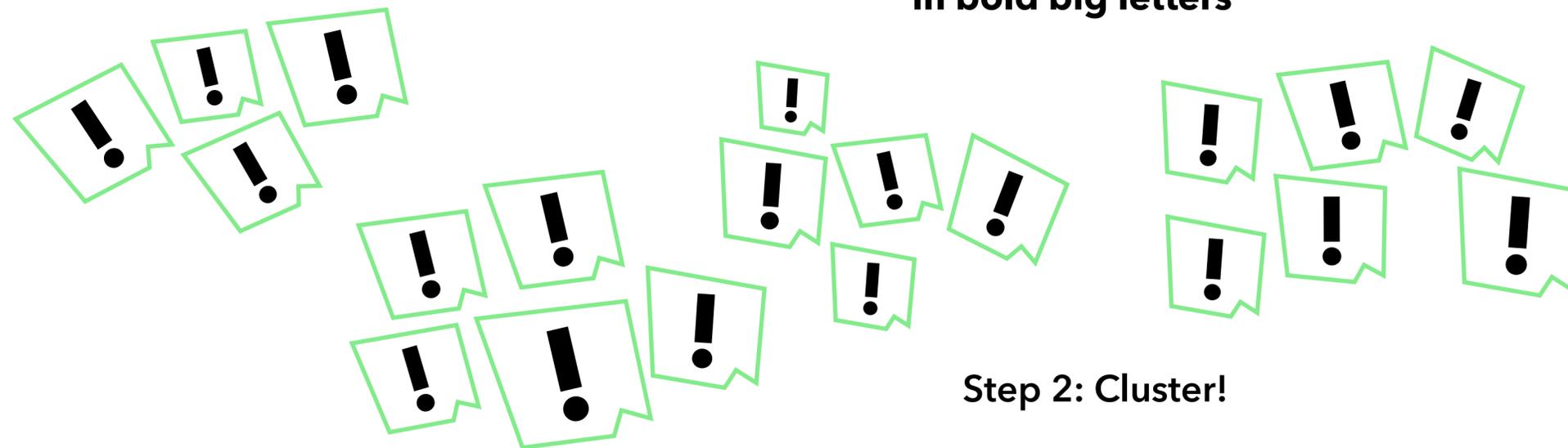
Step 2: Cluster!

How might we... to solve...

Reframe/specify the challenge

Benefit

This method connects knowledge about the user and the prototype to produce several problem hypotheses, one for each scenario (several user groups, several problems). In the evaluation phase the "how might we" method may be a starting point for a reiteration process introducing you to a new create process.

Description

In preparation for the "How might we" question, gather information about the evaluation and if needed further information about technologies, markets and/or trends. The "How might we" question describes a user unmet need that is still unsolved according to your evaluation.

Tips

• You can produce suitable and innovative solutions that lead to the next step in the Design Thinking.
• The question is difficult to respond to. The tension felt here is important and good.

> Evaluate Methods

Difficulty level:

★★☆☆☆

Material:
Large sticky notes
Marker

Empty Templates

Research Mindmap 2

"How can we find an <u>solution</u> for <u>user groups</u> without the previous <u>obstacles</u>?"

associations & categories
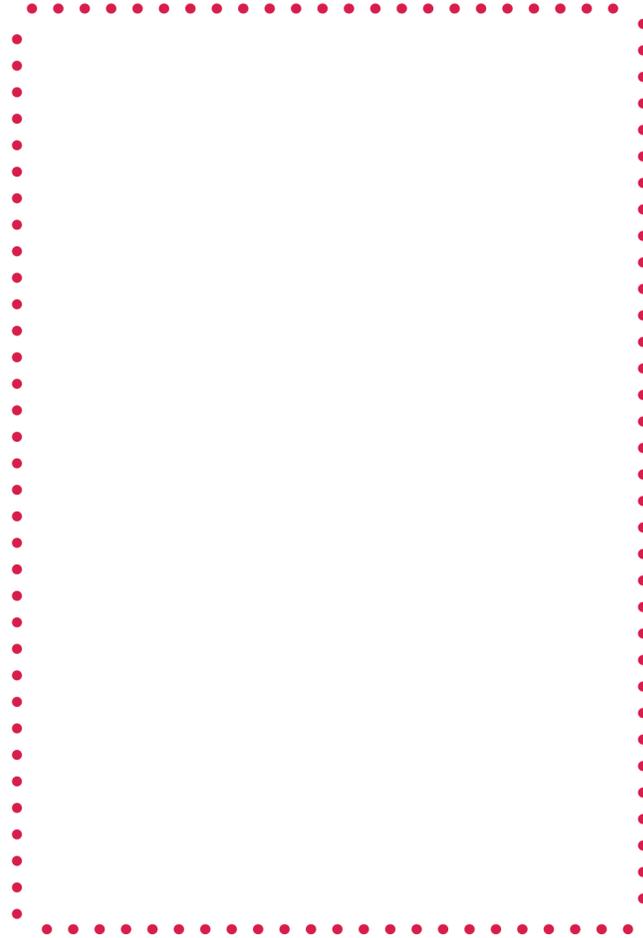
associations & categories
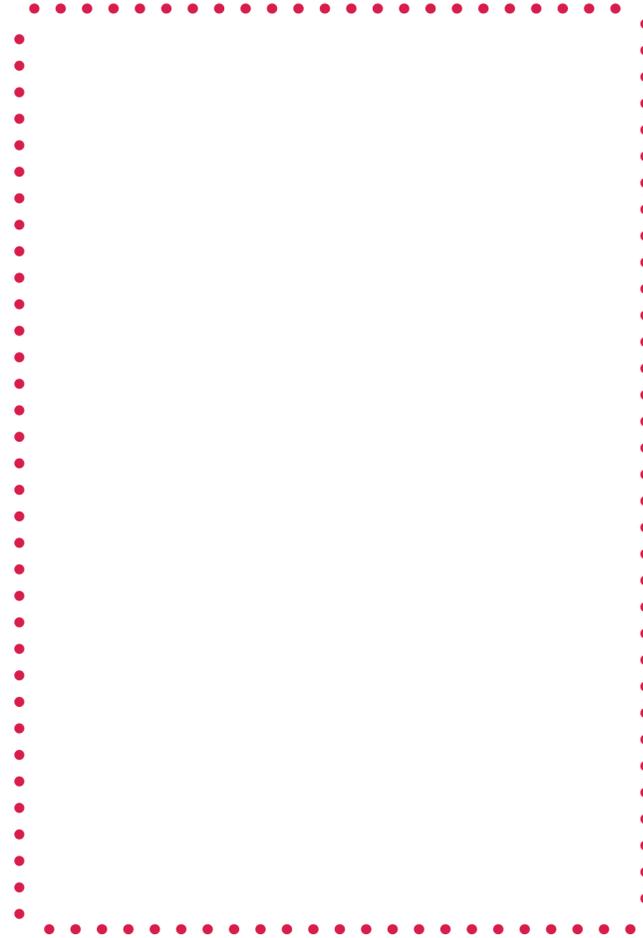
associations & categories

Research Mindmap 3

1.

2.

3.

...

1.

2.

3.

...

1.

2.

3.

...

Who? What? How? Why?

Who?

Who is acting as a user?

What?

What exactly is the user doing?

How?

How does the person do it?
How does the user proceed?

Why?

Why does the person do this?
In what ways is the user motivated?
How is the user driven?

Stakeholder Map 1

Position: _____
Title: _____
Name: _____

Basic facts:
_____
_____
_____

Personal interests:
_____
_____
_____

Role in the project:
_____
_____
_____

Biggest Motivator:
_____
_____
_____

Self-perception:
_____
_____
_____

Rules the stakeholder has to follow:
_____
_____
_____
_____
_____
_____
_____
_____

Stakeholder Map 2

Connection

Common goals:

_____
_____
_____
_____
_____
_____

Emotional connection:

_____
_____
_____
_____
_____
_____

What they do not tell each other:

_____
_____
_____
_____
_____
_____

Conflicts:

_____
_____
_____
_____
_____

Hidden animosities:

_____
_____
_____
_____
_____

Other facts:

_____
_____
_____
_____
_____

Interview

Gerneral Questions
What does ... mean for you?
What do you associate with ...?

Experimental Questions
Everyday, positive, negative and surprising experiences

Meta Level
Here is room for the meta-level of the topic

Specific Questions
When did you ... the last time?

Wish Questions
What do you wish regarding...?

Interview

User: _____	
What caught your eye at once?	
Key sentence?	
Peculiarity?	
Was honest about...?	

Persona

👤	**Name:** _____
	Age: _____
	Job: _____

Goals:

_____
_____
_____

Values:

_____
_____
_____

Motivation:

_____
_____
_____

Sees:

_____
_____
_____

Hears:

_____
_____
_____

Thinks:

_____
_____
_____

Says & Does:

_____
_____
_____

Is afraid of / Is angry about:

_____
_____
_____
_____
_____
_____

Is happy about / wishes for:

_____
_____
_____
_____
_____
_____

User Motivation Analysis 1

Needs	Obstacles

User Motivation Analysis 2

Pair	Needs	←——————→	Obstacles
1			
2			
3			
4			
5			
6			

Customer Journey

customer journey map	process		
	before	**during**	**after**
contact points			
user action			
feelings thoughts			
emotions	🙂 ☹️		
actions for improvement			

user group: _____   Situation: _____

Value Proposition Canvas

Company		User (group)	
Idea	**Gain creators**	**Gains**	**Job-to-be-done**
	Pain relievers	**Pains**	

Brain Writing

#1	#2	#3
#6	#5	#4

KYI 1: Idea Destruction

Our Idea falls apart when our opponent manages to...

Then our idea is worth nothing, because...

That opponent comes from:

What is our strategy, when this scenario occurs?
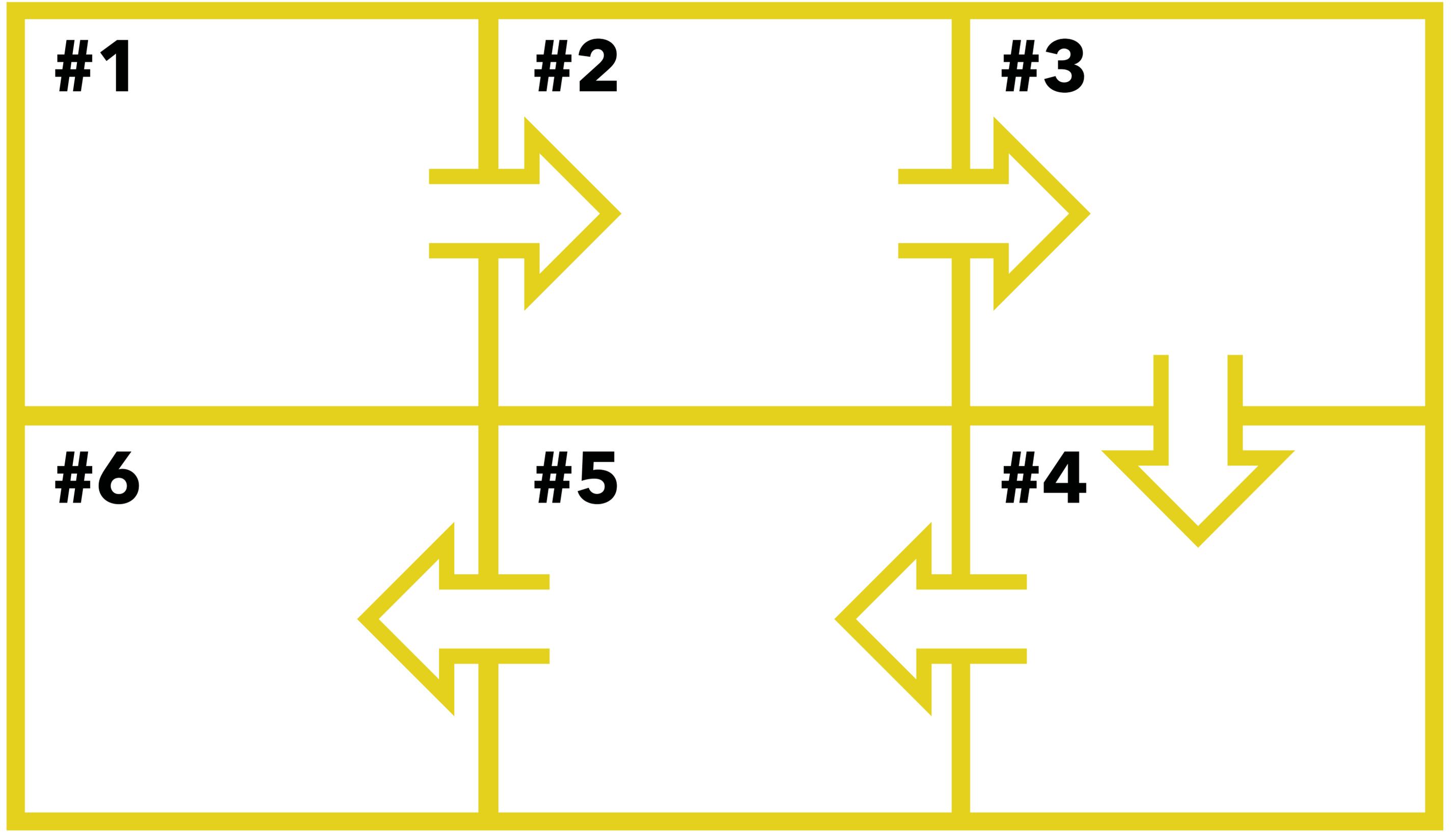
KYI 2: Worst Case Scenario

What must happen so that:
> The users complain

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____
  _____

What must happen so that:
> Our idea fails

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____
  _____

What must happen so that:
> No one wants to use our idea anymore

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____
  _____

KYI 3: Best Case Scenario

What must happen so that:
> The users are satisfied

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____

- _____
  _____
  _____

What must happen so that:
> Our idea becomes a full sucess

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____

- _____
  _____
  _____

What must happen so that:
> everyone want to use our idea

- _____
  _____
  _____

- _____
  _____
  _____

- _____
  _____

- _____
  _____
  _____

🙂

User: _____

Interview

What caught your eye at once?	
Key sentence?	
Peculiarity?	
Was honest about…?	

Matrix Scale

		1	2	3	4	5	6	7	8	
User Value:	Midge Bite									Shark attack
Scalability:	Robinson Crusoe									Climate Change
Feasibility:	Hammer and nail									Jet engine

Hello,

Send a Postcard

Test Grid Planning

What was good?	What was bad?
New ideas?	**New problems?**

Interview

Gerneral Questions
What does ... mean for you?
What do you associate with ...?

Experimental Questions
Everyday, positive, negative and surprising experiences

**Meta Level**
Here is room for the meta-level of the topic

Specific Questions
When did you ... the last time?

**Wish Questions**
What do you wish regarding...?

Interview

User:	
What caught your eye at once?	
Key sentence?	
Peculiarity?	
Was honest about...?	

Agenda Examples

1-day DT.Shop
at IPG Guarda, Portugal

Introduction
Clarifying the challenge with storytelling

Personas
User Motivation Analysis
How might we?

Brainwriting
Send a postcard

Prototype creation

Peer review
Test grid planning

Reflection
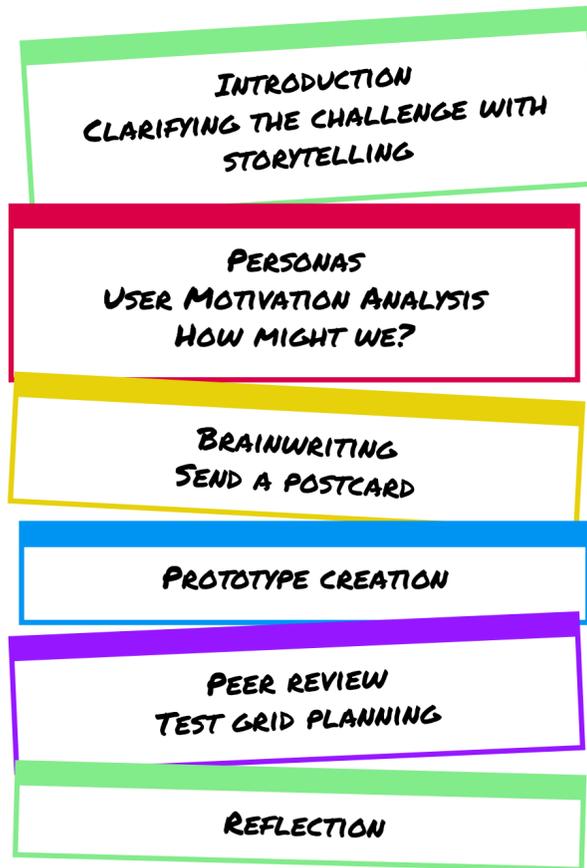
Source: DT.Shop on 11./12.10.2018
at Instituto Politécnico da Guarda, Portugal

1-day DT.Shop
at BCU, UK

Introduction

Personas given as input
Customer Journey

Brainstorming
Brainwriting
Group presentation

Prototype creation

Peer review / Testing

Dynamic Refinement

Group presentation

Reflection
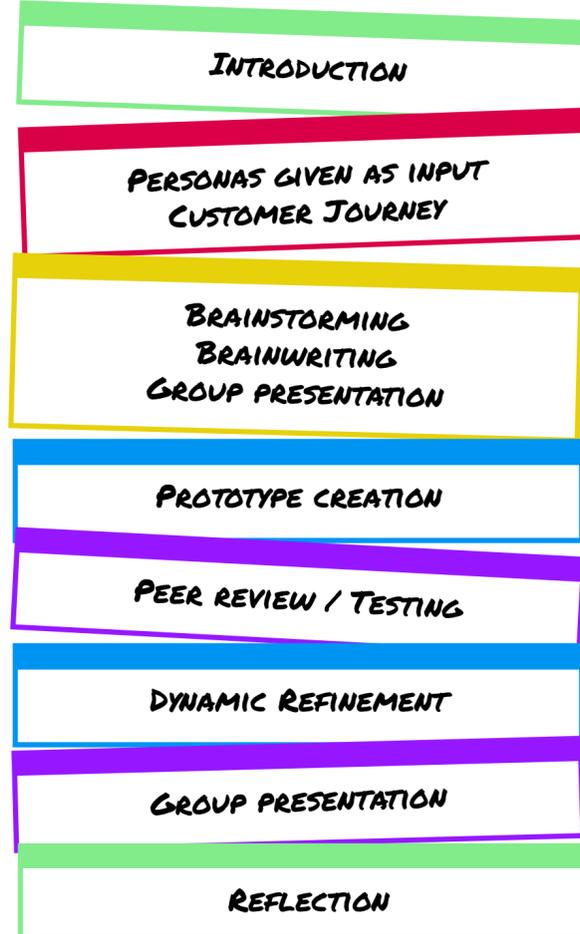
Source: DT.Shop on 17.11.2018
at Birmingham City University, UK

1-day DT.Shop
at UMCS Lublin, Poland

Introduction

Who? What? How? Why?
Personas

Brainstorming
Brainwriting
Send a postcard
Group presentation

Prototype creation

Group presentation

Reflection
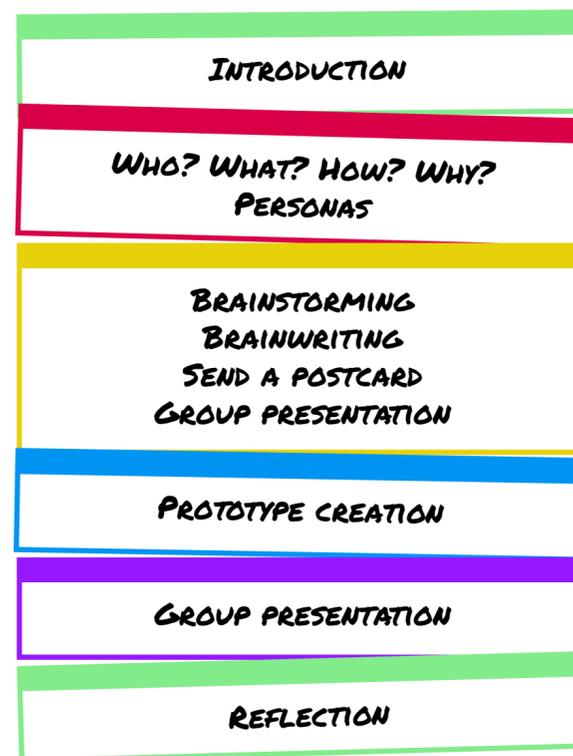
Source: DT.Shop on 14./15.11.2018
at UMCS Lublin, Poland

1-day DT.Shop
at UEBA Bratislava, Slovakia

Introduction

Who? What? How? Why?
Personas

Brainstorming
Brainwriting
Matrix Scale
Group presentation

**Prototype creation**

Group presentation

Reflection
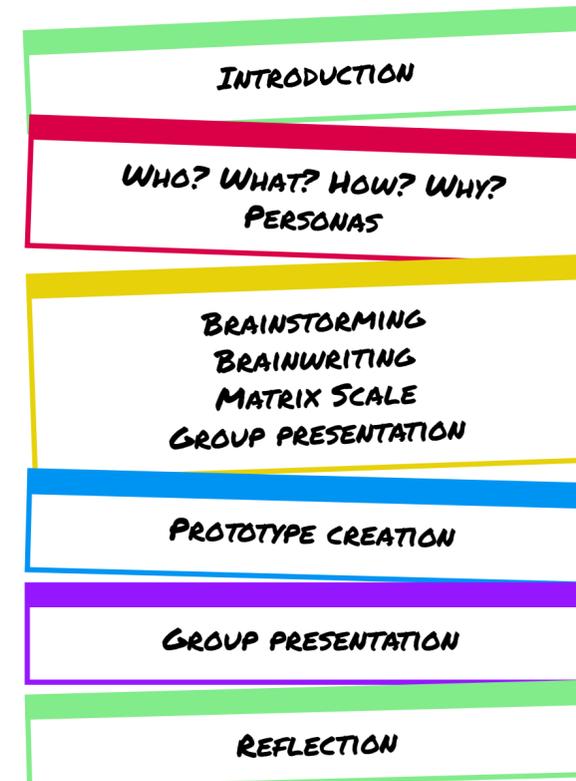
Source: DT.Shop on 12.10.2018
at UEBA Bratislava, Slovakia

Agenda Examples

1.5-day DT.Shop
at TU Dresden, Germany

- Introduction
- Interview / User Motivation Analysis / Personas / How might we? — 1 day
- Brainstorming / Brainwriting / Send a postcard
- Prototype creation
- Reflection — 1/2 day
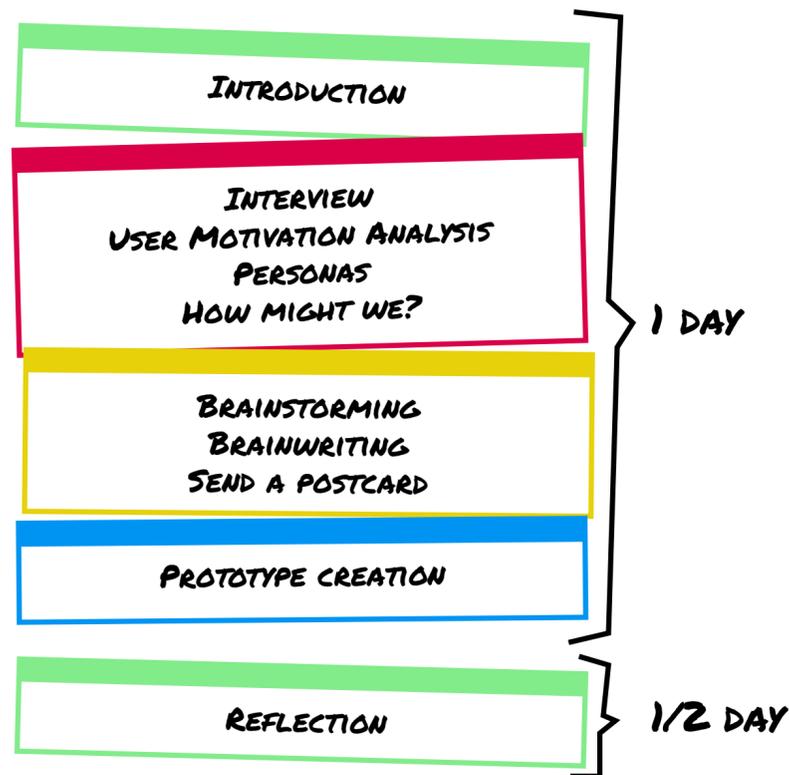
Source: DT.Shop on 25./26.06.2019
at Technische Universität Dresden, Germany

2.5-day DT.Shop
at TU Dresden, Germany

- Introduction
- Research Mindmap (as homework preparation) / Stakeholder Map / Interview / User motivation analysis / how might we? / group presentation — 1 day
- Brainstorming / brainwriting / kill your idea / send a postcard / Prototype / group presentation — 1 day
- Test grid planning / interview / group presentation — 1/2 day
- Reflection
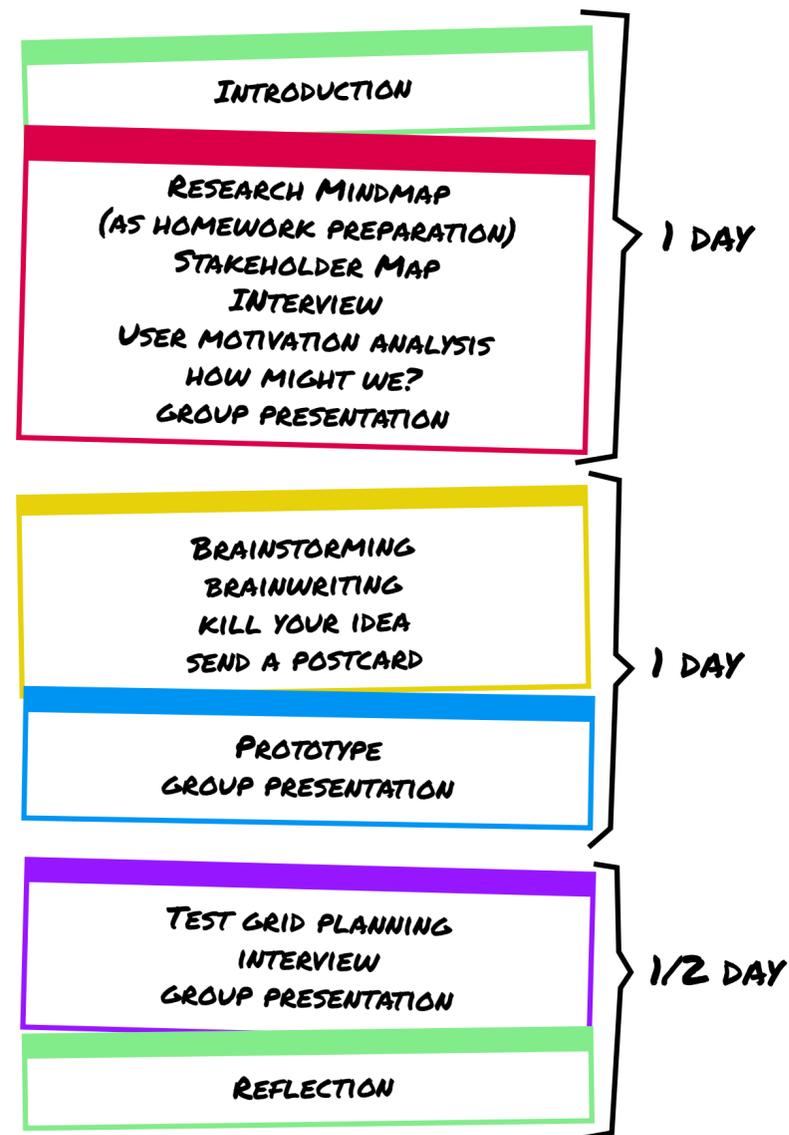
Source: Global Service Jam Dresden 2018

4-days DT.Shop
at TU Dresden, Germany

- Introduction — 1/2 day
- Who? What? How? Why? / Interview / Personas / How might we...? — 1 day
- Brainstorming / Brainwriting / Matrix Scale / Send a postcard / Group presentation — 1 day
- Prototype creation — 1 day
- Testing / Group presentation — 1/2 day
- Reflection
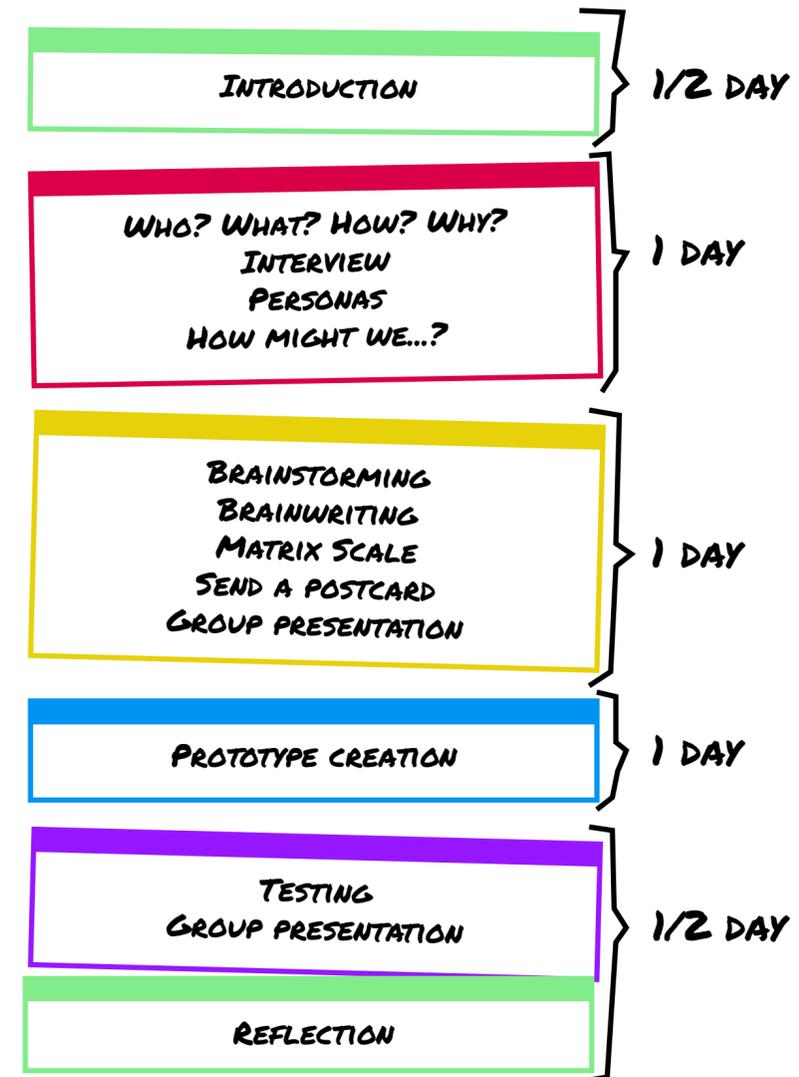
Source: DT.Shop on 09.-13.04.2018
at Technische Universität Dresden, Germany

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Credits

Authors in alphabetical order

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Studied Physics and Mechatronics at TU Dresden. Did research in biophysical fundamentals at MPI-CBG and electrohydraulic fragmentation at ImpulsTec. Started to initiate interdiscipliary research projects at the ZSE - Center for Synergy Enhancement in 2014. Coordinates ZSE and the DT.Uni. project since 2016.

Robert Fischer

Studied Latin American History, English Language and Literature, Sociology and Political Science at University of Erfurt and Universidad Nacional Autónoma de México (UNAM). Started to work in interdisciplinary research groups during his PhD thesis on a history of local networks and processes of interaction and knowledge transfer at the U.S.-Mexican border twin cities of El Paso/ Ciudad Juárez in the first half of the 20th century. At ZSE initiated projects with a focus on interdisciplinary research, change management and research on interdisciplinary collaboration.

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Applying Design Thinking

A Workbook for Academics and Researchers in Higher Education

Christian Bruchatz, Robert Fischer, Janine Stelzer