Spin-Off Competence Lab

Design Thinking
Kiel University / Christian-Albrechts-Universität zu Kiel
Katharina Knapp
Entrepreneurship Lecturer
kknapp@bwl.uni-kiel.de
Speaker

1. Katharina Knapp & Leve Freiwald
2. kknapp@bwl.uni-kiel.de & freiwald@zfe.uni-kiel.de
3. Entrepreneurship Lecturer & Startup Advisor
Design Thinking & Innovation

- Economic viability
- Human desirability
- Technical feasibility
Magnetic resonance imaging (MRI) in children must often be repeated or children must be sedated for treatment as they do not lie still during procedure.

**Later diagnoses → later treatment**

**Emotional stress for families**

**Higher costs for health insurances**

**Scenario:**
Health insurers or doctors ask manufacturers for faster and quieter devices

Manufacturers start Research & Development project
Doug Dietz - Industrial designer at GE Healthcare for 20 years

„The room itself is kind of dark and has those flickering fluorescent lights. That machine that I had designed basically looked like a brick with a hole in it.”

- Small team of volunteers
- Observations in kindergardens
- Discussions with pedagogues, pediatricians, hospital staff, employees of a children’s museum

How might we create a scanner experience that children would love?

HASSO PLATTNER Institute of Design at Stanford
GE “Adventure Series”

Product [website](#) & [brochure](#)
Design Thinking looks for innovations that people want.

Technical feasibility and economic viability are important but not the starting point.
Design Thinking basics

PEOPLE

MULTI-DISCIPLINARY TEAMS

PROCESS

ITERATIVE PROCESS

PLACE

VARIABLE SPACE

School of Design Thinking
Hasso-Plattner-Institut
Universität Potsdam

Write to HPI

This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement No 669694.
People – Multidisciplinary teams

CROSS-DISCIPLINE EXPERTISE

T-shaped people

DEEP-DISCIPLINE EXPERTISE
Design Thinking basics

PEOPLE

MULTI-DISCIPLINARY TEAMS

PROCESS

ITERATIVE PROCESS

VARIABLE SPACE

PLACE

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Universität Potsdam
Place – Variable space
Design Thinking basics

People

Multi-disciplinary teams

Process

Iterative process

Place

Variable space

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HPI
Design Thinking – Iterative Process

Convergent thinking: Analytical, linear, rational, logical, critical, rule-based
“If I have an hour to solve a problem, I spend 55 minutes on the problem and 5 minutes on the solution.”

(Albert Einstein)
UNDERSTAND the problem, the market, the users, existing solutions, the technology, the boundary conditions, the restrictions, the interdependencies, the actors, ...

Activities: Desk research, interview experts, document & visualise results
Aim: Gain as much background knowledge as possible

Where?
...is the problem taking place?
...has it been solved before?
...have been similar situations?

Who?
...is involved?
...is affected?
...decides?

Why?
...is the problem important?
...does it occur?
...has it not yet been solved?

How?
...are the cause-effect relationships?
...could this problem represent an opportunity?
...has it already been tried to be solved?

When?
...is the problem taking place?
...has the problem started?
...do you want to see results?

What?
...is the problem?
...would we like to know?
...are assumptions that need to be questioned?
OBSERVE the behaviour of real people in real situations in relation to the problem

Activities: Observe people's behaviour and interaction as well as physical locations, get in contact with people and interview them, reflect on what has been learnt, document & visualise results

Aim: Develop empathy
Phase 2 – What is a need?

"To protect myself against the sun" is a need

"Shade" is one solution
Phase 2 – Persona

Naomi, 28

**PERSONALITY**

<table>
<thead>
<tr>
<th>conservative</th>
<th>carefree</th>
<th>introverted</th>
<th>competitive</th>
<th>self-confident</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
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</tr>
</tbody>
</table>

**KEY DATA AND BIOGRAPHY**

- Phd student in Social Sciences in third year
- doesn’t have a sufficient stipend so works part time in a café
- engaged in local project for digital education

**NEEDS, DESIRES & MOTIVATIONS**

- motivated to explore her career options
- wishes to see social change
- needs to learn about the options for social scientists in the startup world and exchange with those in a similar situation

**PROBLEMS & FRUSTRATIONS**

- doesn’t see a clear career path for herself after obtaining her doctorate. Her professional and social circles include exclusively male roles about which she feels intimidated and blocked
- doesn’t have any experience in the business world and feels insecure about branching out from academia
- worries about how to make money and support a family in the future
Persona – Twins

Prince Charles
Born 1948
Grew up in England
Married twice
Has children
Successful, rich
Goes on vacation in the Alps
Likes dogs

Ozzy Osbourne
Born 1948
Grew up in England
Married twice
Has children
Successful, rich
Goes on vacation in the Alps
Likes dogs

No standard personas but deeper insights
Target segment B2C

Demographic characteristics
- Age
- Gender
- Marital status
- Place of residence
- Language

Socio-economic characteristics
- Educational level
- Occupation
- Income

Psychological characteristics
- Activities
- Motivation
- Opinions
- Wishes
- Values
- Lifestyle

Purchasing behaviour
- Price sensitivity
- Purchase frequency
- Brand loyalty
- Time of purchase
- Point of sale
Target segment B2B

Organisational features
- Headquarters
- Industry
- Company phase
- Number of employees

Economic characteristics
- Turnover
- Profit
- Growth
- Purchasing power

Purchasing behaviour
- Purchase frequency
- Price sensitivity
- Time of purchase
- Point of sale

Psychological characteristics
- Vision
- Corporate values

Personal characteristics of the decision-maker
- as B2C

→ as B2C
• "Elvira Brandner" is a 73-year-old pensioner who regularly uses local transport around her home as a "Silver Traveller".
• "Holger Pfandenburg" is a "Business Traveller" who travels a lot to customers and wants to work undisturbed on the train.
• "Melek Yildirim" is a student and as a "Budget Traveller" attaches great importance to low-cost mobility.
• "Felix Rittberg and Anna Mai" are modern “Urban Travellers” who use public transport as well as rental bikes and car sharing.
• "Andreas and Rabea Brinkhoff-Müller" are "Family Travellers" who travel with up to three children.
“I don't know a sure path to success, but I do know a sure path to failure: trying to please everyone.”

(Platon)
Phase 3 – Point of view

Define **THE POINT OF VIEW** by means of a concrete "How might we..." question.

Activities: Draw on all collected insights, interpret and weigh them; establish a common knowledge base among group members; formulate questions and concretise them to one.

Aim: Concrete common understanding of the problem.
Phase 3 – How might we…

How might we create a scanner experience that children would love?

How might we make the German Mining Museum more attractive for families?

How might we provide access to financial resources for the poorest in Bangladesh?

How might we reduce the high drop-out rates and psychological stress of doctoral students?

How might we facilitate interdisciplinary research at universities for doctoral students?
Problem: "The recycling of plastic waste in private households in Germany is not working."

How might we make sure that everyone gets a recycling bin?

How could we help [user, client, affected person] to achieve [a specific goal]?

How could we redesign [context: what?] for [actor: for whom?], so that [need: which?] is satisfied?

How might we facilitate the recycling of plastic waste for private households?

How might we solve the plastic waste problem?
Phase 3 – How might we...

HOW MIGHT WE...

1. Create questions
Think individually of possible HMW-questions and write them separately on sticky notes.

2. Sort questions
Read out your questions to the group and stick them on according to whether they are too broad, too narrow or already perfect. You can ask „How“ and „Why“ to make questions perfect.

3. Choose question
Choose the best HMW-question from the middle sector.
Phase 4 – Ideate

**IDEA FINDING** in as large a number as possible (without feedback).

Activities: Using different creative techniques; not evaluating but building on each other; having fun; dreaming the impossible… and the possible.

Aim: A large number of possible ideas
Phase 4 - Ideate

Intuitive-creative idea generation

- Unconscious thought process characterised by sudden ideas
- Insights through associations, analogy building, etc.
- Holistic view
- Quick and easy to implement

Systematic-analytical idea generation

- Conscious approach
- Problem is solved in many small steps of thinking
- Facts and relations are consciously analysed, varied, recombined, etc.
- More time required, overcoming fixation on ideas
Systematic-analytical idea generation
Morphological Box

Systematic-analytical idea generation
Morphological Box

For my functional requirements, I broke it down to the main features I wanted my product to have.

1. Holds/carry water: ultimately, my product is a water bottle so it is important that it can hold water
2. Holds things: I want this to be a multifunctional water bottle, so it is important that it can hold other things
3. Is adjustable: I want this product to be versatile, so adjustability is an important factor
4. Has insulating material: I want this to also be a good water bottle, so it needs a coating/material that keeps water hot or cold
5. Is eco friendly: I think sustainability is very important, so my product can promote sustainability (reducing plastic bottle use), and also be made with eco friendly materials

### Systematic-analytical idea generation

**Morphological Box**

<table>
<thead>
<tr>
<th>Holds &amp; Carries Water</th>
<th>Little</th>
<th>Dish</th>
<th>Cup</th>
<th>Balloon</th>
<th>Bladder</th>
<th>Water Gun</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holds Things</td>
<td>Pouch</td>
<td>Bag</td>
<td>Container</td>
<td>Pouch</td>
<td>Wallet</td>
<td>Shelf</td>
</tr>
<tr>
<td>Adjustable</td>
<td>Magnets</td>
<td>Velcro</td>
<td>Plastic</td>
<td>Collapsing</td>
<td>Wire</td>
<td>Pegs</td>
</tr>
<tr>
<td>Insulating Material</td>
<td>Foam</td>
<td>Ceramic</td>
<td>Reflective</td>
<td>Double Wall</td>
<td>Stainless Steel</td>
<td>Copper</td>
</tr>
<tr>
<td>ECO Friendly Material</td>
<td>Plastic</td>
<td>Glass</td>
<td>Bamboo</td>
<td>Cork</td>
<td>Cardboard</td>
<td>Wood</td>
</tr>
</tbody>
</table>

Cheri Wang (2014): structured ideation, [https://medium.com/@wang7258/structured-ideation-b68295b9678c](https://medium.com/@wang7258/structured-ideation-b68295b9678c)
Systematic-analytical idea generation
Morphological Box

Intuitive-creative idea generation
6-3-5 Method

"The best way to get a good idea is to have lots of ideas."

Linus Pauling

6 persons / rounds
3 ideas each
5 minutes each
=108 ideas in 30 minutes
Intuitive-creative idea generation
6-3-5 Method

1) Read through the 3 ideas
2) Associate 3 "new" ideas

1) Read through the 6 ideas
2) Associate 3 "new" ideas
Intuitive-creative idea generation

Associations

Drawing

Combination of several ideas

What can be substituted?

(Further) partners for implementation

How does it work?

Derived ideas

As specific as possible!

Great title

As exciting as possible!

INITIAL IDEA

Reduce: more concise, minimalistic

Completely new idea
Intuitive-creative idea generation
Structure & selection

Possible criteria for structuring and selecting ideas
• Potential for success
• Speed of dissemination
• Financial feasibility
• Technical feasibility
• Risk
• Today - Tomorrow - Future
• Innovativeness

➔ Personal preference
➔ Team skills
Intuitive-creative idea generation

Rules

BUILD ON THE IDEAS OF OTHERS
DEFER JUDGEMENT
STAY FOCUSED ON TOPIC
FAIL EARLY AND OFTEN
BE VISUAL
ONE CONVERSATION AT A TIME
THINK USER-CENTRIC
GO FOR QUANTITY
GO FOR WILD IDEAS
Phase 5 – Prototype

Create **PROTOTYPES** for promising ideas

Activities: Build, paint, glue, cut, design, draw, act, film, …

Aim: Make ideas tangible (& test them afterwards)
Phase 5 – Sketch
Phase 5 – Mock-Up
Phase 5 – Minimum Viable Product (MVP)

That’s **Not How To Build** Minimum Viable Products

1. ![Incorrect tire]
2. ![Incorrect bicycle]
3. ![Incorrect motorcycle]
4. ![Correct car]

That’s **Not How To Build** Minimum Viable Products

1. ![Correct bike]
2. ![Correct bicycle]
3. ![Correct motorcycle]
4. ![Correct car]

That’s **How To Build** Minimum Viable Products

1. ![Correct pickup]
2. ![Correct car]
3. ![Correct car]
4. ![Correct car]
Phase 5 – Wireframe

Higher fidelity
Phase 5 – User Journey

Part of the results
Selects our app
Compatibility
Understands functions

Provided correct email address
Finds friends
Likes functions

Uses payment method
Phase 5 – User Experience

![Cartoon Image](image-url)
Phase 5 – Creating Prototypes

... first think about what needs to be tested. Based on this, build the prototype as simple as possible.
Phase 6 – Test

TEST the ideas with the help of the prototypes on the target group.

Activities: Show prototypes to potential users, let the users try them out, observe the users, discuss the prototypes.

Aim: Get feedback and adapt ideas accordingly
## Phase 6 – Planning the Test

### Description of the test scenario (where and how is the testing done?)

<table>
<thead>
<tr>
<th>Test procedure</th>
<th>Division of roles</th>
<th>Key questions</th>
</tr>
</thead>
</table>

### Test results (documentation of the test ideally with photos or videos)

### Learnings (summary of findings and conclusions)

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**FAIL EARLY – FAIL FAST – FAIL OFTEN**
Phase 6 – Tips for the Interview

Introduce yourself

WHY? WHY? WHY?

Conversation at eye level

80% Listening
20% Speaking

One at a time

Ask short and open questions

Dig for stories and emotions

People…..
.... don't always think what they say.
.... don't always say what they want.
.... don't always want what they do.
.... don't always do what we expect.

Dig deeper & pay special attention to:
• Surprises
• Contradictions
• Emotions
• Problems
Phase 6 – Document Feedback

Strengths
Things that you like or that are worth mentioning

Weaknesses
Constructive criticism

Questions
resulting from the experience or presentation

Ideas
resulting from the experience or presentation
Phase 6 – Number of Tests

Figure 1  Proportion of usability problems found with increasing numbers of subjects or evaluators for the interfaces in Table 1. The markers indicate the actual values from the studies and the lines indicate the fitted curves according to (EQ 1). The values from the various studies have been normalized to proportions rather than absolute number of problems to allow comparisons in a single figure.

Phase 6 – Number of Tests

“There are no facts inside your building, so get outside.”

(Steve Blank)
List of sources

Slide 5:
Stress icon created by Freepik – Flaticon
Disease icon created by Eucalyp – Flaticon
Money icon created by Smashicons – Flaticon
MRI image: Medizinio – Das Portal für die Praxis

Slide 6:
Doug Dietz: UrbanMilwaukee
Scared girl: Psycom
Hasso Plattner Intitute logo: Gstatic

Slide 7:
All images: Product brochure by GE

Slide 8:
Quote: LibreTexts (2020): Entrepreneurship
Tim Brown: Fortune

Slide 9:
Logo and image: HPI School of Design Thinking Potsdam

Slide 10:
Different shapes: Agile Hub Noord

Slide 11:
Top left: Medium by Opencampus.sh
Top right: Own resources
Bottom left: Raytheon Anschütz
Bottom right: Own resources

Slide 12:
Design Thinking Process: Research Gate
Wordcloud: Own representation using Classic Word Clouds

Slide 13:
Albert Einstein: Zitate berühmter Personen

Slide 14:
Design Thinking Process: Research Gate

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Parasol icon created by SatawatDesign – Flaticon

Slide 17:
Ozzy Osbourne: Rock Celebrities
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Slide 18:
Woman icon created by Freepik – Flaticon
Suitcase icon created by srip – Flaticon
Psychology icon created by Smashicons – Flaticon
Shopping basket icon created by Freepik – Flaticon

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Organisation icon created by Good Ware – Flaticon
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Woman icon created by Freepik – Flaticon
Psychology icon created by Eucalyp – Flaticon
Shopping basket icon created by Freepik – Flaticon

Slide 20:
Deutsche Bahn Logo: Deutsche Bahn

Slide 21:
Platon: Wikiseminar

Slide 22:
German Mining Museum: Deutsches Bergbau Museum
Doug Dietz: UrbanMilwaukee
Grameen Bank: Daily Excelsior

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Puzzle icon created by Becris – Flaticon

Slide 24:
Recycling: BUND

Slide 28:
Lamp icon created by Icongeek26 – Flaticon

Slides 29-31:
Cheri Wang (2014): structured ideation (medium.com)

Slide 34:
Clock icon created by Freepik – Flaticon

Slide 36:
Lamp icon created by Freepik – Flaticon

Slide 37:
Brainstorming rules: process.st

Slide 38:
Sketch: Dreamstime

Slide 39:
Minimum Viable Product: Starshot
List of sources

Slide 43:
Wireframe: Careerfoundry

Slide 44:
User Journey: elabor8

Slide 45:
User Experience: me.me

Slide 46:
Fablab Kiel: fablab
Canva Logo: Canva
Figma Logo: CI Hub

Slide 47:
Tips by Young Entrepreneurs in Science
Partnership handshake icon created by Pixel perfect – Flaticon
Google talk icon created by Pixel perfect – Flaticon
Noise icon created by Pixel perfect – Flaticon
Question icon created by Pixel perfect – Flaticon
Smile icon created by Pixel perfect – Flaticon
Multiple users icon created by Pixel perfect – Flaticon

Slide 48:
Red ribbon present: Kind PNG
Red present: iStockphoto
Cardboard box: iStockphoto

Slide 49:
Study: Semantic Scholar

Slide 50:
Average: NNgroup

Slide 51: