Concept Development Course

Ideation

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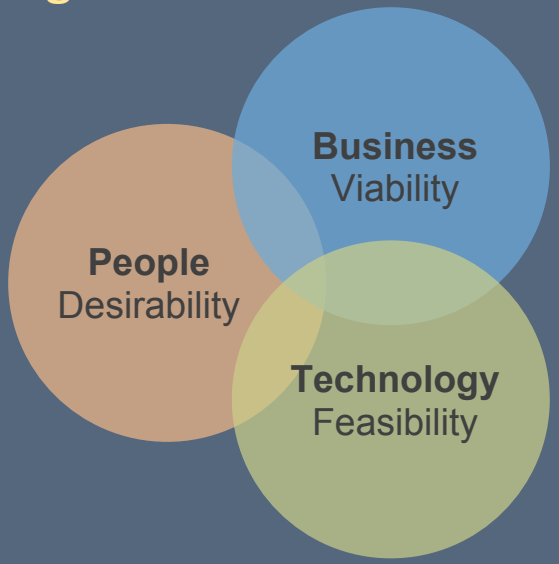
A few words about me
Marin Zec

- A huge proponent of **Human Centered Design Thinking**

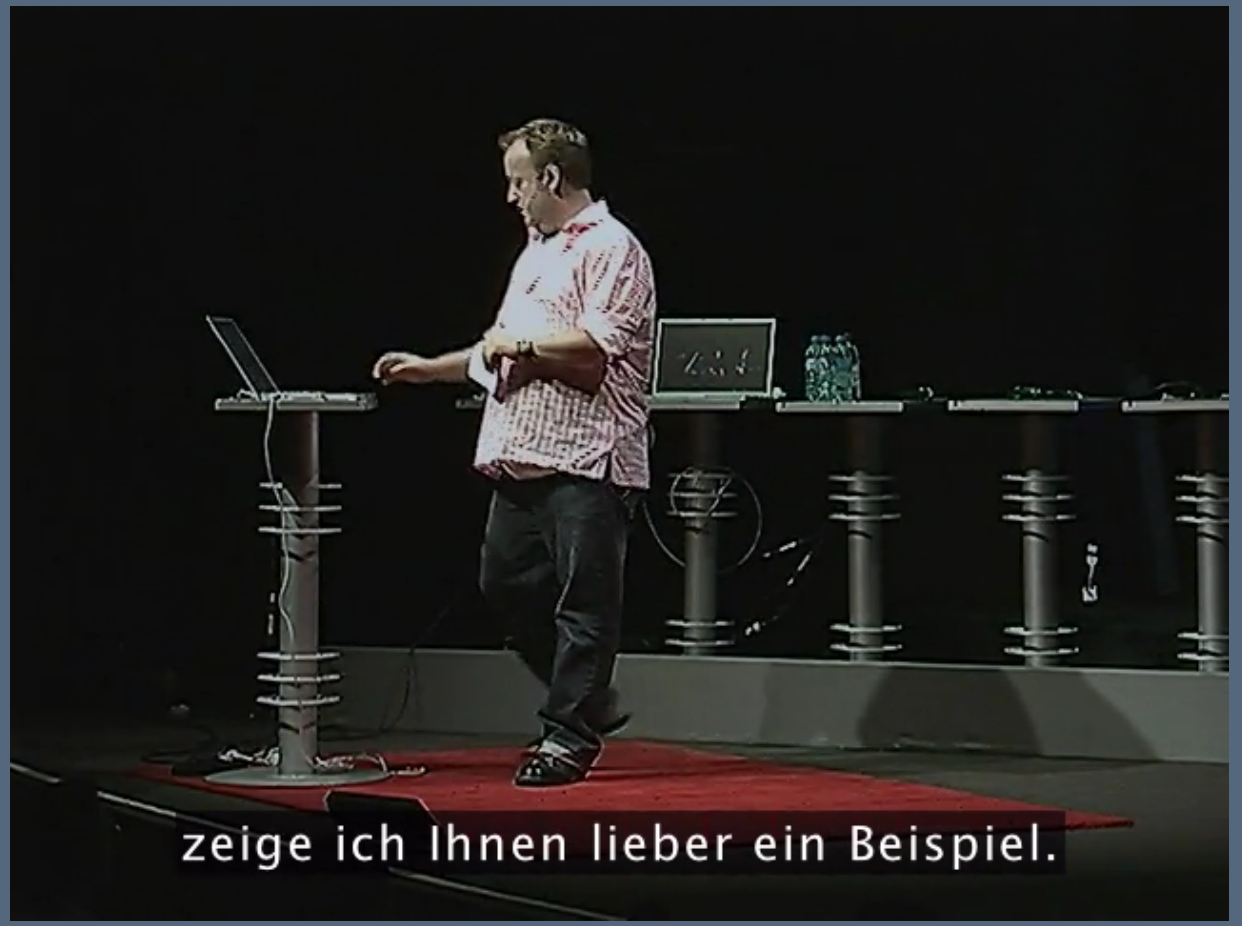


- Educational Background
  Computer Science (LMU, TUM, University of Augsburg, MIT), **Economics** (TUM, FUH) & **Philosophy** (LMU)

- PhD student & Research Assistant at TUM in the area of Knowledge Work and Collaborative Creative Complex Problem Solving

- Freelance Consultant & Engineer
  Volkswagen, GIZ, Goethe Institut, Volkswagen, ProSiebenSat.1, MIT, Siemens, ForceFive, Waldburg-Zeil Kliniken and more than 30 SME and startups

Design Thinking in Healthcare from IDEO



Course Overview

Week 1

Today

User Research, Data Analysis

Today: Generate & Refine Solution Ideas based on your User Research and Transform them into Stories

1. **Creativity & Creativity Research**

2. **Creativity Techniques**
   - Divergent Thinking
     6-3-5 Method, Analogies , SCAMPER
   - Convergent Thinking
     Clustering, Walt-Disney Method, Dotmocracy, How-Wow-Now
   - Idea Refinement
     Morphological Analysis

Week 2

Storyboarding, Mid Presentation, Prototyping, Final Presentation

Agenda

09:15 – 09:45	Introduction	
09:45 – 10:15	Divergent Thinking	
10:15 – 11:15	6-3-5 Method, (SCAMPER)	
11:15 – 11:30	Convergent Thinking	
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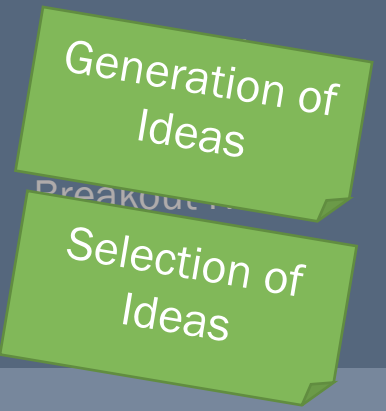
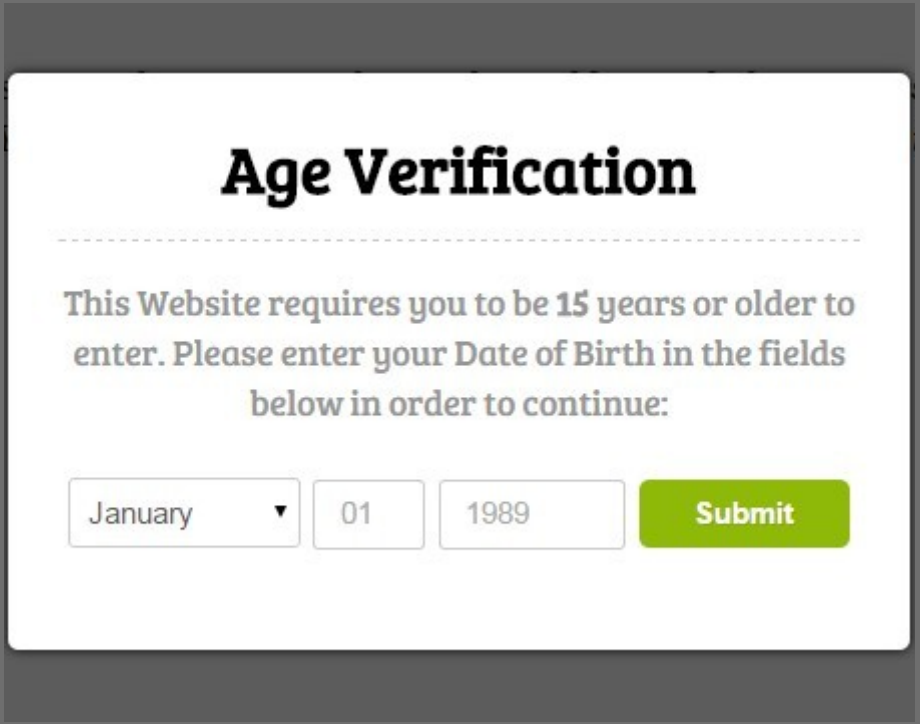


1

What is Creativity?

Age verification



Separate faucets (UK)

Separating egg whites

2

Cold Start

A 10 minute crash course on creativity techniques

Take a pen and paper. You have 50 seconds.

50s

Let‘s agree on some ground rules

Aim for Quantity

Search for wild ideas

Combine with and improve on existing ideas

Defer judgment

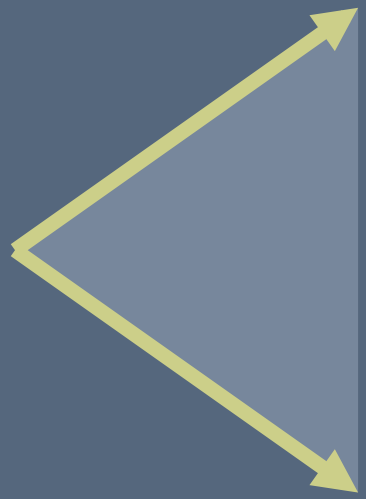
Take a pen and paper. You have 50 seconds.

50s

Key Insight from Creativity Research

Divergent Thinking

Issue

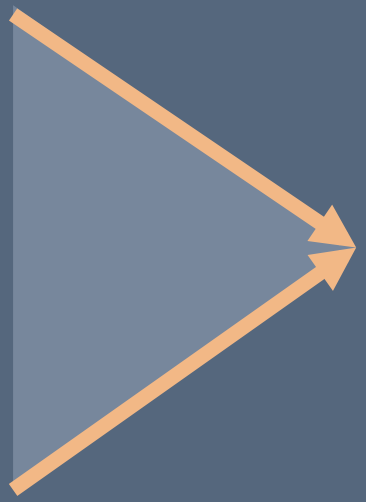


Ideas

Aim for quantity!

Convergent Thinking

Ideas



Solutions

Aim for quality!

Ground Rules

Divergent Thinking

Aim for quantity!

Defer judgment

Search for wild ideas

Combine with and improve on existing ideas

Convergent Thinking

Aim for quality!

Think positive (potentials rather than problems)

Act consciously and thoroughly

Keep the goal in mind

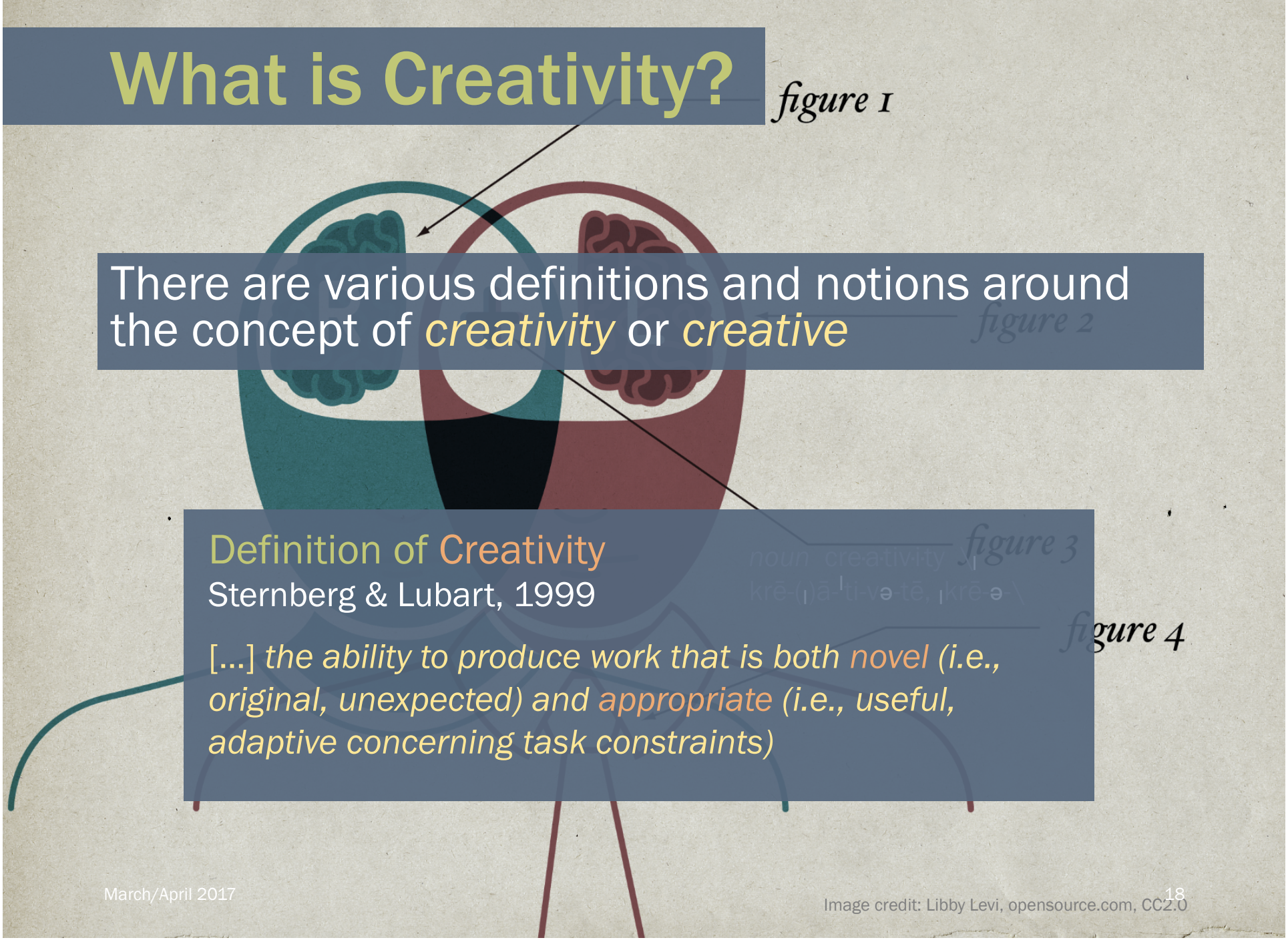
Aim to improve ideas (ideas are not solutions)

3

Creativity and Technique

This course is about creativity techniques.
But wait, this sounds like an oxymoron.

What is Creativity?



There are various definitions and notions around the concept of *creativity* or *creative*

Definition of Creativity

Sternberg & Lubart, 1999

[...] *the ability to produce work that is both novel (i.e., original, unexpected) and appropriate (i.e., useful, adaptive concerning task constraints)*

Image credit: Libby Levi, opensource.com, CC2.0

What is a Technique?

- A technique is a way of doing something by using special knowledge or skill.

Definition of Technique

noun tech·nique \tek-ˈnēk

Merriam-Webster

[...]

2 ***a*** **:** a body of technical methods (as in a craft or in scientific research)

b : a method of accomplishing a desired aim

But how do they fit together?

- On the one hand, striving for creativity we are looking for unconventional, novel and appropriate ideas and solutions

- On the other hand, techniques are basically stable and predetermine how certain things are supposed to be done

Creativity Techniques

- We have to avoid a common misconception about the aim of creativity techniques:

"Creativity techniques are a foolproof way to systematically produce creative output"

- No! Creativity techniques do not "produce" creative results. People do! Creativity techniques cannot enforce creative output.

- Rather, creativity techniques aim to decrease mental block and promote an open environment that fosters divergent thinking such that creative thoughts are more likely to surface

4

Creativity in Groups

Groups are more creative, right?

Group Creativity
Sometimes teamwork is indispensable, e.g. in team sports such as Volleyball
At other times, teamwork is not mandatory, but we expect that a group performs better than individuals, e.g. in Brainstorming
Are we correct?

Everyone knows Brainstorming(?)

"A bunch of people gather together to generate a list of spontaneous ideas around a certain issue"

- Originally proposed by Alex Osborn in 1939
- Probably the most popular and most misused creativity technique
- In practice, there is a broad range of variations. Thus, brainstorming is actually a class of more or less similar creativity techniques.

Osborn's Brainstorming
(Isaksen et al, 1998)

- Brainstorming is a creative conference for creating a checklist of ideas which can be subsequently evaluated and further processed

- Group session was designed to supplant individual ideation
- 4 basic guidelines
  1. Criticism is ruled out
  2. Freewheeling is welcomed
  3. Quantity is wanted
  4. Combination and improvement are sought
- Osborn recommended a trained facilitator and recorder
- 5-10 participants selected based on the nature of the problem

Brainstorming Research

Key claim of Osborn

Brainstorming in a group leads to the generation of more and better ideas than would be obtained individually

Is this true?

Brainstorming Research

What is the correct comparison condition?

1. Interacting Group vs. Individual

- ✓ An interacting group, on average, generates more and better ideas than an individual

2. Interacting Group vs. Non-interacting Group

- ○ An interacting group, on average, generates more and better ideas than a non-interacting group?

Real Group

Group members work on the same task and interact with each other

Nominal Group

Group members work on the same task but do not interact with each other

Results
(see Mullen, Johnson & Salas, 1991)

- In all experiments, interacting groups hardly ever produced as many ideas as non-interacting groups. In fact, in most cases they generated significantly less ideas.

- The deficit is not compensated by increased quality. On average, interactive groups did not create more creative or more practicable ideas than non-interacting groups.

- Countermeasure
  Brainwriting instead of Brainstorming

Why do real groups sometimes perform worse than nominal groups?

- Framing
- Evaluation Apprehension
- Production Blocking (e.g. Diehl and Stroebe 1987)
- Groups often prefer (even incorrect) solutions proposed by the majority (e.g. Torrance 1954; Smith, Tindale & Steiner 1998)
- Social Loafing (e.g. Latané et al. 1979)
- Dispensability effect (e.g. Kerr & Bruun 1983)
- Sucker effect (e.g. Kerr 1983)

...

5

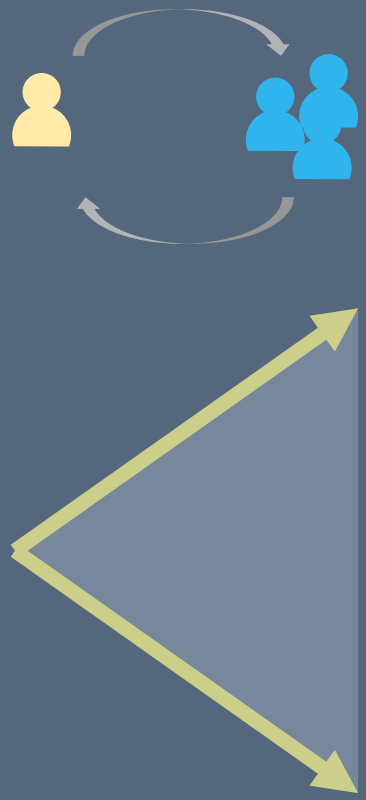
Summary

Summary

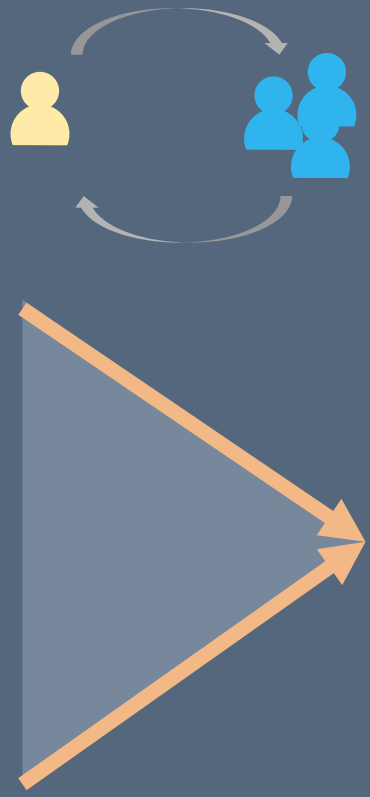
- Ideation involves two complementary modes of thinking: divergent and convergent thinking
- Creativity techniques aim to decrease mental block and foster divergent thinking
- A large body of research has shown that groups do not necessarily perform better in creative problem solving tasks

Key Takeaway

Divergent Thinking



Convergent Thinking



> *If I had an hour to solve a problem I'd spend 55 minutes thinking about the problem and 5 minutes thinking about solutions.*
> - Albert Einstein (?) -

Does every team have a meaningful problem statement?

Creativity Techniques for Divergent Thinking

6-3-5 Method, Analogies, SCAMPER

6-3-5 Method
Structured brainwriting for groups

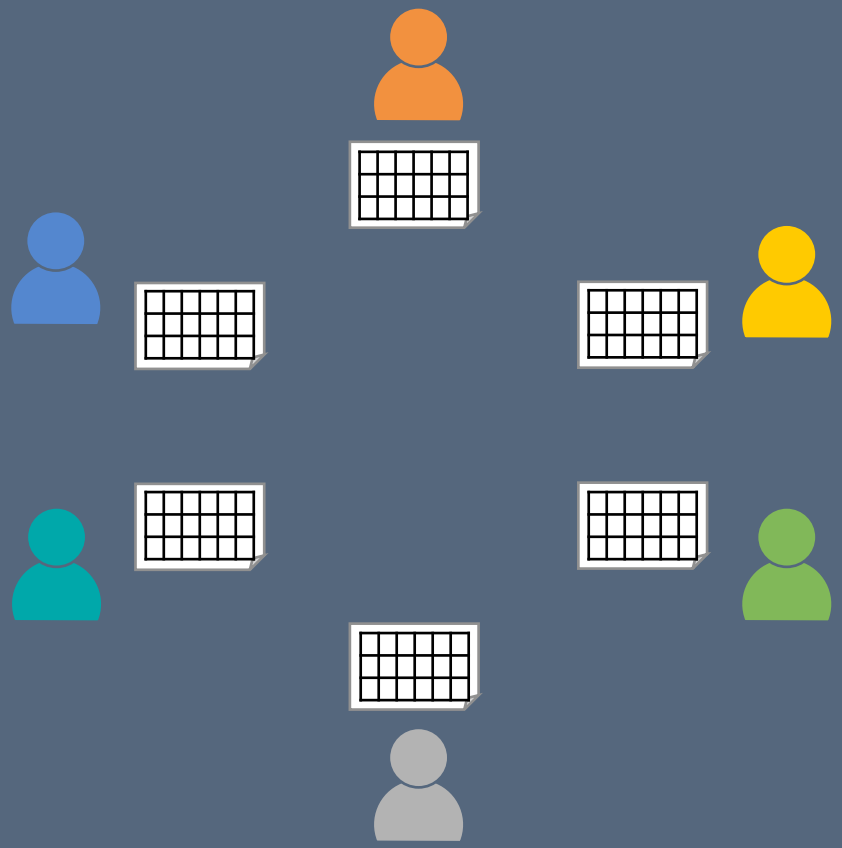
- **Input**
  - A concise but open problem statement
    (e.g. How might we increase employee safety?)

- **Process**
  - Each team member is handed out an empty 6-3-5 template
  - One run consists of 6 rounds (# rounds = # participants)
    - In each round of 5 minutes duration, every team member silently generates 3 ideas and writes them down in the specified area on his/her worksheet. Team members should build on the ideas of others but can also decide to ignore them.
    - After each round, team members pass on their worksheet to the team member at their right.
  - Conduct another run if desired

- **Output**
  - Up to 108 ideas in 30 minutes

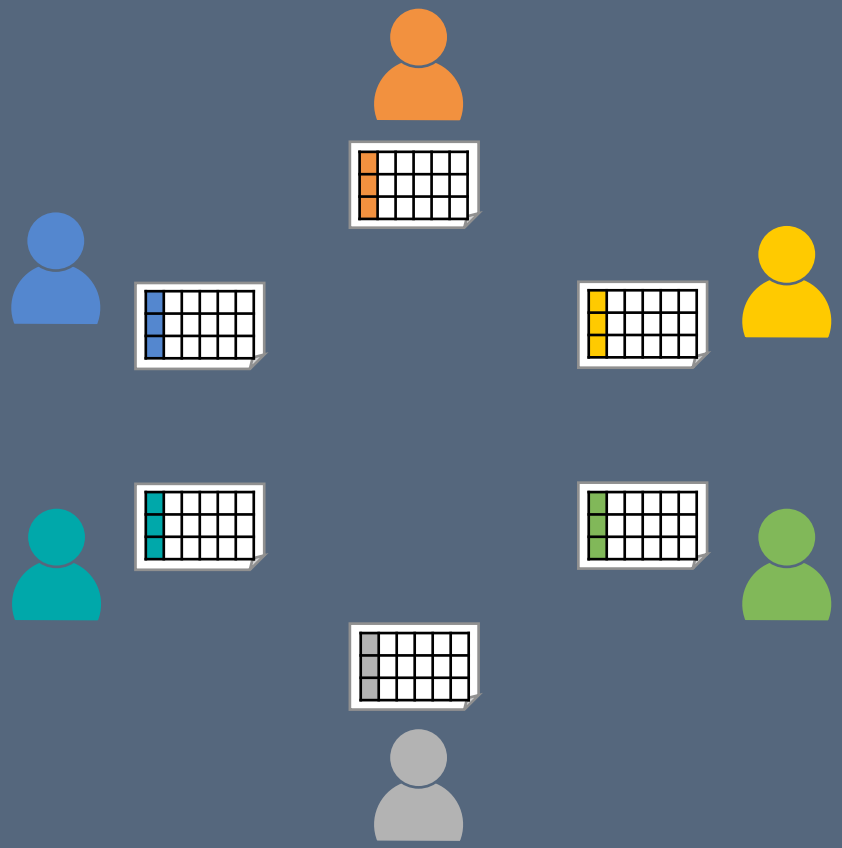
6-3-5 Method
Example

How might we increase employee safety?



6-3-5 Method
Example

How might we increase employee safety?



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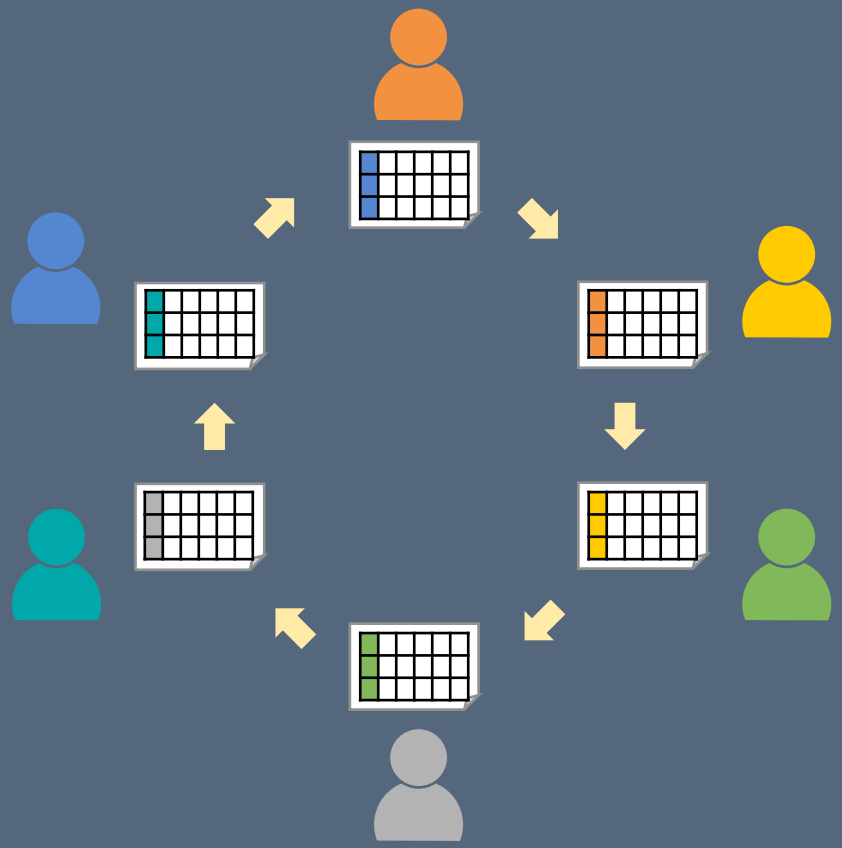

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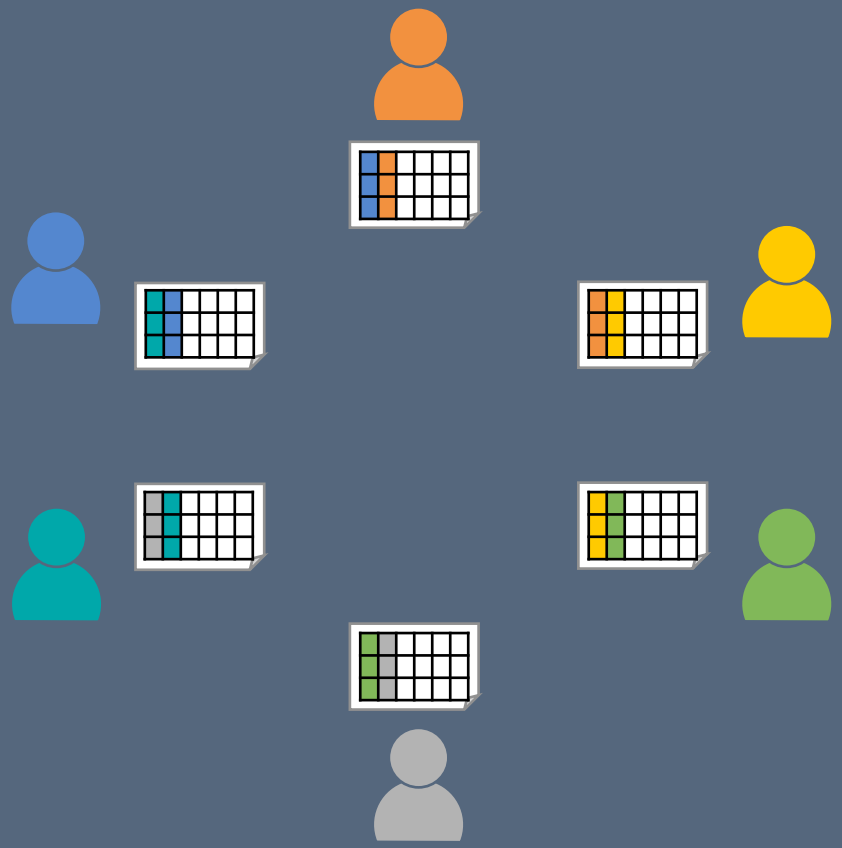

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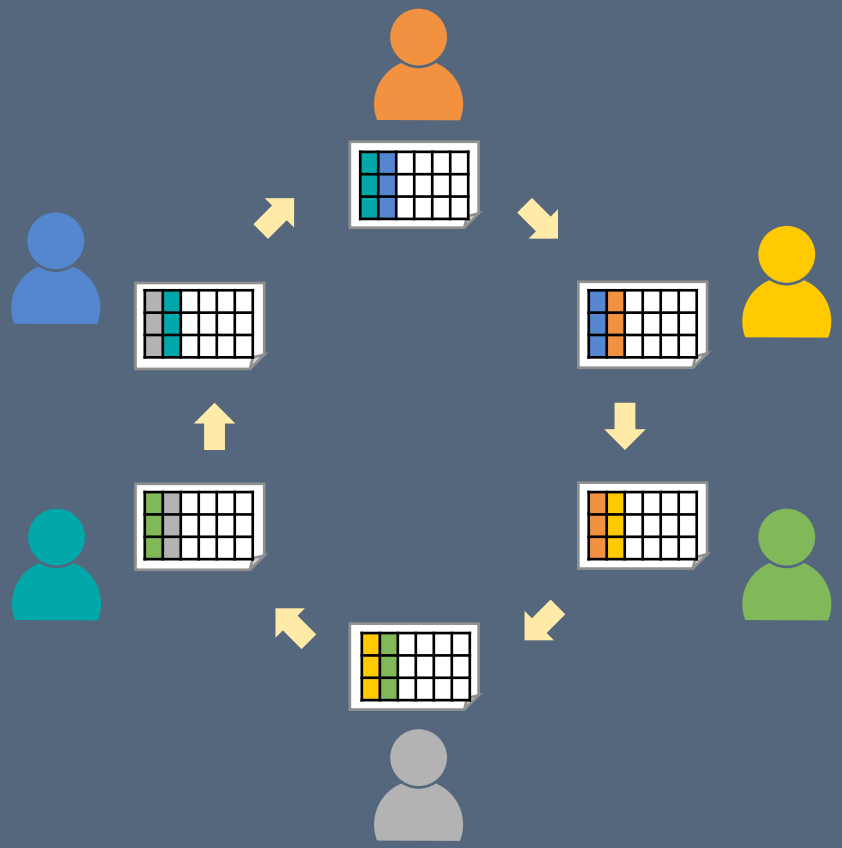

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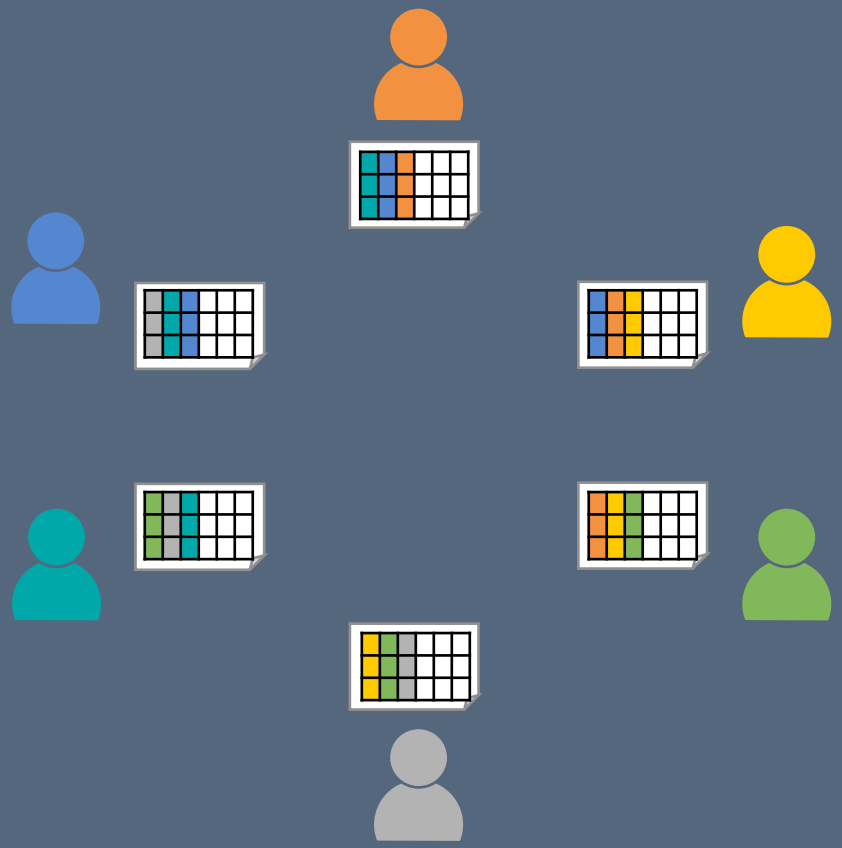

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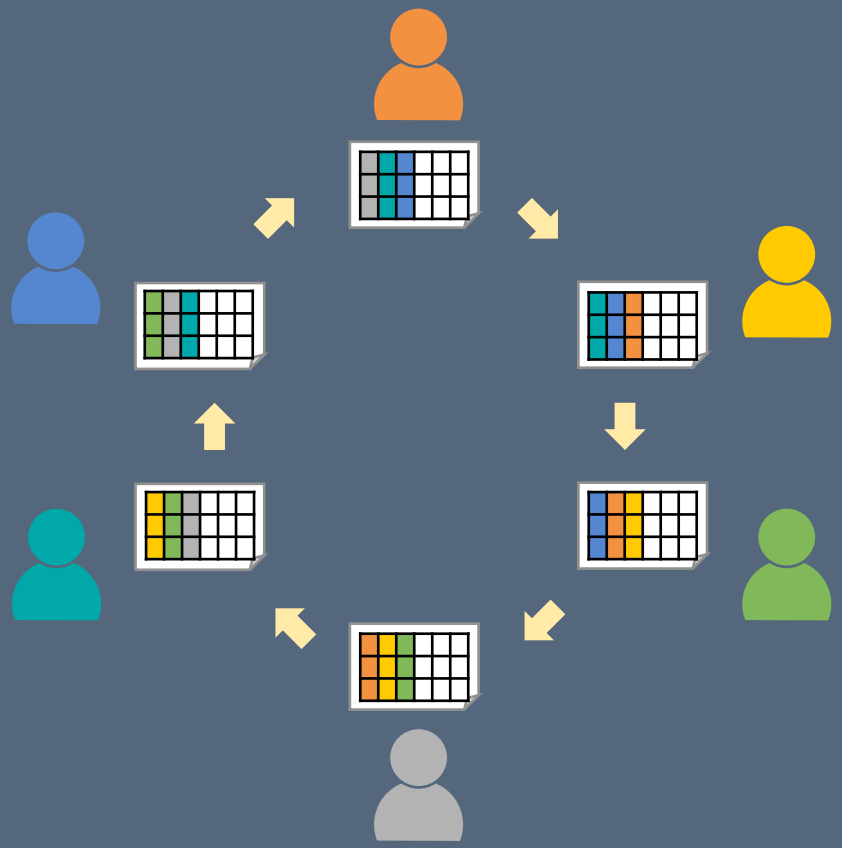

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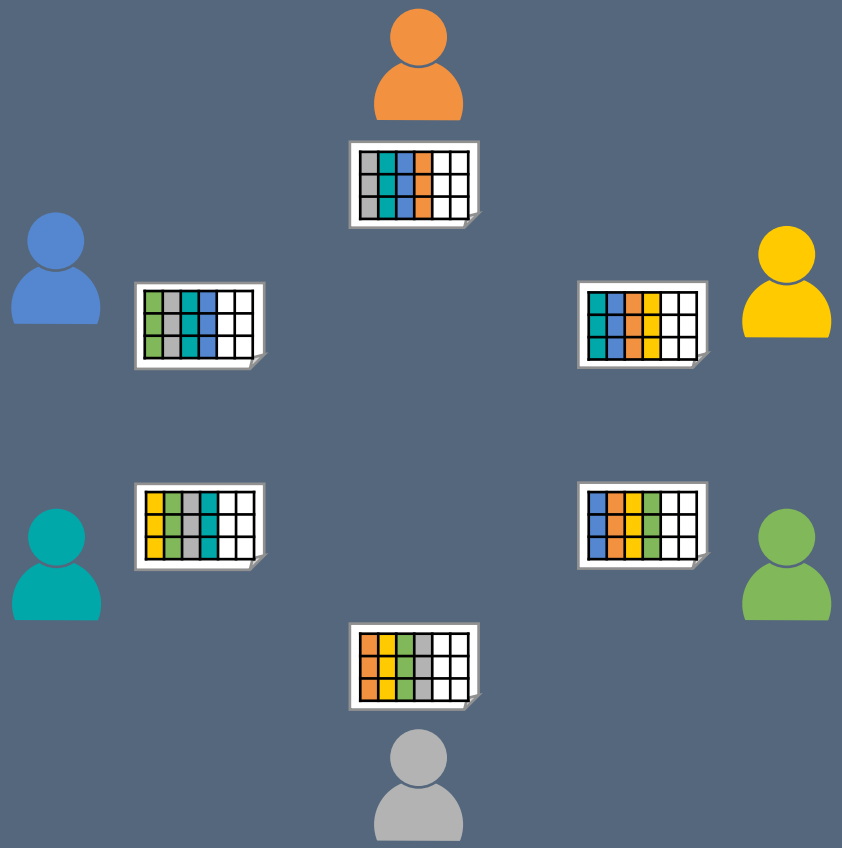

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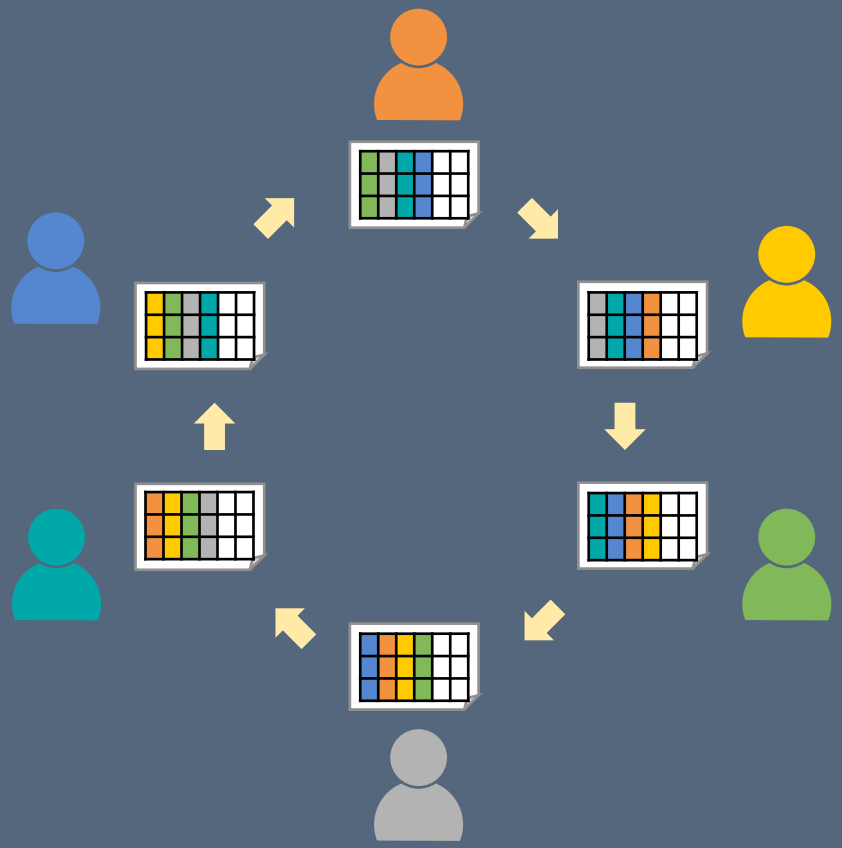

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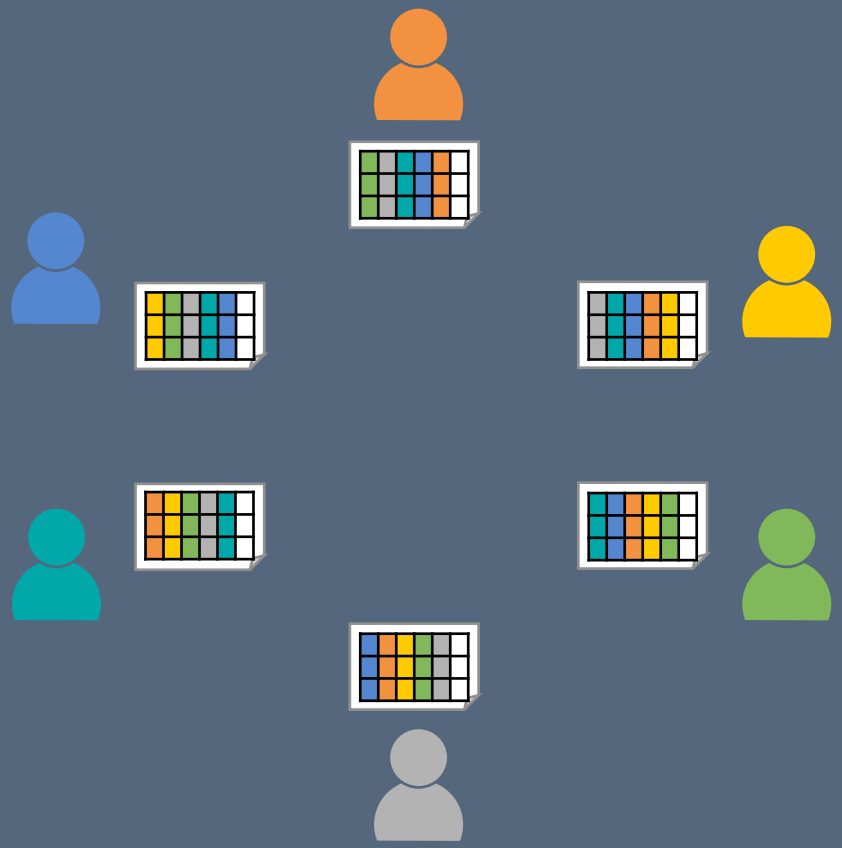

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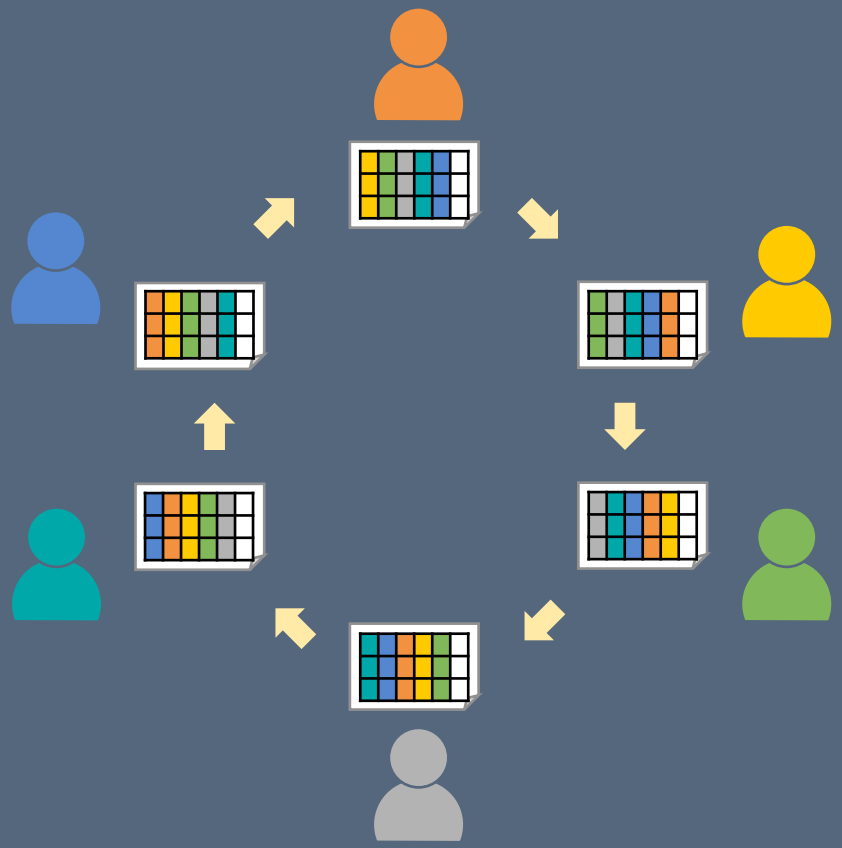

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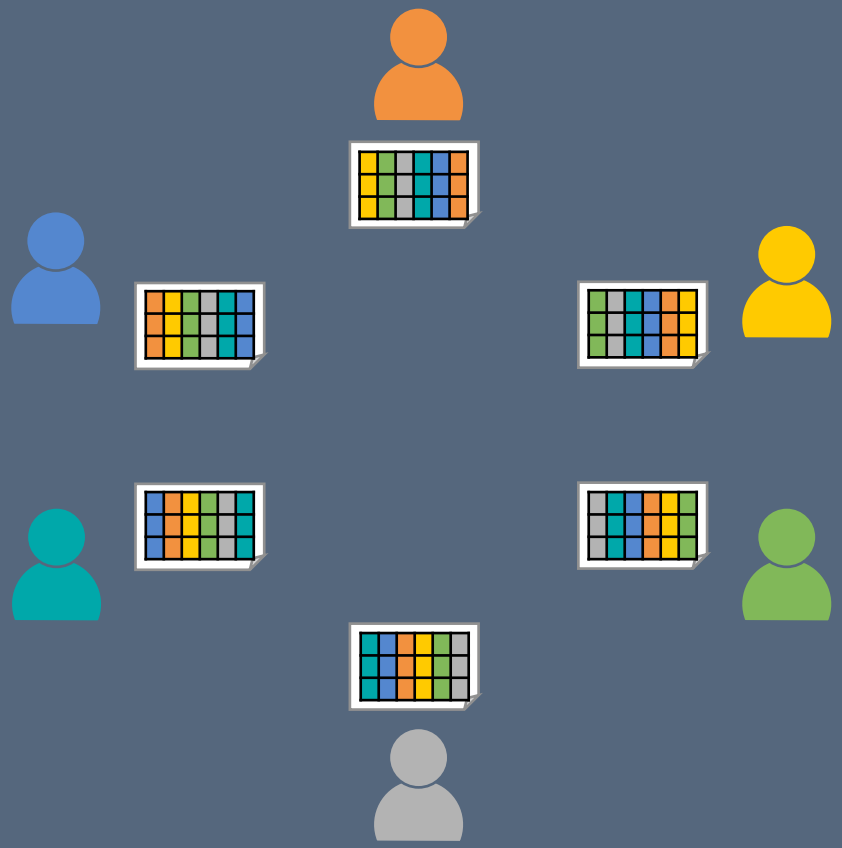


Analogies
Transfer solutions from other fields

- **Input**
  - A concise but open problem statement
    (e.g. How might we increase employee safety?)

- **Process**
  - The team generates a list of (structurally) similar areas and how the analogous problem is solved in that area

  - For each identified analogy, the team generates ideas by mapping solutions in the similar area to the situation at hand

- **Output**
  - A list of solution ideas that are analogous to successful approaches in other areas

Analogies
Example

How might we increase employee safety?

Similar Area	Solution	Analogous Solution
Traffic	Police Traffic lights Airbags	Security officer Warning lights Cushion on machines
Mountains	Safety ropes Route ratings	…
Skiing	Avalanche warnings	…
Paragliding	Training Safety parachute	…
…	…	…

SCAMPER

- **Input**
  - An initial idea or product or benchmark product/process (e.g. How could a new type of chair look like?)
- **Process**
  - S ubstitute: Which parts could be replaced/substituted?
  - C ombine: May parts or the whole be combined with other things?
  - A dapt: How could ideas from other domains be adapted?
  - M agnify: What could be enlarged or emphasized?
  - P ut to another use: What are other uses for the idea?
  - E liminate: What could be reduced or removed?
  - R earrange/Reverse: How could we rearrange parts or change the order of steps?
- **Output**
  - A variation of the initial idea

SCAMPER
Example

How could a new type of chair look like?

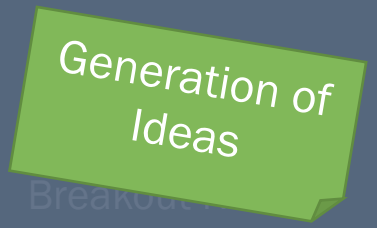
- Substitute: We could replace the chair legs with wires a fixed to the ceiling
- Combine: We could attach a coffee cup holder to one one of the armrests or mount a parasol
- Adapt: We could build in an electric engine to allow the customer to adjust the backrest as comfortably as possible
- Magnify: We could increase the seating surface such that two persons or obese persons could sit on the chair
- Put (to another use): We could add hinges such that the customer can turn it into a coffee table
- Eliminate: We could remove the armchairs to achieve a minimalistic design.
- Rearrange/Reverse: We could attach the chair legs at the middle of each side of the seating surface instead of the corners

Alright, it’s time to make your hands dirty and work on your project!

Timekeeper / Instructions

Have fun!

Agenda



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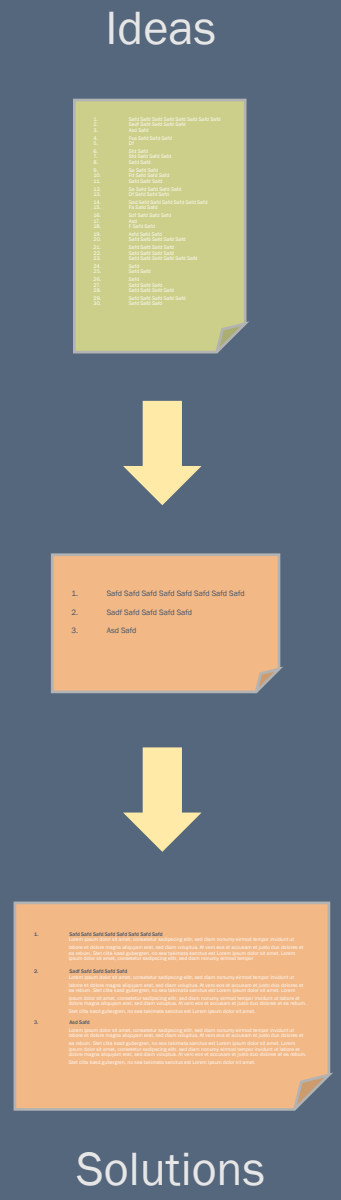
From Quantity to Quality, from Ideas to Solutions.

- Up to now, we focused on **Quantity** (Divergent Thinking). You generated a large collection of ideas using the 6-3-5, SCAMPER and Analogies methods.

- Now, we want to select the best ideas from our collection, refine them and transform them to solutions. Thus, we will focus on **Quality** (Convergent Thinking).

- In the next block, we are going to discuss two methods for Convergent Thinking: Clustering, How-Wow-Now and Dotmocracy



1

Convergent Thinking

From ideas to solutions

Ground Rules

Divergent Thinking

Aim for quantity!

Defer judgment

Search for wild ideas

Combine with and improve on existing ideas

Convergent Thinking

Aim for quality!

Think positive (potentials rather than problems)

Act consciously and thoroughly

Keep the goal in mind

Aim to improve ideas (ideas are not solutions)

Convergent Thinking

- We can not pursue all of our ideas: we have to select the most promising candidates
- Convergent Thinking is all about narrowing down our pool of ideas and transforming them into more elaborate solutions
- Ideas are rough directions of thoughts, Solutions are more concrete and detailed and they solve a problem within a given context

2

Idea Selection

Choosing the most promising ideas after idea generation

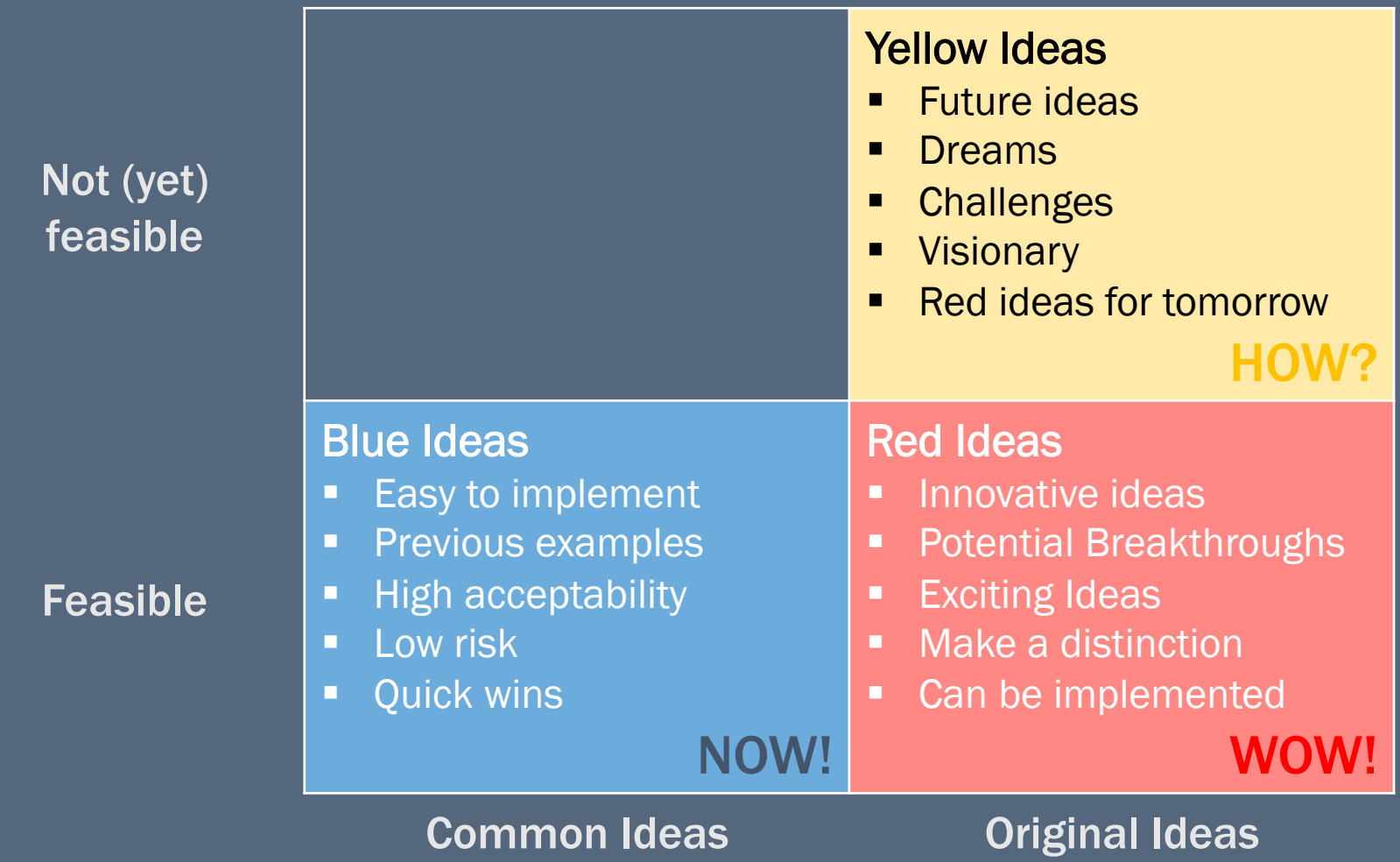
Clustering & Affinity Diagrams

Depending on the number and diversity of your ideas, you might start with Clustering and Affinity Diagrams to map the idea space

Procedure

1. Record each idea on a card or note
2. Look for related ideas
3. Group them together
4. Go to step 1 until all ideas have been sorted

COCD Box (How-Wow-Now-Matrix)



Dotmocracy
Democratic Dot-Voting

Participants vote on their favorite ideas using stickers or marks with pens

Procedure

1. Each participant is given a limited number of dot stickers (or pen) (e.g. 3)
2. Each participant silently decides on her/his voting
3. Participants place dot stickers (or their mark) simultaneously next to the ideas they like
4. Ideas with the most dots at the end win

Recommendation

- Restrict the allowed number of dots per idea to prevent individual bias (e.g. 2)

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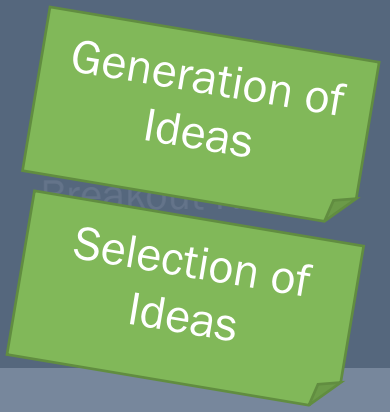

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Idea Refinement

Transforming ideas into solutions using Morphological Analysis

Morphological Analysis (MA)

A generic problem structuring method pioneered by Fritz Zwicky

Key Idea: Divide & Conquer

1. Decompose the problem into subproblems
2. Generate solutions to the subproblems
3. Combine the individual solutions to a holistic solutions

Example: Developing a new type of trash can

Shape	Material	Context of usage	Volume (in liters)
Cylindrical	Glass	Office	1
Cuboid	Rubber	Outdoor	5
Cube	Plastic	Kitchen	10
Organic	Metal	Garage	50
	Wood		80

Process innovation using MA

Morphological Analysis
Pen and paper approach

A major issues with the classic approach:

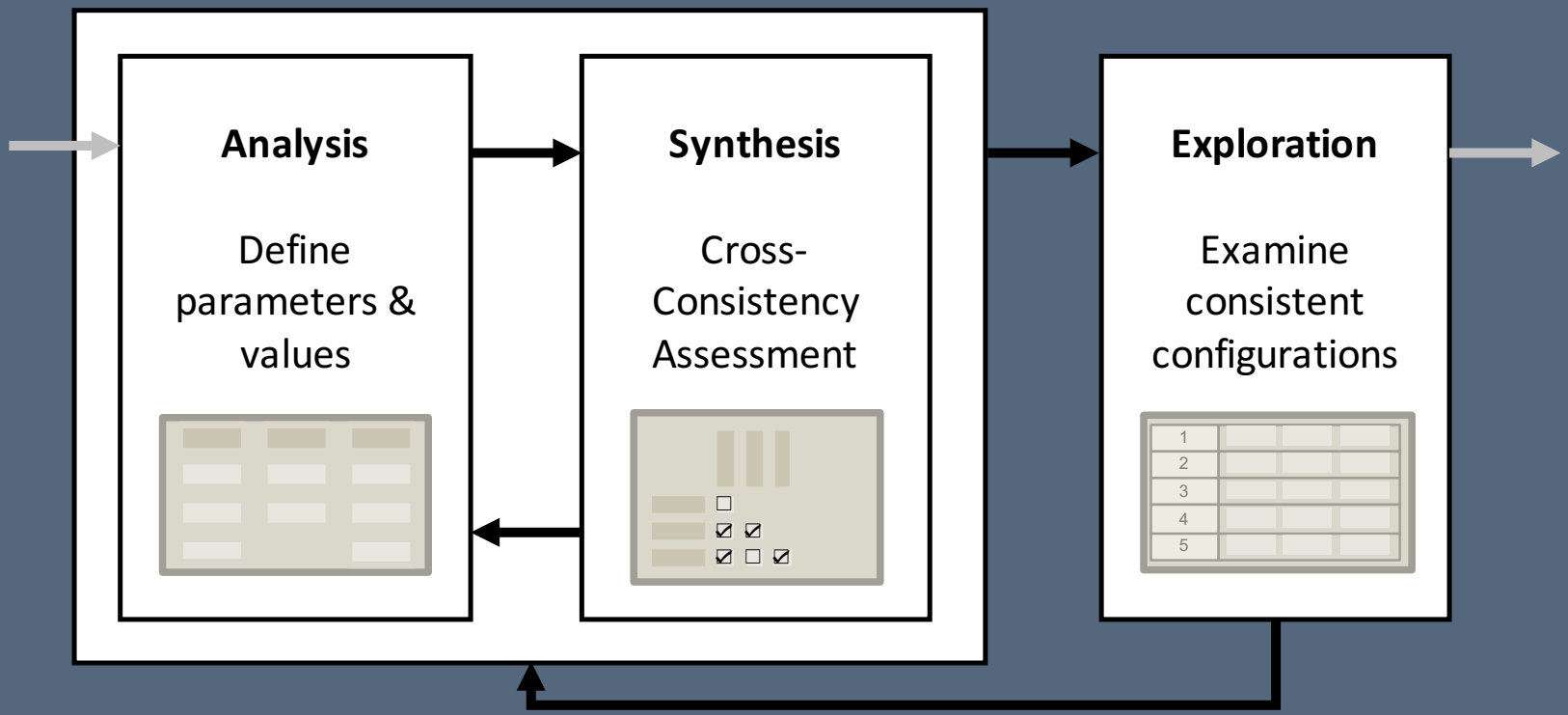
How to identify „good“ candidates?

Combinatorial explosion

Example on the left:
13x19x15x15x15x…

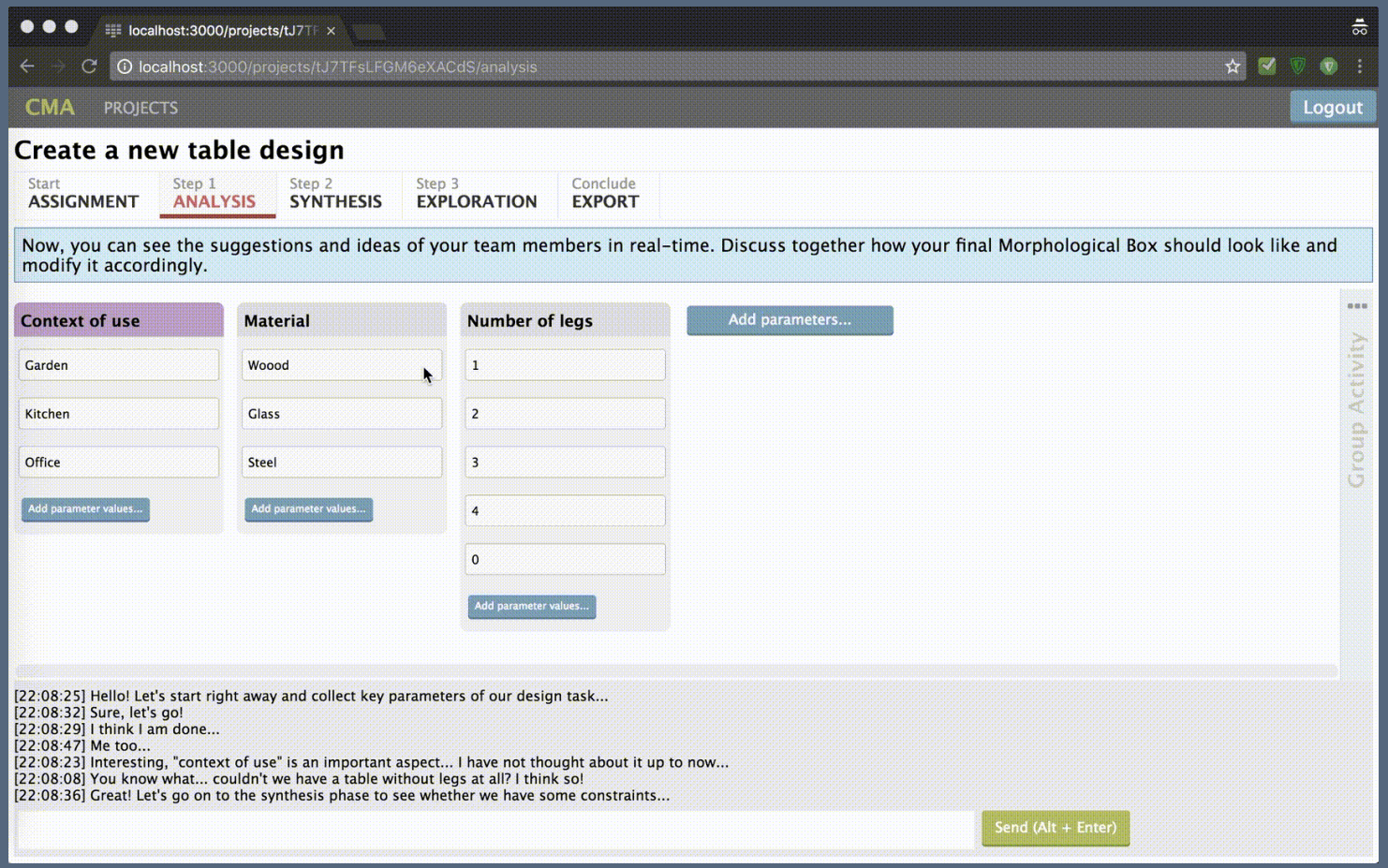
> 1 Million configurations

Computer-Supported MA Process Model

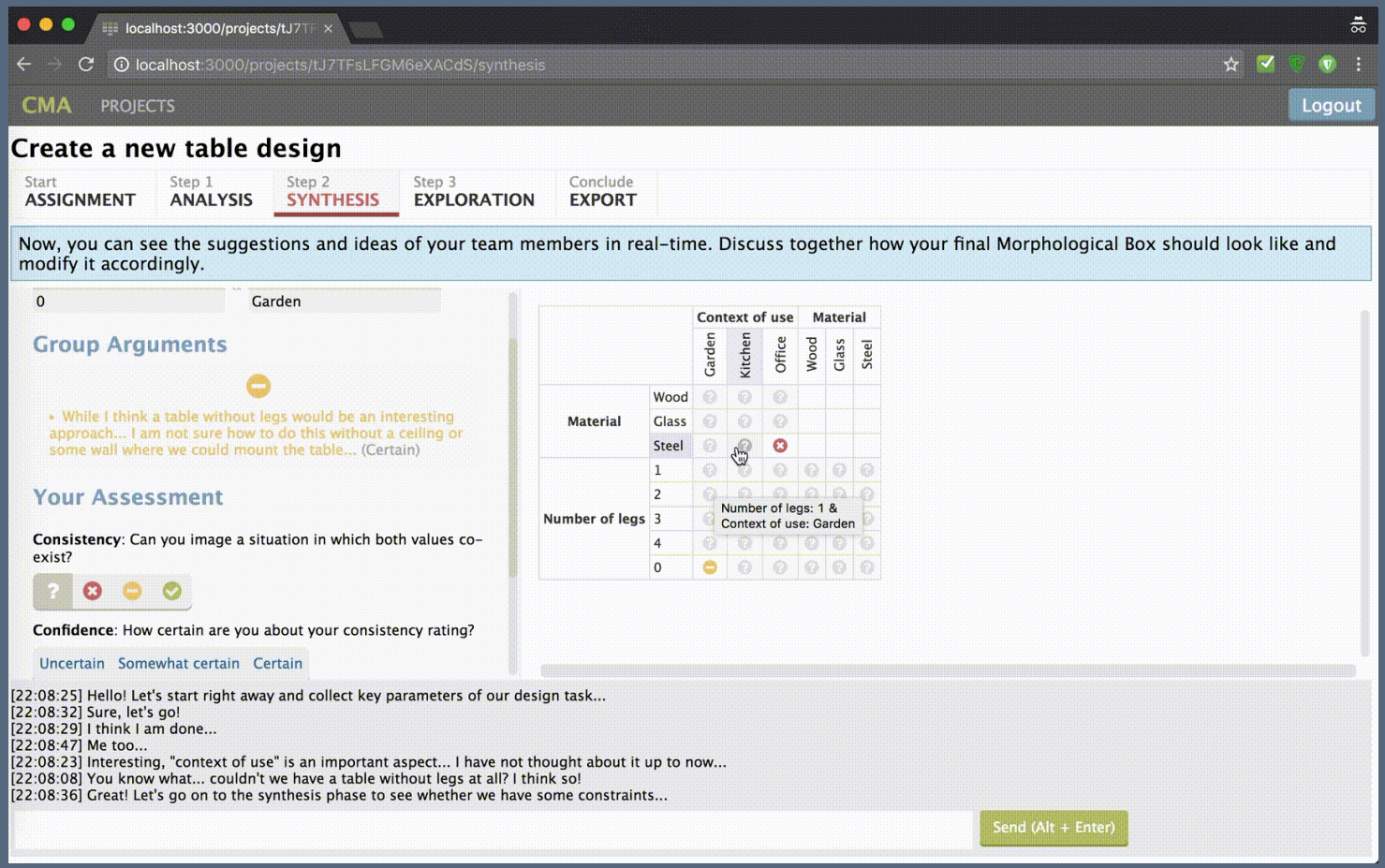


Computer-Supported MA
MA/Carma

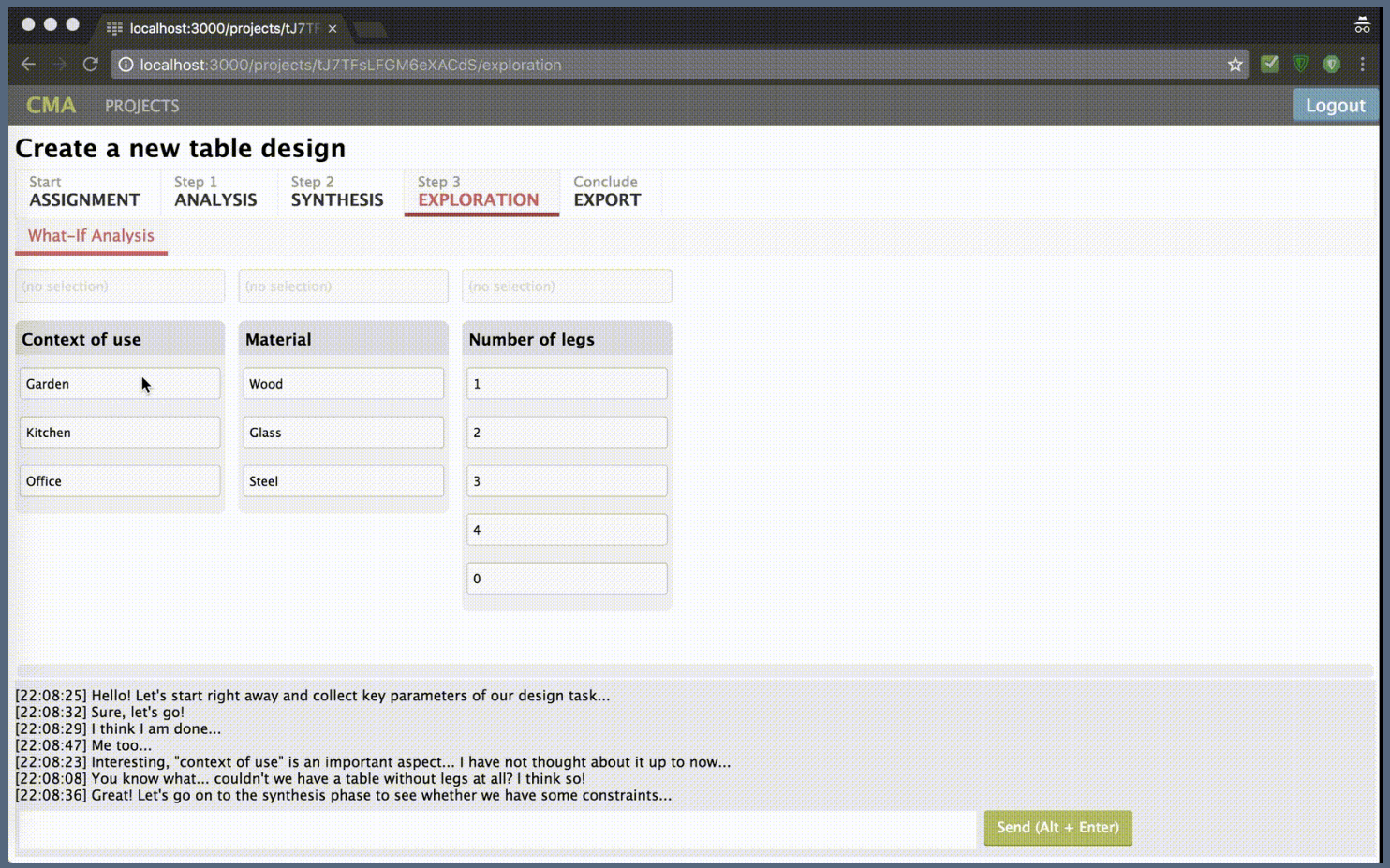
CMA
Analysis



CMA
Synthesis



CMA
Exploration

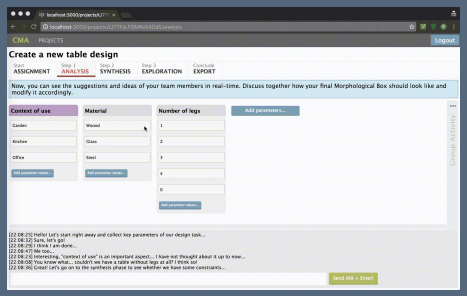


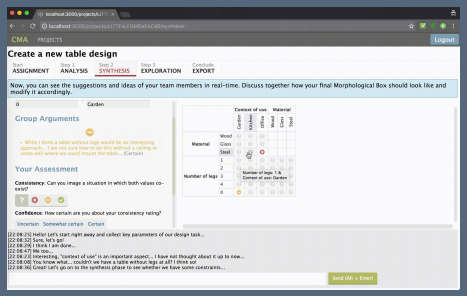
Summary Morphological Analysis

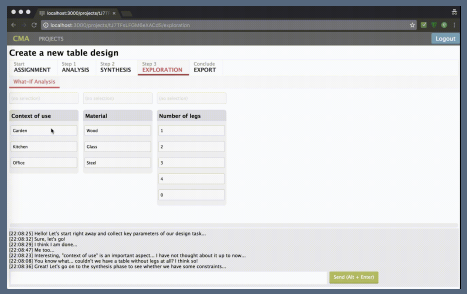
1. **Analysis**
   Determine parameters and values

2. **Synthesis**
   Assign pairwise consistency assessments

3. **Exploration**
   Explore the remaining solution space using software support

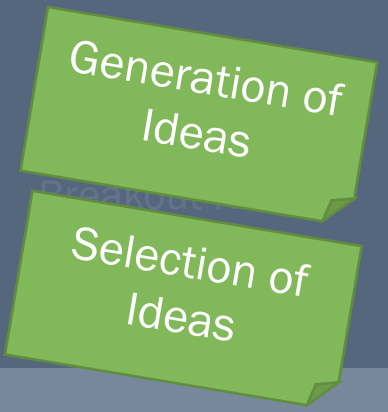






Agenda

09:15 – 09:45	Introduction	
09:45 – 10:15	Divergent Thinking	
10:15 – 11:15	6-3-5 Method, (SCAMPER)	
11:15 – 11:30	Convergent Thinking	
11:30 – 12:15	Clustering, How-Wow-Now, Dotmocracy	
12:15 – 13:00	**Lunch Break**	
13:00 – 13:10	Idea Refinement	Lecture Hall
13:10 – 13:30	Morphological Analysis (MA) + Study	Lecture Hall
13:30 – 13:45	**Short Break**	
13:45 – 14:00	MA: Analysis	Lecture Hall
14:00 – 15:15	Analysis	Breakout Rooms
15:15 – 15:30	MA: Synthesis	Lecture Hall
15:30 – 16:30	Synthesis	Breakout Rooms
16:30 – 16:40	MA: Exploration	Lecture Hall
16:40 – 17:00	Exploration	Breakout Rooms
17:00 – 17:15	**Wrap-up & Outlook**	Lecture Hall



Important Hints

- Parameters and values should follow the MECE rule: mutually exclusive, collectively exhaustive

- Levels & Choices from Sets

Team
Martin
Max
Petra
Martin, Max
Martin, Petra
Max, Petra
Martin, Max, Petra

Team		
Martin	Max	Petra
Ja	Ja	Ja
Nein	Nein	Nein

- Focus on the key aspects

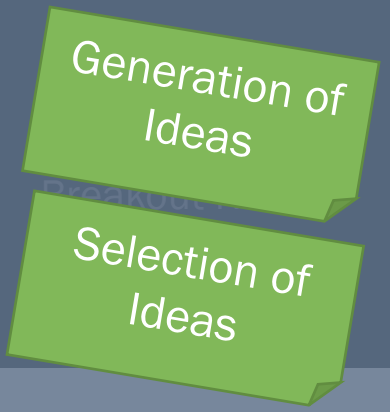
Morphological Analysis
Analysis

DEMO

Again, it’s your turn now! Define a Morphological Box based on your most promising idea

Have fun!

Agenda



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17:00 – 17:15	Wrap-up & Outlook	Lecture Hall

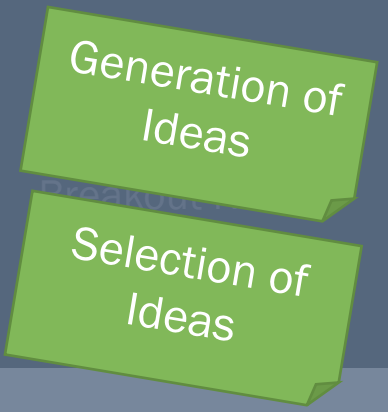
Morphological Analysis
Synthesis

DEMO

Again, it’s your turn now! Create a consistency matrix for your Morphological Model

Have fun!

Agenda



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16:40 – 17:00	**Exploration**	Breakout Rooms
17:00 – 17:15	**Wrap-up & Outlook**	Lecture Hall

Morphological Analysis
Exploration

DEMO

Again, it’s your turn now! Find the most interesting solutions.

Have fun!

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Generation of Ideas

Selection of Ideas

Refinement of Idea(s)