

Mitigating Fixation in Creative Process by Using Patent Data Tool as Stimuli

## Appendix

Ranzhi Wei

25-11-2025

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# 1. Project Brief

DESIGN  
FOR our  
future

TU Delft

## IDE Master Graduation

Project team, Procedural checks and personal Project brief

This document contains the agreements made between student and supervisory team about the student's IDE Master Graduation Project. This document can also include the involvement of an external organisation, however, it does not cover any legal employment relationship that the student and the client (might) agree upon. Next to that, this document facilitates the required procedural checks. In this document:

- The student defines the team, what he/she is going to do/deliver and how that will come about.
- SSC E&SA (Shared Service Center, Education & Student Affairs) reports on the student's registration and study progress.
- IDE's Board of Examiners confirms if the student is allowed to start the Graduation Project.

**1 USE ADOBE ACROBAT READER TO OPEN, EDIT AND SAVE THIS DOCUMENT**  
Download again and reopen in case you tried other software, such as Preview (Mac) or a webbrowser.

### STUDENT DATA & MASTER PROGRAMME

Save this form according to the format "IDE Master Graduation Project Brief\_familyname\_firstname\_studentnumber\_dd-mm-yyyy". Complete all blue parts of the form and include the approved Project Brief in your Graduation Report as Appendix 1!

family name	Wei	5675	Your master programme (only select the options that apply to you):
initials	R.	given name	Ranzhi
student number	5136717	IDE master(s):	<input type="checkbox"/> IPD <input type="checkbox"/> DII <input checked="" type="checkbox"/> SPD
street & no.		2nd non-IDE master:	
zipcode & city	Z	individual programme:	(give date of approval)
country	I	honours programme:	<input type="checkbox"/> Honours Programme Master
phone		specialisation / annotation:	<input type="checkbox"/> Medesign
email	F		<input type="checkbox"/> Tech. in Sustainable Design
			<input type="checkbox"/> Entrepreneurship

### SUPERVISORY TEAM \*\*

Fill in the required data for the supervisory team members. Please check the instructions on the right!

** chair	Senthil Chandrasegaran	dept. / section:	DOS
** mentor	Heng Gu	dept. / section:	DOS
2nd mentor			
organisation:			
city:		country:	
comments (optional)			

Chair should request the IDE Board of Examiners for approval of a non-IDE mentor, including a motivation letter and c.v.

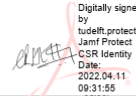
Second mentor only applies in case the assignment is hosted by an external organisation.

Ensure a heterogeneous team. In case you wish to include two team members from the same section, please explain why.

### Procedural Checks - IDE Master Graduation

#### APPROVAL PROJECT BRIEF

To be filled in by the chair of the supervisory team.

chair Senthil Chandrasegaran date 11 - 04 - 2022 signature   
Digitally signed by tuedelft.protect Jamf Protect CSR Identity Date: 2022.04.11 09:31:55 +02'00'

#### CHECK STUDY PROGRESS

To be filled in by the SSC E&SA (Shared Service Center, Education & Student Affairs), after approval of the project brief by the Chair. The study progress will be checked for a 2nd time just before the green light meeting.

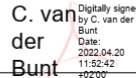
Master electives no. of EC accumulated in total: 35 EC

☒ YES all 1st year master courses passed

Of which, taking the conditional requirements into account, can be part of the exam programme 30 EC

☐ NO missing 1st year master courses are:

List of electives obtained before the third semester without approval of the BoE

name C. van der Bunt date 20 - 04 - 2022 signature   
Digitally signed by C. van der Bunt Date: 2022.04.20 11:52:42 +02'00'

#### FORMAL APPROVAL GRADUATION PROJECT

To be filled in by the Board of Examiners of IDE TU Delft. Please check the supervisory team and study the parts of the brief marked \*\*. Next, please assess, (dis)approve and sign this Project Brief, by using the criteria below.

- Does the project fit within the (MSc)-programme of the student (taking into account, if described, the activities done next to the obligatory MSc specific courses)?
- Is the level of the project challenging enough for a MSc IDE graduating student?
- Is the project expected to be doable within 100 working days/20 weeks?
- Does the composition of the supervisory team comply with the regulations and fit the assignment?

Content: ☒ APPROVED ☐ NOT APPROVED

Procedure: ☒ APPROVED ☐ NOT APPROVED

comments

name Monique von Morgen date 26 - 04 - 2022 signature \_\_\_\_\_

Initials & Name R. Wei 5675 Student number 5136717

Title of Project Mitigating fixation in creative process by using patent data tool as stimuli

**Mitigating fixation in creative process by using patent data tool as stimuli** project title

Please state the title of your graduation project (above) and the start date and end date (below). Keep the title compact and simple. Do not use abbreviations. The remainder of this document allows you to define and clarify your graduation project.

start date 21 - 03 - 2022 16 - 09 - 2022 end date

**INTRODUCTION \*\***

Please describe, the context of your project, and address the main stakeholders (interests) within this context in a concise yet complete manner. Who are involved, what do they value and how do they currently operate within the given context? What are the main opportunities and limitations you are currently aware of (cultural- and social norms, resources (time, money,...), technology, ...).

Creativity is one of the most important human cognitive capabilities, distinguishing human thinking from linear machine processing. Designers are expected to be creative and find "out of the box" solutions. To generate creative ideas, designers see how to reframe the problems, and how to search for solutions as a co-evolution process (Dorst & Cross, 2001). They need inspiration from design tools and workflows to explore creative opportunities (Crilly & Cardoso, 2017).

However, both design students and professionals experience different levels of fixation in the early conceptual stage, which prevents them from being productive (Jansson & Smith, 1991). Design fixation refers to the condition that designers conduct a limited creative exploration for the design task because of the unaware bias from previous design experience, knowledge, or assumptions (Crilly and Cardoso, 2017). Previous researchers also point out the need of informative tools to mitigate design fixation. One effective way is to use computer-based "inspirational stimuli", which refers to creative inspirations motivating designers to be creative for novel solutions (Crilly & Cardoso, 2017).

Patent database records large numbers of innovation solutions. Companies register their latest intellectual property in the patent database as a business strategy. They can also dig innovation insights from other companies' registered patents (Rivera, 2000). Patent visualization tools, such as PatentsView (<http://patentsview.org>), give users a quick overview by applying data mining and text mining technology and presenting patents in clear-structured infographics. Because of the low efficiency of manually searching patent documents, researchers have built patent data analysis and visualization tools, such as TechNet (<http://www.tech-net.org>) and InnoGPS system (<http://www.innogps.com>) to facilitate human interpretation of patent data. These knowledge-based visualization platforms automatically analyze millions of patent data based on semantic, document, and field levels. They can perform as design stimuli for designers to explore both the problem definition phase and solution phase (Luo et al., 2021).

Researchers propose a new computer-aided ideation process using combination and analogy methods to explore new engineering solutions with these patent tools. By using these near-distance stimuli, designers can find more feasible idea while far-distance stimuli can lead to more novel solutions (Luo et al., 2021). Fixation can happen in every design stage, including the problem definition phase and the co-evolution of problem solution process. Currently, most fixation studies measure the creative outcomes but not count the opportunities from the iteration of problem reinterpretation (Crilly & Cardoso, 2017). But, less is known about how these patent tools influence the design process and design fixation during different stages. This research will examine how designers can use these patent stimuli (near-distance or far-distance) and iteratively work on both design problems and solutions.

space available for images / figures on next page

## introduction (continued): space for images

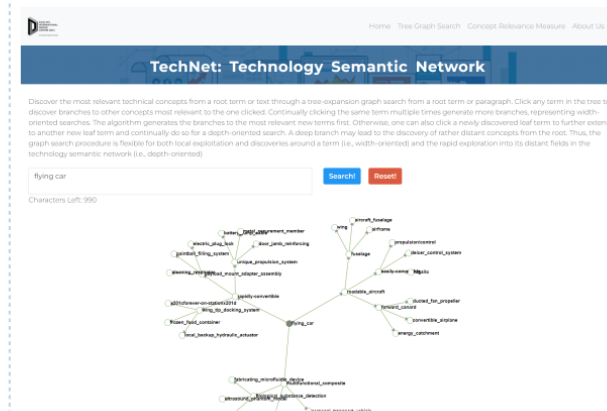


image / figure 1: an example of key word search in TechNet tool (<http://www.tech-net.org>)

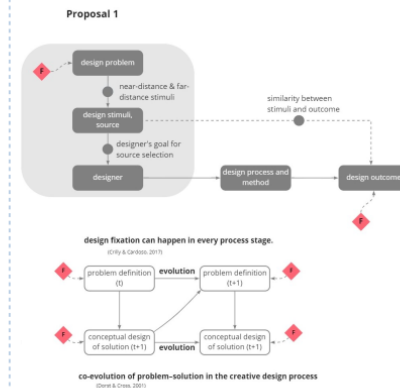


image / figure 2: variables in fixation researches and co-evolution process (Alipour et al. 2018, Dorst & Cross 2001)



**PROBLEM DEFINITION \*\***

Limit and define the scope and solution space of your project to one that is manageable within one Master Graduation Project of 30 EC (= 20 full time weeks or 100 working days) and clearly indicate what issue(s) should be addressed in this project.

From Alipour et al. (2018)'s design fixation research framework (Figure 2), design problem, inspiration source, designer, and design process can be key variables influencing the design outcome. Besides, the distance between inspiration source and design problem, designer's goal for source selection, and similarity between source and design outcome can be the elements influence the design solution. Knowledge-based fixation happens when designers fail to integrate the knowledge outside the familiar domain (Youmans & Arciszewski 2014).

TechNet and InnoGPS provide an easy-to-use interface driven by big data, present visualized semantic network as analysis result. Builders believe these tools can help designers retrieve insights for ideation and brainstorming purposes (SUTD Data-Driven Innovation Lab, 2022a & 2022b). Moreover, by these tools, innovators can navigate the complexity of searching and analyzing patent. Patent researchers also suggest work on this creative task in an iterative and exploratory process facilitated by the TRIZ method (Bonino et al., 2009). Considering these state-of-art tools are new for design innovators, the value of this study can provide understanding of how these tools can facilitate the iterative design process.

This project aims to research use these patent analysis and visualization tools as design stimuli to minimize knowledge-based fixation in different design stage (Figure 2).

RQ1: What are the effects of patent data stimuli on creative space exploration in both problem definition and conceptual design phase?

RQ2: How can patent data stimuli be effectively used to aid the design process?

**ASSIGNMENT \*\***

State in 2 or 3 sentences what you are going to research, design, create and / or generate, that will solve (part of) the issue(s) pointed out in "problem definition". Then illustrate this assignment by indicating what kind of solution you expect and / or aim to deliver, for instance, a product, a product-service combination, a strategy illustrated through product or product-service combination ideas, ... In case of a Specialisation and/or Annotation, make sure the assignment reflects this/these.

- The experiment to measure how effectively designers can collaborate with patent tools, analysis of design process, and experiment outcomes

- Redesign of designers' creative process with these tools

Phase 0, literature review, experiment setup, and preliminary test

The literature review will help understand previous research on design Stimuli and experiments set up in this domain. Some important elements to be clarified are Far-distance and near-distance stimuli, verbal and visual stimuli, the abstraction levels of stimuli, measurements of creativity, use of Linkography.

Phase 1-2, test

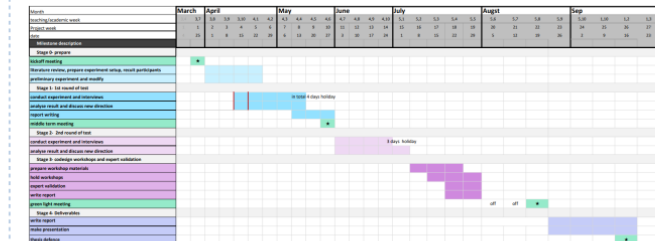
The experiment will be conducted in an empirical way. I will recruit around 10-15 participants from engineering design students, graduates, and researchers. They will try out patent data visualization with a given task, followed by an individual design assignment. In each test, participants need to use design stimuli and generate as many ideas as possible within the given design task. Rich data (think-aloud protocol, design notes, sketches) will be acquired during the tests. The design process data will be analyzed into Linkography to examine idea move and use of stimuli in the process. Also, qualitative transcript data will help determine designers' thinking and creative pattern in response to stimuli. These analyses will shed insights on the hypothesis of using patent semantics network as inspirations and provide direction for future research.

Phase 3, redesign of creative process and expert evaluation

**PLANNING AND APPROACH \*\***

Include a Gantt Chart (replace the example below - more examples can be found in Manual 2) that shows the different phases of your project, deliverables you have in mind, meetings, and how you plan to spend your time. Please note that all activities should fit within the given net time of 30 EC = 20 full time weeks or 100 working days, and your planning should include a kick-off meeting, mid-term meeting, green light meeting and graduation ceremony. Illustrate your Gantt Chart by, for instance, explaining your approach, and please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any, for instance because of holidays or parallel activities.

start date 21 - 3 - 2022 16 - 9 - 2022 end date



Kickoff: 21 March

Middle term: 4.6 week, 24 May 10AM

Green light meeting: 5.8 week, 15-19 August

Thesis Defense: 1.2 week, 12-16 September

**MOTIVATION AND PERSONAL AMBITIONS**

Explain why you set up this project, what competences you want to prove and learn. For example: acquired competences from your MSc programme, the elective semester, extra-curricular activities (etc.) and point out the competences you have yet developed. Optionally, describe which personal learning ambitions you explicitly want to address in this project, on top of the learning objectives of the Graduation Project, such as: in depth knowledge a on specific subject, broadening your competences or experimenting with a specific tool and/or methodology, .... Stick to no more than five ambitions.

I am interested in a research project on using big data analysis in the creative design process. Because in the future, a basic understanding of programming and big data analysis will be a must for almost all domains. I am interested in working with these data-driven tools and learning how they can change creative workflow. From this 5-6 month journey, I want to prove my capability of setting up new research, conducting research independently in SPD track. Besides these thoughts, I can also achieve my ambitions:

- improve project management with supervisor teams,
- improve communication skills and thesis writing.

Alipour, L., Faizi, M., Moradi, A. M., & Akrami, G. (2018). A review of design fixation: Research directions and key factors. *International Journal of Design Creativity and Innovation*, 6(1-2), 22-35.

Bonino, D., Ciaramella, A., & Corno, F. (2010). Review of the state-of-the-art in patent information and forthcoming evolutions in intelligent patent informatics. *World Patent Information*, 32(1), 30-38.

Crilly, N., & Cardoso, C. (2017). Where next for research on fixation, inspiration and creativity in design? *Design Studies*, 50, 1-38.

Dorst, K., & Cross, N. (2001). Creativity in the design process: co-evolution of problem-solution. *Design studies*, 22(5), 425-437.

Jansson, D. G., & Smith, S. M. (1991). Design fixation. *Design studies*, 12(1), 3-11.

Luo, J., Sarica, S., & Wood, K. L. (2021). Guiding data-driven design ideation by knowledge distance. *Knowledge-Based Systems*, 218, 106873.

PatentsView. (2021). PatentsView. <https://patentsview.org/>

Rivera, K. G., & Kline, D. (2000). Discovering new value in intellectual property. *Harvard business review*, 55, 1-14.

SUTD Data-Driven Innovation Lab. (2022a). InnoGPS: GPS for Innovation. InnoGPS. <http://www.innogps.com>

SUTD Data-Driven Innovation Lab. (2022b). TechNet: Technology Semantic Network. TechNet. <http://www.tech-net.org/>

Youmans, R. J., & Arciszewski, T. (2014). Design fixation: Classifications and modern methods of prevention. *AI EDAM*, 28(2), 129-137.

**FINAL COMMENTS**

In case your project brief needs final comments, please add any information you think is relevant.

## 2. Participant Consent Form

Delft University of Technology

**HUMAN RESEARCH ETHICS INFORMED CONSENT****(for Brainstorming Session)**

You are being invited to participate in a research study titled "Mitigating fixation in creative process by using patent data tool as stimuli." This study is being done by Ranzhi Wei, a master's student of Industrial Design Engineering, TU Delft.

This research aims to measure how effectively design students and researchers can brainstorm with an online patent data analysis tool (<http://tech-net.org>) as inspiration. Your brainstorming process and outcomes will contribute to this study. The data will be used for Ranzhi Wei's master's thesis at TU Delft. Each participant will receive a 20 euro voucher as compensation.

It will take approximately 90-100 minutes in two days. I will be asking you to do the following tasks:

- Fill in a pre-survey and post-experiment survey, say your experience of brainstorming, share your feedback about using the Tech-Net tool,
- Do two individual brainstorm sessions, write and draw on post-it notes, be video recorded of your writing, sketching, and using the computer,
- Use think-aloud protocol, say where your design ideas come from, which will be transcribed as text.

As with any online activity, the risk of a breach is always possible. Your data and answers in this study will remain confidential to the best of our ability. We will minimize any risks by giving you a number to represent you in the whole data collection and analysis process. The participant's facial image will be blurred. The two online tools, Tech-Net, and DuckDuckGo are for anonymous use and will not collect your IP addresses or any other identifiable data. After finishing this research, the data will be stored in Tu Delft Education Repository.

Your participation in this study is entirely voluntary, and you can withdraw at any time. You are free to omit any questions. Contact details:

Ranzhi Wei, +31651423969, R.Wei-1@student.tudelft.nl

Heng Gu, H.Gu@tudelft.nl

Senthil Chandrasegaran, R.S.K.Chandrasegaran@tudelft.nl

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
<b>A: GENERAL AGREEMENT – RESEARCH GOALS, PARTICIPANT TASKS AND VOLUNTARY PARTICIPATION</b>		
1. I have read and understood the study information dated [___/ 06/ 2022], or it has been read to me. I have been able to ask questions about the study and my questions have been answered to my satisfaction.	<input type="checkbox"/>	<input type="checkbox"/>
2. I consent voluntarily to be a participant in this study and understand that I can refuse to answer questions and I can withdraw from the study at any time, without having to give a reason.	<input type="checkbox"/>	<input type="checkbox"/>
3. I understand that taking part in the study involves: <ul style="list-style-type: none"> <li>Fill in a Pre-survey, and post-experiment survey, say my experience of brainstorming, feedback about using Tech-Net tool.</li> <li>Do two individual brainstorm sessions, write and draw on post-it notes, be video recorded of my writing, sketching and using computer.</li> <li>Use think aloud protocol, say design ideas, reasoning, and inspirations. The protocol will be transcribed as text, and analysed.</li> <li>Screen record of using Tech-Net, and using DuckDuckGo on the laptop.</li> </ul>	<input type="checkbox"/>	<input type="checkbox"/>
4. I understand that I will be compensated for my participation by 20 euro voucher	<input type="checkbox"/>	<input type="checkbox"/>
5. I understand that the study will be 2 sessions of around 100-120 minutes in total within 2 days.	<input type="checkbox"/>	<input type="checkbox"/>
<b>B: POTENTIAL RISKS OF PARTICIPATING (INCLUDING DATA PROTECTION)</b>		
6. I understand that taking part in the study involves the following risks of doing 2 brainstorm tasks. I know I can ask for the experiment to stop at any point.	<input type="checkbox"/>	<input type="checkbox"/>
7. I understand that taking part in the study also involves collecting specific personally identifiable information (PII): my name, email, my writings and sketches, surveys, audio transcripts, video recording, grading will not be shared beyond the research team.	<input type="checkbox"/>	<input type="checkbox"/>
9. I understand that the following steps will be taken to minimise the threat of a data breach, and protect my identity in the event of such a breach: anonymous data collection, secure data storage/limited access, transcription, blurring facial image.	<input type="checkbox"/>	<input type="checkbox"/>
10. I understand that personal information collected about me that can identify me, such as my name, email, my writings and sketches, surveys, audio transcripts, video recording, grading will not be shared beyond the research team. Personal facial image, voice will not be used for presentation, or publication.	<input type="checkbox"/>	<input type="checkbox"/>
11. I understand that the (identifiable) personal data I provide will be destroyed after the research student finishes master's thesis.	<input type="checkbox"/>	<input type="checkbox"/>
<b>C: RESEARCH PUBLICATION, DISSEMINATION AND APPLICATION</b>		
12. I understand that after the research study the de-identified information I provide will be used for research student's graduate thesis.	<input type="checkbox"/>	<input type="checkbox"/>
13. I agree that my responses, views or other input can be quoted anonymously in research outputs.	<input type="checkbox"/>	<input type="checkbox"/>

2

PLEASE TICK THE APPROPRIATE BOXES	Yes	No
15. By participating in this project and by signing this form you agree to transfer the copyright of the works that you are going to create within the mentioned project for the sole purpose of this project to Ranzhi Wei. In addition, you agree to waive all your moral rights to the extent this is possible.	<input type="checkbox"/>	<input type="checkbox"/>
<b>D: (LONGTERM) DATA STORAGE, ACCESS AND REUSE</b>		
16. I give permission for the de-identified data, including survey results, writings on post-it notes, transcription, and photos that I provide to be archived in TU Delft education repository so it can be used for future research and learning.	<input type="checkbox"/>	<input type="checkbox"/>
17. I understand that access to this repository is open.	<input type="checkbox"/>	<input type="checkbox"/>

Signatures		
Name of participant [printed]	Signature	Date
<p>I, as researcher, have accurately read out the information sheet to the potential participant and, to the best of my ability, ensured that the participant understands to what they are freely consenting.</p>		
Ranzhi Wei	Ranzhi Wei	15/06/2022
Researcher name [printed]	Signature	Date
Study contact details for further information: [Name, phone number, email address]		
Ranzhi Wei, +31651423969, R.Wei-1@student.tudelft.nl		

3

### 3. Data Management Plan

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#### Plan Overview

*A Data Management Plan created using DMPonline*

**Title:** Master's Thesis: Mitigating fixation in creative process by using patent data tool as stimuli

**Creator:**Ranzhi Wei

**Affiliation:** Delft University of Technology

**Template:** TU Delft Data Management Plan template (2021)

#### Project abstract:

The experiment measures how effectively design students and researchers can ideate with an online patent data analysis tool (<http://tech-net.org> ). Design researchers will evaluate participants' brainstorming process and outcomes. I will recruit around 10 design students, graduates, and researchers by convenient sampling from IDE faculty. They will do one given design task by using Tech-Net, and do another task by using DuckDuckGo. In each test, participants need to generate as many ideas as possible and write design ideas on Post-it notes. Their think-aloud protocol, design process and computer screen will be recorded during the tests. Also, they will fill in the pre-survey and post-experiment surveys to give their feedback about the tool. The design process and outcome will be analyzed by 2-3 design researchers to examine idea move and effect of using the online inspirational tool. This experiment will answer the effect of using the patent semantics network as inspiration and provide direction for future research.

**ID:** 101299

**Start date:** 21-03-2022

**End date:** 31-10-2022

**Last modified:** 08-06-2022

Created using DMPonline. Last modified 08 June 2022

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#### Master's Thesis: Mitigating fixation in creative process by using patent data tool as stimuli

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#### 0. Administrative questions

##### 1. Name of data management support staff consulted during the preparation of this plan.

My faculty data steward, Jeff Love, was consulted during the preparation of this DMP on 8th June, 2022.

##### 2. Date of consultation with support staff.

2022-06-08

#### I. Data description and collection or re-use of existing data

##### 3. Provide a general description of the type of data you will be working with, including any re-used data:

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Type of data	File format(s)	How will data be collected (for re-used data: source and terms of use)?	Purpose of processing	Storage location	Who will have access to the data
participant contact info, and participant number	.doc	Participants contact Ranzhi, share their info, or be recruited by Ranzhi	to give each participant an anonymised number to refer to them	Personal laptop drive +Project Storage TUD	Ranzhi Wei
scanned images of participants' writing, and sketching	.jpg	one-to-one brainstorming experiment	to understand how the online inspirational tool can help participant ideate	Personal laptop drive +Project Storage TUD	Ranzhi Wei
pre-survey, and post-experiment survey results	.xlsx	Online survey	To collect participants' demographic info, and their experience, feedbacks of the tool	Personal laptop drive +Project Storage TUD	Ranzhi Wei
screen record	.mov	one-to-one brainstorming experiment	To record how participants use the ideation tool, Tech-Net, and DuckDuckGo	Personal laptop drive+Project Storage TUD	Ranzhi Wei
video	.mov	one-to-one brainstorming experiment	To record participants writing, sketching process, and think-aloud protocol, only keep demo clips and eliminate rest after analysis phase	Personal laptop drive+Project Storage TUD	Ranzhi Wei
video	.mov	one-to-one brainstorming experiment	eliminate after analysis phase, use as one backup video recording for the whole experiment process	Personal laptop drive+Project Storage TUD	Ranzhi Wei

#### 4. How much data storage will you require during the project lifetime?

- < 250 GB

## II. Documentation and data quality

#### 5. What documentation will accompany data?

- README file or other documentation explaining how data is organised

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- Methodology of data collection

A document stating the following will be accompanying the data:

- Descriptions of the participants (non-personal information): their gender, age, education background, creative experience,
- Pre-survey, and post-experiment survey questions,
- descriptions of 2 brainstorming tasks,
- the experiment introduction slides.

Video descriptive system to represent the original videos:

- observations notes from screenshots, and video recording,
- transcript of the think-aloud protocol.

## III. Storage and backup during research process

#### 6. Where will the data (and code, if applicable) be stored and backed-up during the project lifetime?

- Another storage system - please explain below, including provided security measures
- Project Storage at TU Delft

Data will first be created and stored on Ranzhi personal laptop and then transferred to TU Delft Project Storage of student researcher Ranzhi Wei.

After each one-to-one experiment, participants' writing and sketching on post-it notes will be transferred into digital images using a TU Delft scanning machine. The video recordings will be shared from two iPhones on the researcher's laptop.

The think-aloud protocol extracted from videos will be immediately transcribed and anonymised. The participant's ideation video and screen records will be transferred as observation notes. In the data analysis stage, only important clips of videos will be kept as a demo to explain data analysis results until the research ends. Other unimportant or repeated videos will be eliminated after being analysed.

The physical copy of the data recorded in the iPhones will be destroyed. The anonymised files will then be stored and backed up in the Project Storage at TUD.

## IV. Legal and ethical requirements, codes of conduct

#### 7. Does your research involve human subjects or 3rd party datasets collected from human participants?

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- Yes

**8A. Will you work with personal data? (information about an identified or identifiable natural person)**

*If you are not sure which option to select, ask your [Faculty Data Steward](#) for advice. You can also check with the [privacy website](#) or contact the privacy team: [privacy-tud@tudelft.nl](mailto:privacy-tud@tudelft.nl)*

- Yes

**8B. Will you work with any types of confidential or classified data or code as listed below? (tick all that apply)**

*If you are not sure which option to select, ask your [Faculty Data Steward](#) for advice.*

- No, I will not work with any confidential or classified data/code

Any unintended confidential information collection will be avoided during the experiment. Before the experiment, the researcher will check the laptop screen, and remind participants not to share their personal information accidentally in the experiment, e.g. check email, open a webpage with their identifications, or answer a personal phone call.

**9. How will ownership of the data and intellectual property rights to the data be managed?**

*For projects involving commercially-sensitive research or research involving third parties, seek advice of your [Faculty Contract Manager](#) when answering this question. If this is not the case, you can use the example below.*

During the active phase of research, the responsible researcher Ranzhi Wei from TU Delft will oversee the access rights to data (and other outputs), as well as any requests for access from external parties. They will be released publicly, as part of the thesis report, no later than at the time of publication of corresponding research papers.

**10. Which personal data will you process? Tick all that apply**

- Email addresses and/or other addresses for digital communication
- Gender, date of birth and/or age
- Data collected in Informed Consent form (names and email addresses)

- Photographs, video materials, performance appraisals or student results

**11. Please list the categories of data subjects**

Design students, and researchers of IDE  
Specific professionals (to be targeted for validation of assumptions)

**12. Will you be sharing personal data with individuals/organisations outside of the EEA (European Economic Area)?**

- No

**15. What is the legal ground for personal data processing?**

- Informed consent

**16. Please describe the informed consent procedure you will follow:**

All study participants will be asked for their written consent for taking part in the study and for data processing before the start of the experiment.

**17. Where will you store the signed consent forms?**

- Same storage solutions as explained in question 6

**18. Does the processing of the personal data result in a high risk to the data subjects?**

If the processing of the personal data results in a high risk to the data subjects, it is required to perform a [Data Protection Impact Assessment \(DPIA\)](#). In order to determine if there is a high risk for the data subjects, please check if any of the options below that are applicable to the processing of the personal data during your research (check all that apply).

If two or more of the options listed below apply, you will have to [complete the DPIA](#). Please get in touch with the privacy team: [privacy-tud@tudelft.nl](mailto:privacy-tud@tudelft.nl) to receive support with DPIA.

If only one of the options listed below applies, your project might need a DPIA. Please

**get in touch with the privacy team: [privacy-tud@tudelft.nl](mailto:privacy-tud@tudelft.nl) to get advice as to whether DPIA is necessary.**

**If you have any additional comments, please add them in the box below.**

- None of the above applies

## **22. What will happen with personal research data after the end of the research project?**

- Personal data will be shared with others - please explain which personal data will be shared, with whom, how and whether you have specified this in the informed consent form
- Anonymised or aggregated data will be shared with others

A separate document that records all participants' names, contact info, experiment time, and participant numbers will be eliminated.

The experiment data will be published in the thesis appendix, and partly in the main report. This will happen under anonymized. The experiment data consists of:

- Answers to the pre-survey, and post-experiment survey questions,
- Writing and sketching as design outcomes in the two brainstorming tasks,
- Video recording of the brainstorming process,
- screen record of using Tech-Net, and DuckDuckGo,
- participant gender, age, education background, and creative experience

This is specified in the informed consent form and will only be done if the participants consent at time of the experiment and at time of the publication of the thesis.

## **23. How long will (pseudonymised) personal data be stored for?**

- 10 years or more, in accordance with the TU Delft Research Data Framework Policy

## **24. What is the purpose of sharing personal data?**

- For research purposes, which are in-line with the original research purpose for which data have been collected

## **25. Will your study participants be asked for their consent for data sharing?**

- Yes, in consent form - please explain below what you will do with data from participants who did not consent to data sharing

If participants do not consent to share data, they will be asked to consent to

anonymized data sharing. The expectancy is that all participants that agree to the experiment, will agree to the publication (at least anonymized).

If this is not the case, which can happen naturally, their data will not be saved longer than the active research phase nor published. It will be stored during the active research phase, for research purposes. As soon as the research is finished and the thesis is published, it will be deleted.

## **V. Data sharing and long-term preservation**

### **27. Apart from personal data mentioned in question 22, will any other data be publicly shared?**

- I do not work with any data other than personal data

### **29. How will you share research data (and code), including the one mentioned in question 22?**

- My data will be shared in a different way - please explain below

A separate document that records all participants' names, contact info, and participant numbers will be eliminated when the research ends. Video recording of the brainstorming process and screen records will be eliminated when the research ends.

The other anonymized data will be included in my thesis report, which will be published to the TU Delft Repository. There will be no other publication of sharing of the data separately.

### **30. How much of your data will be shared in a research data repository?**

- < 100 GB

### **31. When will the data (or code) be shared?**

- As soon as corresponding results (papers, theses, reports) are published

### **32. Under what licence will be the data/code released?**

- CC BY-NC-ND

## VI. Data management responsibilities and resources

### 33. Is TU Delft the lead institution for this project?

- Yes, the only institution involved

### 34. If you leave TU Delft (or are unavailable), who is going to be responsible for the data resulting from this project?

The data will not be saved by the TU Delft, also not after I leave the TU Delft. After publishing my thesis to Education Repository, the data will be public and does not have to be stored or managed.

### 35. What resources (for example financial and time) will be dedicated to data management and ensuring that data will be FAIR (Findable, Accessible, Interoperable, Re-usable)?

none



## 4. Human Research Ethics Checklist for Human Research

Delft University of Technology

### HUMAN RESEARCH ETHICS CHECKLIST FOR HUMAN RESEARCH (Version January 2022)

#### IMPORTANT NOTES ON PREPARING THIS CHECKLIST

1. An HREC application should be submitted for every research study that involves human participants (as Research Subjects) carried out by TU Delft researchers
2. Your HREC application should be submitted and approved **before** potential participants are approached to take part in your study
3. All submissions from Master's Students for their research thesis need approval from the relevant Responsible Researcher
4. The Responsible Researcher must indicate their approval of the completeness and quality of the submission by signing and dating this form OR by providing approval to the corresponding researcher via email (included as a PDF with the full HREC submission)
5. There are various aspects of human research compliance which fall outside of the remit of the HREC, but which must be in place to obtain HREC approval. These often require input from internal or external experts such as [Faculty Data Stewards](#), [Faculty HSE advisors](#), the [TU Delft Privacy Team](#) or external [Medical research partners](#).
6. You can find detailed guidance on completing your HREC application [here](#)
7. Please note that incomplete submissions (whether in terms of documentation or the information provided therein) will be returned for completion **prior to any assessment**
8. If you have any feedback on any aspect of the HREC approval tools and/or process you can leave your comments [here](#)

#### I. Applicant Information

<b>PROJECT TITLE:</b>	Mitigating fixation in creative process by using patent data tool as stimuli
<b>Research period:</b> <i>Over what period of time will this specific part of the research take place</i>	21 <sup>st</sup> , March, 2022- 21 <sup>st</sup> , October, 2022
<b>Faculty:</b>	Industrial Design Engineering
<b>Department:</b>	Design, Organization & Strategy
<b>Type of the research project:</b> <i>(Bachelor's, Master's, DreamTeam, PhD, PostDoc, Senior Researcher, Organisational etc.)</i>	Master's thesis
<b>Funder of research:</b> <i>(EU, NWO, TUD, other – in which case please elaborate)</i>	none
<b>Name of Corresponding Researcher:</b> <i>(If different from the Responsible Researcher)</i>	Ranzhi Wei
<b>E-mail Corresponding Researcher:</b> <i>(If different from the Responsible Researcher)</i>	R.Wei-1@student.tudelft.nl
<b>Position of Corresponding Researcher:</b> <i>(Masters, DreamTeam, PhD, PostDoc, Assistant/ Associate/ Full Professor)</i>	Master student
<b>Name of Responsible Researcher:</b> <i>Note: all student work must have a named Responsible Researcher to approve, sign and submit this application</i>	Senthil Chandrasegaran
<b>E-mail of Responsible Researcher:</b>	R.S.K.Chandrasegaran@tudelft.nl

Please ensure that an institutional email address (no Gmail, Yahoo, etc.) is used for all project documentation/ communications including informed Consent materials	
<b>Position of Responsible Researcher :</b> <i>(PhD, PostDoc, Associate/ Assistant/ Full Professor)</i>	Assistant Professor, supervisory team chair

#### II. Research Overview

*NOTE: You can find more guidance on completing this checklist [here](#)*

##### a) Please summarise your research very briefly (100-200 words)

What are you looking into, who is involved, how many participants there will be, how they will be recruited and what are they expected to do?

*Add your text here – (please avoid jargon and abbreviations)*

The experiment measures how effectively design students and researchers can ideate with an online patent data analysis tool (<http://tech-net.org>). Design researchers will evaluate participants' brainstorming process and outcomes. I will recruit around 10 design students, graduates, and researchers by convenient sampling from IDE faculty. They will do one given design task by using Tech-Net, and do another task by using DuckDuckGo. In each test, participants need to generate as many ideas as possible and write design ideas on Post-it notes. Their think-aloud protocol, design process and computer screen will be recorded during the tests. Also, they will fill in the pre-survey and post-experiment surveys to give their feedback about the tool. The design process and outcome will be analyzed by 2 design researchers to examine idea move and effect of using online inspirational tool. This experiment will answer the effect of using the patent semantics network as inspiration and provide direction for future research.

- b) If your application is an additional project related to an existing approved HREC submission, please provide a brief explanation including the existing relevant HREC submission number/s.

*Add your text here – (please avoid jargon and abbreviations)*

/

- c) If your application is a simple extension of, or amendment to, an existing approved HREC submission, you can simply submit an [HREC Amendment Form](#) as a submission through LabServant.

### III. Risk Assessment and Mitigation Plan

*NOTE: You can find more guidance on completing this checklist [here](#)*

Please complete the following table in full for all points to which your answer is “yes”. Bear in mind that the vast majority of projects involving human participants as Research Subjects also involve the collection of **Personally Identifiable Information (PII)** and/or **Personally Identifiable Research Data (PIRD)** which may pose potential risks to participants as detailed in Section G: Data Processing and Privacy below.

To ensure alignment between your risk assessment, data management and what you agree with your Research Subjects you can use the last two columns in the table below to refer to specific points in your Data Management Plan (DMP) and Informed Consent Form (ICF) – **but this is not compulsory**.

It’s worth noting that **you’re much more likely to need to resubmit your application if you neglect to identify potential risks**, than if you identify a potential risk and demonstrate how you will mitigate it. If necessary, the HREC will always work with you and colleagues in the Privacy Team and Data Management Services to see how, if at all possible, your research can be conducted.

			<i>If YES please complete the Risk Assessment and Mitigation Plan columns below.</i>		<i>Please provide the relevant reference #</i>	
ISSUE	Yes	No	RISK ASSESSMENT – what risks could arise? <i>Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!</i>	MITIGATION PLAN – what mitigating steps will you take? <i>Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.</i>	DMP	ICF
<b>A: Partners and collaboration</b>						
1. Will the research be carried out in collaboration with additional organisational partners such as: <ul style="list-style-type: none"> <li>One or more collaborating research and/or commercial organisations</li> <li>Either a research, or a work experience internship provider<sup>1</sup></li> </ul> <i><sup>1</sup> If yes, please include the graduation agreement in this application</i>		no				
2. Is this research dependent on a Data Transfer or Processing Agreement with a collaborating partner or third party supplier? <i>If yes please provide a copy of the signed DTA/DPA</i>		no				
3. Has this research been approved by another (external) research ethics committee (e.g.: HREC and/or MREC/METC)? <i>If yes, please provide a copy of the approval (if possible) and summarise any key points in your Risk Management section below</i>		no				
<b>B: Location</b>						

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		Please provide the relevant reference #	
ISSUE	Yes	No	RISK ASSESSMENT – what risks could arise? <i>Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!</i>	MITIGATION PLAN – what mitigating steps will you take? <i>Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.</i>	DMP	ICF
4. Will the research take place in a country or countries, other than the Netherlands, within the EU?		no				
5. Will the research take place in a country or countries outside the EU?		no				
6. Will the research take place in a place/region or of higher risk – including known dangerous locations (in any country) or locations with non-democratic regimes?		no				
C: Participants						
7. Will the study involve participants who <b>may</b> be vulnerable and possibly (legally) unable to give informed consent? (e.g., children below the legal age for giving consent, people with learning difficulties, people living in care or nursing homes.)		no				
8. Will the study involve participants who <b>may</b> be vulnerable under specific circumstances and in specific contexts, such as victims and witnesses of violence, including domestic violence; sex workers; members of minority groups, refugees, irregular migrants or dissidents?		no				
9. Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator (such as own children, own students or employees of either TU Delft and/or a collaborating partner organisation)? <i>It is essential that you safeguard against possible adverse consequences of this situation (such as allowing a student's failure to participate to your satisfaction to affect your evaluation of their coursework).</i>		no				
10. Is there a high possibility of re-identification for your participants? (e.g., do they have a very specialist job of which there are only a small number in a given country, are they members of a small community, or employees from a partner company collaborating in the research? Or are they one of only a handful of (expert) participants in the study?		no				
D: Recruiting Participants						

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		Please provide the relevant reference #	
ISSUE	Yes	No	RISK ASSESSMENT – what risks could arise? <i>Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!</i>	MITIGATION PLAN – what mitigating steps will you take? <i>Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.</i>	DMP	ICF
11. Will your participants be recruited through your own, professional, channels such as conference attendance lists, or through specific network/s such as self-help groups	yes		The possible risk of revealing participants' name and contact, The possible risk of showing participants creativity competency in the brainstorming tasks.	All the data collected from the participant, e.g. brainstorming and survey results, will be anonymized. They will be given a number to refer to all the data collected from them. And the participant's name and contact list will not be shared with anyone. The grading of their brainstorming outcomes is only to compare the effect of different brainstorming tools, and to test their collaboration with the brainstorming tool. It does not imply their creativity competency.		
12. Will the participants be recruited or accessed in the longer term by a (legal or customary) gatekeeper? (e.g., an adult professional working with children; a community leader or family member who has this customary role – within or outside the EU; the data producer of a long-term cohort study)		no				
13. Will you be recruiting your participants through a crowd-sourcing service and/or involve a third party data-gathering service, such as a survey platform?		no				
14. Will you be offering any financial, or other, remuneration to participants, and might this induce or bias participation?	yes		The possible risk of counterfeit money, revealing participant's bank account,	The financial remuneration will be voucher to be sent to all participants directly from Amazon.nl. The participants do not need to say their personal bank account information.		
<b>E: Subject Matter</b> <i>Research related to medical questions/health may require special attention. See also the website of the <a href="#">CCMO</a> before contacting the HREC.</i>						
15. Will your research involve any of the following: <ul style="list-style-type: none"> <li>• Medical research and/or clinical trials</li> <li>• Invasive sampling and/or medical imaging</li> <li>• Medical and In Vitro Diagnostic Medical Devices Research</li> </ul>		no				
16. Will drugs, placebos, or other substances (e.g., drinks, foods, food or drink constituents, dietary supplements) be administered to the study participants? <i>If yes see <a href="#">here</a> to determine whether medical ethical approval is required</i>		no				
17. Will blood or tissue samples be obtained from participants? <i>If yes see <a href="#">here</a> to determine whether medical ethical approval is required</i>		no				
18. Does the study risk causing psychological stress or anxiety beyond that normally encountered by the participants in their life outside research?		no				

			If YES please complete the Risk Assessment and Mitigation Plan columns below.		Please provide the relevant reference #	
ISSUE	Yes	No	RISK ASSESSMENT – what risks could arise? <i>Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!</i>	MITIGATION PLAN – what mitigating steps will you take? <i>Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.</i>	DMP	ICF
19. Will the study involve discussion of personal sensitive data which could put participants at increased legal, financial, reputational, security or other risk? (e.g., financial data, location data, data relating to children or other vulnerable groups) <i>Definitions of sensitive personal data, and special cases are provided on the TUD Privacy Team website.</i>		no				
20. Will the study involve disclosing commercially or professionally sensitive, or confidential information? (e.g., relating to decision-making processes or business strategies which might, for example, be of interest to competitors)		no				
21. Has your study been identified by the TU Delft Privacy Team as requiring a Data Processing Impact Assessment (DPIA)? <i>If yes please attach the advice/approval from the Privacy Team to this application</i>		no				
22. Does your research investigate causes or areas of conflict? <i>If yes please confirm that your fieldwork has been discussed with the appropriate safety/security advisors and approved by your Department/Faculty.</i>		no				
23. Does your research involve observing illegal activities or data processed or provided by authorities responsible for preventing, investigating, detecting or prosecuting criminal offences <i>If so please confirm that your work has been discussed with the appropriate legal advisors and approved by your Department/Faculty.</i>		no				
<b>F: Research Methods</b>						
24. Will it be necessary for participants to take part in the study without their knowledge and consent at the time? (e.g., covert observation of people in non-public places).		no				
25. Will the study involve actively deceiving the participants? (For example, will participants be deliberately falsely informed, will information be withheld from them or will they be misled in such a way that they are likely to object or show unease when debriefed about the study).		no				
26. Is pain or more than mild discomfort likely to result from the study? And/or could your research activity cause an accident involving (non-) participants?		no				
27. Will the experiment involve the use of devices that are not 'CE' certified? <i>Only, if 'yes': continue with the following questions:</i>		no				
• Was the device built in-house?		no				

			<i>If YES please complete the Risk Assessment and Mitigation Plan columns below.</i>		<i>Please provide the relevant reference #</i>	
ISSUE	Yes	No	<b>RISK ASSESSMENT – what risks could arise?</b> <i>Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!</i>	<b>MITIGATION PLAN – what mitigating steps will you take?</b> <i>Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.</i>	DMP	ICF
<ul style="list-style-type: none"> <li>Was it inspected by a safety expert at TU Delft? <i>If yes, please provide a signed <a href="#">device report</a></i></li> </ul>		no				
<ul style="list-style-type: none"> <li>If it was not built in-house and not CE-certified, was it inspected by some other, qualified authority in safety and approved? <i>If yes, please provide records of the inspection</i></li> </ul>		no				
28. Will your research involve face-to-face encounters with your participants and if so how will you assess and address Covid considerations?	yes		The possible risk of Covid infection	Confirm the participant and researcher do not have any Covid symptom, keep 1 meter social distance in the experiment		
29. Will your research involve either: a) “big data”, combined datasets, new data-gathering or new data-merging techniques which might lead to re-identification of your participants and/or b) artificial intelligence or algorithm training where, for example biased datasets could lead to biased outcomes?		no				
<b>G: Data Processing and Privacy</b>						
30. Will the research involve collecting, processing and/or storing any directly identifiable PII (Personally Identifiable Information) including name or email address that will be used for administrative purposes only? (eg: obtaining Informed Consent or disbursing remuneration)	yes		The possible risk of data breach of participants' email, name	The contact data is stored separately from other files. It is only accessible to Corresponding Researcher. The data will be eliminated when the research ends.		
31. Will the research involve collecting, processing and/or storing any directly or indirectly identifiable PIRD (Personally Identifiable Research Data) including videos, pictures, IP address, gender, age etc and what other Personal Research Data (including personal or professional views) will you be collecting?	yes		The possible risk of revealing personal identifiable information, including social media account, partial facial images in the video recording, gender and age in the pre-survey.	<p>Before the experiment, the Researcher will remind participants and check that they do not use their email or social media with personally identifiable information on the laptop.</p> <p>The Researcher will avoid participants' facial images being recorded.</p> <p>After the experiment, the participant's ideation video and screen records will be transferred as observation notes. In the data analysis stage, only important clips of videos will be kept as a demo to explain data analysis results until the research ends.</p> <p>Other unimportant or repeated videos will be eliminated after being analyzed into observation notes. Video recording of the brainstorming process and screen recording will be eliminated when the research ends.</p>		

			<i>If YES please complete the Risk Assessment and Mitigation Plan columns below.</i>		<i>Please provide the relevant reference #</i>	
ISSUE	Yes	No	RISK ASSESSMENT – what risks could arise? <i>Please ensure that you list ALL of the actual risks that could potentially arise – do not simply state whether you consider any such risks are important!</i>	MITIGATION PLAN – what mitigating steps will you take? <i>Please ensure that you summarise what actual mitigation measures you will take for each potential risk identified – do not simply state that you will e.g. comply with regulations.</i>	DMP	ICF
32. Will this research involve collecting data from the internet, social media and/or publicly available datasets which have been originally contributed by human participants	yes		The possible risk of revealing participant's personal online data, and online surfing behavior.	The survey forms use Microsoft office form, which align with GDPR. Tech-Net and DuckDuckgo website, do not track or store participants' IP addresses, personal accounts, or usage history.		
33. Will your research findings be published in one or more forms in the public domain, as e.g., Masters thesis, journal publication, conference presentation or wider public dissemination?	yes		It will be published in education repository.	There will be no other publication or sharing of the data separately.		
34. Will your research data be archived for re-use and/or teaching in an open, private or semi-open archive?		no				

#### H: More on Informed Consent and Data Management

*NOTE: You can find guidance and templates for preparing your Informed Consent materials [here](#)*

Your research involves human participants as Research Subjects if you are recruiting them or actively involving or influencing, manipulating or directing them in any way in your research activities. This means you must seek informed consent and agree/ implement appropriate safeguards regardless of whether you are collecting any PIRD.

Where you are also collecting PIRD, and using Informed Consent as the legal basis for your research, you need to also make sure that your IC materials are clear on any related risks and the mitigating measures you will take – including through responsible data management.

*Got a comment on this checklist or the HREC process? You can leave your comments [here](#)*

#### IV. Signature/s

*Please note that by signing this checklist list as the sole, or Responsible, researcher you are providing approval of the completeness and quality of the submission, as well as confirming alignment between GDPR, Data Management and Informed Consent requirements.*

Name of Corresponding Researcher (if different from the Responsible Researcher) (print)

Signature of Corresponding Researcher:

Ran zhi Wei

Date: 15 June 2022

Name of Responsible Researcher (print)

Senthil Chandrasegaran

Signature (or upload consent by mail) Responsible Researcher:



Date: 15 June 2022

#### V. Completing your HREC application

Please use the following list to check that you have provided all relevant documentation

##### Required:

- **Always:** This completed HREC checklist
- **Always:** A data management plan (reviewed, where necessary, by a data-steward)
- **Usually:** A complete Informed Consent form (including Participant Information) and/or Opening Statement (for online consent)

©Please also attach any of the following, if relevant to your research:

Document or approval	Contact/s
Full Research Ethics Application	After the assessment of your initial application HREC will let you know if and when you need to submit additional information
Signed, valid <a href="#">Device Report</a>	Your <a href="#">Faculty HSE advisor</a>
Ethics approval from an external Medical Committee	TU Delft Policy Advisor, Medical (Devices) Research
Ethics approval from an external Research Ethics Committee	Please append, if possible, with your submission
<a href="#">Approved Data Transfer or Data Processing Agreement</a>	Your <a href="#">Faculty Data Steward</a> and/or TU <a href="#">Delft Privacy Team</a>
<a href="#">Approved Graduation Agreement</a>	Your Master's thesis supervisor
Data Processing Impact Assessment (DPIA)	TU <a href="#">Delft Privacy Team</a>
Other specific requirement	Please reference/explain in your checklist and append with your submission



## 5. Learnings From 1st Pilot Experiment

Experiment date: 3rd May, 2022

Place: IO

Clear instructions should be given to participants to get familiar with the interface, and an example usage of Tech-Net. For new users, the interface of the Tech-Net website is confusing and not user-friendly as regular websites such as Google, and Pinterest. When a new user inputs phases, Tech-Net website shows ERROR if the phases do not exist. Besides, the word tree graph is flowing on the screen. This makes it difficult for a participant to zoom in and zoom out to read a specific word. The participant was used to ENTER button after she input the search word. She forgot to press the SEARCH button on the screen. These issues bring inconvenience for users to try patent databases as stimuli.

Secondly, clear communication and preparation for the brainstorming session are also needed. I should help participants be well informed for the brainstorming task, make them relaxed, and do the task more naturally. Also, they should know they need to consider problem definition iteratively during the task.

### Improvements to be made:

#### Participant Selection Criteria:

- The participants should have interest/curiosity in doing design ideation tasks. Ask and recruit quick learner who is interested in creative activities, and brainstorming. I will put ads in the IO faculty, and give a reward(20 euro voucher).

#### Communication:

- tell participant the task is to generate as many ideas as possible in a given time,

- help participant to be ready for the brainstorming mode, show an example of problem solution iteration, and do a warmup exercise,
- Do not need to tell the participant too many research terminologies to confuse them, such as “design fixation”, “design by analogy”,
- Do not suggest that the participant join the experiment when feeling tired.

#### Preparation before experiment:

- let the participant try out the website at home, and get used to the search interface.
- Do brainstorming exercise , make sure participant are familiar with generating enough quantity of ideas in a given time.

#### Survey input:

- Set more objective measurements about designers’ pain points in the ideation stage. E.g. How often do you feel fixated in one design task? Or How do you see the importance of having a large quantities of brainstorming ideas in the early stage of your project?
- Collect participant’s preference, and user habit during ideation process, E.g. their direct inspiration from text or images, method, tools used?

#### Design task:

- in the training, and warmup session, give each participant enough time to try out keywords within their own interest,
- Further test about daily object, e.g. toothbrush. So that they can emphasize, and reframe differently on the problems. Do not use

baby crib task with which participant do not have life experience.

#### Experiment setup:

- Speak aloud protocol does not work out well. I should show participant a short video to explain.

## 6. Learnings From 2<sup>nd</sup> Pilot Experiment

Experiment date: 14-17 May, 2022

#### **Issues identified from pilot test:**

- Think aloud is difficult for one participant. He says he is a highly visual thinker. Thinking in verbal way is challenging when he do the brainstorm task.
- Participants tend to select similar concepts as final deliverables in two-day experiment, and possibly ignore other much more novel ideas.
- Participants fixed on the design directions from 1<sup>st</sup> time.
- Make 2 tasks for participants, otherwise most participants can possibly get fixed in the second day experiment.

#### **Learning from pilot experiment:**

- Ask how they reframe the problems when they present their ideation.
- Make sure all device record properly in the experiment. One more camera needs to record the participant from wide view.

#### Procedure

- Tell participants convergent process is not needed, otherwise they can possibly produce final results without fully exploring new ideas.

## 7. Experiment Introduction And Setup V3 Version

The document is sent to participants via WhatsApp, or email at least days before the experiment.

Hi, there! Thank you for participating this fun brainstorming experiment. Below are the information of this experiment.



Design challenge of an everyday object (shown in presentation with examples):

- learn to use Tech-Net website, and keyword texts from patent data as design inspirations,
- explore as many directions as possible in 2\*20 minutes,
- try reframe the design problem from different perspectives.

#### Record of data:

- Screen record, Key + G,
- think aloud protocol, speak out how you thoughts, and whatever come up to your mind in the process, including the difficulties you meet with,
- video record of the sketch on the Post-it note.

It takes around 100 min. Participant join patent data Condition(using Tech-net) and baseline condition (using Duckduckgo), Task A, B in random order and combination.

Condition	Session	Time	Detail	Materials
Patent data condition	Presentation of Tech-Net, and brainstorming training	15-20 min	Introduction of how to use Tech-net tool, try out the tool, Q&A with website interface Try out with participant's own design task on Tech-Net until they feel comfortable with the interface	Showing Tech-Net website, Online presentation
	Pre-survey	2-3 min	do the survey, sign consent form,	Online survey form, Consent form,
	1 <sup>st</sup> brainstorming task	20min	(in randomize order of using Tech-Net, or not using) Do the design task	Post-it and color pens, If it is with Tech-Net condition, survey online link
	Presentation of ideas	3-5min	Explain the ideas on post-it, and why, what, how, when to use analogy	
	survey (only for using Tech-Net condition )	5-7min	Post-experiment survey	Online survey form
	Incubation period			
Baseline condition	Review training slides	3 min	Review 1 <sup>st</sup> day training materials	
	2 <sup>nd</sup> brainstorming task	20min	(in random order) Do another design task in another condition	Post-it and pens,
	Presentation of ideas	3-5min	Explain the ideas on post-it	
	Final reflection	5-7min	Post-experiment survey	Online survey form

Pre-experiment Survey, and results (V3)

(Recruiting participants who are interested in brainstorming, and ideation activities), Thank you for participating in this experiment. Please take around 3-5 minutes to fill in this form. <https://forms.office.com/r/zJCievpWtu>

Post-experiment Survey, and results (V3)

Congratulates. You have done the task. Now let's take around 10 minutes to know your feedbacks. <https://forms.office.com/r/dGxY9qfMi7>

## 8. Training Material For Participant(V3)

# Brainstorming with Tech-Net

patent data-driven ideation tool

Master thesis, Ranzhi Wei

## Survey

---

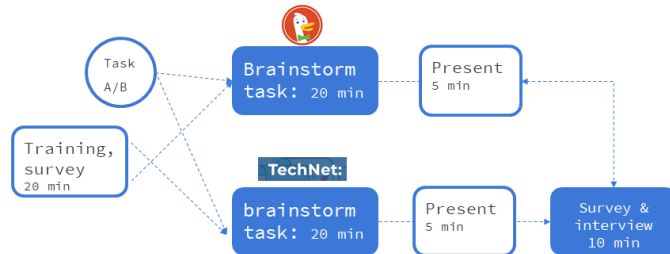
Please Fill in the online survey.

<https://forms.office.com/r/zJCievpWtu>



## Experiment

---

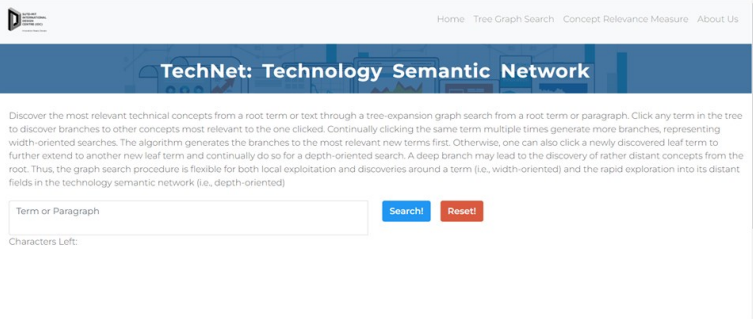


## What is Tech-Net

---

- Technology semantic analysis of millions of patent database,
- Extract keywords in categories rather than show details,
- Help designers to get key information and brainstorm new ideas.



	<h2>Experiment purpose</h2> <p>---</p> <ul style="list-style-type: none"> <li>• How Tech-Net can help you create more ideas?</li> <li>• How Tech-Net can help you define new problems?</li> </ul>
<h2>Open-ended design tasks</h2> <p>---</p> <ul style="list-style-type: none"> <li>• 2 task: redesign everyday object,</li> <li>• Free exploration. No restrictions on design task,</li> <li>• Write down as many problems as possible,</li> <li>• Write down as many solutions as possible.</li> </ul>	<h2>Project brief</h2> <p>---</p> <div> <p>Please use 20 minutes to think about as many ideas as possible and write or draw on post-it notes as your typical brainstorming session. A useful way is to search with many keywords. Only diverging process is required. Please do not judge the ideas; freewheel your mind.</p> <div> <div>Task A</div> <div>Task B</div> </div> </div>



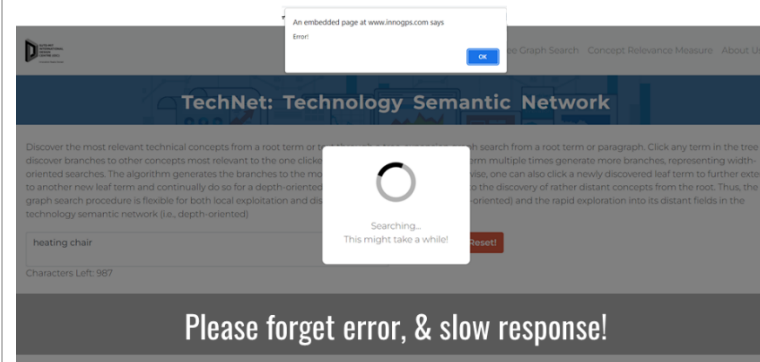
## Operate

---

- Move tree graph, move a search result dot: long press left click,
- Press Search key on screen(not ENTER key on keyboard)

Search!

Reset!



## Try out

---

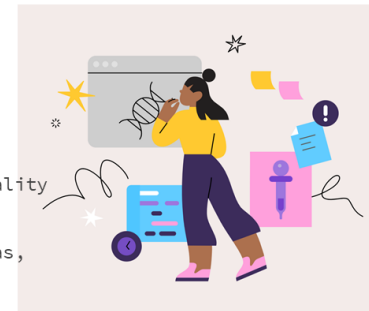
Do you have questions about Tech-Net?

Do you feel comfortable to use Tech-Net?

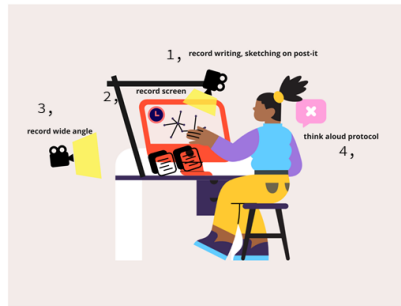
## Brainstorming principles

---

- do not judge the ideas,
- freewheel the mind,
- go for **quantity** than quality (search many keywords),
- combine and improve ideas,
- focus on get it done.



## Data recording

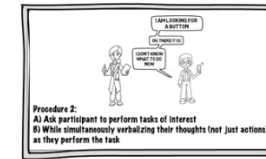


You will have:  
A timer,  
Post-it notes & Pen

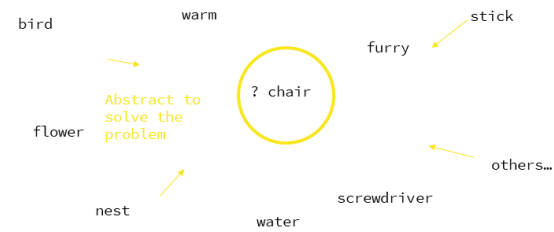
## Creative analogy



## Think aloud protocol



## Creative analogy game 1: chair design





## Warm up exercise

---

Think about 100 uses of a Pen

## Warm up exercise

---

1. Write,
2. Draw,
3. Self-defence,
4. Clean teeth,
5. Straw for drinking,
6. Punch paper
7. Store & pass secret messages,
8. make a chandelier,
9. Ruler,
10. Blow gun,
11. Toothpicks container...

<https://www.blogbyben.com/2013/07/100-uses-for-bic-pen.html>

## Duck Duck Go

---



The search engine  
protect privacy

## Post-experiment survey

---

Please Fill in the  
online survey.

<https://forms.office.com/r/dGxY9qfMi7>



## 9. Printed Tasks And Briefs

The following tasks, and design brief will be printed, and present to participant during the experiment.

---

Task A: ***Design a novel(unconventional) portable device that can keep user dry in strong wind and rain. Please think aloud!***

---

Task B: ***Design a novel(unconventional) device that can keep users' teeth clean every day. Please think aloud!***

---

### **Brief:**

Please use **20** minutes to brainstorm as **MANY** design directions as possible. Then, write or draw on every post-it note. Please think about what problems you want to solve and describe every new design direction.

No need to go into the details. Different solutions can solve the same design problem. The same solution can also solve different problems.

### **Tips:**

- Please do not judge the ideas; and freewheel your mind.
- Try to search different keywords. You are encouraged to go for novel out-of-box ideas.

### **Rules for using the given online tool:**

1. In the Duckduckgo condition, you can use Duckduckgo as normal brainstorming session.
2. For TechNet condition, you must use TechNet to think about ideas first. If you have difficulty understanding your search results from TechNet, you can use Duckduckgo to help you interpret TechNet search results. You can NOT search for other words that come up to you in Duckduckgo.

## 10. Poster For Recruiting Participants

### Are you curious about using a patent data driven tool for ideation?

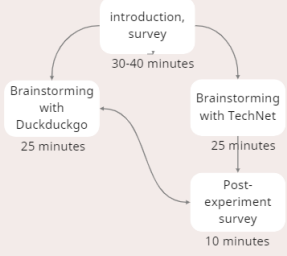
**Are you...?**

You are a design student, graduate, or design researcher.  
You find lots of fun in brainstorming activities.  
You have an interest in tech-driven products.

**Purpose**

This is part of my master thesis. I would like to know your opinions about how this patent data driven tool can help you in ideation and brainstorming activities.



**Procedure**



```
graph TD; A["introduction, survey  
30-40 minutes"] --> B["Brainstorming with Duckduckgo  
25 minutes"]; A --> C["Brainstorming with TechNet  
25 minutes"]; B --> D["Post-experiment survey  
10 minutes"]; C --> D;
```

You will do 2 fun brainstorming tasks with Duckduckgo search engine, and one patent data analysis tool (<http://www.tech-net.org/>) separately. Each task takes you about 20 minutes brainstorming, 5 minutes explanation and reflection. I will give a 30 minutes introduction about patent data analysis tool. You will also fill in one survey, and post experiment survey.

Time	Contact	Reward
It takes about 100-120 minutes in 2 continuous days. You can book any time from 1st July to 17th July, 2022.	Natalie Wei +31651423969 R.Wei-1@student.tudelft.nl	20 euro online store voucher



## 11. 2<sup>nd</sup> Pilot Results

Recruiting participants who are interested in brainstorming, and ideation activities. The purpose of the experiment, Tech-net tool, and 2-day agenda were clearly stated in the email communication. 2 participants joined the pilot experiment.

Participant code	age	Work/ Study	Type of thinking	Experiment order	Their feedbacks of preferred order
X	30	PhD, Postdoc	Visual thinker	Baseline condition, Patent data condition,	Want to use Tech-Net first
Y	28	PhD, Postdoc	Visual thinker	Baseline condition, Patent data condition,	Want to use Google search first

### Pre-survey results

	Question No.	1.	2.	3.	4.	5.	6.	7.
participant code	Timestamp	How do you feel your energy level now? (4 neutral)	Currently you are	How many years have you studied in Industrial design engineering?	How many years have you worked in Industrial design engineering?	How are you familiar with creative brainstorming activities? (4 neutral)	How do you see the importance of trying many ideas in the early ideation stage? (4 neutral)	How do you see the challenge for your ideation and brainstorming task? (4 neutral)
Y	14/05/2022 19:39:11	3	phd researcher, post-doc researcher	0	5	5	5	4
X	16/05/2022 17:09:35	3	phd researcher, post-doc researcher	7	5	6	7	5

	Question No.	8.	9.	10.
participant code	Timestamp	Where do you find your design inspirations for your ideation and brainstorming task?	Have you used any inspiration source driven by patent data analysis?	What design methods (sketching, mind map, brainwriting, etc.) do you use for your ideation and brainstorming task?

Y	14/05/2022 19:39:11	card decks; google image	No	sketching, mind map, brainwriting
X	16/05/2022 17:09:35	memories of past experiences, imagination of future scenarios, talking with co-workers, casually thinking while working on other things, etc.	No	sketching, mind map, design fiction, storyboard, etc.

### Post-experiment survey results

	Question No.	11.	12.	13.	14.	15.	16.
Timestamp	participant code	How do you feel your energy level when you take the experiment? (4 neutral)	How creative do you think of using Tech-Net as design inspiration (not considering the interface design, 4 neutral)?	How similar do you think of using Tech-Net as design inspiration compared with your current brainstorming tool (4 neutral)?	How efficient do you think of using Tech-Net as design inspiration (not considering the interface design, 4 neutral)?	How do you think Tech-Net can help you to think about problems creatively (not considering the interface design, 4 neutral)?	How do you feel Tech-Net help you explore many ideas rather than fixed on one idea (4 neutral)?
17/05/2022 21:16:19	Y	3	5	5	5	5	6
17/05/2022 17:39:52	X	4	5	2	6	2	6

Note: participant G joined experiment twice. The first experiment last 10 minutes. Then, the timing changed to 20 minutes which is the same with participant X.

	Question No.	17.	18.	19.
Timestamp	participant code	If you can redesign the Tech-Net website, which part do you want to change most?	Which part of Tech-Net website are of most value to you (4 neutral)?	Do you need the extra guideline or methodological support to use Tech-Net search for design ideation?
14/05/2022 20:59:41	Y	maybe add some images	it can show up different words related to the keyword, which triggers me to think of ideas	No

17/05/2022 17:39:52	X	visual elements, visually interactive, add a notebook function, to track your interaction history	the number of surprisingly relevant (sub)topics	No
participant code	Condition with Google search		Condition with Tech-Net	
	Search times	Keywords	Search times	Keywords
Y	4	Shared umbrella Umbrella in big wind, Raincoat, Raincoat strong wind,	5	umbrella, rib, raincoat, hat, curtain,
X	1	Wind proof umbrella	2	Raincoat, umbrella


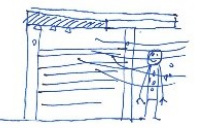

Table 1 Information

Condition	Search Keyword	Idea
Patent data condition	windproof umbrella	1. Umbrella 2. Raincoat 3. Bike 4. Shoes 5. glasses 6. A bus stop with dryer function ...
Baseline Condition	Rain coat  Umbrella (generate 8 idea move)	1. back pack, 2. hooded jacket, 3. flexible material+ shape shifting material 4. hooded jacket style raincoat, sketch 5. back pack that can provide a roof and change shape 6. Neck strap 7. Inflatable rain coat folded in the shape of a neck strap 8. Tent+ umbrella 9. Unbrella that can be attached to the cloth

Table 2 Example Of Participant X Ideation Process In The Pilot Experiment

### Brainstorming sketches

X in baseline condition

0-1 every day objects	0-2 Glasses.	2-1 Fan ★ 2-3 <u>Dryer</u> (ventilation?) 2-5 Warming/drying technologies ★ 3-2 Bus stop	★ 2-2 heating-system 2-4 temperature-sensor. 3-1 front of the building extended 3-3 <u>Environmental</u> (technologies)	<p>F-1 An umbrella that <del>is</del> can be combined with the coat to withstand the wind.</p>  <p>F-2 A busstop to dry the people who wait for bus, or who are escaping from the Rain.</p>  <p>F-3 A rain coat that dry the wearer from the inside of it.</p> 
0-3 bike 1-1 Rain-products tools/wearables ★ 1-3 Rain coat 1-5 Not usable in strong wind.	0-4 Hat. 1-2 Rain-shoes ★ 1-4 Umbrella			

△backpack

△ hooded jack.

★ A backpack that can produce a "roof" through change the shape.



Δ neck-strap.

a flexible material  
↓  
shape-shifting material.

\* A hooded jack ~~hose~~  
hood can change shape to  
protect the person from the  
rain (wind)



\* inflatable raincoat  
in the shape of a neck-strap.



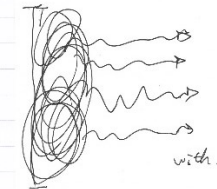
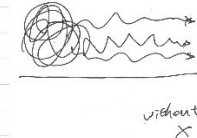
△ tent + umbrella?



\* umbrella that can be attached to the cloth (by buttons?)

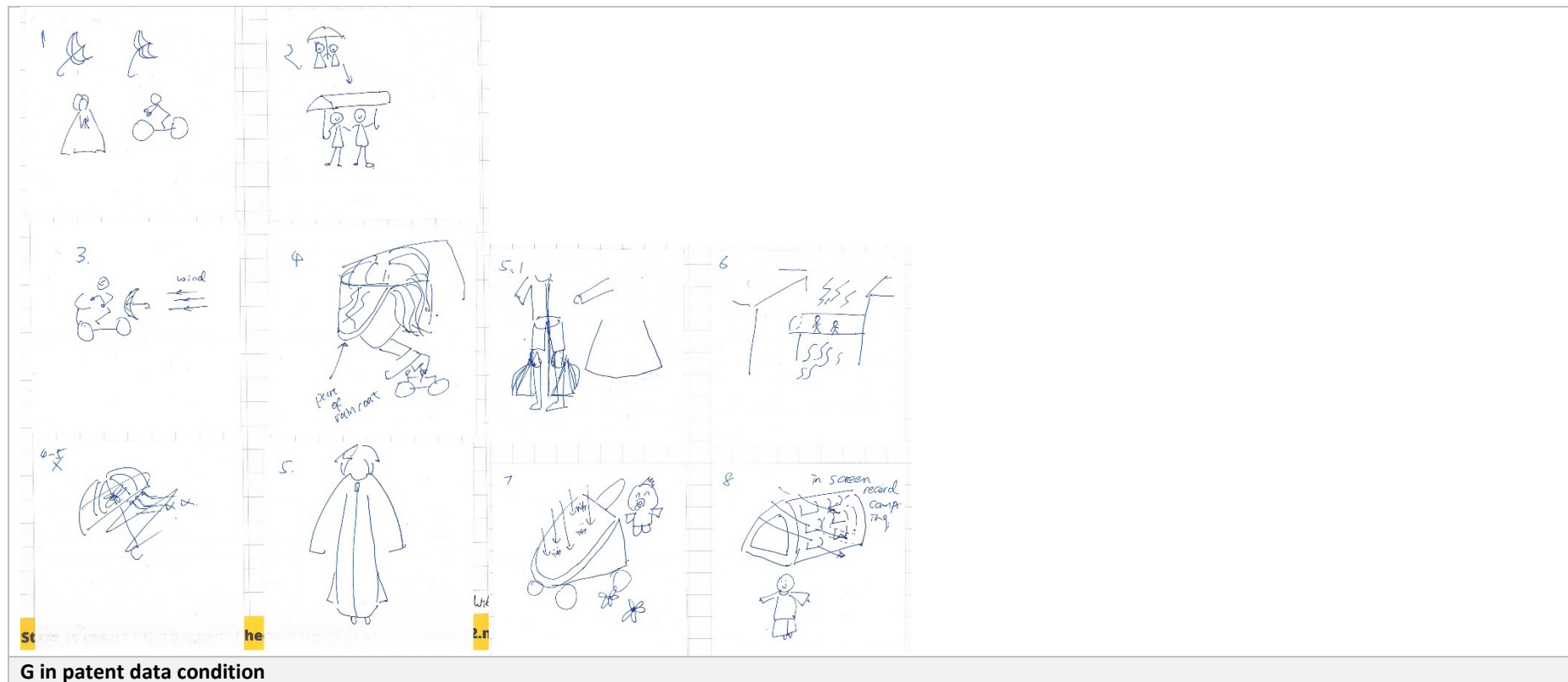


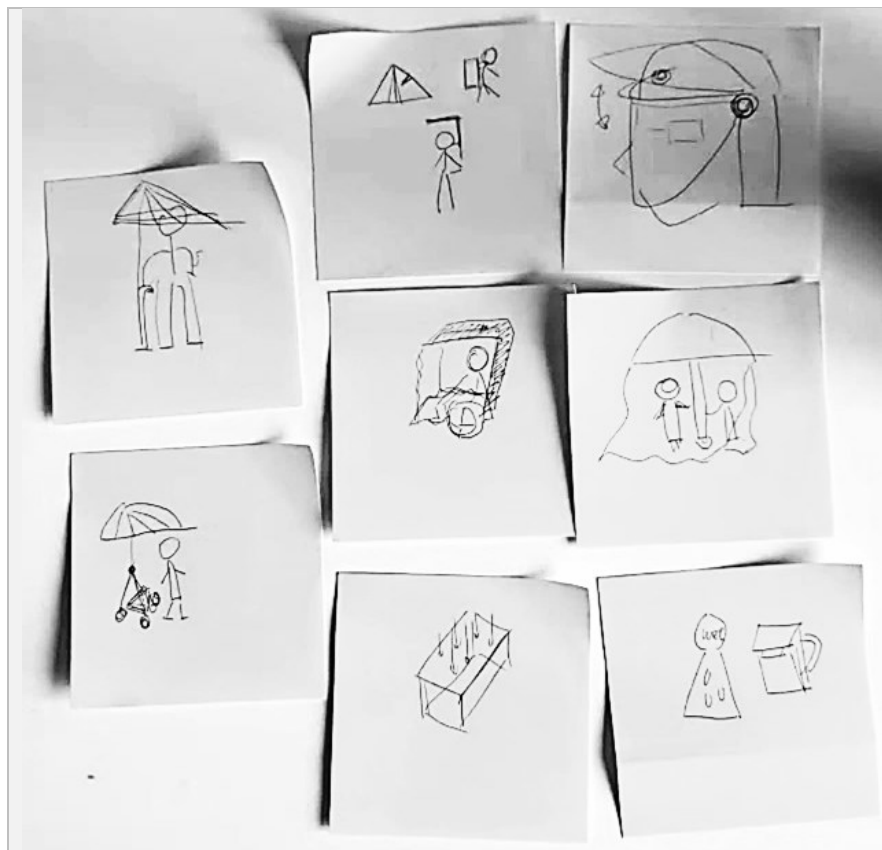
participant feedback.



Y in baseline condition

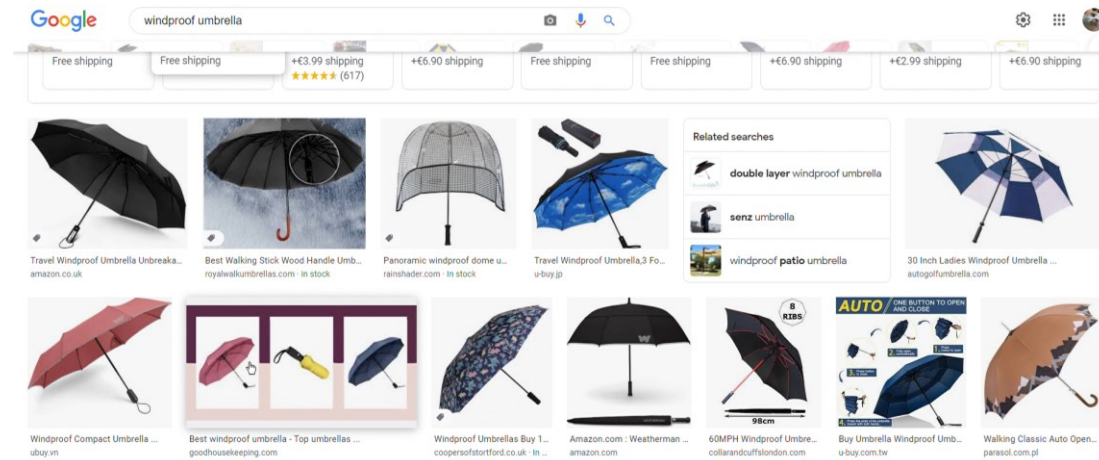
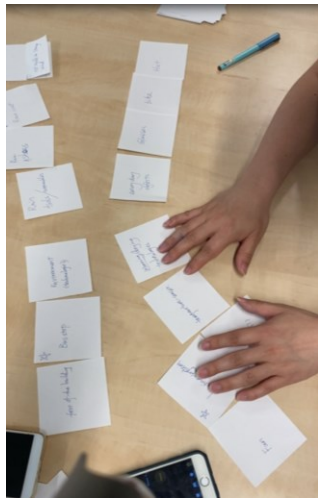






**Note: This is was conducted in online condition.**

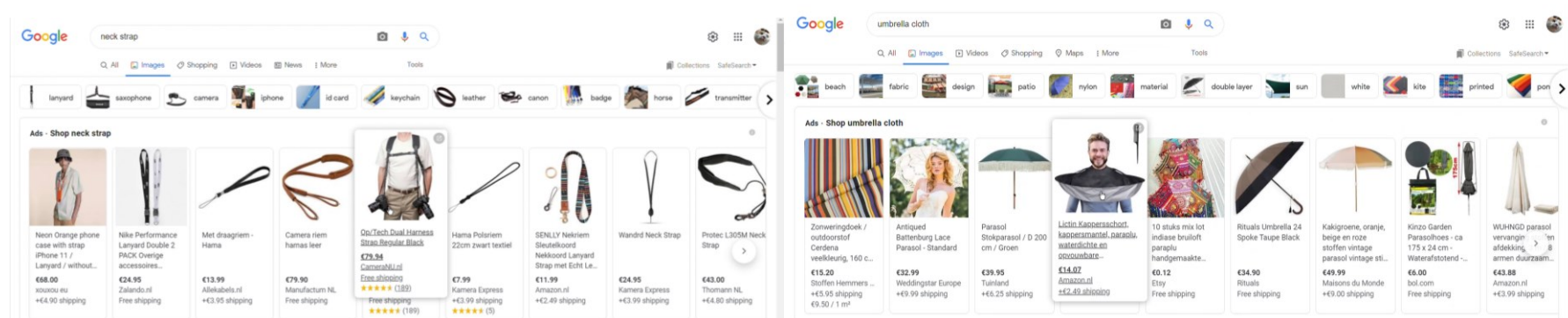
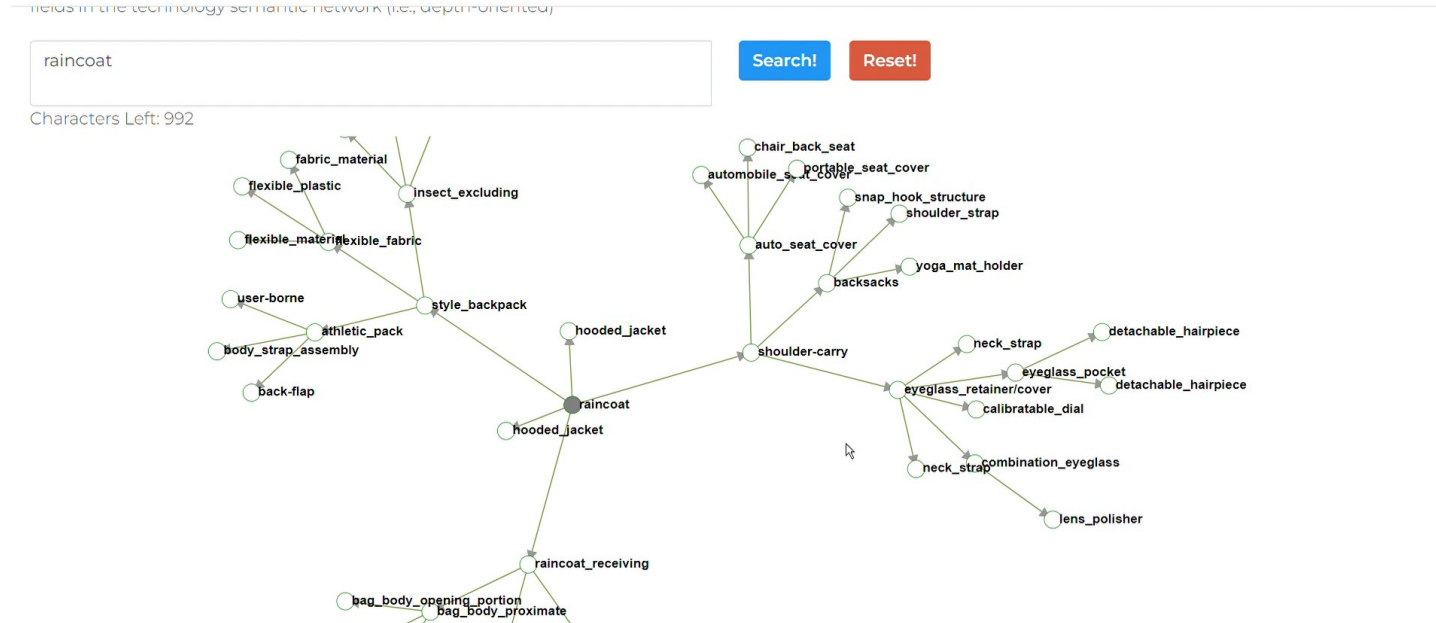
	Participant Y		Participant X	
Condition	Use google search	Use Tech-Net (with post survey)	Use google search	Use Tech-Net
Time	15/05/2022 20:40	17/05/2022 20:30	16/05/2022 17:00-17:40	17/05/2022 17:00-17:40
Experiment location	participant's home in Eindhoven		Meeting room in IO	
Experiment setting		Online	Face to face test	



*X's Ideation process recording and screen record in baseline condition*



fields in the technology semantic network (i.e., depth-oriented)



*X's Ideation screen record in the patent data condition*

## X in Duckduckgo Condition

different color t represent codings,

Drawing, and writing idea move on the post-it, organize the post it,

Thinking, not use search tool,

Asking questions with experimenter

Use search tool on the laptop

Arrange thoughts behavior

### Explanations of color coding

Normal font means participant's think-aloud protocol in Duckduckgo condition

*Italic font* means my coding analysis in Duckduckgo condition.

Normal font means participant's think-aloud protocol in Tech-Net condition

*Italic font* means my coding analysis in Tech-Net condition.

00:00:00 draw 1st post it note umbrella

00:00:11 Good, I think when I see this task I will first think of some rain proof product like. draw 2nd post it note raincoat

00:00:20 Raincoat umbrella? think what to write on 3rd post-it

00:00:23 And some other things that you might.

00:00:29 Be using or wearing.

00:00:32 Many string.

00:00:34 Actually, you could buy. Write 3rd post-it bike

00:00:44 You might need to. Write 4th post-it shoes

00:00:48 Yeah, you wear shoes.

00:01:03 Something else glasses. Write 5th post-it glasses

00:01:15 Emmm. put 5 post-it in 1 line together.

00:01:20 I think.

00:01:33 Tools. Write 6th post-it tools/wearables

00:01:39 And for the drying.

00:01:42 Keep it dry. Look at assignment again,

00:01:46 Have something keep you dry.

00:01:54 For example like dryer. Write 7th post-it dryer, think what to

Write on 8th post-it

00:02:20 Emmm...

00:02:20 Something heating system. Write on 8th post-it heating system

00:02:40 Sensor. Write on 9th post-it temperature sensor

00:02:45 Think what to write on 10th post-it

00:02:55 Technologies. Write on 10th post-it technologies

00:03:12 Strong wind. Rearrange the post it notes on the table.

00:03:18 Let me think. Recatognize the post it notes in groups

00:03:47 Right? Write on 11th post-it everyday object

reviewrequirement

00:04:14 Hat. Write on 12th post-it hat

00:04:24 Rearrange the post it notes on the table

00:04:29 Pick up post it dryer, look at it, and put in another position.

Rearrange the post it notes. Thinking.

00:04:39 Emm. Think what to write on 13th post-it thinking

00:04:48 write 13th post-it environmental techonologies

00:05:10 Writing much slower than before. thinking

00:05:30 Think what to write on 14th post-it. thinking

00:05:37 Bus stop. Write on 14th post-it bus stop

00:05:46 Think what to write on 15th post-it. thinking

00:06:03 Write on 15th post-it Front of the building

00:06:15 Rearrange the post it notes on the table.

00:06:25 write on 16th post-it fan

00:06:33 adding on 10th post-it warming /drying technologies

00:06:48 Think what to write on 17th post-it

00:06:50 Thinking, thinking, reflecting own knowledge, and life experience, not trying to use search tool

00:07:00 same fixed behavior

00:07:16 folding 17th post it note

00:07:24 Rearrange the post it notes on the table.

00:07:30 write 17th post it not usable in strong wind

00:07:47 folding 18th post it note

00:07:59 adding 6th post i rain products

00:08:16 adding a mark on 14th post-it bus stop

00:08:24 adding a mark on 8th post-it heating system

00:08:33 adding on 7th post-it dryer, ventilation

00:08:38 adding a mark on 7th post-it dryer, ventilation, thinking,

00:08:49 write 18th post it "a bus stop to dry the people who wait for bus, or who are escaping from the rain" and draw concept image, diverging

00:10:35 finished 18th post it drawing, put it aside

00:10:52 write 19th post it "a rain coat that dry the wearer from the inside of it" diverging

00:11:03 How many do I need at the end? ask experimenter, get the answer "It doesn't matter. It's up to you. "

00:11:11 OK, yeah, I will try my best to.

00:11:14 Come up with the ideas as many as possible. and draw concept image diverging

00:12:25 finished 19th post it drawing, put it aside

00:12:39 I mean. Input windproof umbrella, change to google image .

00:12:56 . . Experimenter helped to move the laptop closer to participant. Experimenter reminded "If you want to combine, and build upon your previous ideas also count". Write 20th post it(not used)

00:13:02 Yeah, yeah, I know. Using google search, 2 columns ad images 9\*2 products with prices, then scoll down 7 product each column and read 5 columns, read 53 product images in total

00:13:20 emm finished using laptop. rewrite 21th post it "an umbrella that can be combined with the coat to withstand the wind"

00:14:03 and draw concept image

00:15:01 Yes, I think I come up with three idea.

00:15:07 experimenter reminded "You still have 5 minutes. Do you want to use, or you are done?"

00:15:13 Oh, I think I I am very.

00:15:16 Happy with this, I don't think I can come up with better ones. Do I need to walk you through the new Ideas?

### Participant X, Retrospective protocol and presentation part

...

00:15:43 Yeah, maybe you can take a picture later on. Yeah, so here I think.

00:15:48 Actually, at the beginning I just come up with some random idea, but in the middle of that I think I can give a structure to that which helps me to also to better understand the all the different ideas.

00:15:52 OK.

00:16:01 So first of all, I think of some. So you see, there are four groups of ideas. One is about the rain.

00:16:09 Products to rain coat.

00:16:13 Tools, variables so rain products.

00:16:21 So I have.

00:16:22 The rain shoes, rain coat, umbrella and of course I was also thinking of some.

00:16:29 Everyday objects that you are using anyway. Whenever there's, you know, because you don't know when is. The rain is coming, so you might have that.

00:16:40 So glasses, bike, hat, productable and on the other hand, I was thinking because there are two key one is

00:16:50 for the rain

00:16:52 And one is for the wind.

00:16:56 So that's why I'm thinking to keep you dry. There's also another element which is drying.

00:17:04 And, here I come up with some technologies when when it comes to drying. So here I have the the heating system or the dryer that might be integrated with the the other product.

00:17:20 And on the other hand, I was also thinking some environment environmental technologies.

00:17:27 All the environmental elements, so to say, because one is ring sometimes.

00:17:33 You when you.

00:17:35 Were stuck in the rain or caught.

00:17:37 Up by the.

00:17:38 Wind you might need to find something some some place to hide, to escape from the rain, and most often are came by.

00:17:47 Think of two things. One is the bus stop.

00:17:50 One is, it could be the front of the building when they have the.

00:17:53 The the kind of open area with the roof.

00:17:58 The extended roof.

00:18:01 So the way how I was thinking?

00:18:05 For me, it's really about where to start. Yeah, here I first start with some of the rain product result and most common things you might think of and I think one of the challenges here, especially when I'm thinking about the umbrella.

00:18:19 Normally, doesn't really.

00:18:22 And protect you from the wind when the rain is very strong.

00:18:26 Especially in the Netherlands.

00:18:29 Actually, that's the only time I used the Google.

00:18:38 Like the searching engine.

00:18:41 Like basically the windproof umbrella. So it is a thing as I'm also aware that I was trying to say to think whether they have already some good ideas. So to see if it's a good direction to go. But then I learned that.

00:18:57 But I already know all them, so no surprise there.

00:19:02 So that's why I come to the idea maybe.

00:19:06 Like you said, you can combine some ideas here.

00:19:10 So here I combined the rain coat.

00:19:14 Yeah, we start drying the heating system. It could be the rain coat that provide heating, but from the inside so it's something like that. So you could say this is the the rain coat plus the dryer.

00:19:29 Or the heating system.

00:19:31 So those two combined and another thing is that the umbrella combined with the coat, but not necessarily the raincoat. But because I think.

00:19:43 To make sure the the umbrella can hold.

00:19:49 withstand the wind you need to form structure. Yeah so I think maybe one is like very closely combined with your clothes. It can withstand the wind. I hope I suppose. And then I had the third idea.

00:20:15 So the third idea is basically the bus stop.

00:20:19 Combined with the heating system. So when you are resting or escaping from the rain, the bus stop can provide, like the warm wind from one side of the the bus stop. Something like that.

00:20:34 So that's my thinking process.

00:20:39 Yes, I hope it helps.

#### pilot X in Tech-net condition

different color t represent codings,

Drawing, and writing idea move on the post-it, organize the post it,

Thinking, not use search tool,

Asking questions with experimenter

Use search tool on the laptop

(missing first 3 minutes )

00:00:27 1st using Tech-net, input raincoat,

00:00:29 learn to zoom in, zoom out, scroll down, and drag the interface



00:00:35 double click the rain coat, 2 branches appear, hooded jacket  
 00:02:20 draw 1st-2nd post it note, back pack, hooded jack,  
 00:03:01 draw 3rd post it note flexible material, shape shifting material  
 00:03:19 think what to write on 4th post it note, thinking  
 00:03:41 draw 4th post it note concept image,  
 00:05:12 write on 4th post it note a hooded jacket, hood can change  
 shape to protect the person from rain and wind final concept  
 00:06:07 finished, Rearrange the post it notes on the table.  
 00:06:22 draw 5th post it note concept image  
 00:07:47 write on 5th post it note a back pack that can provide a roof  
 through change the shape final concept  
 00:08:30 Emm... thinking  
 00:08:40 2nd using Tech-net, looking at shoulder carry branch, eyeglass  
 retainer/cover, combination eyeglass, click combination eyeglass, lens  
 polisher appear, press eyeglass pocket, detachable hairpiece appear,  
 double click eyeglass branch, find neckstrap  
 00:09:26 What's the neck strap? write on 6th post it note Neck strap  
 00:09:33 Can I use Google search? Answer: Yeah. Google Search or  
 Google Translate.  
 00:09:38 Yeah, I would just Google that. 1st Use google, mouse move to  
 the image of strap for phone case or camera.  
 00:10:01 OK.  
 00:10:05 Yes, I think I know what it is.  
 00:10:30 think what to write on 7th post it note, thinking  
 00:11:03 write on 7th post it note inflatable raincoat in the shape of a  
 neck strap  
 00:11:30 draw 7th post it note concept image final concept  
 00:12:38 How many ideas do I have to provide? A: I don't have the limit.  
 00:12:54 Just maybe try to think of another one. 3rd using Tech-net,  
 zoom in, out first, input umbrella  
 00:13:04 Search, drag umbrella search result, look through umbrella rib  
 branch, umbrella cloth branch, rib assembly, drag canopy branch,

00:13:13 Experimenter reminds to use all 20 minutes time.  
 00:13:17 Yes, I think I noticed, but we can talk about later. I'm not very  
 used to thinking out loud.  
 00:13:26 Sometimes it's like I'm more focused on visual. It's difficult to  
 express. can not think aloud  
 00:13:33 Or think aloud.  
 00:13:56 OK  
 00:13:57 It cannot be.  
 00:14:03 I can use the Google Translate?  
 00:14:05 Right? Get permission  
 00:14:13 Use google search for canopy meaning, show Chinese meaning  
 of this word  
 00:14:43 thinking  
 00:15:21 drag portable painting, shelter running, lower umbrella cloth,  
 use google image search for umbrella cloth, scroll down quickly, move  
 back to first line, look at an image of hair cut umbrella  
 00:15:40 write on 8th post it note tent+ umbrella  
 00:16:07 draw 8th post it note  
 00:16:27 thinking  
 00:16:40 write on 9th post it note umbrella that can be attached to the  
 cloth(by button)  
 00:17:01 draw 9th post it note  
 00:17:42 Yes, I think I'm done.  
 00:17:45 I have four ideas. Yeah, this time. Reminds still 2 minutes to  
 go.  
 00:17:51 I think I run out of ideas.  
 00:17:57 Yeah, let's continue.

#### Participant X, Retrospective protocol and presentation part

00:15:05 X  
 Quickly guide you through the ideas I come up with. Maybe also the  
 thinking process.



00:15:12 X

Actually, I think.

00:15:13 X

This is quite useful. I only try like.

00:15:20 X

It's very useful for brainstorming in terms of the how you can open up your mind to some new ideas, so I was quite surprised.

00:15:32 E

Should I shoot this slowly?

00:15:38 X

But we can. I can just quickly get you through. We can later talk about that if you have specific questions. So basically I have 4 ideas, so I use some of the keywords here. The backpack, the hooded jacket and flexible material which gave me some inspiration, for example.

00:15:57 E

These are come from the tree, right?

00:15:59 X

Yeah, those are from the the tree. First of all, I think of because this flexible material. It makes me think of shape material, although it doesn't say that, but it does remind me.

00:16:14 X

That which means that the things your clothes can change shape.

00:16:18

Just you.

00:16:19 X

So textile that contains shape so it could be a hooded jacket which leads me to the idea that the hood which can change the shape into a kind of of like, for protect protection like..

00:16:36 X

Like an umbrella? Yeah, how do you say that the tongue?

00:16:41 E

The tongue yeah, I can't get what you mean.

00:16:44 X

Yeah, you know what I mean. And then I also combine the shape, shift the shape shifting material with the backpack, which leads me to the idea of the shape shifting backpack which can also open up like it's kind of like a. You know the car,

00:17:03 X

Yeah, that kind.

00:17:04 X

Of sport car which have this this foldable?

00:17:08 X

Yeah roof you could say.

00:17:15 X

So these are the two.

00:17:16 X

Ideas and then I also see the neck strap.

00:17:23 X

When I first saw it, I don't know what it means. so that I used the Google image to see what it's like and then realize maybe actually.

00:17:34 X

It leads me to the idea of thinking about, maybe because umbrella you don't really carry it with you and if it's easier to carry, maybe you also have. So I think of a idea that is inflatable. Is it that word?

00:17:55 X

Like the

00:17:58 X

If it's like the kind of thing that.

00:18:01 X

You can see from here it's like the the hood, almost the hood or protection that can. For example, if you have the air in it, you can just also change the shape and protect and provide protection.

00:18:19 X

Like this inflatable hood, you could say.

00:18:20 E

It's nice.

00:18:24 X

And then the other one is that I was thinking about here. I also when I was searching umbrella I see the tent. So I was thinking maybe we can combine the tent.

00:18:35 X

With umbrella which.

00:18:38 X

Actually, because here I notice if it's a tent, what's the major difference is that you can fix it on the ground so you can.

00:18:47 X

You can also withstand the wind, so I was thinking maybe we can also kind of have a.

00:18:53 X

Fixing point.

00:18:55 X

That can fix the umbrella on your body.

00:18:58 E

Yes, yeah.

00:19:00 X

Actually on the cloth, which can also strengthen the umbrella, which leads me to this idea, which later I realized could be similar to this one, but it's slightly somehow different. because it's more integrated with close perhaps.

00:19:18 X

I mean, in terms of technology, could be simple as buttons.

00:19:21 X

You can cliff the umbrella on your clothes.

00:19:26 X

Test idea.

00:19:27 E

This is the same one.

00:19:29 X

Yeah yeah yeah yeah.

00:19:30 E

This is the same.

00:19:33 E

These are two different shape?

00:19:37 X

Yeah, so there are like 4.

00:19:38 X

Idea ones, yes.

00:19:40 E

And do you think yesterday's idea influence today's direction?

00:19:46 X

I think so. There has to be some connection, for example.

00:19:51 X

When I was working on this, the umbrella that can.

00:19:54 X

Be attached to cloth. I do realize there are similarity between the umbrella here.

00:20:00 X

there are some connection.

00:20:05 X

But they're also surprise. For example, like the hooded jacket I, I didn't.

00:20:11 X

know I didn't come to my mind yesterday.

00:20:15 X

I was inspired by that specifically and also the backpack.

00:20:20 X

So those are the new idea and also the neck strap. Those are the new idea.

00:20:24 X

Thanks to this.

### **Post survey and explanation**

00:20:58 X

Ah yes, how similar do you think of using Technet as design inspiration compared to your current brainstorming tool?

00:21:09 X

I would say very different.

00:21:15 X

And the second question is.

00:21:19 X

How do you feel your energy level will take the experiment?

00:21:26 X

Mutual in the middle.

00:21:28 X

How efficient do you think of using techniques as design inspiration, not considering the interface design?

00:21:38 X

I think it's quite efficient. I would say 6.

00:21:42 X

Do you need the extra guidance on medical support to use?

00:21:48 X

Technet search for design idea no thanks.

00:21:53 X

Good enough, how do you think Technet can help you to think about problems.

00:22:00 X

Creatively not considering the interface design.

00:22:04 X

I think in terms of that think of programs.

00:22:10 X

Not very helpful because it only gave you keyword. It's really about selecting the right keyword.

00:22:18 X

Wish you had to decide yourself.

00:22:22 X

If you the second question, the next question is if you can redesign the Technet.

00:22:28 X

Website which part we think oh I would say just add.

00:22:34 X

Maybe we will.

00:22:38 X

Period visual.

00:22:46 X

There's something and.

00:22:49 E

What do you mean this animal?

00:22:51 X

May be like.

00:22:55 X

Like some.

00:23:01 X

Because for now it's very technical like like the bones. Maybe you need something like to give it a bit flash to make it more visually attractive.

00:23:05 E

Yeah, yeah.

00:23:14 X

And, uh.

00:23:23 X

Reactive because for example you don't know.

00:23:27 X

Actually, if you don't tell me, I didn't know I can double click it.

00:23:30 X

And increase the branches.

00:23:30

OK.

00:23:33 E

Which kind of website do you think there looks good and interactive?

00:23:40

For you.

00:23:46 E

Sure, you're expected.

00:23:47 X

I cannot find a similar compared to this. No, because I couldn't find the reference relevant. Similar ones to this.

00:24:00 X

Maybe, maybe like I think mirror board. For example you could add.

00:24:07 X

Yeah, and notes.

00:24:11 E

Yeah yeah, OK.

00:24:11 X

Book function.

00:24:12 E

OK.

00:24:13 X

So you can.

00:24:16 X

You can to track your.

00:24:20 X

Your history.

00:24:22 X

Interaction history.

00:24:33 X

Yes, OK.

00:24:36 X

And then which part of Technet website? Most weather to you I think.

00:24:45 X

I'm proud of.

00:25:00 X

Surprisingly relevant.

00:25:04 X

Topics or subtopics?

00:25:10 E

The first one.

00:25:11 E

Thank you very much.

00:25:13 X

You don't have to tell me that.

00:25:19 X

Actually, I think you make it quite clear. I don't really have a very high expectation. I only use it for certain keywords.

00:25:27 X

I don't really expect to compare it to Google, it's very different. I wouldn't compare them, so how creative you think do you think of using Technet as design?

00:25:30

You see?

00:25:41 X

I think.

00:25:44 X

Quite creative with five.

00:25:48 X

How do you feel? Technet help you explore many idea rather than fix on one.

00:25:56 X

Very helpful.

00:25:58 E

Four is neutral.

00:26:03 X

I think that's it submit.

00:26:06 E

And one question which order do you prefer the experiment order? For example, do you prefer you do the brainstorming with Google search freely and then use the Technet or you want to use Technet 1st and then go back.

00:26:24 E

Through Google.

00:26:24 X

I would prefer first technique on Google.

00:26:28 X

I think that's also one of the advantages that technique had have has over Google because Google.

00:26:37 X

It's like.

00:26:39 X

I would say.

00:26:40 X

A point to point searching and this one.

00:26:46 X

Although we only have keywords but it can help you to find the right keyword, so that's how, for example, if you want to Google you first come to come to the keyword which is.

00:27:00 X

Like the end of your thinking process.

00:27:04 X

And then for the technique, you sometimes you come with a very general idea and you don't know how deeper you can go and then the technique can help.

00:27:15 X

You to to.

00:27:15 X

Go deeper into the specific keyword saying that it can help you to find the right keyword and the keyword can be the starting point or Google search.

00:27:26 E

And do you think, based on your brainstorming habit or your style?

00:27:35 E

For example, do you feel you you like to input lots of the keyword or you disappear or you don't need to input and you can get based on your life experience or something. You don't need the laptop to brainstorm.

00:27:57 X

I think so. If you're asking. Actually, I think of these questions more like comparing to.

00:28:04 X

Using techniques to. For example, yesterday I was doing mostly without using this idea.

00:28:11 X

I think it does help.

00:28:17 X

I think brainstorming is really about the how many idea do you have at the same?

00:28:22 X

Time, for example, yesterday I didn't think of.

00:28:26 X

Backpack and hooded jacket, which was the direct inspiration I got from using the tech net, so in that sense it does help to help me open up my my thoughts.

00:28:27 E  
Yeah, yeah.  
00:28:39 X  
And so it does help. I'm not sure how much, but it does help OK?  
00:28:47 E  
I see I see I don't have further.  
00:28:50 E  
Questions, thank you.  
00:28:53 X  
And maybe something I can add.  
00:28:55 X  
Yeah, something I can add is I was also reflecting on my own thinking process. I find myself more like a visual thinker.  
00:29:04 E  
Ah yeah.  
00:29:05 X  
So I use drawing a lot.  
00:29:09 X  
So you see, how does the.  
00:29:12 X  
Creative session.  
00:29:14 X  
Uh, like.  
00:29:17 X  
Starts out diverse from the Technet.  
00:29:23 X  
Think of the keywords. I immediately start doing stuff and I think from that point I couldn't.  
00:29:32 X  
So I couldn't imagine how further helpful can the tech net be. Saying that maybe the technique is only helpful, but on the very beginning of my

thinking process. But very soon after that I will go back to my normal track.  
00:29:50 X  
Like thinking on drawing, which is not that much different than yesterday. So if I can summarize the usefulness of the technique, it helps, for example.  
00:29:55  
OK.  
00:30:03 X  
Like this is my syncing process.  
00:30:08 X  
And then comes one.  
00:30:11 X  
This is without thinking technique without using technique and this this is.  
00:30:19 X  
Wasting you see the.  
00:30:21 X  
Yeah it increased the range of your idea.  
00:30:27 E  
OK.  
00:30:27 X  
So maybe you can come with more than.  
00:30:30 X  
Maybe this is like you can come up with two and then you can come up with actually yes they come up with three.  
00:30:34  
Yeah, yeah.  
00:30:39 X  
And today I come up with four. So that's the difference.  
00:30:44 E  
Yeah, one.

00:30:47 E

I forgot to say.

00:30:51 E

This is who is this is.

00:30:56 E

Oh yeah, do you feel the design if we evaluate design one? One part is this is very novel. Very creative. One part is it's very practical or it's.

00:31:09 E

It's really useful in their life. And how do you feel the keyword or you find the Internet can help you?

00:31:20 E

For example, in the creativity level, or in the practical.

00:31:24 X

I think like I said, it's very helpful but limited. Yeah, because I think the creative process is very much.

00:31:35 X

UH relies on your personal experience of skills.

00:31:40 E

Yeah, yes.

00:31:43 X

So I can easily imagine.

00:31:46 X

So some it could be some of the ideas have already existed in different forms. In my past experience.

00:31:53 E

Yeah, yeah.

00:31:55

Yeah, yeah.

00:31:56 X

But then this only serves as a trigger for me to to start thinking on that track.

00:32:03 X

So I wouldn't use. I wouldn't say it helps you.

00:32:08 X

Like create the idea from from zero, it's more like a trigger you.

00:32:10 E

Yeah yeah, yeah.

00:32:11

OK.

00:32:13 E

Yeah, remember.

00:32:14 X

Yeah, remodel things and also I could imagine for for example student they don't have.

00:32:22 X

Much design experience it could. They could already struggle with a stage show like.

00:32:28 E

Yeah, yeah.

00:32:29 X

Drawing them, for example, I would say I'm I'm very good, but I I think I'm being trained as a designer. You have the.

00:32:29 E

Yeah, yeah.

00:32:36 X

A more smooth way of thinking and putting ideas into drawing and summarize your ideas. So I think like I said in that sense, that too the usefulness is very limited.

00:32:51 E

Yeah, OK.

00:32:52 X

And also depend on your personal skills and experience. Designer experience, skills and knowledge

00:32:58 E

Yeah, OK.

00:33:00 E

I I get what you mean. It's also your experience or understanding about.

00:33:05 X

This yeah and also when I come to the idea of.

00:33:11 X

Brainstorming is also about providing or elaborating the thinking process.

When you need to show that to another person. And sometimes especially we are designing.

00:33:21 E

Yeah, yeah.

00:33:26 X

As a task like one you are asked to design ideas some.

00:33:32 X

And the thinking process.

00:33:34 X

It doesn't have to be too big. Sometimes you only have to come up with a couple.

00:33:38 E

Yeah

00:33:39 X

Good idea and people.

00:33:40 X

Wouldn't bother to think about how you get.

00:33:43 X

To this idea.

00:33:43 E

Yeah yeah, yeah.

00:33:45 X

So this specific context, why showing other people your thinking process is so important thing?

00:33:52 X

I hope I make myself clear, yeah?



## 12. Pre-experiment Surveys

Participant No.	Currently you are	What are your first and second language?	Your age is	Your gender is	How familiar do you feel with creative brainstorming activities? (4 neutral)	How challenging do you feel of ideation and brainstorming task? (4 neutral)	Where (online sources) do you find your design inspirations for your ideation and brainstorming task?	What design methods (sketching, mind map, brainwriting, etc.) do you use for your ideation and brainstorming task?	Have you used any inspiration source driven by patent data analysis?
P1	Ui ux designer in the company	Mandarin and english	31	Female	7	4	Interest, dribble, ux workshop, user interview	Sketching, kanban method,	Maybe
P2	graduate with industrial design master degree	Hindi/Marathi, English	27	Female	7	6	Pinterest, Instagram (people I follow, hashtags), random google searches	Mix of sketching and mindmapping	No
P3	master student of industrial design	Indonesian and English	28	Female	7	5	Behance, a certain company's website	sketching, crazy eight, discussion, affinity map, dot voting	No
P4	graduate with industrial design master degree	English and Hindi	26	Male	6	2	Pinterest, Goggle, Behance	mindmap	No
P5	PhD researcher in industrial design faculty	Chinese, English	30	Female	4	6	google chrom, instagram	mind map, sketching	No
P6	PhD researcher in industrial design faculty	Chinese; English	25	Male	7	7	google; behance; pinterest; dribble; awareded concepts e.g., reddot	sketching; writing	No
AVERAGE					6.33	5			

### 13. Post-experiment Surveys

The following tables are collected from Microsoft form software.

PARTICIPANT NO.	creativity of your ideas inspired by Tech-Net	efficiency of your working with Tech-Net as design inspiration	helpfulness of using Tech-Net to find new problems	similarity of using Tech-Net compared with your normal brainstorming tool	usefulness Tech-Net help explore many directions rather than fix on only one	Need of extra guideline or methodological support to use Tech-Net as creative inspirations
P1	6	6	5	2	6	Maybe
P2	5	5	3	3	6	No
P3	5	5	5	3	6	Yes
P4	5	5	6	2	6	Yes
P5	3	4	6	4	5	Maybe
P6	7	6	4	1	7	Yes
AVERAGE	5.17	5.17	4.83	2.5	6	

Participant NO.	Which part of Tech-Net website are of most value for you to explore many design directions?	What are your difficulties of using Tech-Net to explore many different design directions?
P1	first layer of search results are useful for me to know the knowledge that I do not know. It helps me to expand the knowledge with certain direction.	bouncing layout. unclear structure of first search and later search (expanded by myself).
P2	That it gives relevant keywords, maybe not what you want but something that inspires thoughts.	Not difficulties but I missed a visual search aspect.
P3	the branches concept. There is unexpected link between the first word and the branches which helps to make more ideas. For example: I type teeth cleaner and there is endoscope in the branches.	understanding some technical words.
P4	Diverse Brain map, think outside the box	Word suggestion, Illustrative.
P5	the first round search (the first three tree layers)	when it shows "error" I feel stopped.
P6	it lists a lot of keywords, which can help brainstorming; because they are just like a co-worker brainstorm with you together.	interaction experience; another sub-interface; separated from the searching interface; user more colors to divide the nodes and demonstrate which are the most prevalent keywords

Participant NO. Which of the following situation do you think Tech-Net can help you overcome?

P1	getting fixated on abstract knowledge or pattern;I do not feel conscious that I am imitating some existing design solutions;
P2	a brief that novel, unproven ideas that can bring risks;I am conscious when I can not find new ideas;I do not feel conscious that I am imitating some existing design solutions;
P3	getting fixated on abstract knowledge or pattern;a brief that novel, unproven ideas that can bring risks;I am conscious when I can not find new ideas;
P4	not able to produce more tangible ideas, such as drawings, graphs, and shapes;a brief that novel, unproven ideas that can bring risks;
P5	a brief that novel, unproven ideas that can bring risks;I am conscious when I can not find new ideas;getting fixated on abstract knowledge or pattern;
P6	I am conscious when I can not find new ideas;getting fixated on abstract knowledge or pattern;not able to produce more tangible ideas, such as drawings, graphs, and shapes;


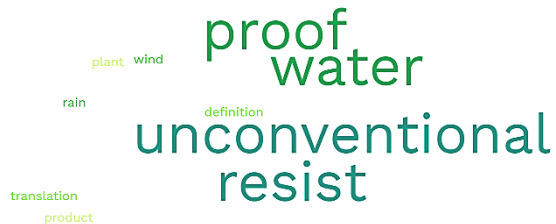
## 14. Participants' Search Keywords In 2 Conditions

Participant No	P1	P2	P3	P4	P5	P6
Search Keywords in the Patent Tool Condition	<ol style="list-style-type: none"> <li>1. user,</li> <li>2. clean,</li> <li>3. teeth,</li> <li>4. clean teeth</li> </ol> <p>using Baseline tool to interpret technic terms</p> <ol style="list-style-type: none"> <li>1. pneumatic clean system,</li> <li>2. arch wire,</li> <li>3. dental arch,</li> <li>4. dental articulation model,</li> <li>5. mandible,</li> <li>6. discontinuous tip,</li> <li>7. adjacent tooth,</li> <li>8. gingiva,</li> <li>9. hypersensitive inhibitor,</li> <li>10. tooth flank</li> </ol>	<ol style="list-style-type: none"> <li>1. umbrella,</li> <li>2. rain protect,</li> </ol> <p>showed error,</p> <ol style="list-style-type: none"> <li>3. rain,</li> <li>4. umbrella,</li> <li>5. raincoat,</li> <li>6. raincover,</li> <li>7. rain protection,</li> </ol>	<ol style="list-style-type: none"> <li>1. Teeth cleaner,</li> </ol> <p>using Baseline tool to interpret technic terms</p> <ol style="list-style-type: none"> <li>1. Cryogenic transport</li> <li>2. Socket welded,</li> <li>3. Actinism</li> <li>4. Thermocouple,</li> <li>5. Hemoclip system,</li> <li>6. Laminoplasty</li> <li>7. Luminaire latch</li> <li>8. Endoscope</li> </ol>	<ol style="list-style-type: none"> <li>1. hat,</li> <li>2. bicycle helmet,</li> <li>3. wind shield,</li> <li>4. umbrella,</li> <li>5. rain umbrella,</li> <li>6. rain coat,</li> <li>7. raincoat,</li> <li>8. school bag,</li> <li>9. rain water,</li> <li>10. bicycle handle,</li> </ol>	<ol style="list-style-type: none"> <li>1. Toothbrush,</li> <li>2. Quick teeth,</li> </ol> <p>showed error</p> <ol style="list-style-type: none"> <li>3. Quick clean,</li> <li>4. Quick clean daily,</li> <li>5. Clean,</li> <li>6. Clean teeth,</li> <li>7. Clean corn,</li> </ol> <p>showed error,</p> <ol style="list-style-type: none"> <li>8. Clean small,</li> <li>9. Clean corner,</li> <li>10. Clean tongue,</li> <li>11. Tongue,</li> <li>12. Chemical Brush,</li> <li>13. Chemical teeth,</li> <li>14. Biomedical teeth,</li> <li>15. Bio teeth,</li> <li>16. Bio tooth,</li> <li>17. Fake tooth,</li> <li>18. Fake teeth,</li> <li>19. Light teeth,</li> </ol> <p>showed error,</p>	<ol style="list-style-type: none"> <li>1. Teeth clean,</li> <li>2. Teeth (with space) ,</li> <li>3. Tooth (with space) ,</li> <li>4. Tooth brush,</li> <li>5. Toothbrush (with space),</li> <li>6. Cleaner (with space),</li> <li>7. User teeth (with space),</li> <li>8. Teeth(with space) ,</li> <li>9. Teeth(with space),</li> <li>10. Clean, (difficulties with zooming in and zooming out),</li> <li>11. Clean</li> </ol> <p>Using Baseline tool to interpret technic terms</p> <ol style="list-style-type: none"> <li>1. Body inserted device</li> <li>2. Cleaning blade</li> <li>3. Thermoelectric</li> </ol>

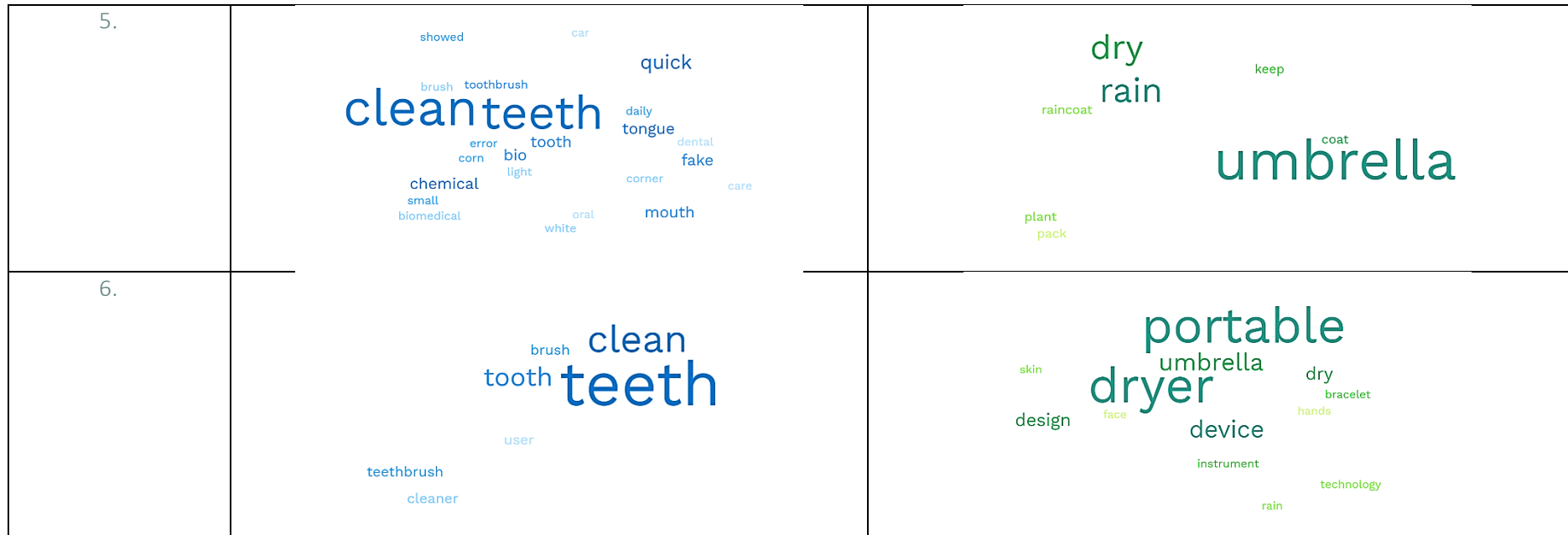
					20. White teeth, showed error, 21. Teeth, 22. Oral, showed error, 23. Mouth, 24. Mouth clean, showed error, 25. Clean car, showed error, 26. Clean teeth, 27. Dental care	
Search Keywords in the Baseline Condition	1. resist rain, 2. resist wind, 3. unconventional definition (translation), 4. unconventional product, 5. water proof, 6. water proof plant	1. teeth cleaning tool, 2. automated toothbrush, 3. plaque remover for teeth, 4. tooth cleaning, 5. tooth health, 6. mouth hygiene products, 7. oral hygiene products for dry mouth	1. Party under the rain, 2. Wind protector, 3. Wind rain costume, 4. Wind rain portable device, 5. Wind rain protector portable device, 6. Wind capture device, 7. Rain protector, 8. Wind and rain, 9. Wind and rain device, 10. Wind and rain	1. teeth clean habits, 2. what makes teeth dirty, (images, then articles) 3. tooth toy ( changed to Pinterest image search till the end), 4. best tooth cleaner 5. necklace brush, 6. necklace tooth brush 7. every day object, 8. teeth cleaning kit, 9. teeth cleaning floss, 10. hand gel,	1. rain coat, 2. umbrella 3. dry rain 4. keep dry 5. umbrella plant (Duckduckgo recommendation) 6. umbrella 7. raincoat pack	1. Portable device 2. Bracelet umbrella 3. Umbrella 4. Portable umbrella 5. Portable device 6. Portable instrument 7. Portable technology 8. Dry from rain 9. Dryer 10. Skin dryer 11. Face dryer 12. Hands dryer 13. Dryer 14. Dryer design (Pinterest) 15. Portable dryer design(Pinterest) 16. Portable device and dry(Pinterest)

			11. protector design, Portable device Wind and rain, 12. device Wind and rain, 13. dryer portable, 14. design of dryer portable, 15. design of portable dryer, 16. rain and wind solution	11. old people teeth cleaning, 12. child mouth guard, 13. child mouth chewinhg (misspelling), 14. child mouth guard, 15. digital teeth cleaner,		
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#### Word cloud visualization of search key words

Participant No.	Patent Data Condition	Baseline Condition
1.		

2.	<p>raincover</p> <p>raincoat protect umbrella</p> <p>rain</p> <p>protection</p>	<p>oral plaque remover</p> <p>hygiene</p> <p>toothbrush teeth cleaning mouth tooth products</p> <p>dry health automated tool</p>
3.	<p>teeth cleaner</p>	<p>party dryer</p> <p>wind device protector</p> <p>rain design portable solution costume</p>
4.	<p>hat rain water wind</p> <p>helmet bicycle</p> <p>bag coat school</p> <p>umbrella shield</p> <p>raincoat handle</p>	<p>dirty makes brush guard cleaner child floss</p> <p>digital habits cleaning mouth every</p> <p>gel old best teeth necklace day</p> <p>object clean toy tooth kit hand</p>



Visualizations are made by [freewordcloudgenerator.com](https://www.freewordcloudgenerator.com)



## 15. Explanations of Ideas

lighting pen/gun use light pointing at the teeth and clean.  
Quick, convenient, easy to pack up.  
No.

1



a device like a gum. When you chew it, it spills out chemical things to clean teeth.  
Something outside water, paste and brush.  
Clean teeth → cheeks tongue, gum massaging

2



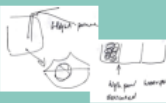
a new water flosser with circular system of the water. You do not need to spilt out the water by yourself.  
When you use water flosser to wash teeth, the water goes into mouth, and goes out.  
no

3



High power ball, a new kind of water flosser can be put within the mouth to clean the teeth.  
Something use high power.  
no

4



A tooth cleaning tool like woodpecker. It can recognize the gaps, and dirt and pick it out.  
/  
Tooth cleaning tool image, Dental calculus remover, dentist tool

5



Magnifying glass scans your tooth, know your gum health, use AI image process.  
/  
Tooth cleaning tool image, Dental calculus remover, dentist tool

6



Bristles can switch sides with a pressing button. It can clean both inside, and outside of teeth.  
Design something not a toothbrush  
probably from Previous search result, automated toothbrush image, teeth structure images, Automatic toothbrush

10



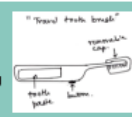
extra floss stores in this plastic tool. You can pull out, use, then cut off floss. Save some plastic, and use it longer.  
Environment friendly  
Mouth hygiene products image,

11



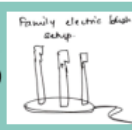
a caped toothbrush with toothpaste for travelers. It has brush cap, and refilling paste button.  
For travelling  
Mouth hygiene products image, no specific image found.

12



a family brush setup. You can charge multiple brushes on the same base.  
/  
no.

13



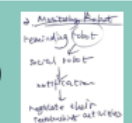
Teeth protector can be adopted to users teeth. Users wear when washing face in the morning  
Spend time and effort on brushing teeth  
No

14



a robot can monitor(tooth health), remind, notify user, and regulate their cleaning activities. Also with social function.  
/  
Clean → Robotic cleaning system

15



a toothbrush can adopt to user's mouth. The bristles (length) can change.  
/  
No

7



automated tooth scanner can find the food stuck in the teeth. Then floss/flosser from this device removes dirt.  
/  
Automated toothbrush image,

8



Brush glows on the Charging base. It Play music and vibrate when kids brush entire mouth.  
Make the process more fun for Kids, and build habit.  
Teeth health image,

9



A toothbrush can detect decay teeth, Vibrate, and remind you to clean teeth  
/  
teeth--> Oral cavity

104

a smart fake tooth inserted in users mouth. It can produce fresh smell, and help clean the bacteria in the mouth.  
Clean --> body inserted  
Body inserted device image

16



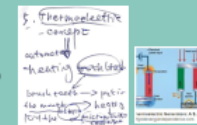
a cup in the shape of the mouth or teeth when users drink water. Use the teeth to bite edge of the cup. The cup can clean the teeth.  
/  
Clean --> cleaning liquid, manual cup, rinsing, wash

17



Automated heating toothbrush can put into the mouth. You do not need to brush teeth. It will also kill the bacteria.  
/  
Clean --> thermoelectric personal environment,  
Thermoelectric image

18



a bowl can be widen to place teeth cup. I use this space the wash the teeth cup. change the bowl more often  
Forget to wash the bowl with which I rinse teeth. Forget to wash the bowl with which I rinse teeth.  
Teeth cleaner--> widen end part, change a bowl

19



water cleaner with cleaning control. It can measure the water condition.  
The water is not clean  
Teeth cleaner--> thermocouple  
Thermos couple image, For gas and oven use

20

Water Cleaner  
with Cleaning  
control,  
to measure the  
cleaning of the  
image



Toothbrush finder at home  
Lost toothbrush with families,  
Teeth cleaner--> Password recovery system

21

toothbrush  
Finder  
at home

ionized water, or liquid to clean toothbrush  
Toothbrush need cleaning  
Probably Teeth cleaner--> ionization type smoke sensing,

22

ionized  
water / liquid  
to clean the  
toothbrush

UV filter to clean Toothbrush  
Toothbrush need cleaning  
no

23

UV filter ✓  
for cleaning  
the toothbrush

Small micro toothbrush  
Difficult to clean the teeth in details (between teeth), in holes  
Teeth cleaner--> Multiple hemoclip system,  
Surgical instruments image search

24

Small / micro  
toothbrush



Mouth sensor to analyze the dirt, food that left in the mouth.  
I can not see the food in the backside of teeth.  
no

25

Mouth sensor ✓  
to analyse the  
dirt / food that  
is left inside  
the mouth

A device Check the cleanliness of the teeth  
I can not see the food in the backside of teeth.  
no

26

100% clean  
✓  
check the  
cleanliness of  
the teeth

Whiten sensor for the teeth  
I can not see the food in the backside of teeth.  
no

27

whitening  
sensor for  
teeth.

A Vacuum cleaner for cleaning the teeth  
I can not see the food in the backside of teeth.  
Teeth cleaner--> Suction Pressure responsive valve

28

VACUUM  
cleaner  
for cleaning  
the teeth.

A monitor ( with teeth image) can Produce teeth health report  
I can not see the food in the backside of teeth.  
Teeth cleaner--> Intra observation, endoscope imaging,

29

teeth  
report

a teeth vacuum cleaner to remove the dirt in the teeth by compressed air.

/ teeth--> pneumatic clean system, air cleaning system  
portable, compressed air cleaning gun

30



a 2-sided tooth brush. One side can clean the teeth. The other side can generate a light to detect cleanliness of you teeth.

/ teeth--> tooth profile

31



a toothbrush can vibrate and tell you that you need to clean your teeth to a certain level.

/ teeth--> Pressure angle

32



a mouth wash can change the color of your unclean teeth area. It remind you to clean unclean teeth. How to clean every side of your teeth  
teeth--> Tooth root side

33



a device similar to arch wire installed on your teeth. It can spill water on your teeth. You do not need to do anything to clean your teeth. You only need to spit out water. It is invisible.

teeth--> arch wire,  
arch wire image,

34



If you wear fake tooth, the dental arch can automatically spray water to clean the fake teeth for you.

/ teeth--> Dental arch  
Dental arch image, dental implant

35



a tooth shape brush. It cleans teeth when users chew it. For a kid, or a dog,

Teeth toy image, Tooth crochet patter toy

40



Combination a brush with a pen on its top part. You keep it in the office. It gives you notification to clean teeth.

/ Best tooth cleaner image, Ultrasonic dental series

41



A small necklace brush is everyday object you keep it with. It can self-cleaning, which does not need your effort.

For people working in the office  
Necklace toothbrush image, Toothbrush, paste necklace steel

42



A ring shape brush (wear on finger). The top part is soft materials with three functions, cleaning teeth, whitening, and chewing.

/ Teeth cleaning kit image

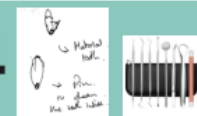
43



Hook in the form of safe pin. It is a special material good for your teeth.

/ Dentist tool image

44



A Ring with floss inside.

/ Teeth cleaning floss image

45



A cute bottle with toothpaste and brush (in one). A two-way can on the top make up of a brush and an opening for



teeth--> Dental arch  
Dental arch image, dental implant



a device installed in your mouth. It spray out fresh smell.  
/  
teeth--> dental articulation model,  
dental articulation image, dentist clinic

36



A device installed near missing tooth, or some material coat in the nearby teeth. It can reduce the harmful bacteria, and remove unpleasant smell.  
If you miss one tooth, there will be unpleasant smell.  
teeth--> adjacent tooth,

37



a smiling toy brush. It connects with Bluetooth, and make some sound.  
/  
teeth cleaning habits image,

38



a Chewing bush in the shape of fruit, e.g. an apple. It cleans teeth when users chew it.  
/  
teeth cleaning habits image,

39



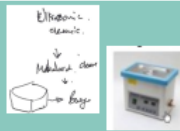
A transparent biting guard, by players to avoid saliva, and yellow teeth.  
People with saliva  
Child mouth guard image, Sports mouth guard

50



Ultrasonic tooth Cleaner, a modular cleaner in a small box, and can be carried in bag  
/  
Digital teeth cleaner image, dental lab ultrasonic cleaner

51



A cute bottle with toothpaste and brush (in one). A two-way cap on the top make up of a brush, and an opening for toothpaste.

Hand gel image,

46



toothpaste dispensing machine mounted on the wall.  
Travelers can have access, push it to clean teeth.  
For travelers in the train station,  
No. knowledge of Hand dispensing machine

47



An electronic device clean fake teeth with drainage. Elder can clean without much effort.  
Old people use fake teeth.  
old people teeth cleaning image, Teeth cleaner U shaped 2-12 years old

48



A toy, mouth guard, and teeth cleaner which keep teeth clean, and make kids silent. It is transparent  
Kids put something in the mouth. Parents do not worry about dirty teeth.  
Child mouth chewing image, Toothing toy

49



a collar can cover neck, and (unfolded to protect) entire face, it is portable.  
 Something Portable  
 Bicycle helmet --> neck shield

52



Earphone with a plastic shield which can cover your face. It can also connect (with music).  
 /  
 Wind shield --> microphone

53



Portable Safe umbrella can not hurt child or stuck. Multiple fold will have a long use life.  
 Safety issue of using umbrella  
 Rain umbrella --> safety umbrella & multiple fold

54



Two-way clothes. one side is fancy cloth. Another side is rain jacket. It is not dispensing, and harmful for environment.  
 dispensing raincoat is bad for Environment  
 raincoat --> Foldable exerciser, flexible dispensing package

55



jacket in the Simple Pouch, which can turn into a rain coat. Its material can be plastic, flexible.  
 /  
 raincoat --> Foldable exerciser, pouch opening,

56



Water proof school bag with a cover  
 Rain goes into Open bag, store lots of water  
 /  
 schoolbag --> tray nest

57



a hat (in the shape of cloud or stylish shape) can protect from rain.  
 People want to have party in the rain. People do not want to use boring umbrella. People need to take it everywhere.  
 Party under the rain image, Rain cloud costume homemade Halloween

60



People have party in the car  
 People want to have party in the rain. People do not want to use boring umbrella. People need to take it everywhere.  
 Wind protector image, Weather tech sunroof wind deflector

61



Bus party  
 People want to have party in the rain. People do not want to use boring umbrella. People need to take it everywhere.  
 Wind protector image, Weather tech sunroof wind deflector

62



a foldable umbrella has a tripod, sit on the ground.  
 It needs to be portable for people who want to have party in the rain.  
 Wind rain protector image, Tent with a seat

63



an umbrella has a plastic rain cover. It also has a tripod, sit on the ground  
 It needs to be portable for people who want to have party in the rain.  
 Wind rain protector image, tent with a seat

64



Foldable clothes can expand to a super high quality raincoat.  
 /  
 Rain protector image

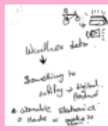
65



an App or a watch give users indication, notify them of wind and rain. Wearable electronics, or install on a bike to notify users.

/  
Rain water --> Weather data

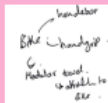
58



Bike handle, handle bar, or hand grip give users alarm. A modular towel attached to a bike drawer.

/  
Bicycle handle--> handle bar, hand grip, modular towel

59



a device, like a drone can ask someone to bring a raincoat for you.

/  
Rain and wind image, Wales battered by strong winds and heavy rain

66



an umbrella changes the (moon) shape to protect user from the rain and wind.

/  
Rain and coat device image, Rain shield

67



an umbrella with portable dryer (on the top to produce heat) Something portable  
Device rain and wind image, Wild camping, tent Dryer  
portable image

68



no explanation

Rain and wind solution image, Sculpture treelike canopies harvest rainwater...

69





a powerful device installed on the hat. It produces wind flow which blows away the wind, and rain.

/  
No. knowledge of Dyson product.

70



a fan (underneath an umbrella) blows away the wind and rain.

Need something to against wind, umbrella is not necessarily enough  
Umbrella image

71



Something fully protect you. The structure with rollers do not need users to hold it.

/  
no

72



Water proof and elastic material attached to the waist. It is similar as you wear gym clothes. The cleaning of it is also easy after you take it off.  
The raincoat, rain trousers for cyclers are separated.  
Probably Dry rain image, Dry rain set

73



a 1980's old fashioned big dress for all genders. It also help you keep social distance.  
Easy to put on and off.  
no

74



Use the harmless spay over our clothes, body, like a car spay.  
/  
No. knowledge of Car spay.

75



an umbrella Mounted on the head, like Doraemon (animation)

/  
no

80



Mounted on the head with a zip. You can take it down. It protects from the wind.

/  
no

81



a fan that can be open and closed. Triangle-folded thing from the center. It can be smaller than a cylinder in the folded condition.

Portable thing  
probably umbrella--> tent

82



a bottom part of backpack can be rain cover. Also rain cover inside the bottom of shoes.

Keep the user dry, be part of users  
probably raincoat--> style backpack

83



Something wrap around your feet, and will change to foot, cover from the rain

/  
no

84





a new material for umbrella or raincoat is hard when it is dry.  
It will become soft when it meet with water.  
Something can be attached to (fit) the body.  
Raincoat pack image,

76



a device can adjust umbrella (automatically with the wind direction). There is a sensor on the top of the umbrella, and a ball hanging to against the wind.

/  
Umbrella image, Existing delft design Umbrella.

77



The user in a wheel can walk, or cycle. The wheel can keep you dry.

/  
No. knowledge of a wheel game.

78



a clothes inside a big bag. You can hang it somewhere.

/  
Raincoat pack image, vintage Kway windbreaker

79



adaptable raincoat. It can adopt to body and bag.  
Portable  
Probably raincoat--> style backpack,

85

Adaptable raincoat  
Body + Bag.

an umbrella has a plastic layer which collapse on the outside.  
Flexible metal structure (the stand) inside can also be collapsed and folded.

/  
raincoat--> Flexible fabric

86

Flexible metal structure  
entirely foldable.  
outside plastic collapse

a raincoat integrated in a bag. It covers the bag and person.  
You can unzip and wear it.

/  
Probably raincoat--> style backpack, backflap

87

Bag with raincoat  
unzip & wear  
bag + person  
"back-flap"

You can smell the coffee from coffee package material. but you can not put air in, or get beans out.

Explore New Material  
Probably Rain protection--> disposable rain hood,  
disposable rain,

88

coffee package  
Smell coffee  
can't put air in or  
get beans out  
performance  
material exploration

a bracelet. It uses water proof, transparent, plastic material.  
/ Portable device image, Bracelet umbrella image not found.

89



Plastic umbrella with a shield.  
preparation stage -Before rain and wind  
Portable umbrella image (image half loaded)

90



It is a portable body dryer, like a hair dryer.  
It should be a portable device, can not be a raincoat. after  
rain and wind solution.  
Portable device image, A product turns seawater into  
drinking water.

91



A portable device forecast weather with embedded light to  
raise awareness. It should be very noticeable.  
For preparation, people ignore the weather forecast on smart  
watch.  
Portable device image, (mouth on the image for long time)

92



Artificial human skin. It is water proof and digital. for  
Prevention stage.  
Portable technology image, Futurist telephone,

93



a Smart sponge. It is Water absorbing smart object like  
sponge for drying face and skin.  
using after rain and wind solution  
Skin dryer image, Ionic skin care stand product

94



a glass which can blow strong wind to protect your face from  
rain.  
It can be embedded into something that you are using.  
Resist wind image, Transparent wind resistance

100



a jacket in the normal days. In the raining, it can be unfolded  
to a long dress to protect cyclist.  
/ Resist rain image

101



a spray can pray something with lots of small hair on the  
human to protect from rain. Some plants have small hair,  
which are waterproof.  
Design unconventional material. People will not accept  
unconventional product soon. It should be something  
strange(cutting edge).  
no image. plant's hair biology knowledge

102



Something flexible, elastic. A new raincoat material has  
small grooves on the surface to drain rain water to the  
ground.  
New structure  
Water proof plant image

103



A dryer similar to a fan  
after rain and wind solution  
Portable device and Dry image on Pinterest, Lash fan

95



A small flat portable device which you can hold on hand.  
From a narrow mouth, It generates a strong wind shield to  
below away the wind and rain around you. It can be put in  
your pocket.  
Portable device, smaller size.  
No knowledge of Dyson product

96



a fan like Doraemon animation.  
What can protect you from wind besides an umbrella,  
raincoat, rain shoes,  
Resist wind image

97

no  
sketch



a mask to cover your whole face like Covid facial mask. When  
You do not use, it is a hair band. When you press a button, it  
can spread like a curtain to cover your face.  
Resist wind image, Transparent wind resistance

98



It is a portable transparent panel for cyclist. The panel in the  
shape of origami can be folded in a cylinder installed on the  
bicycle. If you press a button, it can extend and protect from  
wind.  
Protect cyclist from strong wind  
no

99



## 16. Ideas Classifications and Interrater Agreement

Both two raters used Miro Online Platform to do the categorization.

Counting Categorizations: **1<sup>st</sup> round**

Idea Number in light grey color means two raters put this idea in the same category. Idea number in grey color means two raters agree to put this number of ideas together but into different categories with other ideas. Not colored ideas are that two raters have different opinions.

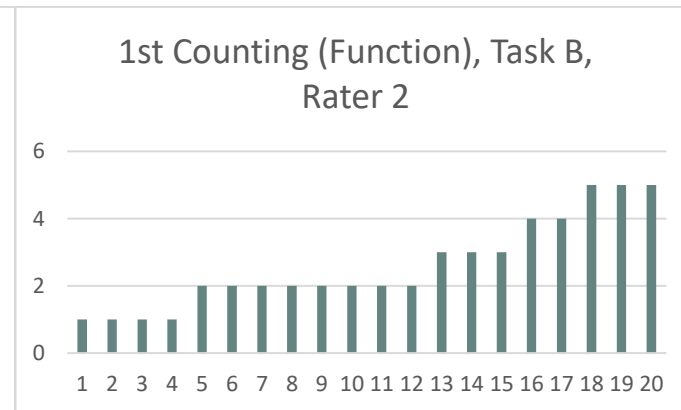
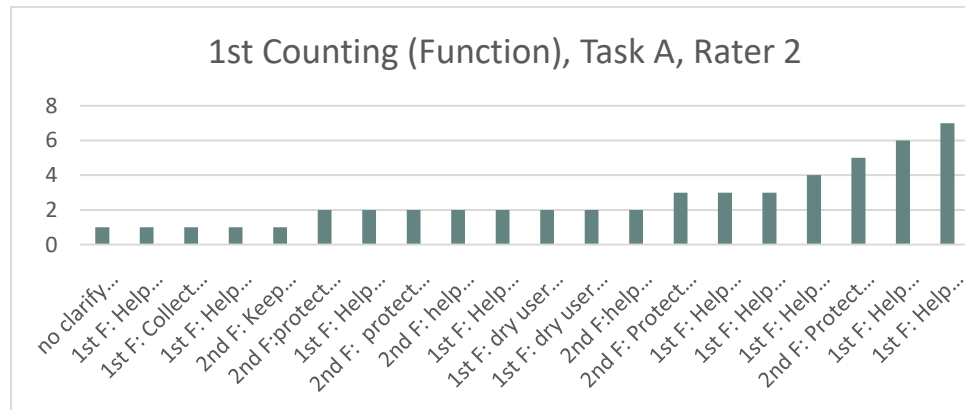
Idea in green color means that two raters defined the idea in a similar categories with different details. They can be merged to a big group to solve disagreement.

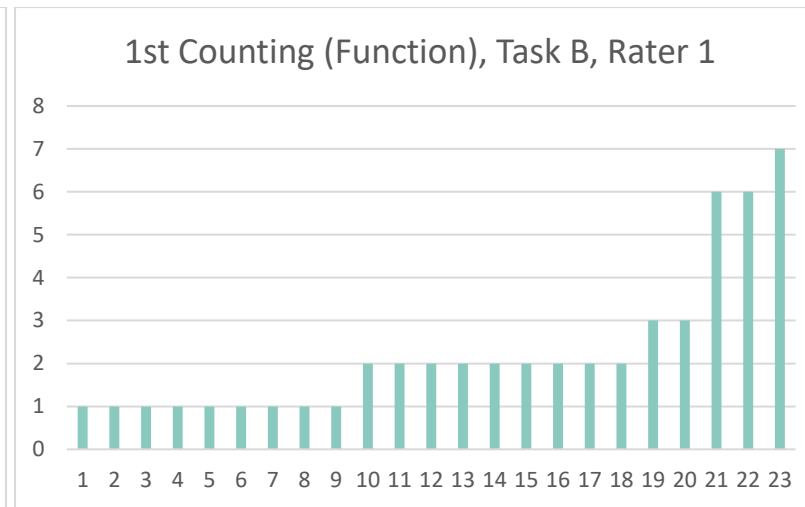
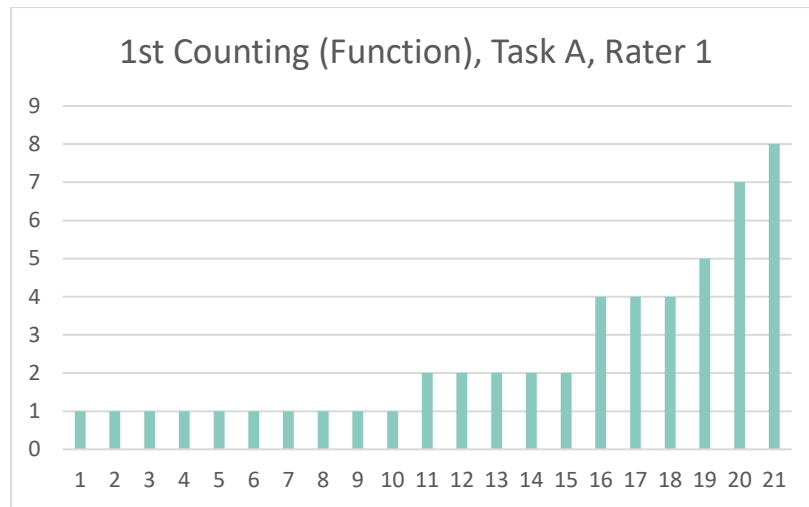
Design task B, design for tooth/toothbrush

No.	Rater 1	No.	Rater 2
A.	22, 23 Cleans brush (Does not clean tooth)	A.	13, 21, 22, 23, 1 <sup>nd</sup> F: toothbrush care/maintenance
B.	6, 15, 25, 26, 27, 29, Monitors (Does not clean tooth)	B.	6, 25, 26, 27, 29, 1 <sup>nd</sup> F: sensing, no actuation
C.	16, 37, Teeth Protection (Does not clean tooth)	C.	16, 36, 37, 1 <sup>nd</sup> F: Halitosis Control
D.	7, 10, Adaptive Bristles (cleans tooth)	D.	7, 10, 24, 39, 40, New kind of brush (1 <sup>st</sup> F: cleaning)
E.	14, 50, Mouth guard (Does not clean tooth)	E.	14, 49, 50, tooth guard (1 <sup>st</sup> F: cleaning)
F.	2, 17, 34, 39, 40, 43, 49, Chewable (cleans tooth)	F.	2, 17, 34, chemical action(1 <sup>st</sup> F: cleaning)
G.	28, 30, Vacuums (cleans tooth)	G.	28, 30, suction(1 <sup>st</sup> F: cleaning)
H.	1, Light based cleaner (cleans tooth)	H.	1, Laser(1 <sup>st</sup> F: cleaning)
I.	3, 4, Water flosser (cleans tooth)	I.	3, 4 water flossing (2 <sup>nd</sup> F: flossing, 1 <sup>st</sup> F: Cleaning)
J.	5, 8, 31, 32, 33, 104, Monitors (cleans tooth)	J.	15, 31, 32, 41, 104, sensor/actuator (2 F: reminders, 1F: cleaning)
K.	19, 35, 48, Cleans dentures (Does not clean tooth)	K.	19, 48, immersion in liquid(2 <sup>nd</sup> F: Focus on Cleaning Dentures)
L.	45, 11, Dispenses floss (cleans tooth)	L.	11, 2 <sup>nd</sup> F: store/save floss, 1 <sup>st</sup> F: Cleaning
M.	38, Plays sound (cleans tooth)	M.	38, 9, 2 <sup>nd</sup> F: Make brushing appealing, 1 <sup>st</sup> F: Cleaning
N.	46, 12, Contains paste (cleans tooth)	N.	12, 47, 2 <sup>nd</sup> F: help cleaning during travel, 1 <sup>st</sup> F: Cleaning
O.	18, Heat cleaner (cleans tooth)	O.	20, 18, heat(1 <sup>st</sup> F: cleaning)
P.	41, 42, 44, Transformable (cleans tooth)	P.	5, 44, peck/scrape (1 <sup>st</sup> F: cleaning)
Q.	21, Finds brush (Does not clean tooth)	Q.	33, chemical (2 <sup>nd</sup> F: reminders, 1 <sup>st</sup> F: cleaning)
R.	24, Adaptive Bristles (cleans tooth)	R.	35, dental arch (2 <sup>nd</sup> F: Focus on Cleaning Dentures)
S.	36, Scent spray (Does not clean tooth)	S.	8, 45, mechanical flossing (2 <sup>nd</sup> F: flossing, 1 <sup>st</sup> F: Cleaning)
T.	51, Ultrasonic cleaner (cleans tooth)	T.	- 46, 42, 43, 51, 2 <sup>nd</sup> F: Portability, 1 <sup>st</sup> F: cleaning
U.	47, Dispense paste (Does not clean tooth)		
V.	9, 13, Charging (Does not clean tooth)		
W.	- 20, Cleans Water (Does not clean tooth)		

Design task A, design for rain and wind

No.	Rater 1	No.	Rater 2
a.	67, 77, Shape changing (protect from rain)	a.	67, 77, modifying existing cover/canopy (2 <sup>nd</sup> F:protect from wind & 1 <sup>st</sup> F:)
b.	100, 70, 71, 96, Wind-shield (protect from rain)	b.	70, 100, Using forced air (1 <sup>st</sup> F: Help User stay dry )
c.	68, Dries (protect from rain)	c.	68, 2 <sup>nd</sup> F: Keep dry/warm, (1 <sup>st</sup> F: Help User stay dry )
d.	61, 62, Socialise (protect from rain)	d.	61, 62, Using modified transport (2 <sup>nd</sup> F: help users socialise & & 1 <sup>st</sup> F:)
e.	103, 93, 73, 76, 88, Novel Material(protect from wind)	e.	103, 93, 102, 75, Using alternative materials (1 <sup>st</sup> F: Help User stay dry)
f.	54, 63, 64, 69, 72, 82, 86, 90, foldable(protect from rain)	f.	54, 60, 69, 72, 80, 86, 90, using canopy-like structure (1 <sup>st</sup> F: Help User stay dry)
g.	78, Vehicle (protect from rain)	g.	78, Using modified transportation (1 <sup>st</sup> F: Help User stay dry)
h.	60, 80, 81, 97, Head-mounted (protect from rain)	h.	81, 97, 99, Using additional physical shield (2 <sup>nd</sup> F: Protect from wind)
i.	57, Stores rain (protect from rain)	i.	57, 1 <sup>st</sup> F: Collect rain water
j.	79, 83, 87, 55, 56, 65, 101, clothing (transformable, protect from rain)	j.	101, 55, 56, 65, 76, 82, transform objects (1 <sup>st</sup> F: Help User stay dry)
k.	52, 53, 89, 98, Accessory (transformable, protect from rain)	k.	52, 53, 89, 98, 84, 2 <sup>nd</sup> F: Protect specific parts, not full body from rain (1 <sup>st</sup> F:)
l.	66, Brings raincoat (Does not protect from rain)	l.	66, Fetch raincoat (1 <sup>st</sup> F: Help User stay dry)
m.	58, 92, Indicates weather (Does not protect from rain)	m.	58, 92, Notify user (1 <sup>st</sup> F: Help User stay dry)
n.	91, 95, handheld(dries, does not protect from rain)	n.	95, 91, Evaporate water (1 <sup>st</sup> F: dry user if wet)
o.	74, Social Distance (Does not protect from rain)	o.	85, 73, 74, Transform/adapt existing clothing/accessories(1 <sup>st</sup> F: Help User stay dry)
p.	94, Sponge (dries, does not protect from rain)	p.	59, 94, Absorb water (1 <sup>st</sup> F: dry user if wet)
q.	59, bike handle (dries, does not protect from rain)	q.	88 (not fit all categorization)
r.	99, Bike Panel (transformable, protect from rain)	r.	79, 83, 87, 2 <sup>nd</sup> F: Storage (1 <sup>st</sup> F: Help User stay dry)
s.	84, foot cover (protect from rain)	s.	71, 96, using forced air, (2 <sup>nd</sup> F: protect from wind & 1 <sup>st</sup> F)
t.	85, Adaptable (protect from rain)	t.	63, 64, using portable enclosed canopy/space (2 <sup>nd</sup> F:help users socialise & 1 <sup>st</sup> F)
u.	75, 102, Spray-on (protect from rain)		





#### Counting Categorizations: 2<sup>nd</sup> round

Design task B, design for tooth/toothbrush

No.	Rater 1	No.	Rater 2
A.	36, 14, 50, 9, 13, 20, 37, 16, 47, 48, 35, 19, 29, 25, 26, 15, 27, 6, 21, 22, 23, 1 <sup>st</sup> F: does not clean teeth	A.	13, 21, 22, 23, 6, 25, 26, 27, 29, 16, 36, 37, 1 <sup>st</sup> F: not clean tooth
B. -	18, 24, 38, 7, 10, 51, 28, 30, 1, 45, 11, 41, 42, 44, 46, 12, 2, 17, 40, 49, 34, 39, 43, 3, 4, 32, 33, 31, 104, 5, 8, 1 <sup>st</sup> function: clean teeth,	B. -	46, 42, 43, 51, 1 <sup>st</sup> F: Cleaning, 2 <sup>nd</sup> F: Portability
		C.	38, 9, 1 <sup>st</sup> F: Cleaning, 2 <sup>nd</sup> F: Make brush appealing
		D.	3, 4, 8, 45, 11, 1 <sup>st</sup> F: Cleaning, 2 <sup>nd</sup> F: related with flossing
		E.	19, 48, 35, 1 <sup>st</sup> F: Cleaning, 2 <sup>nd</sup> F: Cleaning dentures
		F.	12, 47, 1 <sup>st</sup> F: Cleaning, 2 <sup>nd</sup> F: clean in the travel
		G.	15, 32, 41, 104, 31, 33, 1 <sup>st</sup> F: Cleaning, 2 <sup>nd</sup> F: reminders
		H. -	7, 10, 24, 39, 40, 5, 44, 17, 2, 34, 14, 49, 50, 28, 30, 20, 18, 1, 1 <sup>st</sup> F: Cleaning, different How

Design task A, design for rain and wind

No.	Rater 1	No.	Rater 2
-----	---------	-----	---------

a.	74, 66, 58, 92, 91, 95, 94, 59, 1 <sup>st</sup> function: does not protect from rain	a.	57, 95, 91, 59, 94, 1 <sup>st</sup> F: not make user stay dry
b.	- 96, 100, 70, 71, 67, 77, 97, 60, 81, 80, 85, 57, 78, 84, 68, 61, 62, 75, 102, 103, 93, 73, 76, 88, 82, 90, 63, 64, 69, 72, 86, 54, 83, 65, 87, 56, 101, 79, 55, 52, 98, 53, 89, 99, 1 <sup>st</sup> function: protect from rain,	b.	96, 71, 97, 99, 81, 67, 77, 1 <sup>st</sup> F: stay dry, 2 <sup>nd</sup> F: protect from wind
		c.	- 68, 1 <sup>st</sup> F: stay dry, 2 <sup>nd</sup> F: stay warm,
		d.	87, 83, 79, 1 <sup>st</sup> F: stay dry, 2 <sup>nd</sup> F: storage
		e.	61, 62, 63, 64, 1 <sup>st</sup> F: stay dry, 2 <sup>nd</sup> F: help users socialize
		f.	- 84, 89, 98, 53, 52, 1 <sup>st</sup> F: stay dry, 2 <sup>nd</sup> F: protect specific body parts
		g.	66, 58, 92, 78, 90, 69, 72, 86, 80, 60, 54, 103, 93, 102, 75, 85, 73, 74, 101, 56, 76, 55, 65, 82, 70, 100, 1 <sup>st</sup> F: stay dry, different How
		h.	88, Not valid

SPSS calculation of Cohen's Kappa result, 1<sup>st</sup> counting

#### Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
Rater1_E * Rater2_S	104	100.0%	0	0.0%	104	100.0%

#### Symmetric Measures

		Value	Asymptotic Standard Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Measure of Agreement	Kappa	.613	.049	35.133	.000
N of Valid Cases		104			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.

2<sup>nd</sup> counting

### Symmetric Measures

		Value	Asymptotic Standard Error <sup>a</sup>	Approximate T <sup>b</sup>	Approximate Significance
Measure of Agreement	Kappa	.207	.036	9.187	.000
N of Valid Cases		104			

a. Not assuming the null hypothesis.

b. Using the asymptotic standard error assuming the null hypothesis.



## 17. Think-aloud Protocol

Explanations of color coding

Normal font means participant's think-aloud protocol in Duckduckgo condition

*Italic font* means my coding analysis in Duckduckgo condition.

Normal font means participant's think-aloud protocol in Tech-Net condition

*Italic font* means my coding analysis in Tech-Net condition.

### P1 doing Task A in Duckduckgo Condition

Date: 11. 07.2022

Place: zoom online



00:00:10 P1

Well, I want to design an unconventional design in strong wind and rain, so consider wind and rain.

00:00:26 P1 *analysing the brief first, not using the tool*

it should be first, that is, it should be portable, a portable device.

00:00:32 P1

A device, so this thing is going to be uh, uh, light weight, for example,

00:00:42 P1

and then it might, uh, be put in the backpack or pocket.

00:00:55 P1

And then, if it can be put it in the backpack or pocket, which means it is easy to carry. Uh. portable device. so what can be put in the pocket or backpack? cell phone, for example.

00:01:08 P1 *logical, and slow thinking, not using the tool. She paid attention to the size of this device*

Then, say pen. For example, uh, it's about the size of the mouse, the phone. Hand size, so the hand can grab it.

00:01:20 P1

Well, this is the size that similar to one hand, so its size should not be very large.

00:01:24 P1

The normal Umbrella is also ok.

00:01:27 P1

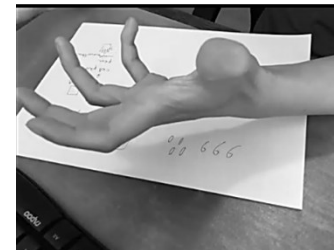
So it's probably that one hand can grasp it. maybe you can use two hands to use it.

00:01:34 P1

It's a little unreasonable if you use two hands.

00:01:35 P1 *using her hand to compare the size, put constraints for her, not using the tool*

you may also hold it if you want.



00:01:39 P1

The easiest idea I think of is Umbrella, but probably there should be more other solutions. Strong wind and rain. Let me think about wind.

00:01:52 P1 *not using the tool, thinking about user scenario, logical thinking process.*

so it is possible to think about different wind directions. Then it's possible that this user... I think that this person might be doing something else. and it's possible that this person is cycling scooter.

00:02:09 P1

It's possible that this person is riding a bicycle.

00:02:13

Oh.

00:02:15 P1 *not using the tool, sketching*

This is a very fast scooter. This bicycle is relatively slow. This person may be walking.

00:02:21 P1

It's possible that the person is driving, but the driver do not need it.

00:02:24 P1

Uh, it's likely driver doesn't need this product, so it should be that someone is exposed to the wind and rain. uh, well. this should be some scenarios. Some user scenarios, and user relate to this design brief.

00:02:45 P1 *not using the tool, intuitive ideation*

For example, uh. There's one screen here, so let's say you can hold this thing by your hand.

00:02:54 P1 *intuitive ideation, idea borrowed from Dyson describing her sketch*

and then this device can make a flow of air. It is similar to Dyson which can blow a strong flow, and then this person can be Walking like this way. and then he just holds it like that. Then it's going to have an invisible barrier so he can put it right in front of her face. The flow is going to make a very invisible block for wind and rain. uh, he should hold an angle like this. So, for example, this person holding this thing like this, it might look like this.

00:03:31 P1

And then, it will blow out the flow. the product can look like that with a little curve.

00:03:36 P1

Then, it would make a barrier like that. It looked flat on this side.

00:03:40 P1

So that its narrow mouth can make a strong flow of air.

00:03:52 P1 *another analogy, faucet, from her life experience & knowledge,*

Similar to faucet. In this way, if it makes a large volume of water, it will not be so strong. but when you make this mouth narrowed, the flow may be forceful. So if you make the mouth smaller and smaller, the flow of air comes out will becomes be powerful and produce pressure. So I can imagine that the mouth of this device is flattened with a little bended shape.

00:04:24 P1 *reviewing the brief*

Portable device, unconventional device. Let me think of rain. It will wet.

00:04:44 P1

Well, you can put it in your pocket.

00:04:51 P1

Pocket.

00:05:02 P1 *not using the tool, logical thinking*

not necessarily Keep it in your pocket. But you can also keep it in your backpack. Just like an umbrella, I should stop thinking about umbrellas.

00:05:12 P1

Blow dryer.

00:05:15 P1 *got fixated, did she forget to use the tool? Or she was thinking about her scope. She did spent 5 minutes to understand the brief.*

If this thing is something physical, prevent the rain. That's the umbrella.

00:05:26 P1

What else can prevent the rain? Something that actually creates a barrier for the rain.

00:05:35 P1

Okay, let's take a look.

00:05:40 P1 *got fixated, input a broad scope word "resist rain", asked the tool.*

Let's take a look at "resist rain".

00:05:44 P1

Uh, raincoat, umbrella. Uh, rain boots.

00:05:53 P1

Raincoat, umbrella, rain boots, OK.

00:06:07 *input a broad scope word "resist wind", asked the tool.*

OK. So what else can block the wind?

00:06:12 P1

The windshield material can also block the wind, so it is a physical thing...

00:06:19 P1

Oh, like a small fan which can also block the wind. If you create one that can against the wind, too.

00:06:30 P1 *moved sensor to turbine image, this image inspired her of Doraemon movie, intuitive thinking*

let's say it looks like this. and then it is a Doraemon's fan, that's a big fan like in the movie, and then it can be rotating when I want to prevent the wind from this side. I create a blow of air to prevent it.



Wind resistance I MIT ...  
news.mit.edu

00:06:45 P1

This is also a way to block the wind, but this may not necessarily block the rain.

00:06:48 P1

but what if You hold it a little higher if you are here. What about this? Ah, this thing looks like this.

00:07:00 P1 *got fixated to figure out what are unconventional stuffs*

So the air you produce will go this side, and then if the rain goes in this direction. this side will be dry. it should be possible. Let me see if there is anything else, prevent wind and rain, prevent wind and rain.

00:07:16 P1 *intuitive thinking, got inspired by big glasse image*

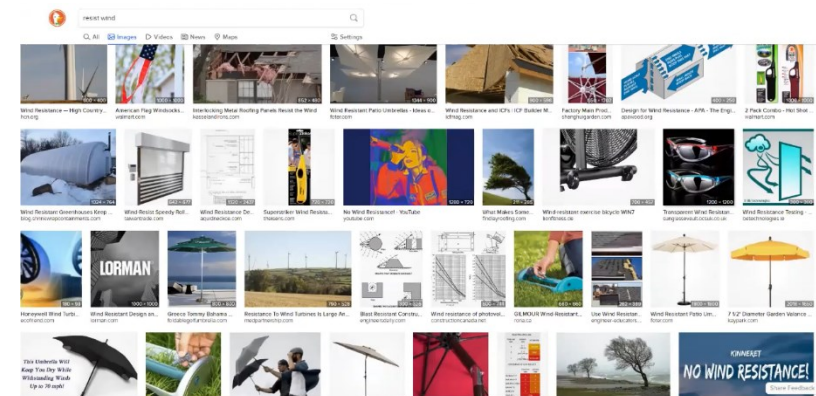
You can also use physical stuff to wrap yourself up, just like a raincoat. but if you want something unconventional, it should be something else than raincoat.

00:07:32 P1

Let me take a look at what's on the page.

00:07:35 P1

Uh, what about glasses, big glasses.



00:07:42 P1

Curtain. Let me take a few pieces of paper.

00:07:54 P1

You can. It's a face. And then.

00:08:03 P1

Like that covid-19, there is always something like that.

00:08:08 P1

Because the brief doesn't mention if it is going to protect the whole body, or to protect a small part. but it seems that it do not protect from rain. but you can have it hang like that, and then it can cover your face from rain.

00:08:21 P1 *the image sun glasses inspired her of small wearable device, she got the idea from "hair band", "transparent face mask" from her intuition. She was aware of her fixation, trying to find something new.*

Oh, maybe you can use Another mechanism. it can be folded, so he might usually be like a hair band, then.

00:08:30 P1

Well, usually such a hair band. Ah, I make this person a bad drawing. OK. that's it.

00:08:40 P1

Then, when you press a key, then he would spread out like a curtain. It's something likes glasses, something likes a mask, something transparent.

00:08:54 P1

Then, unconventional, wind and rain.

00:08:58 P1

Rain.

00:08:59 P1 *reviewing the image search result "resist wind" her of small wearable*

I am thinking the wind is strong.

00:09:03 P1

Well, when you think of the wind, you think of power.

00:09:08 P1

What else come up to your mind when you think of wind and rain? Think of Direction.

00:09:18 P1 *the tool did not show any image related with cycling. She have this idea from her life experience, and knowledge. She did not rely on the tool to brainstorm.*

OK. If This person is, Cycling, well. So this thing may be... It is portable, but it is mounted on your bicycle. So it can also be like this thing. say for example, this is your bike handle.

00:09:35 P1

Then, it can be with a long shape. It has a button.

00:09:43 P1

It's your bike. This is your seat.

00:09:50 P1

If you press the button, a physical windshield thing will appear, then.

00:10:03 P1

After it is turned off, uh, you can put it away. And then it can also be portable. This is like a, uh, portable bicycle headlights, bicycle bells. Ah. You can also take it away. so it look like this.

00:10:19 P1

This is its side, Then its button look like this.

00:10:28 P1

Then he might have another over here.

00:10:31 P1

It can came out like this.

00:10:37 P1

And then the protector is going to be put inside, so it is origami shape.

00:10:46 P1 *got the inspiration origami from her own knowledge, not from the tool*

Japanese origami art style.

00:10:49 P1

So in this way, it can be taken in, and then it can be taken outside with a little bit of thick, and flexible layer.

00:10:58 P1

so that is it.

00:10:59 P1

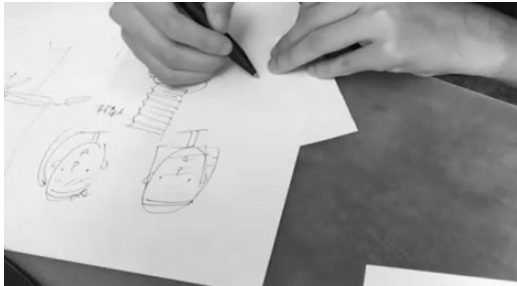
This thing can be wrapped up and off, so it could be a whole system.

00:11:05 P1

It can be turn on and off.

00:11:12 P1

So you can look at it as a cylinder when it is wrapped up. But you can open it from this side with the button..



00:11:21 P1

So this thing is also portable. It can be attached to another object. uh, how about scooter.

00:11:32 P1

Well, let me think about it.

0:11:35 P1

Uh, thinking of rain.

00:11:41 P1 *think about another direction from her intuition.*

Is this thing possible... It was originally a part of your original stuff.

00:11:50 P1

Let me see.

00:11:50 P1

Oh, if this thing was originally a part of your stuffs. so what stuff you have had already.

00:11:58 P1

Is it a mobile phone, isn't it?

00:12:03 P1

Uh, glasses?

00:12:05 P1 *fixated on her previous idea blower*

Glasses that blow out air.

00:12:17 P1

The glasses that blow out strong flow of air. It can help you, protect your face.

00:12:21 P1 *fixated*

But that's just the face.

00:12:24 P1

Uh, color.

00:12:30 P1

Let me think about it.

00:12:31 P1 *was reading through the search result, saw a lighter*

Fire, can fire do it?

00:12:33 P1

Hot.

00:12:36 P1

Through the heat.

00:12:38 P1

Make some convection, well.

00:12:45 P1

Let me look.

00:12:55 P1 *was reading through the search result, saw many rain clothes images*

Raincoat, so it can be clothes itself. Windproof and rainproof clothing.

00:13:06 P1

It's windproof and rainproof clothing.

00:13:10 P1

And then, maybe it's a coat, that's a coat when it does not rain.

00:13:18 P1

A normal coat.

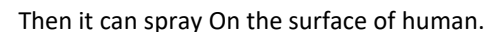
00:13:26 P1

It will cover the long skirt that you wear.

00:13:34 P1

So usually it is a coat, jacket. It can be a long skirt which can be folded back if you ride a bicycle.

Problems, for example, Let us imagine that an octopus, an octopus structure that can solve a certain problem. or similar structure of a sea





00:16:54 P1

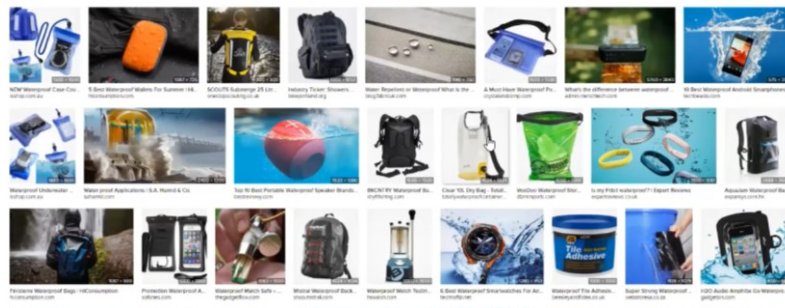
Here's human.

00:16:56 P1

Then we'll have a lot hair, Tiny hairs, and then we can make us waterproof.

00:17:06 P1 *fixated on her reframing, searched "waterproof" images, she did not copied the images, but kept on analysis*

Is there anything else that is waterproof in the nature? What else is waterproof itself? waterproof



00:17:23 P1

So some also use waterproof materials, and some use waterproof structures. like this is structure. Is it possible?

00:17:33 P1

What portable stuffs can be made like this? Portable stuff, its waterproof structure. So it becomes waterproof.

00:17:45 P1 *fixated on the problems in the brief. Logical analysis, not intuitive thinking*

waterproof Things are also windproof. so I should focus on waterproof.

00:17:53 P1

Uh, and you can think of what exactly needs to be waterproof, like the shoes. you can use a spray to make it waterproof.

00:18:02 P1

Waterproof, so.

00:18:03 P1

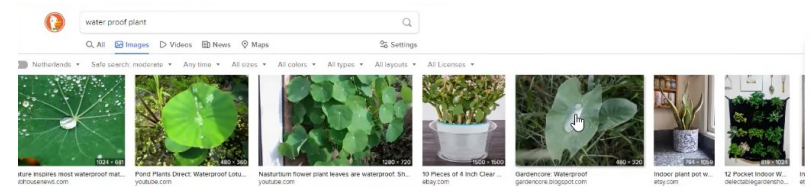
the spray is to change material features. So that something without waterproof features can become waterproof.

00:18:09 P1 *input "water proof plant" in the image search tool. One leaf image inspired her.*

Water proof plant.

00:18:19 P1

The flow of water design is very good. like a plant, it is elastic, so when the water falls down. The water has weight from gravity. Plant surface will let water drop down through the elastic path.



00:18:42 P1

so your own Raincoat or whatever stuff can have this drain design. It is doing well. and it will make your stuff waterproof.

00:18:51 P1

But now there seems to be no such design applied to raincoat.

00:19:00 P1

For example, if you do wear this raincoat when you cycle.

00:19:06 P1

Then the surface is wrinkled, or it has some edges.

00:19:12 P1

The water will store there, so if you make a waterway or design a drain in the midst of material where the water can flow out. The water will not dip into your clothes in this process, either stay on the clothes.

## P1 doing Task B in Tech-Net Condition

Date: 11. 07.2022

Place: zoom online

(translated from Mandarin to English)



00:00:14 P1

Ok. let's look at the user. What keywords will it show?

00:00:33 P1 *analysed the brief by herself. "user" is a broad term for this tool.*

I would imagine there are a lot of users of different ages, but maybe it would give me something different.

00:00:44 P1

User, user, user. Ok

00:00:48 P1

Data, user data. User. Playmaker. mobile device. OK.

00:00:56 P1 *put the tool aside, analysed the brief by herself, wrote down different age groups.*

It seems that it does not talk about the user specifically, not say different classes of users. Let me firstly write down something. There may be adults, kids, old people, middle-aged people, young people. They are different.

00:01:06 P1

Eh.

00:01:10 P1

Oh, adults and children. Old man. And then teenage.

00:01:19 P1

And then, uh, another point is, uh, cleaning teeth.

00:01:25 P1 *put the tool aside, analysed the brief by herself.*

The teeth, and then they need to be clean.

00:01:29 P1

Then, another key word is everyday.

00:01:34 P1

So everyday, it doesn't mean anything special, because everyday it can happen once in the morning, in the evening.

00:01:44 P1

Then it can also be at dinner.

00:01:50 P1

It can also be after eating.

00:01:53 P1

Well, once a day at night.

00:01:58 P1

So it will happens after some events, before or after events, such as after getting up, or after eating.

00:02:06 P1

Uh, clean. Clean can have different degrees of cleanliness.

00:02:12 P1

Well, I want to say, I'm going to look it up. But I'm not sure what keywords it's going to tell me.

00:02:19 P1 *input word "clean", this is a different input than other participant*

Because cleanliness should be a very vague word. I just want to say clean. It might mean differently.

00:02:28 P1

Uh, cleaning. OK, I think I want to look at it. so I Feel, uh, clean. It is very clean, then there can be 1 to 5 degrees of cleanliness. there is super clean,



and then ordinary level of clean. Like uh, mouthwash, this can also clean, and then you can also be brushing the teeth, brushing teeth can also clean.

00:02:50 P1

Well, teeth, every tooth should be clean.

00:02:55 P1

Then, the teeth maybe different kinds of teeth, such as temporary teeth, and then it may be permanent teeth. Two kinds, but should be, uh, right, I can think about it with different ideas, well, now I feel like I want to start with one direction. For example, I want to find out how I'm going to clefup... Eh. Eh.

00:03:25 P1 *she spent time on analysing the brief, not used the tool.*

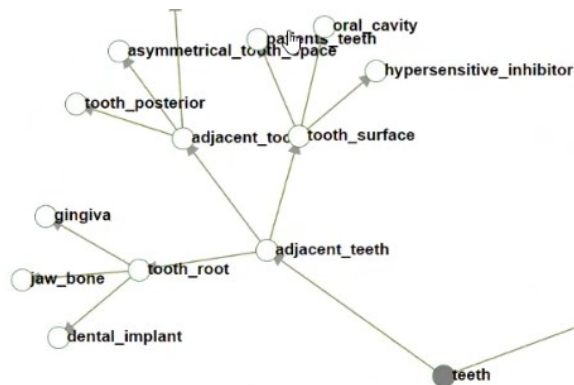
*Starting with simple, direct word seems to be the right way for this tool.*

OK. Teeth. Let me begin with simple keyword, Teeth.

00:03:46 P1 *did not mention in the protocol if these words "teeth surface", "teeth adjacent" gave her inspirations, or knowledge*

So it looks like tooth has a lot of stuff, like clean.

00:03:53 P1



Uh, you can also think of cleaning tooth decay.

00:03:59 P1

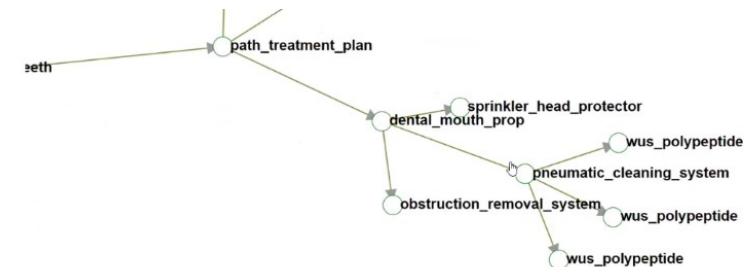
Or clean the surface, Clean the root, Clean the jaw.

00:04:05 P1

Well, it could be that Mom and Dad help you clean up, I'll take a look. What is this?

00:04:15 P1 *picked this word "Pneumatic cleaning system" by her intuition*

*Pneumatic cleaning system. I'm interested in this. Uh, eh. Oh, pneumatic.*



00:04:31 P1 *checked several times how to spell this word in Duckduckgo*

Oh.

00:04:40 P1

right, pneumatic.

00:04:55 P1

Okay, so it looks like, well, it's a feeling that there's air blowing, and then it's, uh, and the doctor cleans you tooth up. and then after washing your teeth, it will clean up small dirt. maybe it looks like this.

00:05:16 P1

Then it'll do that first, and then you can use it. uh, and it can take the dirt of your teeth.

00:05:24 P1

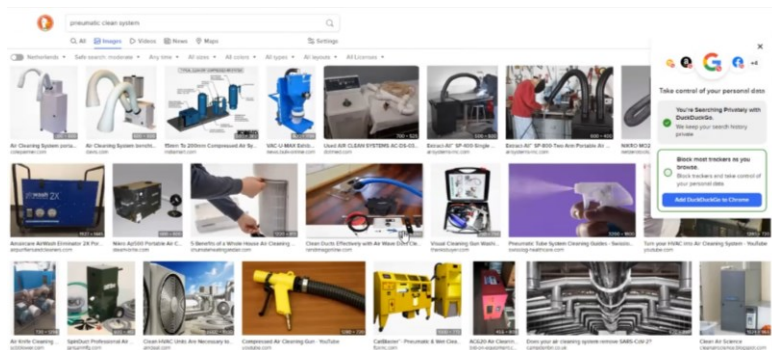
Clean dirt of teeth. Clean small dirt of teeth.

00:05:32 P1 *clicked the word "Pneumatic cleaning system"*

It is also possible... Let's take a look at this link?

00:05:48 P1

It seems to be the same.



00:05:50 P1 *the tree graph visual was not clear. Word contents appeared to be the same on the next layers.*

Oh, yes, you clicked it, it actually showed 3 same contents. Gas sensor configuration, so it can also use the meaning of gas sensor.

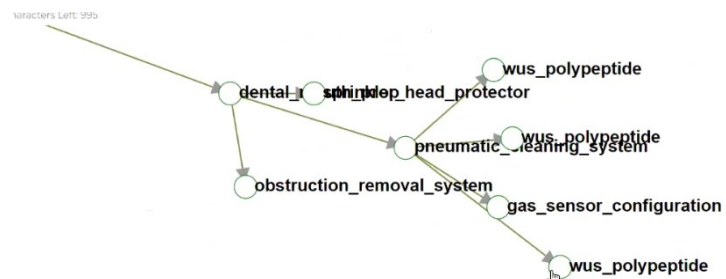
00:06:03 P1

Le me Take a look at these. Oh, my God.

00:06:07 P1 *She needs to click and move these words in the same place to clearly read them. And technic words did not help her brainstorming.*

It seems that I can't get the words (bovine neospora culture). Ok. I give up.

00:06:12 P1 *"user profile" inspired her to link with related with her*



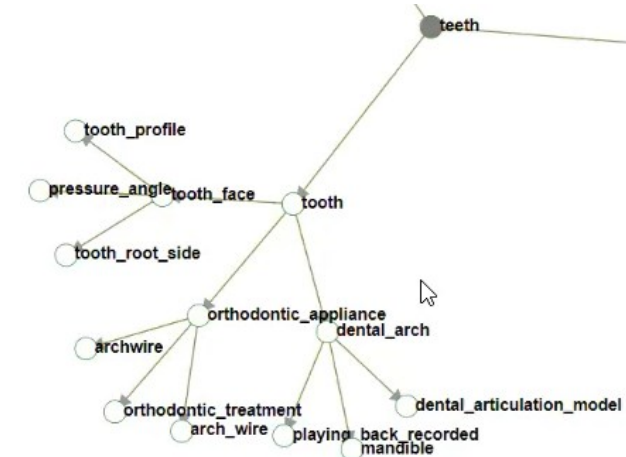
*previous analysis of the brief, some measurements of cleanliness level. She added scanning function, and provide personalized tooth care.*

Tooth profile. Oh, well, so I think it's kind of interesting. that you might have an image, or a light, and then it can know how much plaque in your

teeth now. so maybe it has a light function, and then you can turn on light, uh, you can brush your teeth, and then like this, uh, it's a toothbrush.

00:06:38 P1 *did not mention the problem. But I think this is a good one.*

And then, but it may have a light on the other side, so you can just examine, but it may be able to detect. Oh, you have not brushed clean ah, and then then you can know the degree of the cleanliness we talked before. maybe it will give you a standard exam. and then it is a uh, the score is a good one.



00:07:01 P1

The scores. so you can Check your tooth profile.

00:07:07 P1 *she probably misunderstood the word "pressure angle". It describes the angel between gear teeth.*

Uh, pressure angle, pressure Angel, pressure Angel, so maybe.

00:07:16 P1

It's this stuff, this toothbrush, when you press it, it maybe vibrate. for example, it may say, oh, you have not brushed tooth clean now. and then if you don't brush clean, it may continue to vibrate.

00:07:35 P1

It's vibration.

00:07:39 P1

Then, until you teeth are clean, it'll stop the vibration.

00:07:51 P1 *got inspired from "tooth root side". She used the tool to get knowledge.*

Tooth root side. so yes, so it will also have different sides, so I think there are three surfaces of one tooth, but only one side is clean. then is it possible that this stuff is to help you clean, tell you that you have cleaned every side.

00:08:18 P1

Let's say this thing is.

00:08:23 P1

Clean.

00:08:26

For example.

00:08:29 P1

For example,

you have teeth, right, and then you have a mouthwash, something like a mouthwash. you use it to rinse. and if you don't make it clean, There will be colors on tooth.

00:08:46 P1

Then you'll brush it again. This thing Can help you clean up, so it comes with a toothbrush, so you'll see the color and then brush it clean, so you can keep the root, sides of your teeth clean. uh, arch wire. What is it?

00:09:05 P1

Arch wire

00:09:07 P1

Yes.

00:09:12 P1 *searched "arch wire" in Duckduckgo. Got inspiration. She seemed to combine these into her design naturally. The technic terms are in domain analogy. One possible way is to pick up the understandable terms from the tool. And forgot those far domain.*

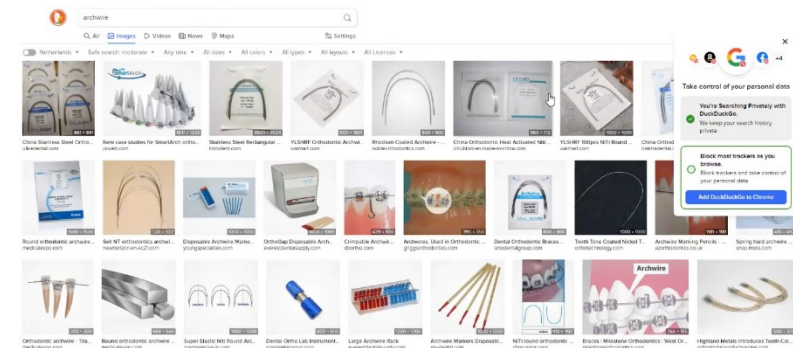
Oh, that's the one, maybe this thing ah... we can have one for a person.

00:09:22 P1

You can put something in the middle of your tooth and gums, and then maybe it will spray water over time. sprays water this morning, and other time.

00:09:36 P1

Then you don't have to do anything, you simply turn it on, and then easily let it squirt for 5 minutes, then.



00:09:45 P1

Or you go to the sink, and then you let it just flush out the dirt from your teeth. The process is also invisible. You don't have to brush your teeth. You don't have to do anything specifically. This is an equipment installed there. It helps you clean up.

00:10:09 P1

Uh, dental.

00:10:16 P1

Dental arch.

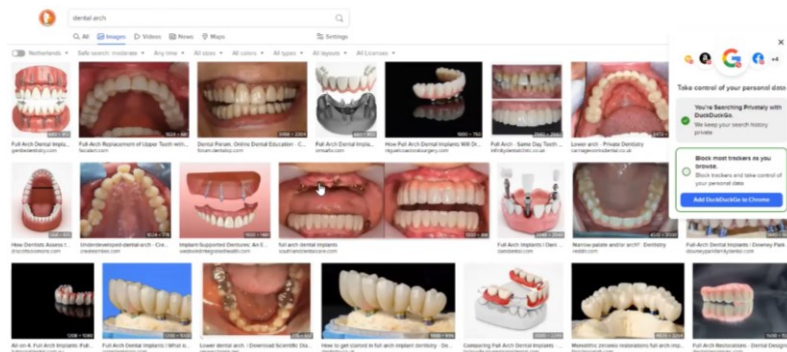
00:10:19 P1 *"Dental arch " also gave her inspirations. These three words probably reminded her of other users' problems.*

OK, oh, tooth implant, uh tooth root, oh, good, so it is also possible. um, for those who wear fake tooth, it is possible, uh your tooth root, tooth root.

00:10:34 P1

It will has own cleaning function. So as long as you eat food, it will help you automatically clean, and clean this fake tooth. and then, for example, if

you look at these four fake tooth, it will directly spew water, and then teeth will be Clean and tidy. Maybe it is possible.



00:11:00 P1

Dental articulation model.

00:11:08 P1

Dental Articulation model.

00:11:13 P1

Good, modelling of Teeth.

00:11:18 P1 *also used Duckduckgo to check the meaning of "dental articulation model". She used intuitive thinking to judge which word was useful, which was not.*

Oh well, I don't think this tooth modelling could be useful.

00:11:23 P1 *she looked back at her notes about the design brief.*

Well, let's take a look. User. So the fake tooth ideas are mainly for older user's group.

00:11:38 P1

Let me take a look at it, breakfast, dinner.

00:11:45 P1 *put the tool aside, Reframed problem here. Came up with the ideas by herself.*

Cleanliness refers to how others feel your tooth cleanliness, so there's a possibility that there's going to be something intalled inside your teeth, and then...

00:11:58 P1

In a regular time.

00:11:59 P1

It helps you fresh your mouth.

00:12:03 P1

So maybe it is, It's a thing that you can then fit inside your mouth and it will regularly make mint smell, or whatever flavour that you like in your mouth. it'll show a clean and fresh feeling to someone else.

00:12:26 P1

Portable device. Let's take a look at what other words are there?

00:12:31 P1

Well?

00:12:33 P1

Mandible

00:12:43 P1 *used Duckduckgo to search for meaning of the word*

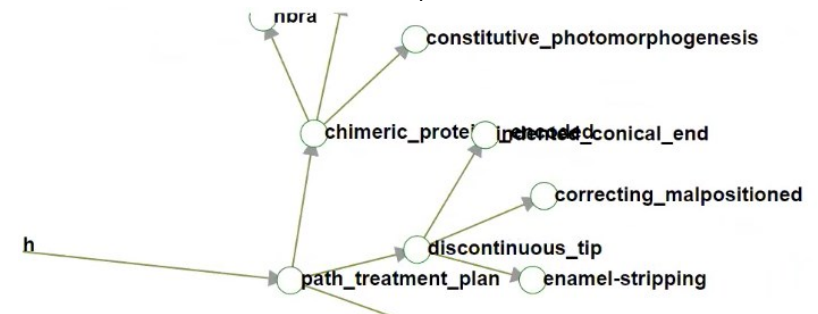
Let me check if I type mandible right.

00:12:52 P1 *P1, P4 can eliminate unrelated words quickly, and align to the tool's rule quickly, keep on explorative search.*

Uh, it looks like a chin, Jaws, but it doesn't seem to be very useful.

00:12:58 P1

Uh, I'll take a look at discontinuous tip.



00:13:02 P1

Discontinuous tip

00:13:12 P1

Eh, am I typing it right?

00:13:15 P1 *she could not find this word from the screen to check spelling.*

*It is of low efficiency for designers to get the meaning of the words.*

Where is discontinuous tip, discontinue tip?

00:13:23 P1

I'm, I just want to copy it now, but I can't copy. The words are all sticking together.

00:13:34 P1

Discontinuous, discontinuous, I don't write it wrong, right?

00:13:40 P1 *zoomed out, tried to understand the theme of each word tree branch*

Ok, not useful. I was thinking this area might be something about teeth. and then this are is... Well?

00:13:58 P1

What is adjacent tooth?

00:14:10 *searched "adjacent tooth" in image search. Felt the sick tooth image results were so disgusting. Designers do not want to see ugly realistic images in the process.*

Well. Oh. This is so disgusting.

00:14:14 P1

Wow, oh well, uh, it means that some one misses teeth. so

00:14:24 P1

because I know that some people wear braces, or lack tooth. there will be bad breath issues. so maybe.

00:14:36 P1

Can anything be in your own Tooth next to your missing tooth?

00:14:47 P1

Put something on it, or paint something on it. it'll make sure keep bacteria at low level. then he won't have bad smell from that area.

00:15:03 P1

Uh, dental implants.

00:15:08 P1

gingiva.

00:15:18 P1

Oh, what?

00:15:21 P1

How disgusting.

00:15:23 P1 *these images are not helpful for brainstorming. Designers want to avoid reading them*

I don't understand it, but I don't want to read it either.

00:15:26 P1

Uh, it should be, uh.

00:15:33 P1

illness, this area should be words of dental illness.

00:15:35 P1

Well, hypersensitive inhibitor.

00:15:46 P1

Hmmm.

00:15:49 P1

hypersensitive.

00:15:52 P1

I type it right.

00:15:55 P1

it feel like vibration or something like that.

00:15:57 P1

oh, the picture is too scary to look at.

00:16:04 P1

Oral cavity. the brief is about cleanliness. Cavity. you know, something that detects our teeth are clean or not, then.

00:16:19 P1

Well, for example it's a toothbrush.

00:16:25 P1

Can it Detect if we have tooth decay inside? Or it can take a video.

00:16:32 P1

So we can see that we have any tooth decay?

00:16:41 P1

Uh, or you know there's this toothbrush. It'll remind you to in the night. It might ring.

00:16:56 P1

He might make some sound and vibrate to remind you to brush your teeth.

00:17:04 P1 *reflecting on the brief*

Keep clean. so mouthwash is also a way of keep clean. Unconventional device.

00:17:13 P1 *fixated, needed to find something else*

Is there anything else to think about, huh?

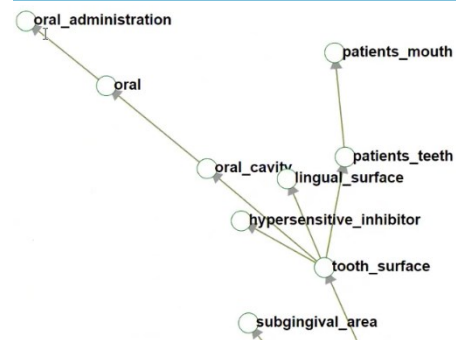
00:17:19 P1

It seems I am done with this area of words.

00:17:30 P1 *interacted with "tooth surface" to see further layers. But these words "Patience teeth", "Patience mouth" did not say anything new.*

Let me look at tooth surface. Patience teeth. Patience mouth. These are some useless words.

00:17:36 P1 *interacted with "oral cavity". These words "oral", "oral administration" did not say anything new.*



Uh, Oral, oh.

00:17:40 P1 *complained these interaction did not bring anything new.*

What a story.

00:17:43 P1

posterior?

00:17:58 P1 *searched "posterior" in image search tool, saw many real tooth images. But she did not figure out what the word meant.*

Oh, my god.

00:18:08 P1

Does it mean shift from proper position? Even if I search it, I do not know the meaning.

00:18:18 P1

I think it might show the changing color, and then let me know that words I've clicked. Then, tooth flank

00:18:34 P1 *searched "flank" in image search tool, saw gear shape image*

What is Flank?

00:18:37 P1

Or gear.

00:18:40 P1 *interacting with nodes aimless, probably killing time, fixated with the tool,*

There was something I can find out. I felt I am going to detect that. Arch wire, what is it meaning

00:18:50 P1 *difficult dental terminology, she felt not useful for ideation*

Cutter mining machine. OK, I would not do it. Uh, Orthodontic. OK, I'm just clicking whatever words right now and see what comes up.

00:19:05 P1

Dental arch, I think its layers are little bit confusing.

00:19:12 P1

for example, if you click this word, and then it comes up with something useless.

00:19:18 P1

Not so useful words. appliance

00:19:23 P1 *fixated, interacting with the tool, but did not have new ideas*

the first Layers, like this, the first layer like this might be most relevant things, and then you click on it again, it doesn't show useful word. uh, what if you type clean tooth?



## P2 doing Task B in Duckduckgo Condition

Date: 13. 07.2022

Place: P2's home



00:00:04 P2

Yeah, I'm just looking for a tooth cleaning tool. And looking at images. Yeah, so this is what I was thinking like.

00:00:19 P2 *came up with the idea by her life experience, not using the tool. "woodpecker" was an interesting biological analogy.*

A woodpecker like. A beak that cleans and it sort of looks like this tool.

00:00:33 P2

It's like this. Big leg thing and then it can recognize the. Gaps in like the stuff here and it can pick it out so it's inspired by.

00:01:03 P2

woodpecker?

00:01:22 P2 *was copying the magnify glass image from her search result "tooth cleaning tool".*

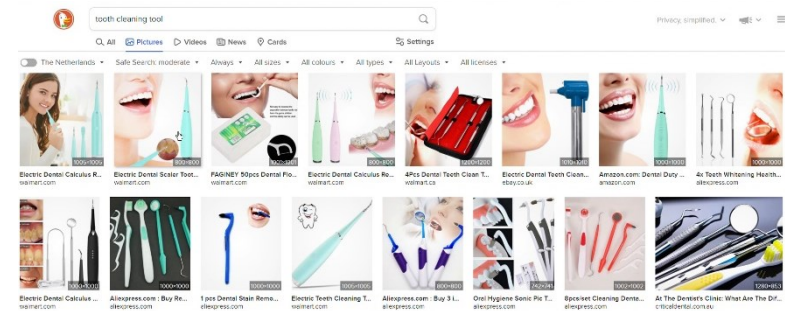
So like this magnifying glass kind of thing that. I'm just thinking like crazy ideas. And something that you. Scan your Teeth with and you know, like. Gum health.

00:01:59 P2

Uh, magnify glass kind of thing.

00:02:02 P2

That is also used with some form of Image processing.



00:02:14 P2

And, what else.

00:02:33 P2 *reviewed the design brief, tried not to repeat.*

So I can't think of something that's straight, right? So something very different.

00:02:59 P2 *did not use the tool, came up with the idea from herself*

Yeah, so it would really be nice that the toothbrush kind of adapts to like which Part of the mouth it's being used in so like A brush that's. So this changes the bristles.

00:03:34 P2

Changing Bristles, what a brush.

00:03:40 P2 *came up with new ideas without the tool. When she got this idea, she searched "automated toothbrush" to confirmed if her idea was novel. This can be another way of using the image search tool. In both two conditions, She did not mention what the problem was going to solve.*

Is that An existing thing? Automatic tooth brush

00:03:55 P2

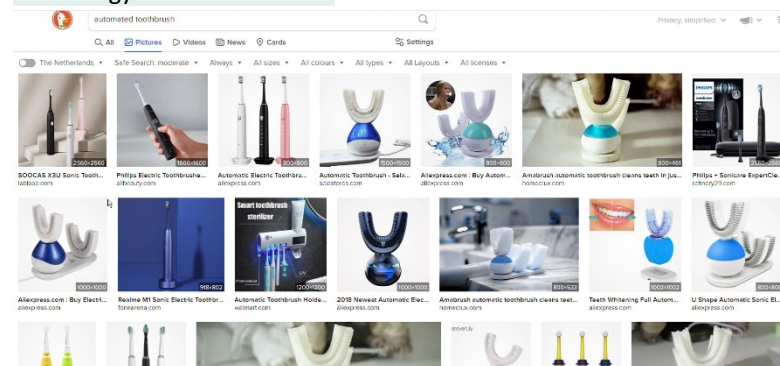
Oh yeah.

00:03:57 P2 *image search really triggered her ideation. This is an intuitive and visual thinking. Although the search results did not answer her questions about changing Bristles*

Oh, this is quite an interesting tool where you just like put that thing in.

00:04:15 P2

Yeah, so I'm just looking for like inspiration to see how they've merged technology with a toothbrush.



00:04:31 P2

OK. What else?

00:04:42 P2 *redefined a new specific problem, image can remind her of user scenarios.*

I wonder what they do for block removal.

00:05:00 P2

So I see that it's quite similar to A toothbrush again.

00:05:20 P2

And now again reading this to See if I can think of something else.

00:05:45 P2 *searched for "tooth cleaning", lots of dentist tools made her fixated obviously. image search tool can help her look for existing products, or problems*

Not really, let's see What happens when I look for just tooth cleaning?

00:05:56 P2

OK, there's a lot of dentist images, not what I was looking for.

00:06:27 P2 *searched for "tooth health",*

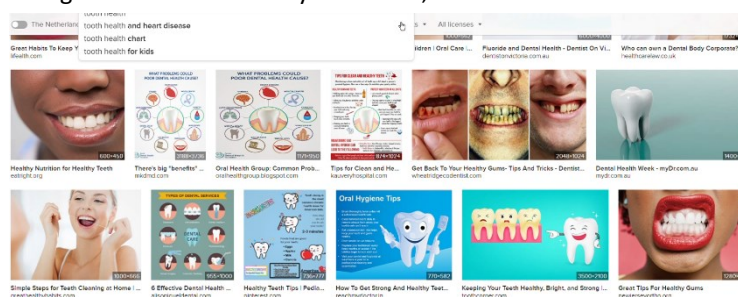
Is there any Device that helps with recognizing tooth health. And how do you do that?

00:06:48 P2 *she was refining the problem in a very explorative manner,*

It is really for every day health so.

00:06:57 P2 *saw lots of dental check image, probably a floss image inspired her*

Oh yeah. So sometimes there is like something stuck in the tooth and to find where that is and to for it to get it out. It'll be nice that the floss is designed in a different way somehow, so like.



00:07:19 P2

a scanner? So something like this. This thing that goes in and scans. First and then it has like a, A floss like thing.

00:07:44 P2

So this is the floss That then goes in and cleans. So scans is the first step and.

00:07:57 P2

Cleaning or removing food from, Between us and another.

00:08:10 P2

So it would really be nice if this is. Automated in some way. So it helps.

00:08:42 P2 *this was a problem definition process, she defined the problem from her life experience. Probably she got inspirations from parents teaching kids tooth brush images.*

We can definitely have something for kids to initiate like this. So, so something for kids. That makes the process more fun.

00:08:57 P2

And it also helps in habit building.



00:09:06 P2

So maybe like an interactive toothbrush so. They see that this brush is kept there and it's like.



00:09:20 P2

On the charging thing and then this glows. So when they see it, they pick it up and then. Uhm, yeah. There's probably like when they have picked it up.

00:09:42 P2

And they've applied some toothpaste on it and they're brushing.

00:09:50 P2

There is some form of music. which is helping them. Cover the entire mouth. And it's probably. Also with some vibration For better cleaning.

00:10:41 P2

So that's another.

00:10:46 P2 *she was reviewing the design brief again. She clearly knew her should not fixated on toothbrush.*

But I still think I'm still looking for like a toothbrush like device and it need not be A toothbrush.

00:11:03 P2 *she probably got the inspirations from her previous search results, the arch brush shape. She did not mentioned the problem here.*

Oh yeah, what if there was this One tool wherein. You sort of have Bristles like this. And all you do is you pull it in and pull it out of Your mouth like this?

00:11:27 P2

So something that helps you clean The outside and then somehow you need to clean the inside too.

00:11:35 P2

I wonder how that would switch to.

00:11:42 P2

Oh yeah, probably With like a Button press here. So button that switches bristle size. And then when you pull it in and out, it becomes like Small and big suit, so this action. Actually changes From this to this so.

00:12:29 P2

Yeah, and the bristle can then like the button Can then switch the 2 sides.

00:13:02 P2 *she was in a similar fixated situation in both two conditions. In this condition, she did not know what scope to search. In another condition, she did not get the meaning of the search result.*

Yeah, what else. I can't really think of anything more.

00:13:16 P2

And I don't know what to search also.

00:13:42 P2

I'm thinking of what to think.

00:13:46 P2

Oh, what else can be done?

00:14:00 P2 *wanted to find tooth cleaning things outside tooth brush. She made a search word "mouth hygiene products". So let the tool tell you what are existing products there.*

Let's see what comes up when you type mouth hygiene products.

00:14:10 P2 *felt stuck with the search results.*

They're all toothbrushes. And some random things.

00:14:22 P2

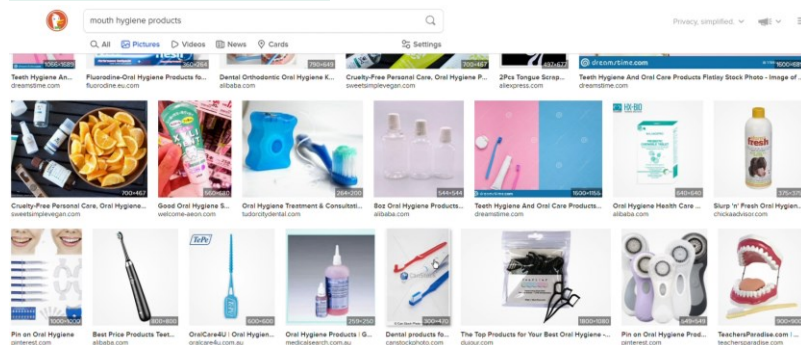
The oral hygiene industry looks the same.

00:14:49 P2

Yeah, I can't really think of anything.

00:15:27 P2 *during the search process of “mouth hygiene products”, she saw some floss images. She came up with the environmental problem by herself.*

Well, there could be one thing definitely which will also be more environmentally friendly with. So there is this. What is it called?



00:15:41 P2

The floss thing. So this is the floss. And it also comes in this. A roll like thing. Where you can pull it out and cut for yourself. So it would be nice if this can be combined with this.

00:16:04 P2

So maybe. Within this Thing that is like a Extra floss. That comes here. Through the thing. And then you can just. Pull out used ones and. And then cut. there is like this Extra bit here so.

00:16:43 P2

Yeah, you're actually saving some plastic and. I don't know. You're probably able to Use this thing for a month.

00:17:17 P2

Yeah, that's what I can think of. What else?

00:17:42 P2

Oh, this could be like a travel kit thing. Not probably everyday use also. But a toothbrush that can also store in some toothpaste Within the brush,

somehow and then. There's like the bristles here. So you probably press this button. And then all you have to do is Have a cap here.

00:18:24 P2

So this is like a travel tooth brush.

00:19:07 P2

OK, now there are all technical papers coming up. What else? What is oral hygiene products for dry mouth?

00:19:29 P2

How much more time do I have?

00:19:31 Experimenter

30 seconds. You still have time.

00:19:37 P2

But I can't think anything.

00:19:44 P2 *she did not use the tool. An idea from intuition.*

Yeah, one thing could be to have like a family electric brush Set up. So basically like a Thing where you can charge multiple. These are all 2 brushes.

## P2 doing Task A in Tech-Net Condition

Date: 14. 07.2022

Place: P2's home



00:00:09 P2 *she also put the tool aside, got inspiration from a movie Doraemon.*

OK, yeah, so the first thing that comes to my mind is That Doraemon like thing on the head, so I'm just trying to remind, so I remember.

00:00:25 P2

So something that's on, That can be mounted on the head, let's say.

00:00:33 P2

So this is a person's head, well. And then it is.

00:00:43 P2

This 3D setup.

00:00:56 P2

So umbrella on the head kind of thing.

00:01:01 P2

Yeah, the other thing could be. So again, something all mounted on the head, but it's, it's a refined idea I think.

00:01:20 P2

So something that. Something on the head of a person, but. Uh, you can actually like. Get it down and then there is this.

00:01:36 P2 *she also put the tool aside, zip thing idea also came from her intuition.*

Zippered thing, and then you can just. Zip things like up.

00:01:42 P2

I think that protects from wind.

00:01:55 P2 *input the word "umbrella"*

I am just searching for an umbrella.

00:02:28 P2

A tent.

00:02:29 P2

Yeah, so this idea I believe is like tent like thing.

00:02:35 P2

Mini umbrella.

00:02:41 P2

Maybe I should look for rain protection or just rain protect.

00:02:54 P2

Oh, so there's an error message.

00:02:57 P2

Because it doesn't search for it.

00:03:02 P2

Just rain.

00:03:13 P2

This shows up like some weather stuff, I don't.

00:03:20 P2 *went back to "umbrella" as search word, was learning how to align with this tool.*

Let's go back to umbrella. Oh yeah, you can't press enter.



00:03:30 P2

The term is already in graph, is it? I already set it and search.

00:03:46 P2 *was reading these keywords, trying to make sense of the result*

Low canopy double story. Easily folded. Yes, make sense

00:03:55 P2

... multiple fold, telescopic centerfolds.

00:04:06 P2 *got stuck with these technic search results. She should ignore the words that were not interesting to her.*

Nothing really Comes to mind.

00:04:27 P2

Pickup truck rack.

00:04:31 P2 *did not understand how "pickup truck rack" appeared in the "umbrella" search results. Then she read through the linked word "canopy", "collapsible", she got the logic.*

Now that would be a weird thing, I think. Oh, because it's collapsible.

00:04:45 Experimenter

If you see some word you don't understand that you can search duckduckgo or not.

00:04:51 P2 *the tool did not include visuals. It seemed that brainstorming without visual was tool difficult for her.*

Yeah, I do understand. But one thing which I think would have been nice in this case. I can say that is if there were images. So then that gives like a visual feedback.

00:05:08 P2

Uh, yeah, that would have been really nice too that I think that's what I missed from the yesterday's search.

00:05:28 P2

I'm thinking more along the lines of work.

00:05:33 P2

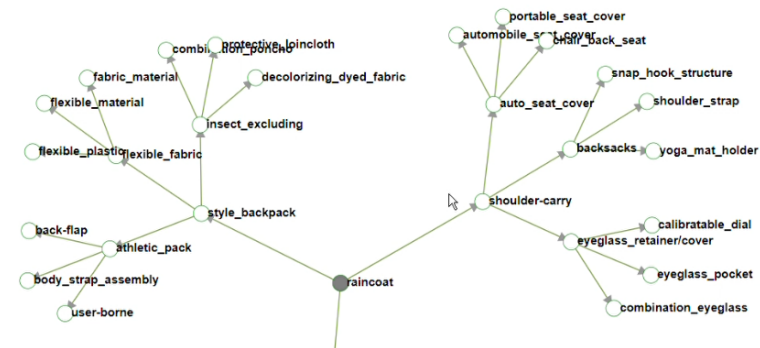
Maybe I should search for a raincoat?

00:05:47 P2 *she felt "raincoat" search results interesting*

Raincoat style backpack, that is interesting, shoulder carrying.

00:05:55 P2

And what is this raincoat receiving lab body clean cushion?



00:06:13 P2 *need more time to understand the results, and link with the design requirement*

Yeah, it should be portable also, right? So how do we go about portable?

00:06:27 P2 *the search results did not show anything related with word "fan", or "wind". She had the idea by herself.*

Yeah, it could. It reminds me of the fan that opens. so I don't know what it's called like. The team like this.

00:06:54 P2

fan, that opens and closes maybe. Can be an inspiration so. Some form of setup wherein the umbrella or raincoat umbrella probably has.

00:07:16 P2

This kind of a thing. It's more of a Triangularly folded Thing so this comes.

00:07:31 P2

Here and there is suppose here so you have a triangle and then from the center there will be.

00:07:44 P2 *not know how her got inspired by the tool. she did not really use the tool. Probably inspired from previous result "collapsible"*

I don't want it to be a roll, but something lighter than a roll.

00:07:54 P2

A cylinder. So it really folds flat, and probably it's also even more foldable, maybe.

00:08:07 P2

Oh, nothing.

00:08:14 P2

That keeps the user dry. It could also be parts of the user, right? So the shoes for instance.

00:08:27 P2 *probably from previous result "Raincoat style backpack, shoulder carrying".*

Oh yeah, so there could be like so the backpack sometimes.

00:08:42 P2

So backpack sometimes has this bottom compartment For, uh, Rain cover.

00:09:00 P2

So why? What if something like this could be in a shoe? So shoes need not be waterproof, but it can be made waterproof.

00:09:13 P2

So I don't know like somewhere. Above the feet. probably yeah, there is this Cover for.

00:09:41 P2

And that would be portable I believe.

00:09:51 P2 *she did not really use the tool. The result did not show anything related with "shoe", "boot" or walking.*

Or something that can be also stuck onto a shoe. So something that you. Let's say. You wrap around your feet.

00:10:11 P2

And then you can somehow like extend it like this, so foot cover for rain.

00:10:27 P2

Then the other aspect that could be done. Oh, yeah, one thing it's definitely nice is so I haven't really seen it is. I'm thinking of various features that can be there in these both devices, so a raincoat is usually just for a body, but an adaptable raincoat.

00:10:58 P2

So something that adapts to body. And bag. So your bag is also all protected.

00:11:15 P2 *she kept on exploring, but did not use these words. did these information make sense for her?*

Yeah, this snap hook structure was sort of an idea.

00:11:19 P2

Yoga mat holder. Ah, the back one. What if?

00:11:46 P2

Yeah, flexible fabric could be nice so.

00:11:52 P2 *not using the tool, she did not relied on the tool, came up with new ideas fluently*

But I think what is the flexible fabric. It should be those flexible connector rolls. Flexible metal structure. I would call those. that are umbrella, Like they have this. Thing that goes over it. Like this?

00:12:31 P2

So usually this outside thing is what collapses.

00:12:43 P2 *keyword "flexible material", "collapsible" gave her an idea of "flexible metal structure". She did not define the problem in both two conditions, but just came with new solution directly.*

But with the flexible metal structure, the whole thing could collapse.

00:12:58 P2

What else, back flap?

00:13:09 P2

Oh, raincoat could be imbedded into the bag itself.

00:13:22 P2

So bag with the raincoat so you Unzip it and Where. so something that covers the bag? And the person.

00:13:43 P2 *"back flap" is the inspiration.*

Yeah, the back flap. Should I write what inspired me?

00:13:46 P3 Experimenter

Yeah please. So a back, back flap was the inspiration here.

00:13:54 P2

Body strapped assembly usable. Combination eyeglass, why does eyeglass show up?

00:14:04 P2

....

00:14:11 P2

Bag body opening portion. Oh, let's see what this shows.

00:14:24 P2 *these search results confused her so much, she got fixated on the results, not produce new idea till the end.*

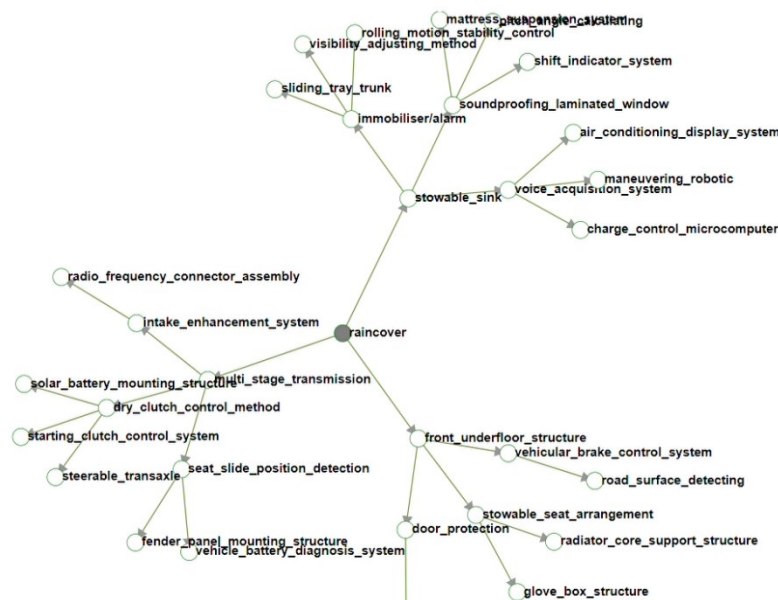
Multi mode traveling. That doesn't make sense. Separate fluid bladder, what my fluid bladder?

00:14:38 P2

Later pull, universal cable guide.

00:15:02 P2

Then what else, rain cover could be a word?



00:15:11 P2

Why can you not press enter?

00:15:31 P2 *lots of technic words appeared in the "rain cover" search results and did not make sense*

This is very random.

00:15:44 P2

No, I don't think this makes sense.

00:15:53 P2 *when the machine misunderstood her, she changed to a new word. this should be the right way to use the tool.*

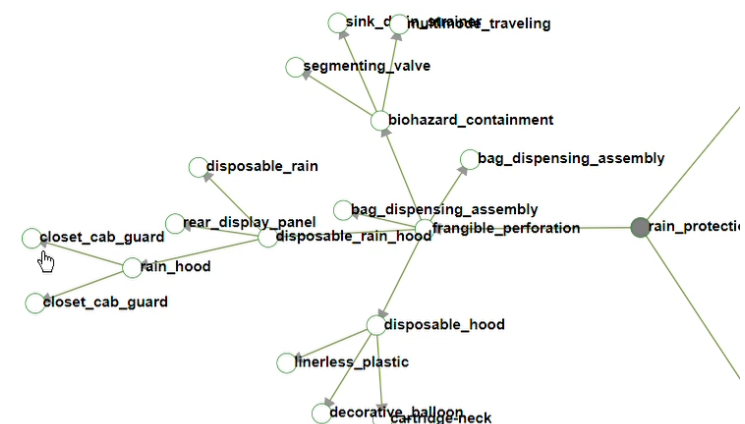
Yeah, rain protected or rain protection could Work.

00:16:08 P2

Disposable rain hood, rain protection is quite a word.

00:16:20 P2

Sink drain strainer, multimode travelling, Biohazard containment, linerless plastic.



00:16:37 P2

Hotel ...

00:17:08 P2

Let's see what rain Hood has to say.

00:17:13 P2 *interacting with "disposable rain hood" nod. She did not get the logic of the two word nods. the result did not inspire her.*

Closet cab guard. What Closet cab guard? cab guard.



00:17:32 P2

Oh, This is something else. It is probably showing rain protection for a building setting.

00:17:48 P2

That can keep user dry in strong wind and rain.

00:18:00 P2 *She probably linked cycling experience with word "rear wheel". The search result did not show any word related with biking or cycling.*

rear wheel, what else? I quite like what they've done for a person biking in the rain.

00:18:14 P2

So biking raincoat.

00:18:25 P2

I can't really think of anything.

00:18:35 P2

There could be a development on materials.

00:18:40 P2 *there was nothing on the screen related with coffee, or package, only bag dispensing assembly. She came up with this coffee package idea from intuition.*

Let's say so something that's inspired by the coffee package. Where you can smell the coffee?

00:18:57 P2

But you can't put air in. Or get beans out.

00:19:17 P2

So those wrapping Like that plastic bag thing with holes. Like this? That's on a coffee package.

00:19:25 P2 *got stuck for about 8 minutes long, obviously that she used image search more naturally and productive.*

That could be one too. So this is more of a Material exploration More than design.

00:19:43 P2

Yeah, What else.

00:20:01 P2

That is all.

### P3 doing Task B in Tech-Net condition

Date: 06. 07.2022

Place: P3's home



00:00:00 P3

Conventional device that can keep users' teeth clean every day...

00:00:14 P3 *defining the search word*

Teeth cleaner

00:00:22 P3

Let me see. So... Em...

00:01:02 P3

Should I also draw?

00:01:05 Experimenter

No, Whichever quicker for you.

00:01:12 P3

So typically we have.

00:01:17 P3

Flexible armor.

00:01:19 P3

Oh...

00:01:32 P3

Change a bowl, I think it's really nice because we rinse teeth with a cup.

00:01:57 P3

But then, problem is.

00:02:10 P3

Tell me I have to change a bowl.

00:02:25 P3

Like this problem?

00:02:30 P3

Need to wash a bowl. Sometimes I forget to change the bowl.

00:03:14 P3

Em...

00:03:49 P3 *Searching this technic word in image search to understand, her search word is teeth cleaner, the tool's capability showed lots of irrelevant results*

Cryogenic transport Oh, OK.

00:04:11 P3 *these two technic words seem not help the brainstorm. We do not know what are the logic to show these key words.*

Socket welded. OK.

00:04:31 P3 *the solution comes first, then think about a problem which fits in the solution.*

So there is a widening end part. I think I want to make a solution that a bowl that can be widened. Maybe the problem is I need the space to keep the bowl for rinsing the teeth.

00:04:56 P3

This tool Can be widened to place the teeth cup.

00:05:35 P3

And then. Yeah, I think also change the bowl. I need to remind myself to rinse, change the bowl widened.

00:06:16 P3

So put this one. And, then teeth cleaner. Em.



00:06:29 P3

This is...Maybe a problem that is changed?

00:06:36 P3

One problem. That's the water. Water is not clean.

00:06:54 P3

And then, here. So there is Thermocouple container.

00:07:37 P3 *the tool provides technic words which seems difficult to apply into the brief. Participants do not understand them, and better not to find out each one's meaning.*

Actinism. What is Actinism? Yeah, I don't understand.

00:07:45 P3

Thermocouple.

00:07:55 P3

OK, so maybe there's a way to clean the water by using a device To clean the water.

00:08:13 P3

So, so then we can use, teeth cleaner again.

00:08:30

Then. There's also, like, uh, yeah, Water cleaner with Cleaning control

00:08:52 P3

So it can measures the, The health. To measure cleanliness of the bottle.

00:09:22 P3

Yeah, so it's mainly about cleaning. But, then I will...

00:09:33 P3 *a search result "password recovery system" from the tool reminded her what problem can fit in this situation.*

But this is also. There is password recovery system on the Tech-net, so maybe the problem would be If you are with the family.

00:09:53 P3

Yeah, what else, We lost our tooth brush.

00:10:03 P3

It's a problem. So then the solution will be. Finder of brush.

00:10:18 P3

Tooth brush finder At home.

00:10:26 P3

and. Em

00:10:35 P3

See how is this charge.

00:10:40 P3

So I have holder. Also I think it's also toothbrush cleaning.

00:11:00 P3

Sometimes it is Dirty. And then.

00:11:14 P3

So that maybe there is. The solution of toothbrush cleaning will be.

00:11:22 P3 *she combined search result "ironized water" into the solution. Does she get fixated on the tool result?*

Maybe ironized water Or liquid To clean The toothbrush.

00:11:40 P3

So people can always have the clean tooth brush. Then.

00:11:55 P3

Maybe also Uv filter for cleaning tooth brush.

00:12:18 P3 *she used tool most of the time, heavily rely on the search results to brainstorm even if some of these results do not make sense for her.*

What is auto released. I don't understand.

00:12:26 P3 .

Electric tankless water heater. Em.

00:12:32 Experimenter

If you don't understand you can us Duckduckgo?.

00:12:38 P3

Integrated mixing valve. Waste drain connection

00:12:50 P3

Data privacy.

00:12:52 P3

Not really.

00:12:55 P3 *these search results do not seem to be helpful.*

flashlight control. Multiple hemoclip system.

00:13:14 P3

What's this?

00:13:21 P3

Maybe it is hemoclip system.

00:13:26 P3

Maybe it's something that the problem. I think. It's difficult to clean the teeth.

00:13:48 P3

So there's sometimes difficult to clean the teeth. In the. In the hole, or in detail. So we need to. Something, something like hemoclip.

00:14:07 P3

That can reach the difficult Position. I will draw.

00:14:43 P3

OK. so I have micro teeth brush. Yeah, but sometimes I'm also problem. I cannot see the food in the back tooth.

00:15:22 P3

And I don't know what does this mean. I called it back tooth.

00:15:28 P3

Problem there may be there will, there's a multi sensor to analyse the dirt of food that inside the mouth.

00:16:00 P3

Then come. Yeah, some I need to draw, maybe? ...

00:17:11 P3

...

00:17:12 P3

Let me know blasted.

00:17:47 P3

Maybe also nice to have a white sensors on teeth.

00:18:13 P3

OK.

00:18:19 P3

Suction pressure

00:18:21 P3 *"suction pressure" gives her the idea of vacuum cleaner for teeth.*

So nice to have, like a vacuum cleaner for teeth.

00:18:56 P3

...

00:19:27 P3

Maybe there's a monitor that can give you a result of health. Teeth report. I make the report.

### P3 doing Task A in Duckduckgo Condition

Date: 07. 07.2022

Place: P3's home



00:00:02 P3

OK, so the problem I will start with the problem.

00:00:09 P3

So there is strong wind and rain.

00:00:20 P3

And then I will think about a situation where maybe.

00:00:26 P3 *this party scenario is a very unique reframing of the problem, it comes from intuitional thinking. When she use image search as tool, she knows to rely on her own analysis, or find inspirations from life experience before using the tool. But in another patent data driven tool session, she heavily relies on the tool to give her the everything. One assumption can be that she knows the limits of the image search tool.*

People want to Have party during the rain.

00:00:43 P3

I will see like how to. I'll take that Duckduckgo if there's party under the rain.

00:01:01 P3

There's a lot of.

00:01:09 P3

Oh yeah, I'm looking for Party under the rain for the images. There's a umbrella.

00:01:21 P3

But it looks so boring, Like people don't want to Use this umbrella this is weird.

00:01:34 P3

So maybe. You know the problem.

00:01:44 P3

So the solution is can be using umbrella. Then there's the problem of using umbrella. People need to. People need to.

00:02:09 P3

They keep.

00:02:26 P3

OK.

00:02:34 P3 *the image is authentic, and out of the box image triggers her inspirations*

Oh, this is so Cool, so there's a girl with the Cloud, it's just like an umbrella on top so we can make a solution also like her.

00:02:50 P3

So this is like a hat That can protect her from rain.

00:03:07 P3

But the problem is, there's still a wind. Yeah. The problem, wind.

00:03:34 P3

Anything, another way to do this?

00:03:45 P3

OK. so take.

00:03:51 P3

Wind protector. Em

00:04:00 P3

This car. Yeah, it's car. Then maybe do party Under the rain is not uh. It can be also done with the car.

00:04:17 P3 *this car solution does not fit "portable device"*

Party in the car.

00:04:33 P3

Party in the car.

00:04:47 P3

This is party.

00:05:13 P3 *fixated on the previous successful experience*

Or people can have also. Let me check Wind costume. Em, then.

00:06:01 P3 *released that the solution is not "portable"*

Well, it's so yeah, it's it needs to be portable, but it's not portable so.

00:06:09 P3

I will change it here.

00:06:19 P3

This is not portable, so maybe it's not.

00:06:22 P3

This idea, well

00:06:26 P3

Being portable.

00:06:41 P3

Wind and rain Protector, portable device.

00:06:48 P3

OK, I can see there's a umbrella. There is also. OK, raincoat.

00:07:02 P3 *on the one side, she can get new ideas from image search, but on the other side, also get fixated on the similar image. fixation on the image search results*

Yeah, maybe you can bring an umbrella that can be Stick to the ground. Eh, yeah

00:07:23 P3

The umbrella. It has three feet.

00:07:31 P3

It's a foldable umbrella. And then the umbrella can also. Have the right rain cover.

00:08:04 P3

It is So big. What else.

00:08:30 P3 *reframing a new search word, this is also a broad scope, she inquires the tool for relative solutions*

Umbrella, Wind capture device. Rain protector

00:08:57 P3

Yeah, portable device.

00:09:07 P3

Maybe it's Can be just a foldable cloth.

00:09:18 P3

That can expand To a rain coat.

00:09:39 P3

So foldable clothes expand into super high quality rain coat.

00:09:50 P3

And... It's difficult.

00:10:01 P3

Wind and rain.

00:10:52 P3 *a strong wind and rain image is her stimuli*

Maybe also The device that can Ask someone to bring a raincoat for you. using a drone.

00:11:14 P3 *got struck. In this condition, she need to come up with new word.*

OK. hehehe

00:11:15 Experimenter

Take your time. You Still have 9 minutes.

00:12:16 P3

Em. This one.

00:12:23 P3

No, maybe this one is nice, so To make a, One directions

00:12:43 P3

Similar like Duckduckgo. umbrella

00:12:56 P3 *relied on the tool to inspire her. Get fixated on the tool*

So I'll change the shape of umbrella so there is a wind protector. But also Protect you from the rain.

00:13:37 P3 *does not have more ideas*

So we could... Portable device. Em

00:14:34 Experimenter

Think about different people.

00:14:51 P3 *does not have more ideas, just do something to kill the time*

This may be People can have their own time.

00:15:16 P3 *no new ideas, can not repeat*

We can we can have a, yeah, this is the same.

00:15:32 P3

No no.

00:15:43 P3

Going hiking.

00:15:54 P3

Yeah, maybe they can have a dryer. Portable.

00:16:10 P3

Maybe the umbrella can have the Portable dryer.

00:16:46 P3

It's sweat.

00:17:16 P3

I couldn't find a portable dryer.

00:17:56 P3

I'm looking at rain and draining solutions On duckduckgo.

00:18:03 P3 *doing some random search to kill the time*

I don't know.

00:18:05 P3

Portable device.

00:18:07 Experimenter

One and a half minute.

00:19:05 P3

Maybe a parachute?

00:19:07 P3

I don't know.

00:19:10 P3

I don't know. it's spinning.

00:19:14

It's Very difficult.

00:19:34 P3

These tech problems.

00:19:53 P3

Time is up. Give up.

## P4 doing Task A in Tech-Net Condition

Date: 10. 07.2022

Place: P4's home



00:00:56 P4 started with an intuitive word. "Hat" input showed "helmet" as search result. But, He found that it was too broad, then he narrowed down to the search word "bicycle helmet", aligned with the tool's rule, made the "search more precise".

So I think it's about using like a portable device which can, How to say, keep me dry?

So maybe first thing I will look is a hat.

00:01:20 P4

OK.

00:01:33 P4

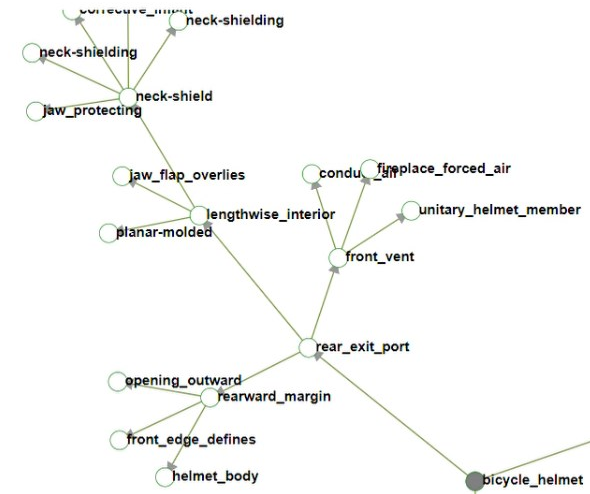
Yeah, maybe I have to use more precise.

00:01:41 P4

Like, Bicycle helmet.

00:02:24 P4 the tool can give an unexpected keyword(solution), extend how you see the problem.

Yeah, so they, they say neck shield. so I think it's very interesting that when you are like riding a bicycle helmet or wearing a bicycle helmet it just cover your head, but they it never covers your neck shield.



00:02:40 P4

Which I never thought of, so something which can help you. Shield and then if I go further on neck shield.

00:03:07 P4

Yeah, and it can also cover your jaw, so I think it gives me ideas about like how I can design something for a collar which can just cover my entire thing like it can be a very portable.

00:04:04

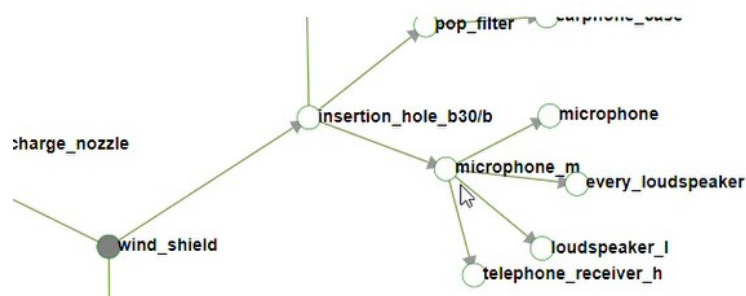
Yeah, so it Can cover the face entirely. it gives You a protection.

00:04:12 P4 "neck shield" inspired him to look for "wind shield"

I will search for wind shield?

00:04:38 P4 if you search for something to protect you in the wind, the result is microphone, the logic between these two words seemed strange. The patent data was about windshield microphone which could filter wind sound. But it was interesting that he just linked with headphone, and continue his brainstorming.

Oh, it says more about like microphone, which gives me ideas about like as the assignment says about how to say.



00:04:47 P4

Uh, earphone or it says about like shielding your entire base or something like a portable. I think something which is like a headphone can have, a how to say, a cover which can help you to...

00:05:05 P4

To cover your face against the rain and it can also have a kind of like a plastic shield which can help you to connect it back.

00:05:22 P4

Says that it.

00:05:31 P4 *he combine solutions from different domains, "microphone" result made him think of earphone.*

It saves your face and then it can connect.

00:05:59 P4

I would search for.

00:06:01 P4 *this participant came up with new search words quickly, he did not interact with nodes on further layers. If this tool only provided relevant words in 1<sup>st</sup>, or 2<sup>nd</sup> layers,, he happened to use the tool in a right way.*

Maybe umbrella?

00:06:19 P4

It gives a lot of ideas about like what is the umbrella, how is it? What are the different parts, which helps you to think what can be improved.

00:06:33 P4 *he narrowed down his search scope, he inputted "rain umbrella" instead of umbrella. He wanted to see solutions more related to the rain.*

Yeah, but I would like to specify. It like a rain umbrella.

00:06:59 P4

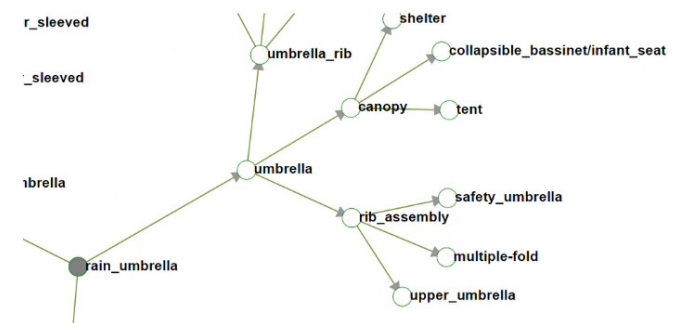
Yeah, it says here about like safety of umbrella which also gives me. How do you say, like something which you can improve in a portable device which is one of the umbrella that.

00:07:14 P4 *the tool showed a keyword "safety umbrella", he reframed the problem.*

It's about safety of umbrella that they have like a different spikes in them, which can be or say like a better that it cannot hurt any children or some other people.

00:07:40 P4 *he connected this word "multiple-fold" to his life experience and reframed the problem. The tool itself did not say about the problem directly.*

Yeah, one of the things which is mentioned is like multiple-fold.



00:07:45 P4

So I think some of the umbrellas had like how to say.

00:07:53 P4

Like they open in a like a lot of things, but that also gives them like, there is also a problem that sometime it get stuck.

00:08:03 P4

Or sometimes it's very annoying to open after like some use it, so maybe we can. How to say? Improve the that life of the thing.

00:08:18 P4 *when it did not show him new insights, he changed to another keyword. He uses it in a similar manner with using Duckduckgo. He just tried with many different key words. I suppose him meant the UI was not well designed, also zoom in , and zoom out issue.*

That's strange.

00:08:26 P4

I will try to search for rain coat.

00:08:56 P4 *the tool gave him useful insights into brainstorming. "foldable exerciser", "multiple fold"*

It says about foldable exerciser.

00:09:04 P4

I will put Raincoat it gives me something about the keyword, such as foldable, so I think, you know, like you can also make some clothes.

00:09:20 P4

Which are like just 2 ways like from outer side. It's nice, like how to say fancy or cloth, but when it rains, you can just how to say, reverse your shirt.

00:09:37 P4

And then it becomes like a rain jacket or raincoat.

00:09:48 P4

One of the keyword for the raincoat is.

00:09:51 P4 *the tool gave him useful insights into brainstorming*

Eh dispensing.

00:09:55 P4

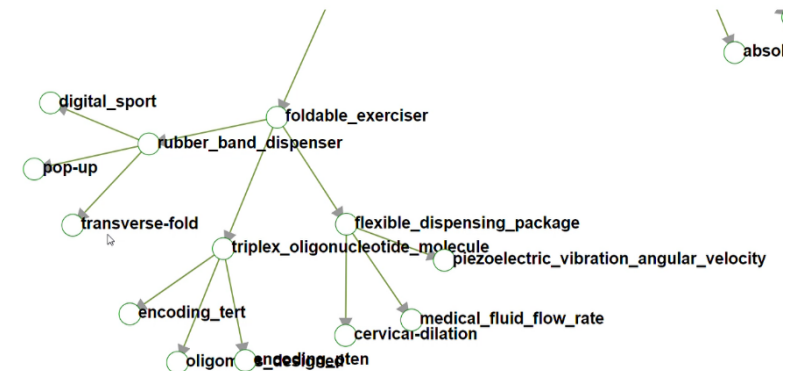
Yeah, I, sometime it gives me like an idea about like those rain jacket which is like more you know one time use.

00:10:06 P4 *he sees a valuable new problem outside the brief from word "dispensing"*

Which is not good for the environment.

00:10:34 P4

Yeah, flexible dispensing package.

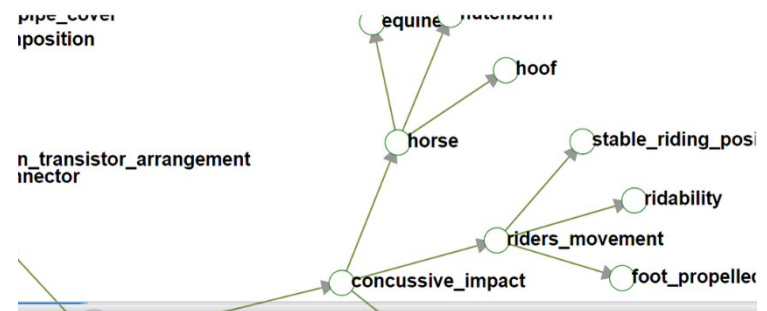


00:10:38 P4

Digital sport, encoding Tert.

00:10:45 P4 *"rain coat" search result also showed "horse", "hoof" "concussive impact" results. He could not make sense of it.*

Horse? It's a? yeah.



00:10:50 P4 *he "try to improve" search key word, when he could not make sense of the results. He deleted the space between the two words, "rain coat" into "raincoat".*

Try to improve my search.

00:11:13 P4 *combined solutions from different domains, "pouch" gave him an idea that raincoat can be a pouch*



Yeah, when you put a raincoat. Like without space (between rain and coat), it gives you like a option of about the pouch, so maybe you can have a how to say, a simple pouch with the jacket which can turn into a nice raincoat.

00:11:50 P4

So is that still that a nice idea?

00:12:11 P4

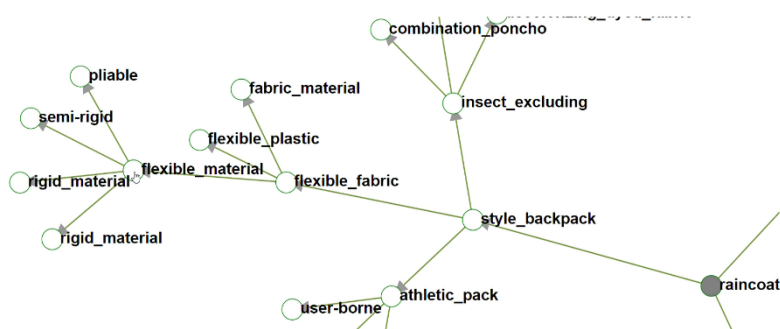
Yeah, then it also gives you a lot of talk about, like material like it's about like fabric.

00:12:20 P4

Or plastic so it gives you how to say different ideas about what different material I can use. So maybe.

00:12:34 P4 *he explored the tool, clicked on "flexible material", the results "semi rigid", "elastic material" could not inspire him*

And also it gives you a different ideas about like flexible. So one of the example is like flexible material which is very important if I extend it gives me pliable, semi rigid.



00:12:59 P4

OK. It is material. Semi rigid, elastic material.

00:13:11 P4

And if I open flexible plastic, it gives a thin, flexible, thin, flexible, again rigid plastic.

00:13:23 P4 *modified his ideas, build on previous search result of different kinds of material*

Yep, maybe one of the. The option about like is like thin versus thick, so it hasn't you think like different possibility of this pouch, like what type of material I can use, maybe inside more thin.

00:13:44 P4

Outside thick for protection.

00:13:54 P4

Yeah, yeah.

00:13:57 P4

That's nice.

00:14:01 P4 *came up with "schoolbag", an interesting search key word built on previous works*

Yeah, I'll maybe look for schoolbag for children's that can also become.

00:14:13 P4

Or one? Thing which can help to.

00:14:18 P4

Like protect you against uh, wind?

00:14:22 P4

Easel transporter, catheter bag holder, lid function, lid function, auto trunk, ladder tray support.

00:14:47 P4

Yeah, it.

00:14:51 P4

Just tray. OK.

00:14:58 P4

That's nice, so when I put the school bag it told me something about tray or nesting, so which gives me a different idea about what type of nesting I can make around the school bag size.

00:15:12 P4 *kept on reframing the problem from the search result "tray, nesting" (existing solutions in the patent data set)*

That it can have a different way to keep your device inside that, so that can give me an idea about like if you have a everyday object, how where you can put it so.

00:15:25 P4

Maybe I can think about like.

00:15:28 P4

Where to keep this object or where to Store at least.

00:15:54 P4

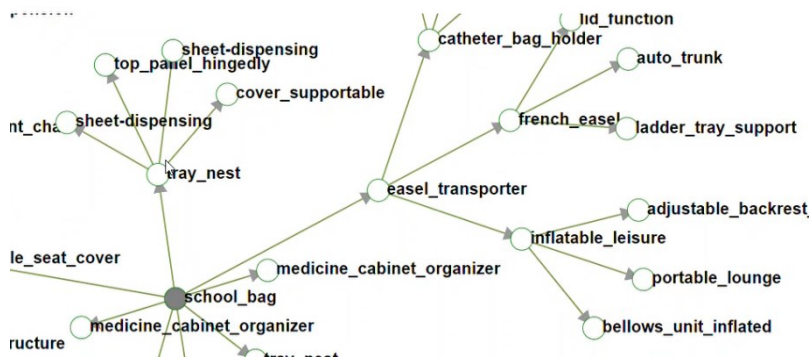
Yeah it it. It says it should be like this gives me a different condition which I can have so the so one of them is leakproof.

00:16:04 P4

So that is very important because if you are in a rain it gives you a, how to say.

00:16:10 P4 interacting with search result "tray nest", it showed him "cover supportable". I am not sure how he knew the engineering structure of "cover supportable". He applied it from its literal meaning.

It gives you a lot of water. It can store a lot of water and then when you are in a bag, when you keep in an open bag, it, can how to say, destroy other things which is in the bag. So maybe there should be a different like, the It should have a cover.



00:16:25 P4

which is self or waterproof.

00:16:36 P4

yeah, yeah.

00:16:45 P4 He came up with search word "rain water" from intuition. He just finished a schoolbag idea to prevent rain water

Maybe I can look for the water, eh, maybe rain. water.

00:17:17 P4

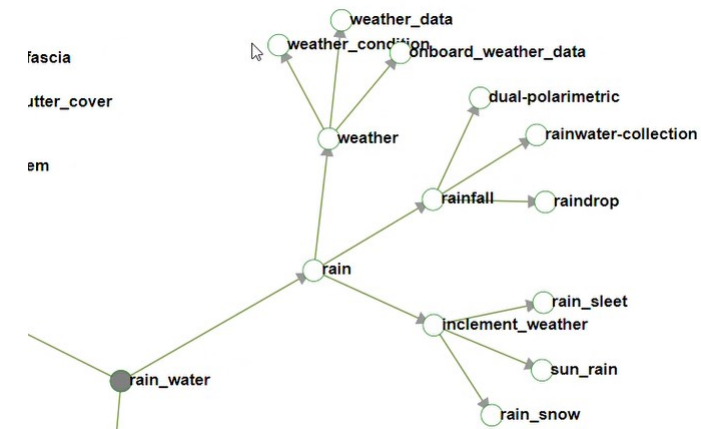
Yeah, also as an assignment was about.

00:17:21 P4 this is an in-domain search word, in the search process, he combined different near-domain, medium-domain search words in this explorative process.

Uh, you know, like if I go to take, uh, zoom out. It talks about a portable device that can keep the user dry in a strong wind and rain.

00:17:30 P4 "weather data" gave him new ideas, he expanded the assignment scope.

So it doesn't have to be a device, but it can also be a, because this thing was talking about weather data, so it can also be an app or a watch or something which gives them already an indication.



00:17:48 P4

That they just had to save themselves from wind rain. So they don't even need the device, but something to notify them.

00:18:04 P4

So it can be a digital product.

00:18:11 P4

Or something which is more. Like a variable electronics.

00:18:25 P4 *quickly applied his new idea to new user scenario, cycling users. This is from his intuition and life experience.*

It can also be in On a bike. says that when you are going on a long trip, but well, you don't have to look at your phone, but maybe some handle or a break can tell.

00:18:34 P4

You, that rain is coming.

00:19:27 P4

Yeah, maybe I will Think about like.

00:19:31 P4 *continues search keyword in this new user scenario, cycling users, ended with another new solution, something similar to towel*

Something which can be integrated in a bike. So maybe bike bicycle handle.

00:19:57 P4

Yeah, then it already gives me a different, different thing.

00:20:01 P4

Like such as. So for the bike.

00:20:07 P4

You have a different, different ways which is in front of you, such as Handlebar or.

00:20:15 P4

Or a hand grip Which can be one way to, how to say it, give people a kind of alarm.

00:20:30 P4 *the result "modular something" inspires him. But probably he misread "trowel" as "towel", or "trowel" word inspired him to towel solution. He did not further develop this ideas. It told different user scenarios.*

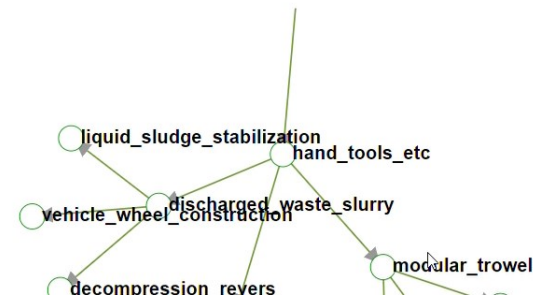
Yeah, that's also very nice that, uh, uh, a modular draw, but it gives me not exactly same thing, but the modular towel (not trowel).

00:20:40 P4

Trowel

00:20:43 P4

Which can we already attach to a bike.



#### P4 doing Task B in Duckduckgo Condition

Date: 11. 07.2022

Place: university library



00:00:04 P4 *began with a broad key words "teeth clean habit" in Duckduckgo. the image results helped him to empathize with users.*

It's about like how easy or hard to keep users teeth clean everyday. Please think aloud. so I think I would say one, I would just start teeth clean habits.

00:00:26 P4

Just to think like with them people how it goes. and then they show a lot of people with the brush like trying to clean. and also it gives a happy smile so.

00:00:41 P4 *most images looked like commercial images showing families and kids brushing tooth*

Ah, maybe, maybe as I see a lot of people like smiling, so smiley so maybe I can make a like.

00:00:51 P4 *defined kids as users, this was a more specific group. Image search helped him to identify a group of users. He came up with "toy" idea by intuition.*

I also see a lot of kids, so I think I would try to design something like a toy which is connected to Bluetooth.

00:01:02 P4

And, then when, if, uh, if a kid does, uh, brush, it the toy. I don't know how to draw a toy. Toy like smiles. And, or make some sound.

00:01:21 P4 *connected toy (analogical design) with tooth brush. He used same method in Tech-net condition.*

Such that be like, how to say a children will also brush. So maybe a toy smiling brush.

00:01:33 P4

That's one idea.

00:01:38 P4 *image research can remind him user scenario directly. He kept on searching users scenario, and inputs a question "what makes teeth dirty". This way of searching shows a more natural dialogue between designer and tool. He expected search engine could give him knowledge from a broad scope.*

Although I feel like, let's say what makes teeth Dirty.

00:01:50 P4 *designers appreciate authentic images. They want to see the beautiful side of the issue, do not want ugly images to bother them. This is*

*very different from using Tech-net. A word in tech-net can just tell designer to associate with a problem, and reframe the problem. Image search will show "horrible image" of severe problems.*

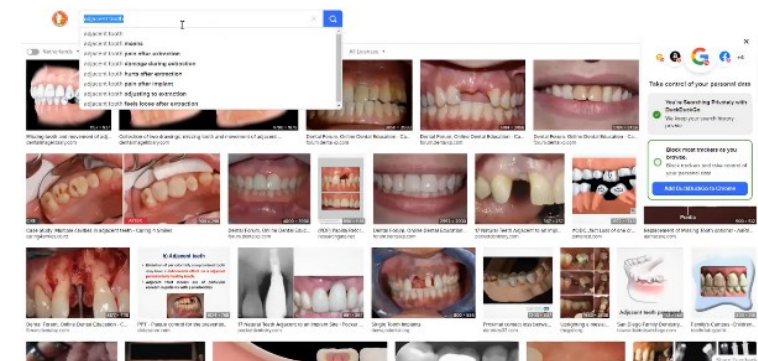
Oh horrible images. So I see up back to, back to... It's not a good idea.

00:02:00

Very scary. But it doesn't say a lot about what makes them Bad, so maybe.

00:02:10 P4

Let's say the search word it is.



00:02:16 P4

Or maybe a food?

00:02:18 P4

Like they say it.

00:02:19 P4 *came up with a new search word himself. he did not rely on the tool to tell him search words.*

Was food, so maybe I can think about the food like design of food, fruit which can make your teeth clean. So maybe.

00:02:33 P4

Some cleaning apple. Like which is not. How do you say, an Apple but it's? A kind of. A shape which, if you chew it, it. Cleans your teeth.

00:02:56 P4 *changed to Pinterest, an image sharing community.*

Maybe I can look for the Pinterest? I like to use Pinterest, so yeah.

00:03:07 P4

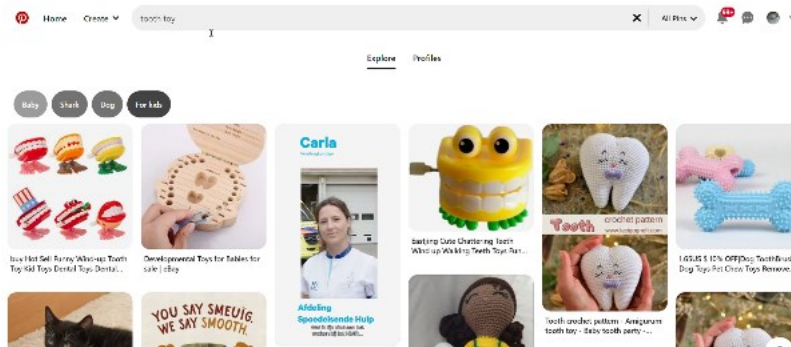
Tooth toy. Oh, yeah.

00:03:22 P4

Oh, maybe it can be.

00:03:27 P4 *"tooth toy" as search key word. participant needs to come up with interesting search phase. He did a broad scope search in the beginning, and then narrowed down to a more specific group, and their problems. According to SAaPPHIRE, "chew" the toy is a new action.*

Like it can be for kids because they're because I see a very cute picture of teeth which is smiling. So maybe I can make a brush which you have to just chew it. Eh, it is the shape of a dude.



00:03:50 P4 *He came up with the apple shape product from intuition. Then, from looking at "tooth toy" search result, he made another chewing solution. Having access to product images and user scenarios, he was able to sketch out more diversified product shapes and usages. He did not mention about the problem specifically.*

And also smiling. So maybe a kids or a Uh, it says users so it can be Also a dog. Or a kid? Which, when it chew. When they chew, it cleans your teeth. OK.

00:04:15 P4

Best tooth cleaner.

00:04:27 P4 *"best teeth brush" showed him existing products in this domain. the shape reminded him to combine a pen. In this condition, he intuitively connected brushes' shape with pen's shape.*

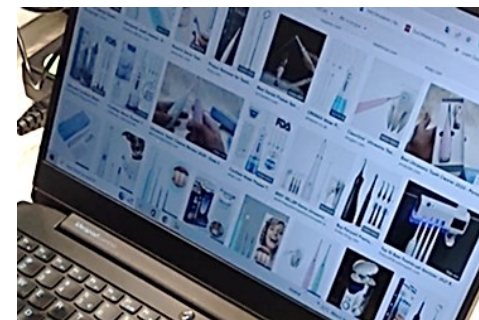
When you, when you look at the best tooth cleaner, it, it shows a lot of image from, how to say different brands, which is like more electrical cleaning devices. So it gives me some inspirations like How to say, a tooth brush?

00:04:46 P4

Oh, yeah. It also looks like a bit how to say. Ah, I was just talking already about pen, so I can maybe combine it with the pen, tooth brush pen.

00:05:01 P4

So maybe like, the top part is a pen?



00:05:11 P4 *came up with a pen + toothbrush solution first. then he defined the problem, and user scenarios that fit this solution.*

And yeah, so that pen because you keep it all the time with you. It also gives you, how do you say you can just go to, when you're working. You can just go to the office and like. Go to the washroom and clean your teeth whenever you want. and it can also gives you how to say, notification when you're having a lunch or a dinner.

00:05:37 P4

It you can already set it and it will remind you.

00:05:43 P4

Right?



00:05:50 P4 *knew that he should not repeat. so skip the image that he has already made an idea. He was aware of fixation.*

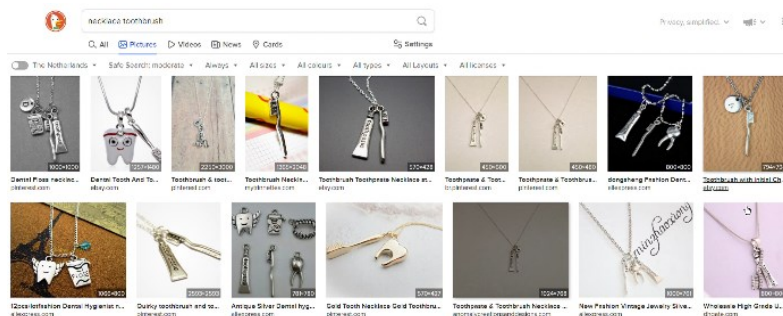
A dog chewing device? again. OK, that's what I already saw.

00:06:07 P4 *When he knew he got fixated, he went for a broad search term to inspire him. The tool had the capability to support him.*

What else, yeah, maybe I'm thinking about more. What is the everyday object which you keep it or entire day object which You keep it with?

00:06:17 P4 *also made this keyword "necklace+ brush" by himself. He used this similar brainstorming way in both two conditions, Add the solution to a new category*

So maybe I can think of a necklace brush. (he needed to restart screen recording on laptop)



00:06:44 P4

So it's more about a necklace, so because this is also one thing which you keep it.

00:06:49 P4

So maybe sometime when you are eating, you something gets stuck in your mouth. and then you cannot clean it. So maybe you can make a small brush which you can just use to clean it and then.

00:07:03 P4

It's also you can clean this brush. so you can just keep it with you whenever you go.

00:07:20 P4 *defined the problem after he got necklace brush idea*

And it can be also self cleaning so. You don't have to really. Ah, put a lot of efforts in cleaning it.

00:07:30 P4

But it shows more about Pair, I will try it.

00:07:43 P4

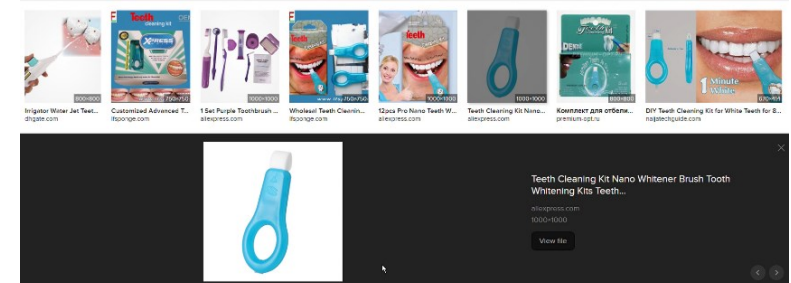
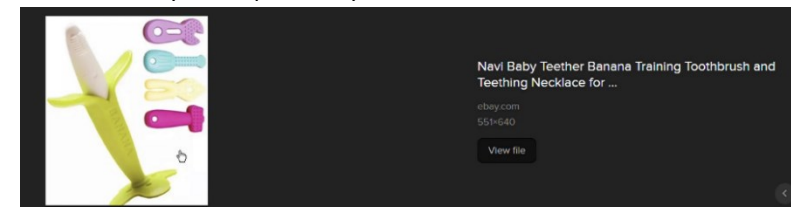
Yeah, I guess a lot of inspiration about like tiny brushes with the small soft thing, and also with the chewing tooth for kids. So that can be one idea or Small Locket with you anymore.

00:08:09 P4

Just smile. We want idea.

00:08:22 P4 *saw an image of baby teether, teething necklace. it explained that this chewing thing did clean teeth. Once the tool gave unexpected, surprising result, it inspired participants.*

What else do you keep it with yourself?



00:09:00 P4 *tried keyword "daily object", it was too broad. Narrowed down to "teeth cleaning kit", the result was satisfying.*

Well, this is also very nice idea. So it also looks like a, A device, so maybe you can have a. It looks like, uh, when I see the hole.

00:09:10 P4 *in this condition, the different product shapes gave him more inspirations*

It gives me Directly a idea about a ring. So maybe you can have a very nice ring.

00:09:19 P4

Where on the top of that is a soft material which can be used to clean your teeth. So whenever you are done with the food, you can just use that ring to clean your teeth.

00:09:40 P4

And people can choose it like, however you want, like also where a multiple one can be for cleaning.

00:09:48 P4

One can be also for chewing.

00:09:52 P4 *added one more function "whitener" with the inspiration of a ring shape, and white teeth commercial images*

And because some people get irritated and it can be also a whitener to clean keep your teeth like white.

00:10:04 P4

Doo Doo Doo...

00:10:11 P4 *the sharp dentist tool shape reminded him of a safety pin. "teeth cleaning kit" search results gave him many different devices, and different cleaning actions.*

I also see a dentist tool so it looks like more like a hook. so it can be in a form of. How to say?

00:10:24 P4

A pin or a safe, safety pin.

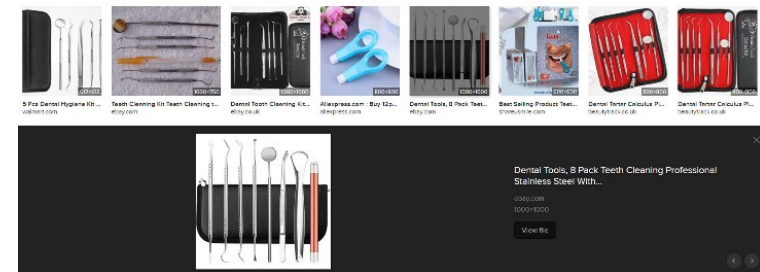
00:10:26 P4

Like the one which you have it like a shape of. This with the circle which you can like how you say, you can open it so, but it is specifically made from the material.

00:10:39 P4

Which is good for your teeth.

00:10:42 P4



And it doesn't get worn out. And then you can just bear it as a Locket or something and then whenever you want to clean your teeth you can just take it out, clean it and maybe.

00:10:55 P4

Maybe clean the pin itself.

00:11:07 P4

Nice

00:11:14 P4 *came up with this search word "deep cleaning floss" by himself. He can come up with different search keywords quickly in the condition. Fluency of language is also an advantage for participant.*

I would like to deep cleaning floss.

00:11:25 P4

Yeah, it's like a small wire.

00:11:30 P4

Yeah, from the previous.

00:11:32 P4

Idea about the ring. Like there's a day.

00:11:41 P4

So maybe there can be a floss inside it which you can just take it out like small, small pieces to clean it. And then maybe you can just make it.

00:11:52 P4

how do you say, a circle?

00:11:54 P4

Around the ring, which you can just like, try to clean it with the finger.

00:12:04 P4 *same with previous, he came up with search word himself, then combined two different things*

Ring cross floss.

00:12:16 P4 *same way, he came up with search word himself, then combined two different things, found a existing relevant solution first, then worked on problem and solution iteration.*

Maybe I'm thinking about a hand gel because of the hand.

00:12:23 P4

So maybe you know we can also, because it's also very difficult to carry the, how do you say, carry a toothpaste or something?

00:12:31 P4

So maybe we can come up with a bottle which is like a very cute bottle for a toothpaste because they're normally in terms of pouch, but this can be a bottle.

00:12:41 P4

Which kids can always take it and then it can have like a 2 elements like top is a brush.

00:12:49 P4 *this idea comes from hand gel*

Cap so you have like 2 way cap. You open it so There is a brush.

00:12:56 P4

Inside the cap. Which you can use to clean it and inside you have a bottle with the opening.

00:13:05 P4

And then there you can take out your toothpaste.

00:13:13 P4

So maybe it's a modular device. Modular bottle With the combination of a toothbrush. And a paste.

00:13:29 P4

So children can carry it easily. It also gives me an idea of, like you know, that a lot of platform in a train station you have a hand gel dispensing machine.

00:13:54 P4

You can also make a toothpaste dispensing machine.

00:14:04 P4

So travellers and everyone who are normally traveling, they can get the access to a good toothpaste.

00:14:12 P4

Wherever they go. And it can be also mounted on a wall.

00:14:20 P4

To put the.

00:14:22 P4

And also with a small bar which you can push and keep your brush. To get a toothpaste.

00:14:41 P4 *not replied on the tool to tell him another new direction. He came up with new things by himself.*

I would like to see old people with problems.

00:14:51 P4

Oh yeah. So sometime OK. Uh, when I think about the old people like something like this device. because sometimes they have they don't have a their own teeth, but they put some how to say fake teeth in their mouth. so maybe there can be a device easier device so you can just take. out the how do you say there can be a cavity?

00:15:24 P4

But you just have to inserts the fake. Sorry for the bad (sketch).

00:15:39 P4

Yeah, you, you just have to insert them and it's an electronic device which. Which cleans it by itself so they don't have to really put a lot of effort. And it can have a small drainage. To troll.

00:16:01 P4

So they can easily clean their teeth without really putting a lot of effort, so it can be for older people.

00:16:11 P4

This is like a fake tooth.



00:16:19 P4

Yeah, this idea also gives me more for kids, that like kids. Also they get some time things to put in their mouth so they can also make a toy with.

00:16:35 P4

With uh, like a teeth cleaner. So they can. What is it called?

00:16:58 P4

Yeah, it's mainly uses a mouth Card, but it can be also used as a toy.

00:17:06 P4

Plus a cleaner.

00:17:21 P4

So parents doesn't have to be worried about their teeth cutting path because this thing will keep them silent but also will help them to clean the teeth of the children.

00:17:41 P4

Biting it.

00:17:53 P4

Yeah, I was looking for. Biting thing and it shows me a guard.

00:18:00 P4

That that is normally used by player, but when I see a transparent guard.

00:18:06 P4

It can be also. It can be also used as by people. To avoid saliva. Are making their tooth yellow.

00:19:21 P4

OK.

00:19:37 P4

I mean, when I put the like a digital teeth cleaner it showed me ultrasonic.

00:19:47 P4

Cleaning. I know what is ultrasonic cleaning but we can make a modular.

00:19:55 P4

A cleaner So which you can just put in your mouth to clean it with the ultrasonic array so it can just come in a box. With a small device. Which you can carry in the bag.

### P5 doing Task B in Tech-net Condition

00:00:06 P5

An unconventional that can keep users teeth clean.

00:00:12 P5

What do we use?

00:00:15 P5 *not using the tool, analyse the brief from timeline*

In past time there's people using salt to clean the teeth, and currently we're using the toothbrush.

00:00:27 P5

OK, these are all conventional things.

00:00:33 P5

Eh, And I think now we have some stickers, whitening stickers.

00:00:50 P5

Oh, OK.

00:00:55 P5

So there are what are we using now.

00:00:58 P5

And keep you teeth and then we need to keep it clean every Day, it's better to.

00:01:03 P5 *relying on the tool to tell her what people are using currently*

Let's see what we can have. Or toothbrush.

00:01:18 P5

The most easier and simple one come to my mind.

00:01:23 P5

Ah yeah, we have the mouthwash. We also use mouthwash to clean the, Clean our teeth.

00:01:36 P5 *she does not use the tool, she remembered all the relevant products from her life experience. this is interesting*

And then we have the floss. Yeah, how to spell that, we also Have the floss.

00:01:43 P5

These are all quite Conventional toothpaste. What's this?

00:01:50 P5

Tooth powder. We also often have water floss.

00:01:57 P5

...head.

00:02:00 P5

Bristle Head. what was the Bristle?

00:02:13 P5

Dentifrice .

00:02:32 P5

Oh, Bristle.

00:02:34 P5

BRISTLE

00:02:41 P5

Eh?

00:02:44 P5

What Is this? Asian people use this to clean.

00:02:48 P5

They used this to make brush.

00:02:51 P5

...

00:02:59 P5

Plastic vulnerable hair?

00:03:02 P5

Is it our hair to clean?

00:03:05 P5

To make the brush hands.

00:03:09 P5 *some words confuse participants, while some make them feel interesting. Does new word remind a new mechanism of cleaning she never think of?*

Scrubbing. Oh, This Is nice.

00:03:11 P3 *she can not find what new words she has not read yet*  
 Where's my new words? Brush...  
 00:03:18 P5  
 I said this..  
 00:03:27  
 (reding).  
 00:03:31 P5  
 Excess liquid for brush head?  
 00:03:35 P5  
 (reading unrecognizable words).  
 00:03:38 P5  
 (reading unrecognizable words).  
 00:03:44 P5 *redefine the brief, not using the tool*  
 I would say in future cleaning. Think about quick. Uh, convenient,  
 convenient or Easy to pack up.  
 00:03:58 P5  
 What is called? Yeah, eh, idea.  
 00:04:22 P5 *Searched quick teeth, showed error. some search words do not*  
*work, learning the tool's rule. searched quick and clean.*  
 A novel device.  
 00:04:37 P5  
 Quick and clean.  
 00:04:41 P5  
 Fuel cell  
 00:04:43 P5  
 And it's all About the fuel for car for transportation.  
 00:04:50 P5  
 anti windmill.  
 00:04:54 P5  
 Calibrating Voice coil?  
 00:04:57 P5 *search something that beyond machines' capability. But*  
*before you try you do not know where are the boundaries of this tool.*

No, this is not the quick and cleaning that I'm looking for.  
 00:05:00 P5  
 daily.  
 00:05:15 P5  
 No.  
 00:05:17 P5 *when the tool do not work, she has to find it out from her life*  
*experience.*  
 Quick clean, Like just use the Quick, maybe just some light.  
 00:05:27 P5  
 A box or a gun. A box can be a some kind of a box or some lighting pen.  
 00:05:38 P5  
 So there are some lights shooting at them, pointing at our teeth.  
 00:05:44 P5  
 Pointing at our teeth, and then it can be clean. For example, how people  
 to clean up the coat and they also use these kind of the the lighting to clean  
 up, the to clean up the with the warm thing.  
 00:06:03 P5  
 Small things, or the dirt are not on the bed.  
 00:06:12 P5  
 Yeah, this is talking for quick and I also think it's very convenient also. But  
 also for a slightly.  
 00:06:20 P5  
 So I do not go that far beyond. we were also thinking about the water and  
 the paste and paste, which is also normal-used ingredients. I would say like  
 the ingredients and how.  
 00:06:35 P5  
 There are also some brush.  
 00:06:37 P5  
 Are they the normal ingredients for currently how we clean our tooth?  
 00:06:54 P5  
 Clean is the keyword.  
 00:07:07 P5

Cleaning systems. Roller cleaning head.

00:07:23

High, high. Like high

00:07:32 P5

High frequency. Like the electrical brush. Eh,

00:07:43 P5

It's not going on. Eh,

00:07:58 P5

I'm not going well. Whatever.

00:08:14 P5

Think about the other cleaning tools? Lighting?

00:08:24 P5

So other cleaning systems either use water, or use a high power like the filters.

00:08:40 P5

Like, or something blah blah or like lights

00:08:56 P5

high power for the cleaning.

00:09:01 P5

Neither, or do neither the energy or the ingredients used in other cleaning systems.

00:09:15 P5

That's one thing.

00:09:22 P5

Clean, clean teeth.

00:09:33 P5

Oh, I've done this before. Cheeks. Tongue is also.

00:09:40 P5

Tongue might also be my thinking about cleaning the teeth.

00:09:53 P5

gum or the gum.

00:09:58 P5

Hey yeah, why not just a device? We didn't say it really has to be.

00:10:02 P5

Erm, something like a gum. You just you. Just chew it. And it gets spit out some kind of chemical things. Why not? I like to chew gums.

00:10:16 P5

Eh?

00:10:26 P5

Or there can be Like a bow. So what we have now? What we have now is like the water floss or something. it spit out To waters with a high power.

00:10:40 P5

But it's very, eh. Yeah, the problem is when you use this, you put this in your mouth but. But you need to keep. There's always have water going in, but they will also need to Go out.

00:10:55 P5

So for example, if we have the filter, something filter along with the waters, maybe, maybe you can just need. You just need to close your mouth and it's an inner systems, so everything is happen Inside your mouth.

00:11:10 P5 *the tool does not work*

well, the water goes out and goes in, kind of like the. Like the. What kind? The circulate system so there you don't have to. Then the user do not have too much problem about the water to spit out everywhere, like it's quite some slightly disgusting and annoying or we cleaning the mouse.

00:11:34 P5

or it can also be. Is it possible to have for example some?

00:11:45 P5

To make the water floss or to embedded, this water floss in like a bowl.

00:11:51 P5

Oh, that will be very difficult because when we cleaning that we need kind of a bottle of water to clean up everything.

00:12:05 P5

Yeah, so the so. So the. The function or something about this cleaning is the high power things. If we can make this big machine into a smaller one, which can be totally just to put within a mouth.

00:12:24 P5

It can also Be. it might also be helpful, yeah? Let's see what's something else. We can use clean.

00:12:34 P5

teeth, there's also like we can see for. There is always have the example of doing that OK, we don't have this.

00:12:49 P5

Small space Like very corner. clean corner. No.

00:13:06 P5 *the tool shows errors many times.*

Tongue. What's the word, tongue?

00:13:11 P5

Tongue

00:13:29 P5 *define what search words for the tool*

Portion, body portion.

00:13:39 P5

You can also use a pen to clean our teeth.

00:13:47 P5

Clean sponge. This helpful. No. brushes. More brush.

00:13:57 P5

And this brush?

00:14:12 P5 *trying to find the workable search words many times*

Chemical tooth. Biomedical tooth. What? What?

00:14:36 P5

OK, or let's say about the fake tooth. Eh. Teeth.

00:15:08 P5

So light

00:15:14 P5

Whiten teeth, whiten.

00:15:21

whiten? (Reading something)

00:15:28

...

00:15:33 P5 *get fixated on the tool, have to understand answers from the tool*

Find something, (reading something). Eh, Eh,

00:15:51 P5

Oral cavity, mouth,

00:16:05 P5

oral. dental

00:16:23 P5 *get fixated on the tool,*

mouth, I know that.

00:16:30 P5

Mouth, That's maybe more like.

00:16:32 P5

(saying something).

00:16:37 P5

Clean car.

00:16:39 P5

Like a big fan.

00:16:42 P5 *read something randomly from the tool*

I think clean car. Cheeks. Eh.

00:17:11 P5

Eh, So killer.

00:17:19 P5

No, it's not that helpful.

00:17:25 P5

Yeah, when you think about. Unique Dental care, what's the unique dental care? Unique dental care.

00:17:44 P5

Hey, oral hygiene, dentifrice.

00:17:50 P5 *it takes so long to read through all these words. How to find the most relevant words, and eliminate others*

tooth paste, mouthwash.

00:17:55 P5

tooth powder, so there's even powder for cleaning the teeth.

00:18:02 P5

Yeah, maybe it is for stronger our teeth.

00:18:11 P5

Yeah, if we eat something and they can be clean that Will be great.

00:18:15 P5

Combination toothpaste Dispenser, dispenser

00:18:21 P5

hygiene purpose, daily dental, brush head.

00:18:25 P5

Brush head is a big topic now, but it can be the current design means. Less innovative than you think.

00:18:36 P5 *is this a good way to do brainstorming, combine something that you know*

Or a combination of the brush and the water floss.

00:18:45 P5

Why cannot.

00:18:47 P5

Yeah, the water floss is for the small space. The water floss is for the. Like the smaller piece for the This high power.

00:19:02 P5

water floss.

00:19:06 P5

Very dedicated To go through it, here is just like tooth brush, or sticker.

00:19:25 P5

Bristle carrier.

00:19:28 P5

Brush head again. They said Brush head tooth here and there.

00:19:35 P5 *this is a word which makes her feel interesting. It seems to be far distance domain.*

Hygienic magnetic, ah, it's magnetic tool.

00:19:42 P5

How do we match? piece brush holder.

00:19:48 P5

Interactive content, oral care fluid deliver.

00:19:55 P5 *get fixated, just browsing the search result randomly*

Floss, yeah, what I said is The floss, wrapping floss, hygienics, flossing.

00:20:02 P5

Have more.

00:20:11 P5

Do I need to make a conclusion of all ideas? I don't feel I have a lot of ideas.

#### P5 doing Task A in Duckduckgo Condition

00:00:08 P5

Topic task is design A novel portable device that can keep user dry in strong wind and rain.

00:00:18 P5

So the goal is to keep dry.

00:00:26 P5 *not using the tool, analysing, brainstorming by herself*

Keep dry. Keep dry, what do we have.

00:00:36 P5

Uhm, we have umbrella. We have raincoat. Umbrella, raincoats, what else.

00:00:52 P5

We have we have something.

00:00:57 P5

How to say, the jacket, water, water protected water?

00:01:03 P5

Resistant, not resistant, protected.

00:01:11 P5

What we have now?

00:01:20 P5

Ah, but talking about the umbrella because they Have wind in the rain. I'm thinking about something like the.

00:01:32 P5

What's it called. Dyson. So they can have like this a motor somewhere and a very powerful wind flow.

00:01:43 P5

So maybe they can blow away. Blow away the rain.

00:01:50 P5

Make a hat. Then is the me. This is someone there.

00:01:58 P5

So oh.

00:02:01 P5

So the wind goes the other way around.

00:02:07 P5

Then, then it does not drop on the person and the person keep dry.

00:02:13 P5 *tool's search results do not help*

Let's do some search. And, Yeah, but the raincoat is.

00:02:39 P5

There still have problems for the raincoats because the water can still drop over the The edge of the coat, unless you also have the shoe shoes to the boots and the trousers for the rain. It can partially protect you, dry or not fully protected.

00:03:25 P5 *not using the tool, analysing, brainstorming by herself*

Umbrella. So the goal is always the idea is to protect someone from the hat. Does the rain will not go through this area and drop on someone's feet?

00:03:48 P5

And for the umbrella things. Someone else had.

00:03:54 P5

So the umbrella is like one center and then they goFar. then rain got to see it.

00:04:12 P5

Keep somebody dry, even in a strong wind.

00:04:16 P5

So you cannot really rely on something about the wind.

00:04:21 P5 *doing the brainstorming process without the tool*

Of course, like this one, if you, you depend on some, some powerful flow, The problem if the wind is very strong. It's a very. It will introduce very big disturbance to here.

00:04:38 P5

OK so but We have something. For example, something like a fan. If they. I don't know if a fan goes very fast. The rainbow goes through this area or not. I'm not so sure.

00:05:01 P5

But how to against the, yeah, but also itself need to against the The strong wind.

00:05:11 P5

If these mechanical properties can help.

00:05:29 P5 *need to figure out a new solution, and use the tool*

Something else.

00:05:35 P5

Right?

00:06:01 P5

I'm having the rain coat. After all these approaches, the problem is the fee.

00:06:12 P5

If there are some one.

00:06:25 P5 *solution, and use*

The problem is if the person this area will also keep dry or not. There's now we have quite many tools to keep the upper parts area dry.

00:06:37 P5

But the problem yeah, of course.

00:06:40 P5

The the strong wind like we have this. This umbrella To against, Against the wind.

00:06:55 P5

How people? One part is to based on the materials that holds of the product. And the other is to.

00:07:17 P5

Yeah, like create something like that. Keep dry like this.

00:07:26 P5 *get fixated, but not using the tool*

Or there can be a very powerful Heater just to dry up the, dry up the rain crops.

00:07:36 P5

some one. Yeah, so fully protected. It's clear the person. There's something to fully covered.

00:07:59 P5

Someone like this? Then we can protect them.

00:08:05 P5

protect them too keep dry.

00:08:08 P5

Small car.

00:08:12 P5

Like this is very difficult. Uh, if someone can, for example. If you hold it, it will be very tired, but for example, if there are some structures, Like this way and then there are some rollers. This will make us move easier.

00:08:46 P5

What else, So is it possible like, first now the problem is we have clothes and trousers for different part?

00:08:54 P5

Is it possible? For example, we have the coats? em

00:09:08 P5

Do we have the coat?

00:09:12 P5

And we have trousers which is fully attached To our wrist.

00:09:21 P5

However, I think get on the coat is, Is much easier than get out of trousers because we have the shoes here.

00:09:32 P5 *not using the tool, interpreting by herself*

Well now we have something like doing this, which is very convenient for people to the bicycle, but. But is it possible for, for example?

00:09:46 P5

We step on this. Ah, I like this, it is waterproof and the. Waterproof and uhm. Like it has some elastic.

00:10:10 P5

So it's like first like for example, it can be similar as you wear the you wear the gym coats.

00:10:21 P5

You put under trousers but they are very good at the, they can be, they can have like a big space and then you take it on. And then you, And then take it off.

00:10:40 P5

And then I would say, If if for a better design, I would also think about how to Like the the clean up of this outfit. because when we in the rain, it's right it's fine, but when you need to take off and put on again it can be a problem there.

00:11:01 P5

If possible, I would say for example we have the. We can also have it like a dress. dress is much easier for put on and off.

00:11:10 P5

And and, and if the if guys, The male, male can also accept this design. For example, we have our shoes here.

00:11:24 P5 *think aloud protocol do not mention where she get the inspirations*



And then we solve the problems on the Coats and then and. And then this one can also be, you know, like the old fashion fashion like 1980s or Elder something like that.

00:11:39 P5

They have the big dress up things there and then we also keep the social distance but the.

00:11:44 P5

But then the thing is if you're a couple you cannot stay with each. Other if you have these things.

00:11:54 P5

Yeah, these are some ideas.

00:11:57 P5

But how can I get more inspirations from here?

00:12:15 P5 *not find some exciting pictures.*

It's not really fun.

00:12:20 P5

Since the material cannot absorb water and. If they this kind of material.

00:12:29 P5

Applied over our body and then we will be dry or we just keep away.

00:12:37 P5

And, try to keep the The big fan, Like keep the water away from us. Then we also dry. So I think these are the two approaches to let somebody keep dry.

00:13:04 P5

Our show, like, for the car, how to keep car dry. They have a special spray if we can also have this kind of spray over our skin. If the spray has no harm,

00:13:20 P5

The spray.

00:13:27 P5

So it's like for example for car. If the spray has no harm to any our skin, or cloth textures.

00:13:36 P5

I think this can also be very helpful and you can spray this.

00:13:44 P5 *using the tool, this is a medium distance analogy? So she finds out something new from the search results*

Over any of our texture, then and they just they just go to the drops but they don't, they will not go through deeper into this spray layer. But of course we have the problem if . Because the spray is not dissolvable with the water, how can we remove This spray layer from the skin or...

00:14:36 P5

Yeah, so and then we if you we have like the umbrella like this quite heavy, is it possible to make kids?

00:14:45 P5

Like a motor here. And then something and only. One frame and they go super fast. And maybe it can also keep out.

00:14:57 P5

For the strong wind. Strong wind.

00:15:00 P5

Yeah, so because if something is really attached over our body, we have no we, we don't have too afraid of the the strong wind.

00:15:12 P5 *some idea from her experience, not from the tool*

So there is a kind of a material, for, for swimming sports is when it's dry. It's super hard. but when they got the water, when it, when it got water in the, the water it get become very soft.

00:15:29 P5 *this is an interesting one. the old way rain coat image triggered her finding new problem, not feel comfortable in hard raincoat*

I don't know if there's kind of inversed materials in exist. If so, for example, when it's dry when it's there, when there's water and it becomes, it becomes super hard, and when it's dry it's it's soft. This will be very interesting for a new design.

00:15:52 P5

Uhm, anything relates to the Kind of the umbrella or raincoat.

00:16:54 P5 *when get fixated, should one find problem, or just go for solution, what should she do with the tool?*

No, no, it's not something.

00:17:10 P5

Is it possible to have some device? For example, it's, it's fixed on your wrist or or. You just hold it on your hand. Horizontal ring something like this and and and this and can. This can adjust The umbrella Here, here can be a bowl. While this can go.

00:17:40 P5

Or like 300 maybe not 360 but a large range of motion and into that. And there's a sensor. No, maybe the top of the the Umbrella there a sensor of The wind flow. Wind direction. And it can get some adjustments over the bowl here. and then. It's always against the against the wind. If it's against the wind, there's a higher possibility that the person behind the umbrella will not get wet.

00:18:22 P5

Yes, something else, oh there was something in my Mind. I just forgot.

00:18:30 P5 *not using the tool, she is the few participant who have more ideas in the last 5 minutes. It is interesting that she felt using image search is much harder to brainstorm.*

or we we opened up a system like a wheel. We believe is very stupid and make ourselves in the wheel. Somebody walked there. Like you know, like, like the game. There was a. That's, that's some kind of beach games you Have a bowl but, Then when you were when you were Covered by something. Like when you're in a car or, Or you kind of took over, occupy their bicycle here. Then, there's no problems that then we don't have any problems over Get, get wet. *Compared to yesterday, actually, this one is more difficult For brainstorming*

00:19:32 P5

This looks quite nice. I have a bag backpack for your all raincoat things.

00:19:42 P5

Yeah, or a better things or I would say maybe make them into a Better bigger bag.

00:19:47 P5

Uh, close to a big bag. So you can. So you can have it to Hang it over somewhere.

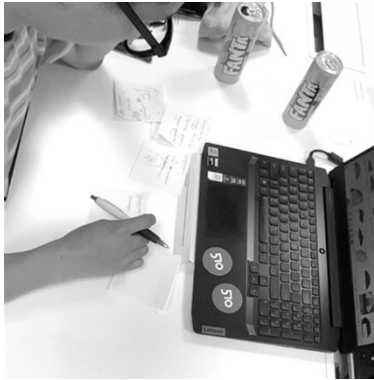
00:20:02 P5

So the wing around can go dry, when You wear it so They protect you from the wind.

## P6 doing Task A in Duckduckgo Condition

Date: 15. 07.2022

Place: university library



00:00:16 P6 *his brainstorming habit is to define the scope, then use the tool to help him find out the existing products, or people's common understand of this scope.*

So I'm gonna, firstly, check what is Portable devices.

00:00:30 P6

And look at pictures.

00:00:48 P6

These are Digital, but I think portable devices Can also be Physical like, yeah.

00:01:04 P6 *analysed the brief in the beginning, not using the tool. This was a rational thinking process, this habit was similar to P3, and P5.*

Digital,

00:02: 17 P6 *be critical, and validate the search outcome. He expanded the scope "portable device" was not only limited to digital things, rational thinking.*

It can be Very small umbrella. And because it needs to be portable.

00:02:35 P6 *not using the tool, rational thinking*

So the material should be very light weight.

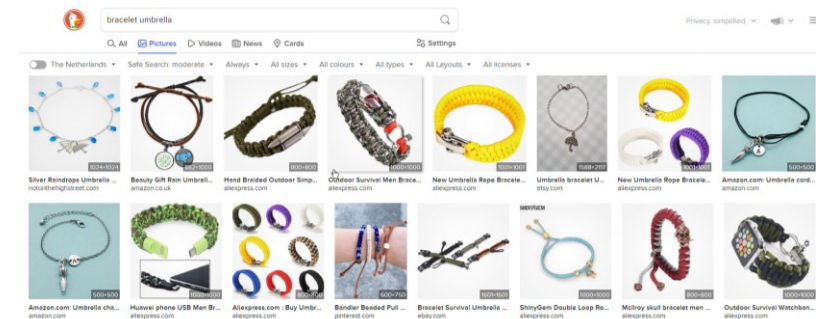
00:02:53 P6 *a portable bracelet image was showed on the screen when he was taking notes. He probably used it as inspirational image. It was intuitive thinking to pick up a "bracelet" image as analogy.*

And, it can be like bracelet, The material can be waterproof, plastic, Transparent plastic.



00:03:26 P6 *after analysing the brief, he used the image search tool to find "bracelet umbrella". he made an unconventional phase, but nothing relevant with rain were found.*

Bracelet umbrella.



00:03:43 P6 *adapting to the tool's rule, changing search words, put a normal word "portable umbrella"*

No, there is no.

00:03:48 P6

This is maybe just some verb.

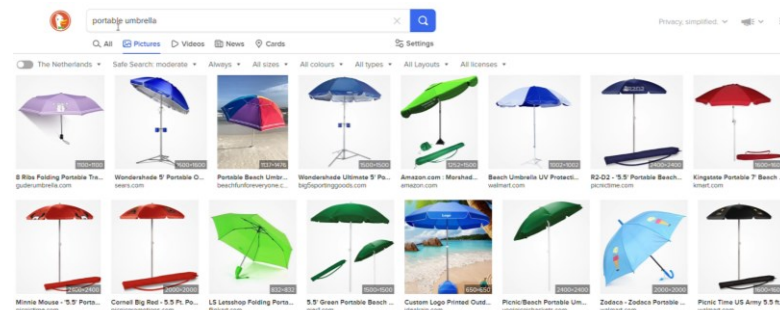
00:03:54 P6

Portable umbrella

00:04:19 P6 *"portable umbrella" search result made him laughing. interesting. Em.*

00:04:55 P6 *but then he gave up with this search result. Most images he got are outdoor umbrella fixed to outdoor furniture, and umbrella wearing on the head. Most images are common merchandises with low novelty. Probably these results did not fit his definition of portable device.*

I'll give this up.



00:04:59 P6

Another one.

00:05:04 P6

Portable device.

00:05:15 P6 *not using the tool, he was writing notes, redefining design problems as "after, during, before" stage. Also rational thinking. This step expanded his design space.*

So only after. Oh yeah. So After, during, before, So this is preparation. This is prevention. This is a solution.

00:05:51 P6

Solution for preparation.

00:05:59 P6

Be the plastic umbrella.

00:06:14 P6

But with...

00:06:36 P6

Anything else for preparation? Oh, yeah, portable

00:06:57 P6

Oh, also water proof.

00:07:07 P6

Portable rain coat.

00:07:20 P6 *not using the tool, putting the boundaries of the design scope*

No, device. It must be device.

00:07:34 P6 *it seemed that "portable device" made him fixated. He could not come up with other new search word, he repeated portable device several times.*

Portable device.

00:07:55 P6

This looks nice.

00:08:02 P6 *enlarged a portable water filter image, intuitive connecting with a hair dryer based on product appearance.*

Looks like a hair dryer, so maybe this can be after solution.



00:08:16 P6

Kind of a Portable body dryer.

00:08:36 P6

Just like hair dryer.

00:08:51 P6 *repeating his interpretation of the task*

Preparation. Solution. Prevention. Portable.

00:09:45 P6

Em. also preparation.

00:09:56 P6 *pointed at an image of different digital screens, intuitively thought that users might forget to read weather forecast from mobile screen.*

Because Weather forecast can also be a preparation.



Michigan dad invents app to limit kids' use of mobile devices...  
webpostingmart.com

00:10:09 P6 *redefined the problem that people forgot to look at weather forecast on the phone*

So just portable devices Can be a portable forecast. Em. Can be a portable forecast device embed lights To raise awareness, Because the smart phone can also provide the forecast, but people usually ignore it, so maybe this can be a

00:11:11 P6 *moved back to the bracelet idea*

Bracelet, very noticeable. People wear their bracelet.

00:11:25 P6

So I just look for preparation. And,

00:12:04 P6

It's maybe portable instrument. Portable instruments.

00:12:20 P6 *looked like having difficulties to define a different search word to feed the tool.*

Portable, maybe portable instrument. This looks wrong. Portable technology.

00:12:32 P6 *P6 defined his search word. He played word game, tried "portable instrument", "portable technology". He had to change input many times to get interesting image results.*

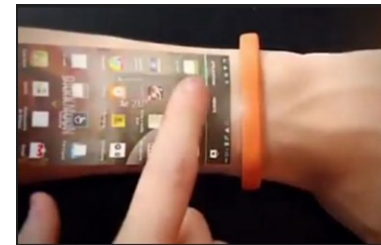
Looks better.

00:12:39 P6

portable.

00:12:45 P6 *felt satisfied with his image search result of "portable technology". The stimuli is a futurist mobile on human skin. Designers felt excited with a very unconventional product image. It helped him think out of the box.*

This looks nice. Prevention. It can be artificial human skin.



00:13:14 P6 *reviewing his interpretation again. He did not reframe the problem, but searched the scope of the possible solutions.*

It is waterproof. And, Can be digital.

00:14:12 P6 *the skin image reminded him reframe design purpose. He expanded his search input to a purpose, "dry from rain". The tool can give him some interesting answers.*

Try, trying another, dry from rain

00:14:25 P6

drying.

00:14:35 P6 *It is a explorative process to find the good word to feed the tool.*

Skin drying.

00:14:54 P6

Yeah, sure. Yeah.

00:14:58 P6 *satisfied with "skin drying" image search result again.*

This sounds nice.

00:15:05 P6

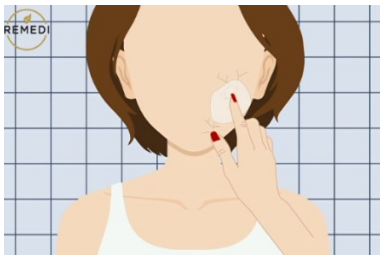
But this is not portable.

00:15:47 P6

This looks nice. Maybe I can. Solution.

00:15:55 P6 *there was a image of spouge product to remove makeup*

Kind of water absorbing. A smart object.



00:16:31 P6

Eh, like a spouge. smart sponge.

00:16:42 P6

Smart sponge, people can use it for Drying their face and skin, et

00:17:07 P6

so smart sponge.

00:17:15 P6

OK.

00:17:47 P6

Skin dryer, Face dryer.

00:17:57 P6

dryer.

00:18:27 P6 *changed to another website, Pinterest search result showed more designed products than duckduckgo tool. When the designer get fixated, authentic images can help him. He saw dryers image mostly.*

Let me try Pinterest.

00:18:42 P6

dryer.

00:18:47 P6

Dryer design, portable,

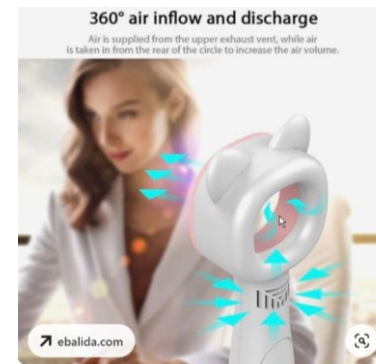
00:19:17 P6 *got fixated on the phase "portable device" given in the brief.*

*He did not narrow down to a more specific problems, or user scenarios in the process.*

Portable device, dryer.

00:19:54 P6

This is a fan. Em. Solution.



P6 doing Task B in Tech-Net Condition

Date: 16. 07.2022

Place: university library





00:00:11 P6 wrote some key words, analysed the brief first before using the tool.

Device, Let's take some key notes, here keywords. So it's a device.

00:00:21 P6

Mostly, the device. secondly. Design Goal keep, so Keep teeth clean. So tooth brush.

00:00:53 P6 aligning the tool's rule, defining the scope of search word, use open questions to explore the tool

But it can be other. Maybe there are other possibilities. So I need to search for. And, to search for what kind of, What kinds of tools can make teeth clean. So this is my first step.

00:01:30 P6

Maybe, First, Teeth clean.

00:01:41 P6 a technical issue, this search term did not show result.

There's no. this is a wrong role, search term.

00:01:46 P6

So maybe just tooth. Error. OK.

00:02:15 P6

OK. Tooth brush.

00:02:58 P6

So teeth brush.

00:03:25 P6 tool's capability was limited. the tool could not recognize his mistakes of inputting the space after keyword. The tool did not auto correct the mistake.

Maybe I can just first brainstorm ideas first.

00:03:37 P6

It Can be so. Maybe a tooth protector?

00:04:01 P6 refined problem in the early beginning, said a specific scenario, and problem

It can be designed. Adapted to users' own teeth. And users can Wear it In the morning When They Wash their face. Something like that, and at that time they don't need to put, Need to put more efforts Brushing their teeth. You can just wear it. So this is a protector.

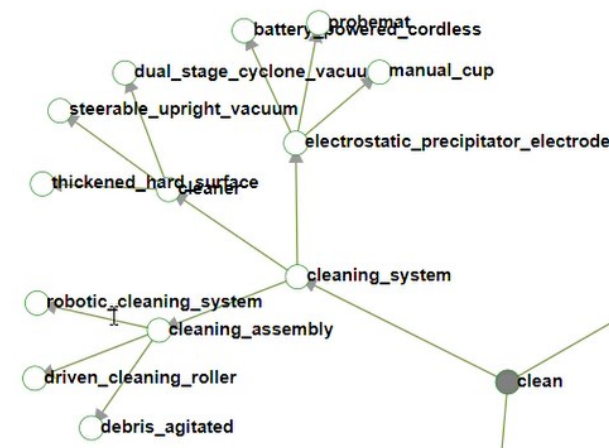
00:05:05 P6

Second idea, maybe?

00:05:12 P6

Can be, keep teeth clean everyday.

00:05:34 P6 he tried many different keywords to adapt to the tool's rule, but it did not work. Luckily, he used key word "clean", and deleted the



empty space after the word. the tool finally showed him search results.  
"robotic cleaning system" showed on the screen.

Why it is not working? Clean, clean system, yeah, robot.

00:06:15 P6

So, yeah, it can be. Yeah, reminding Robot maybe, Social robot Send, send notifications to user. Regular, regulate their Teeth brushing activities.

00:06:54 P6

This is Teeth protector.

00:07:03 P6

Monitoring robot.

00:07:37 P6

Manual cup, manual Cup, em.

00:08:00 P6 exploring the tool, learning its rule. the search results from the patent documents seemed difficult to understand. He also had another technic issue with Zoom in and zoom out the result.  
vacuum.

00:08:33 P6

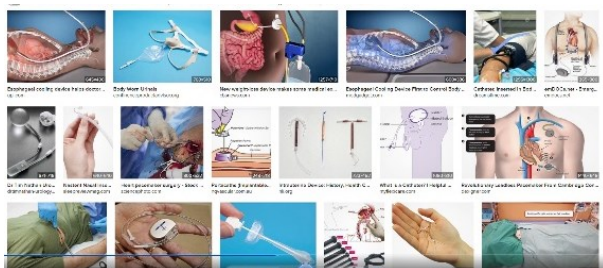
Body inserted.

00:08:38 P6 he finally got accessed to the search results. When he used image search to look for "body inserted", search results appeared to be lingerie images. He met obstacles in using both tool to brainstorm.

What is body inserted, body inserted.

00:08:52 P6

What?



00:08:58 P6 besides the technical issue, he added "device" into the search word in Duckduckgo.

Body inserted device.

00:09:17 P6

Em, Interesting, can be?

00:09:22 P6 "body inserted" result showed him medical devices inserted into users' body. It reminded him of fake tooth, he redefined the problem for fake tooth user, and make it an idea.

Maybe most inserted. Fake teeth, Fake tooth.

00:09:34 P6

Just one. It's actually a smart tooth Banded insert or inserted in mouth.

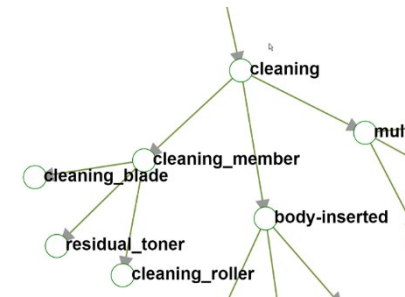
00:09:56 P6

Just like a fake, a fake tooth. And it can, Can help clean.

00:10:14 P6

it can produce smell.

00:10:22 P6



No, can produce an. Produce some fresh, fresh smell. And also it can help kill bacteria In user's mouth.

00:11:03 P6 he used image search to understand cleaning blade, and cleaning roller. language capability is important here

Cleaning blade.

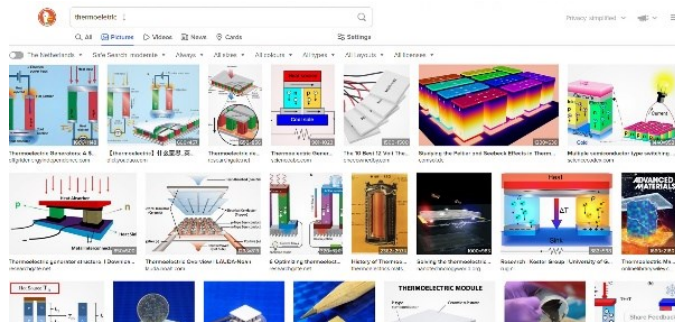
00:11:21 P6

Cleaning roller. Em.

00:12:13 P6



Thermoelectric.



00:14:21 P6 *most of search results were technical terminologies, which are difficult to understand. However, he picked some easy words for them to brainstorm. This intuitive selecting behaviour could possibly help him to make more ideas in given time.*

Yeah.

## Participants explaining survey results

### P1 explaining survey results

(Translated from Mandarin to English)

00:00:15 P1

Well, anyway I think that it's useful is, for example, like, uh, there will be some knowledge that I don't know. so it can help me think of something that is needed, to create more knowledge base. for example, So the teeth may have a lot of parts that I don't understand. and then I will think it may help (tell me) the root of the tooth, the side of the tooth, how they are called, etc.

00:00:40 P1

it will have some different types of information, but it is all related to teeth. and then, for example, you may, if you just think (by yourself), you don't know (these terms).

00:00:54 P1

The side of the tooth, ah, or some of the details of some teeth, so I think it's not bad, and then.

00:01:02 P1

It can make you expand your knowledge database in a short time, then you don't need to be like a dentist.

00:01:12 P1

Oh, and you don't need to become Dentists, actually, that's it.

00:01:17 P1

Not bad, it can help me, eh.

00:01:39 P1

I think it's not bad, yes. Not consider interface design. Lol

00:01:47 P1

Well, I think it's not bad, it helps me to expand related words. How similar...

00:02:03 P1

It (my brainstorming process) usually happens and build on my own knowledge, so I don't have another tool, and how does this helpful?

00:02:14 P1

Well, if you say Google, but.

00:02:17 P1

It doesn't seem to be the same. on the one hand, its structure is different, so it looks like, if you look up in Google, it may search many basic pictures of teeth.

00:02:32 P1

I think it's not bad. But, eh, it has the first layer and the second layer of nodes. When I click on the first layer,

00:02:43 P1

The information shown is more useful. then when I click further layers, I feel that those words is Not so useful.

00:02:50 (the experimenter reads, and explains design fixation question)

00:04:53 P1

Duckduckgo, It's about a kind of facilitation tool. I think duckduckgo is also a kind of search engine like Google, so I think Google should...

00:05:08 P1

It helps, but I'm not sure if it can count in a methodology.

00:06:29 P1

Well, that's pretty much it.

00:06:32 P1

As far as I think, well, it makes it self too complex to present information, uh, it's going to keep blocking (keyword shown in) the tree structure, and then its expansion, like when I clicked a node.

00:06:44 P1

It doesn't show those layers. because I think the first layer, that search result is actually the most relevant, well, and it shows quite a lot words. I was looking for very, very basic words for tooth. It can actually give a lot of things related to this topic.

00:07:00 P1

And then it's not that all words are very helpful. that's enough, and I don't necessarily say, I have to look for the cleaning tool, it's just an extra tool, but I can find more extra tools. But I think the first layer is actually the most helpful.

00:07:20 P1

Besides if it can show something I clicked or not, I hope it can let me know. For example, I clicked, and then it can let me know which is my own click. So that it show me to what extent I am exploring this keyword. and then maybe when I'm looking for other keywords today, it can let me know what I've seen, And then I'll find that the visual feedback is clear. and I'll find that oh, I've clicked these things.

## P2 explaining survey results

00:00:00 P2

How you feel about the Tech-net?

00:00:03 P2

I'm not quite sure. I think it would have been nice. Yeah, yeah, not difficulties. Is there like a ... most valuable.

00:00:19 P2

Not difficulties. But I missed Visual search aspect which I think is Key for me.

00:00:37 P2

And what I liked about it is. Uh, that it gives Relevant ideas, not, relevant keywords.

00:00:53 P2

So maybe not a What you want?

00:01:03 P2

But Something that inspires thoughts...

00:01:35 P2

Well, I think.

00:01:39 P2

Whatever difficulties that answer, how similar do you think...?

00:01:48 P2

It was not that similar.

00:01:52 P2

What is this number? ...It didn't come before.

00:02:00 P2

So maybe here you can see this.

00:02:01 Experimenter

I think 4 is neutral.

00:02:12 P2

Do you need any guideline methodological support...

00:02:18 P2

Well, you know, it's quite self explanatory...

00:02:35 P2

I don't think it was really. Or was it?

00:02:41 P2

I think it's slightly was a inspirational. How do you think of using Tech-Net defining problem...?

00:02:55 P2

To find new problems. Or remind you new problem.

00:03:07 P2

Oh well.

00:03:11 P2

Maybe not. Yeah, this is possible.

00:03:23 P2

Which of the following situation?...

00:03:23 Experimenter

Do you need explain?

00:03:41 P2

No, no, no.

00:04:05 P2

No, not really getting fixed.

00:04:11 Experimenter

OK, and one question, do you feel because Tech-net is used by design by analogy, analytical design Principle. Do you feel that analogy in this website you can easily use?

00:04:30 P2

Yeah, yeah. That's what sometimes the ideas are not What you want?

00:04:36 P2

But it makes you think of something so like towards the end, the ideas that were coming.

00:04:45 P2

To my mind.

00:04:46 P2

Were a result of something I read. But not really that. But you know that kind of thing because when you are doing a search yourself, you're searching for something.

00:05:00 P2

Yeah. So you see just that and you're, you're just looking for, OK, show me something. It's like the Netflix surprise me thing or, you know, like, yeah, because you don't know what it shows and then your mind just opens up to like different ideas. Like, OK, why is this here or like.

00:05:20 P2

This doesn't make sense to me, but then.

00:05:23 P2

And why is it?

00:05:24 P2

Here so then probably when I'm thinking that there is like.

00:05:29 P2

Something else that pops up in the mind.

00:05:32 P2

So, but then the visual part I think is very big for ideation.

00:05:40 P2

You either take inspiration visually through nature or through existing work that you want to improve on, or even like steal like an artist so you can take inspiration from Here, here.

00:05:55 P2

I don't know. Like if you are working in sports, you take inspiration from politics.

00:06:01 P2

Yeah, and so yeah, I don't know, like some crazy different domain.

00:06:08 P2

But it's mostly like this visual thing that I think lacks.

00:06:15 Experimenter

And in the Tech-Net in the tree graph there are lots of the words. what kind of word do you prefer to pick up or have more inspiration?

00:06:29 P2

It wasn't like one thing, but an overall, I like that it shows the tree.

00:06:39 P2

Like it shows different possibilities because sometimes it's The idea is an outcome of a mixture of 2, let's say or.

00:06:50 P2

It's just nice that it makes you think in different ways.

00:06:54 P2

I wouldn't really like at least, what I saw yesterday and today. I didn't see something where I said OK, this is very relevant or yes, this can be done, but it was more like. What if this and this is mixed? Or why is this here?

And because sometimes they felt very irrelevant in the first look.

00:07:17 P2

Like why was that word there? Kind of feeling. And then, when I read like, thought a bit more about it. then it made sense.

00:07:27 P2

So like the food truck? The thing was under retractable something. and I was like, why is the food truck thing here but then?

00:07:37 P2

I could think of like it being retractable, and from there the retractable thing came.

00:07:46 P2

For the... Yeah, so it's those kind of things. So maybe when you think of how it is made or how it functions.

00:07:58 P2

When you visualize it in your head, you think of how it can be applied. If it makes sense.

00:08:05 P2

But I think it really depends on how you, how your mind works for ideation. At least my mine does in a very visual way. So even if like you're talking to me, I'm probably thinking like visualizing it. But maybe some people, it is words.

00:08:26 Experimenter

Some nodes don't not use visual.

00:08:28 P2

Yeah, exactly. So it would really be helpful for them.

00:08:35 Experimenter

And do you think that some keyword are near distance analogy or their very far distance? And with your topic.

00:08:48 P2

They were Uh, far.

00:08:52 P2

Overall, if you do ask like if you take an average, then I'll say that quite a few were further away from what I was having in mind. and sometimes I think it can also backfire in ways because so, so you're really Trying to focus on something and then you.

00:09:17 P2

See something completely different and you don't want to think that.

00:09:24 P2

Yeah, like it could be not implementable, maybe.

00:09:27 Experimenter

Yeah, for instance, It's not what you want.

00:09:29 P2

It's just too broad, but maybe it's good for the initial stage.

00:09:33 P2

You know, when sometimes they they're like, OK, here's the problem and you need to creatively ideate, then this will work. But if it's more of like.

00:09:43 P2

We need a practical situation, fast and immediately, with less resources. And something like that then? I don't see it as a tool, so it has A different use case.

00:09:57 Experimenter

I understand.

00:09:57 P2

Or also for you know concept design.

00:10:01 Experimenter

Yeah,

00:10:01 P2

More than, yeah. So the concept artists.

00:10:05 P2

Uhm, so when you're making movies, let's say the the Disney and Pixar people, and there are concept artists, right?

00:10:16 P2

Like you have some hypothetical problem and you have to really think out of the box and they, I think, we'll everyone Face creative issues, yeah, and this tool can really be helpful for that Situation like.

00:10:37 P2

Where you have to really like.

00:10:38 P2

Think. Yeah, just imagine.

00:10:43 P2

So yeah, it's definitely a tool that can help you come out of your fixation, and I can't think mine.

### P3 explaining survey results

00:04:08 P3

How creative do you think your ideas inspired by Tech-net?

00:04:14 P3

Yeah, it's 5.

00:04:17 P3

Because sometimes I also feel part of a, on the terms, it's a new thing, so I am bit confused, but also five, but I think this one is lower.

00:04:32 P3

Because by using Tech-net it helps me to Thinking out-of-the-box.

00:04:44 P3

So it's, it's probably higher than this one.

00:04:48 P3

And then how efficient do you think of your working with Tech-net as design inspiration?

00:04:56 P3

Yeah, if also 5, also the same.

00:05:02 P3

I think I have quite a lot.

00:05:14 P3

Yes, but sometimes I need something like a trigger. Yeah, yeah, two thing and other things. For example, maybe there's a equations or.

00:05:26 P3

also like triggers, equations rather than only words.

00:05:35 P3

Hope helpful do you think to find any new problems?

00:05:40 P3

New problems is also 5.

00:05:46 P3

Yeah, I also, I think it is useful to find solutions.

00:05:53 P3

For me, but then I think (of) the solution 1st and then the Problems or the...

00:05:59 P3

It's not that high, wait, just 5.

00:06:02 P3

How similar do you think is Tech-Net compared to normal brainstorming tool?...

00:06:11 P3

Yeah, it's not the same, usually, I think.

00:06:16 P3

The only thing our discussion. How useful Tech-net to explore many direction rather than Fixed on only one.

00:06:27 P3

I think 6 is quite high because yeah, as I said, there's a A weird keyword that is not related.

00:06:38 P3

Do you need extra guideline, this methodological, yes.

00:06:44 P3

Yeah, I think it is extra guideline Would be. Maybe there's more pictures. Or not on the image because.

00:06:57 P3

Yeah, sometimes I need to go to Duckduckgo Solutions. And then, yeah, it takes time.

00:07:05 P3

Which part of Tech-net websites are the most valuable to explore many different directions? Yeah, the branches concept,

00:07:16 P3

And there's also unexpected laying between the first word in the second.

00:07:22 P3

What are the difficulties to explore?

00:07:26 P3

Yes, understanding the technical words I need to search.

00:07:34 P3

Which of following situation That can help you...

00:07:42 P3

it's not. Yeah, I think for this second.

00:07:48 P3

The path A I think I get fixed set, but this one is yeah helpful to find another word or solution.

00:08:00 P3

And then.

00:08:02 P3

I used to not feel conscious considering that I'm in testing some.

00:08:11 P3

Uh, yeah, sometimes Duckduckgo, I think I tend to copy here, yeah.

00:08:23 P3

Like this one, yeah?

00:08:26 P3

Help me to get a new thing, more novel.

00:08:34 Experimenter

Yeah, and about the two design tasks, do you think they are very similar level of difficulty?

00:08:47 P3

Yeah, I know. Yes, I think so.

00:08:52 Experimenter

And yesterday.

00:08:54 Experimenter

You search some technical word and I remember very difficult name, Somewhat I forgot. How do you feel satisfied with the result?

00:09:14 P3

Design I think I feel more comfortable. Because what did I design, yeah, I can relate it To the, To the devices.

00:09:32 Experimenter

Yeah. And they're very different domain. Some of them are healthcare device or some are transportation.

00:09:42 P3

Yeah, I think the problem is quite different in terms of situation.

#### P4 explaining survey results

00:00:00 P4

Nice is that when you put a word, it gives you a lot of branching, and those branching are very diverse.

00:00:06 P4

So I think I would say diverse brain map. It helps me to think to something very totally different. How to say direction and then?

00:00:20 P4

It can also help me to think outside the box.

00:00:23 P4

So that is very important Or nice.

00:00:34 P4

I think it's, I would say.

00:00:37 P4

Eh, you can say like I would use 6 or 5 for how much helpful it is to explore many direction. because I think I wouldn't give 7 because it's sometime it is useful, sometimes it is not, sometime you don't need to go converging.

00:00:57 P4

Well, you also you need to do a converging, or diverging. So it can help you sometime, but not always.

00:01:08 P4

I think it's a like a like brainstorm, like normal brainstorming tool. I was using just a Miro or Pinterest which was... I think Tech-net is a bit different because it gives you more in-depth but also diverse. But the other just gives you around the picture but not a lot of diversity.

00:01:28 P4

So I feel it's so very different, I Would go maybe 2.

00:01:32 P4

I guess.

00:01:35 P4

How creative do you think your ideas inspired by Tech-Net. also it's a very interesting, very creative. Maybe I will score it like 5 because it helps you to go in a like jumping from One Direction to another direction, which I don't, normally cannot do with.

00:01:54 P4

Check the following situation. Do you think technique can help you overcome?

00:01:59 P4

Getting fixed...

00:02:11 P4

Yeah, I think a brief that novel or unproven ideas that can bring risk, I think it can help you to think aloud in a different, different direction.

00:02:23 Experimenter

Do I need to explain this question?

00:02:26 P4

The 5th one, yeah, yeah.

00:02:31 P4

Yeah, yeah, yeah. I'm a bit confused here that.

00:02:37 Experimenter

these 2 means sometimes you feel aware. When you can't have more new ideas, you're aware you have this limitation and sometimes you don't aware.

00:02:51 Experimenter

But you are still fixed on one of the previous.

00:02:53 P4

Yeah, yeah I think. I think I also think that this can help you to constantly look for a new ideas but not getting stuck to the one thing because one

you put one word it gives you also are relating but not exactly same thing.

So that is also nice in that one.

00:03:11 P4

But yeah, the other is, I think like drawings, graphs and shapes. I don't feel like it helped me a lot in that, because I mean, I think those are more visualized. So you when you see something it helps you to draw like that, but it.

00:03:25 P4

Was not here.

00:03:27 Experimenter

This helps me maybe overcome these issues.

00:03:32 P4

So I thought that if Tech-net can help me to overcome this.

00:03:39 P4

If like existing website doesn't help me that.

00:03:43 P4

But if they have some modification about like words with visualization, it can maybe help.

00:03:52 P4

... imitating some existing design that that's also... I also feel like that that it doesn't. It helps me that.

00:04:02 P4

What are the difficulties of using Tech-Net to explore many different design direction now? I think one is like some of the word is quite different or quite random, so random suggestion makes you sometimes. It stops you bit.

00:04:19 P4

So and also I think you need more words to like make it understand like, oh, I'm talking about this thing.

00:04:28 P4



So when I put bicycle doesn't understand which if it is a bicycle or something else. So I think it needs more work to make it understand. So maybe that can be a bit more smarter, like a word suggestion.

00:04:50 P4

And maybe it can be a bit more illustrative.

00:04:58 P4

Yeah, I think those 2 things are OK.

00:05:02 P4

How helpful do you think you of using Tech-net to find a new problem.

00:05:07 P4

How helpful do you think of using technology to find a new problems? I think it's quite helpful. I would guess there 6 because sometimes when you're designing you don't see, you were just thinking that, Oh yeah, this can be improved, this can be improved, but when you have a word suggestion it cannot. It might not give you ideas, but it always shows that I had a problem With that thing.

00:05:28 P4

So maybe that can be solved by this? How efficient do you think of your working with Tech-Net as a design inspiration?

00:05:37 P4

I would Say five, because I didn't know how much gives you efficiency, it increased the speed.

00:05:43 P4

For sure, but.

00:05:45 P4

It can also divert you to somewhere else.

00:05:50 P4

Do you need any extra guideline or meta methodological support to use Tech-net as a creative inspiration?

00:05:58 P4

Yeah, I think you need a more like a guideline that how you can go through a different design or something like that and.

00:06:09 P4

Methodological support maybe because if you're using for first or like if you're enough like new user.

00:06:17 P4

You can also maybe get ahead that how you can create more defined word which can help you to think and then you don't How does surprise that I was not talking about this calliper so maybe that can be helpful.

00:06:34 Experimenter

You mean it's not so accurate to use sometimes?

00:06:37 P4

Sometime because if suppose when I was looking for rain coat then I didn't put raincoat as a one word but I said rain and coat because I wanted to maybe think of, like make it think more but it just gave me like coating of some material or some product so.

00:06:58 P4

I didn't understood a bit but I have used.

00:07:00 P4

I don't know if you know.

00:07:02 P4

Do you know DALL-E 2? Like the New Illustrated website?

00:07:07 P4

Do you want to see?

00:07:13 P4

This is a website that helps you to how do?

00:07:16 P4

You say create the image inspiration.

00:07:19 Experimenter

This is Ai I know.

00:07:22 P4

Yeah, I.

00:07:24 P4

I have a user access so I know, I use it. So where they help you to?

00:07:28 P4

How to say how do you type? How should you type? How can you improve?

So maybe this website can do something like that.

00:07:36 P4

Yeah, shall I submit it?

00:07:39 Experimenter

Yeah, please. And one question. There are so many inspirations When you look all of them, do you think, uh, what's your preference to choose keyword or what kind of keyword do you want to choose from the tree graph?

00:07:57 P4

I think I when I when I'm looking at into it that some when something is more still out of the... still not scoped, like when it says material.

00:08:09 P4

So I was like, OK, what type of material then? Then I would like to press on that such that they can elaborate a lot but also.

00:08:17 P4

It, it would be nice if it keeps maintains the relations well. So when I said rain coat and when I click on material then it should be smart enough to think that oh, he's talking about material for raincoat. So I see.

00:08:31 P4

Not totally talk about it, but keep the talk relating to that.

00:08:37 Experimenter

Sometimes it doesn't understand that.

00:08:39 P4

No, I think it just create a new wire from them. And one funny thing was like when I was using clean flexible material, it was saying flexible material in the further dream.

00:08:51 P4

So I was like, OK.

## P5 explaining survey results

00:00:02 P5

I don't know. I feel I will Keep medium.

00:00:09 P5

I don't think that's Helpful as I thought.

00:00:13 P5

I mean Because what I just experienced is mainly based on... from my own experience. However, they do have some keywords that were come out when I use the Tech-Net and it can help to expand my...

00:00:37 P5

My thoughts a little bit... , it helped me to think about, Oh, yes, I also use the mouse water and the floss while cleaning my teeth. I don't know if Google will give me a similar answers.

00:00:53 P5

Uhm yeah. And, also it reminds me that I probably we should also think about the tongue.

00:01:01 P5

When I think about cleaning the teeth.

00:01:03 P5

And, also the whole oral environment. So it is also helpful to give me some of the keywords.

00:01:13 P5

I was thinking about the system in the mouth, but I don't know what are the correct words for that. But yeah, but the Tech-net tell me it is called oral.

00:01:22 P5

Although I don't find the further keywords from them.

00:01:29 P5

What are your difficulties using?

00:01:34 P5

So based on the first question I I would say, I wish, I still more preferred to do these kind of brainstorming with people.

00:01:43 P5

So when people share in different, there are different experience and backgrounds. I feel it's also very helpful.

00:01:50 P5

What are your difficulties of using TechNet to find many different design directions?

00:01:58 P5

Difficulties is when it shows the error when it shows like error.

00:02:05 P5

I feel, I feel, and I feel.

00:02:11 P5

I, kind of feel stopped by the error sign.

00:02:19 Experimenter

It shows lots of error?

00:02:22 P5

Yeah, and it's fine with one time, but then when it shows a lot, I start to stop the thinking, and just want to find some keywords that will work normally. So yeah, this is something not that helpful for the brainstorm.

00:02:41 P5

How similar do you think of using Tech-Net compared to your normal brainstorm tool?

00:02:46 P5

How similar?

00:02:50 P5

Yeah, yeah, I.

00:02:51 P5

I like to talk with people in the brainstorm.

00:02:58 P5

I want keep neutral, but I like that.

00:03:01 P5

And, and.

00:03:04 P5

How similar, the similar things are also they offer you different ideas on the different things. when you talk with people, if the two people have similar backgrounds.

00:03:14 P5

They will jump to conclusion very fast while the tech-net can helpful slightly to open quickly... Open, open the searching pool in your mind, but it also makes you more, more hesitate to make any decisions I feel.

00:03:35 P5

It can introduce a lot of unnecessary key points as well.

00:03:43 P5

Yeah. Do you need any extra guidance...?

00:03:51 P5

So I don't think I I keep it in the neutral. So do you think any extra guidance on methodology is supposed to use...?

00:04:05 P5

No. Or maybe.

00:04:10 P5

Yeah, maybe.

00:04:11 P5

Uhm, because some of the keywords they gave me feels very weird when I have some, When I have some expectation there, uhm.

00:04:24 P5

And, and also.

00:04:25 P5

And, when I for example, I've already clicked the, the end of the tree (which) is supposed to give me some, I was expecting some new keywords.

00:04:36 P5

I thought I'm on a good track. however they keep showing a similar, further the next node. or it even go back to the first node which makes me feel very confused.

00:04:50 P5

Even I start for a new search sometimes it doesn't give me a very ideal result as I expected.

00:04:58 P5

So I was curious about the algorithm at the background.

00:05:04 P5

Yeah, how creative do you think of your ideas inspired by them?

00:05:13 P5

Not very.

00:05:18 P5

No, the most words they gave me were the devices already exists.

00:05:26 P5

Uh, like the brush?

00:05:32 P5

Or there the mouse water or the floss,

00:05:38 P5

Even they also show some about things about the, I think the hair of the pigs, which is old people used to brush the teeth.

00:05:48 P5

But for a more creative, designer may need some ability to combine all these information together which is not shown there yet.

00:06:03 P5

also, the keywords are not presented in time sequence.

00:06:09 P5

For example, it shows the latest search or the patents are more focusing on the, on the chemical side of the.

00:06:21 P5

of mouth waters. Maybe. Maybe it means that the next generation will rely on the mouth water more than us.

00:06:31 P5

Probably because I think, I believe in ancient, our ancestors. They use salts to clean the teeth. They don't use the brush as now.

00:06:40 P5

They don't use the brush as often as we do now.

00:06:44 P5

Yeah, so maybe, so the patent today are shown up, but regardless of times, but they are all exists, so.

00:06:54 P5

How helpful. But I think it would be very nice if you think about some combinations. Then all these existing ideas are very nice. are nice. How helpful do you think of using technique to find a new problems?

00:07:09 P5

Not considering the interface, yeah.

00:07:17 P5

To find a new problem, we define a new.

00:07:19 P5

Problem.

00:07:20 P5

That's helpful. I can give them six because it helps a lot to expand, enlarge your thinking pool and then think about more or wide related topics.

00:07:31

Right.

00:07:34 P5

For example, I keep thinking about tongue cleaning when, when I find the keyword about tongue and oral.

00:07:41 P5

Which part of technical website or offer most valuable for you to explore many design direction. the 1st search.

00:08:02 P5

The first search tree layers.

00:08:10 P5

I feel that the first round of the search, the answer for the first round search this makes more sense.

00:08:20 P5

Although I know, I can, if I think one of the nodes. I'm interested in one of the nodes, I can click and expand a little bit.

00:08:29 P5

But the answer showed me it is not as good. the quality is not as good as the results from the first round.

00:08:36 P5

How useful do you feel Tech-Net help you explore Many directions rather than fixed on...

00:08:45 P5

How useful do you?

00:08:46 P5

Feel Tech-net help explore another rather.

00:08:48 P5

Than...

00:08:51 P5

Yeah, it's helpful.

00:08:54 P5

The reason is similar as question six. Which of the following situations do you think Tech-Net

00:09:00 P5

Can help you overcome

00:09:05 P5

Get fixated on abstract knowledge...

00:09:10 P5

Not able to produce more tangible ideas such as...

00:09:41 Experimenter

These situations are not desirable. When we want to be creative, the first is fixed on Abstract drawing.

00:09:59 P5

This means we are easily to get fixed on abstract knowledge, then Tech-Net can help us to overcome fixation.

00:10:10 Experimenter

So for example, I know of a specific material Very well, I have deep kind of knowledge, so maybe I I can get fixed on a specific like a plastic material or new bio material.

00:10:27 Experimenter

I'm not able to produce the concrete ideas means.

00:10:34 Experimenter

It means lots of. For example I have preference on specific curved shape. Some idea of product like press bottom. so I will get fixed on some tangible ideas and then.

00:10:56 Experimenter

The new idea they are unproven, so they can bring me risk if I want to go for the very creative or the crazy idea I need to convince people. Probably I can not Make it success.

00:11:11 P5

It can be helpful, I think.

00:11:14 P5

And it shows...

00:11:19 Experimenter

This means I don't when I see some other people's solution or their design idea.

00:11:28 Experimenter

I Can copy them or imitate or keep some of their features, but I don't realize.

00:11:37 P5

Yeah, so you can search that.

00:11:40 Experimenter

The last one means I realize I get fixed but I have no idea.

00:11:50 Experimenter

They might.

00:11:50 Experimenter

Do you feel Tech-Net that can help you with all of These.

00:11:57 P5

I feel that can help me if I'm getting fixed on

00:12:01 P5

Abstract knowledge or...

00:12:03 P5

Fixed an abstract knowledge of pattern.

00:12:12 P5

Yeah, because this Tech-Net can search some, give you some kind of idea what's on the existing devices, tools. So then you will have an idea if the your design is proved or exist already.

00:12:33 P5

This one is slightly helpful.

00:12:37 P5

Yeah, if I cannot find a new ideas.

00:12:39 P5

When I search. They might help To open up a little bit of the peek so you Can think about some new things there.

## P6 explaining survey results

00:00:09 P6

Which part...?

00:00:21 P6

I think the most Valuable part maybe... it lists A lot of keywords. And this keyword which, these keywords can help brainstorming.

00:01:04 P6

Because They are just like inspirations.

00:01:16 P6

I mean, they are just like another Another person. Maybe a co-worker, And your, Uh, classmates, or someone they can help you Proceed your brainstorming process.

00:01:39 P6

Yeah, just like, maybe... Yeah, just like.

00:01:44 P6

Like a co-worker Brainstorm with you?

00:02:05 P6

And you can, You can use this Tech-net As a partner. To inspire each other together.

00:02:22 P6

How creative do you think idea is inspired by Tech-Net?

00:02:39 P6

Em. Let me check... Very creative.

00:02:47 P6

How efficient...? I think it increases my...

00:02:54 P6

Oh, this one creative. So firstly I, I just.

00:03:01 P6

I still.

00:03:03 P6

I was still designing some kind of conventional design, such as a brush, but later when I Checked the keywords of clean, some of the keywords like robot.

00:03:20 P6

Body inserted or cup and etc. They inspired me to think about the possibilities of the devices. So I think it makes my Idea is more creative.

00:03:38 P6

And also I think.

00:03:42 P6

It is very efficient because sometimes you are stuck in your brainstorm process. And you can check the ideas there, and maybe the keywords there, can inspire you to find another path to Do the creative design.

00:04:08 P6

Do you need extra guideline methodology...?

00:04:13 P6

I think so. Because there is just barely some nodes, nodes there.

00:04:23 P6

You basically. If you, if this is the first time to use this tool, you basically don't know how to operate it.

00:04:39 P6

And... yeah, so I think we need to, need more methodological guidance To use it as inspiration for, also like maybe?

00:04:55 P6

I think this...From this name Tech-net can be.

00:05:04 P6

Further developed to see In which phase of the creative brainstorming?

00:05:15 P6

Is he, is most appropriate or most efficient?

00:05:19 P6

Because maybe in the very early phase of the brainstorming, you and your classmates or co-workers you can Brainstorm a lot of ideas, and maybe after, After that, you and your co-workers maybe start in Very struggling phase and maybe in this phase.

00:05:51 P6

Tech-net can be most useful to help them to identify more ideas rather than the ideas generated before.

00:06:05 P6

So how similar do they use compared with a normal brainstorming tool?

00:06:11 P6

So I never used the brainstorming tool, so I would say very different.

00:06:21 P6

What are the difficulties of using?

00:06:26 P6

I think basically the.

00:06:30 P6

Interaction experience.

00:06:34 P6

Because I'm.

00:06:38 P6

I would suggest another interface...

00:06:51 Experimenter

Nice looking interface?

00:06:57 P6

Another. I mean, no, I I mean another Sub-interface is that right?

00:07:11 P6

Separate... Separated from the searching interface.

00:07:28 P6

Yeah, and also the. Maybe it can be Use more colors to Divide which...

00:07:44 P6

To divide, to divided nodes. Which are the most prevalent, And which are the less prevalent...

00:08:33 P6

Not considering interface design.

00:08:47 P6

New problems? What do you mean, new problems?

00:08:50 Experimenter

Uh, for example, the teeth cleaning or for example. You don't really aware what kind of problems the users may have, so you use Tech-net and see if you can think about some problems.

00:09:12 P6

Yeah, actually.

00:09:14 P6

I didn't clarify the problems.

00:09:19 P6

But I. Yeah, I think I just regard it as clean. How to keep it clean?

00:09:30 P6

So maybe I just rate 4.

00:09:52 Experimenter

This one do I need to explain?

00:10:03 Experimenter

These are the undesired situation or some situation.

00:10:11 Experimenter

Block you from being creative.

00:10:17 P6

Not from your literature.

00:10:19 Experimenter

Yeah, the first one is, uh, abstract knowledge or pattern. For example, if you are very familiar with some material or maybe some.

00:10:30 Experimenter

Uh, biomaterials. So you always get fixed. You want to try to use this material or use this knowledge. The this one is for example, you are very favour of some shape or some, Uh, product, concrete product or ideas. So you always get fixed on that kind of things. And another one is?

00:10:59 Experimenter

The innovative ideas that haven't been done by previous people, so you think you will run the risk if you want to do something innovative?

00:11:12 Experimenter

This one is, uh, these two are one is you, You don't feel conscious. You don't realize you are imitating or copying some existing solution. This one means you feel you are very aware.

00:11:51 Experimenter

And, the one more question is about the tech-Net is designed by design. By analogy, this means some keyword. You can use this as an analogy, metaphor.

00:12:08 Experimenter

Do you feel you can apply this metaphor from the Tech-net search result?

00:12:20 P6

What do you mean? Can you elaborate a little?

00:12:23 Experimenter

Yeah, for example if you find some keyword like a robot or something else.

Do you feel, How do you feel you can apply them To your design.

00:12:44 P6

I think. I can just treat them to these keywords as and. Inspiring idea, but I still need to consider if this kind of keyword, which may represent another object, can Be suitable for my design case.

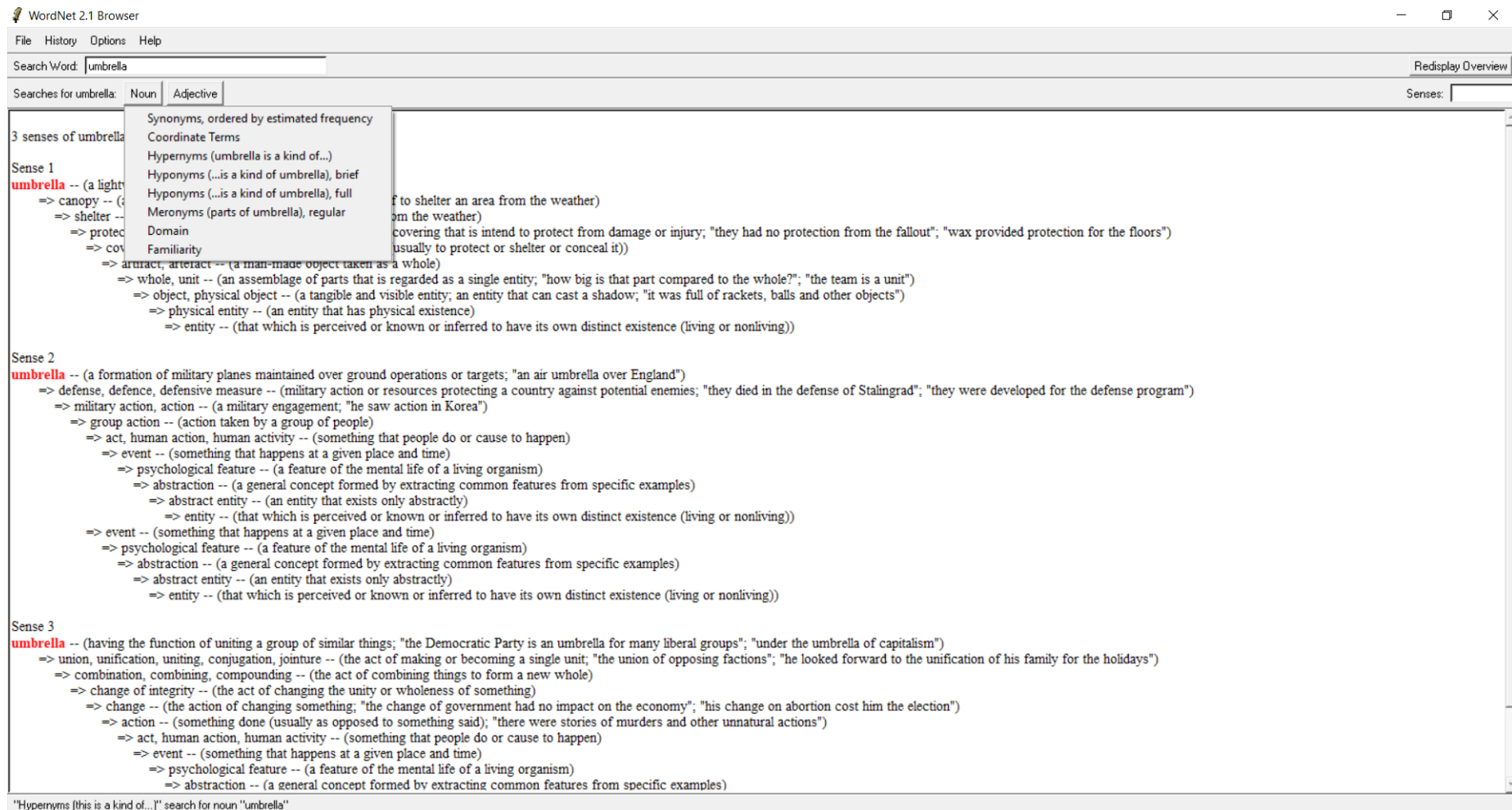
00:13:10 P6

I would say it is very useful for inspiring, but it is not. Uh, I mean, it depends If it can be directly applied in my design case.



## 18. Explorations Of Alternative Knowledgebase Tools

The below screenshot is generated by WordNet (n.d.).



The below screenshots are generated by ConceptNet (n.d.).

Synonyms	umbrella is used for...	Related terms	Location of umbrella
<b>pt</b> Guarda chuva (n, artifact) →	<b>en</b> protection from the rain →	<b>en</b> shade →	<b>en</b> a closet →
<b>ca</b> paraigua (n, act) →	<b>en</b> keeping you dry →	<b>sh</b> kišobran (n) →	<b>en</b> your car →
<b>ca</b> paraigua (n, artifact) →	<b>en</b> keeping the sun off you →	<b>sh</b> kišobranar (n) →	<b>en</b> beach →
<b>ca</b> paraigua (n, military) →	<b>en</b> shelter from rain →	<b>sh</b> suncobran (n) →	<b>en</b> an umbrella stand →
<b>da</b> paraply (n, artifact) →	<b>en</b> help keep dry →	<b>en</b> rain →	<b>en</b> the backseat of a car →
<b>af</b> sambreel →	<b>en</b> keep yourself dry →	<b>ady</b> щамсый (n) →	<b>en</b> a Charlie Chaplin film →
<b>ar</b> شمسية →	<b>en</b> stay dry in the rain →	<b>ady</b> Іэкощ (n) →	<b>en</b> a jacket closet →
<b>ca</b> paraigua →	<b>en</b> bad weather →	<b>af</b> sambreel (n) →	<b>en</b> a rainy place →
<b>da</b> paraply →	<b>en</b> keep yurself dry →	<b>am</b> ጃንጥላ (n) →	<b>en</b> Seattle →
<b>eo</b> ombrelo →	<b>en</b> keeping your golf clubs dry →	<b>ar</b> ستر (v) →	<b>en</b> a store →
<b>es</b> paraguas →	<b>en</b> opening indoors or outdoors →	<b>ar</b> شمسية (n) →	<b>en</b> a suitcase →
<b>fi</b> sateenvarjo →	<b>en</b> protect against rain →	<b>ar</b> مظلة (n) →	<b>en</b> a wet city →
<b>fr</b> parapluie →	<b>en</b> protection from the sun →	<b>ast</b> paragües (n) →	
<b>hu</b> esernyő →	<b>en</b> provide shelter →	<b>bg</b> чадър (n) →	
<b>it</b> ombrello →	<b>en</b> rain storms →	<b>bn</b> ছাতা (n) →	
<b>it</b> sketis →	<b>en</b> rainy days →	<b>bo</b> གདུགས (n) →	
<b>nl</b> paraplu →	<b>en</b> shading the user →	<b>bo</b> ཉེ་གདུགས (n) →	
<b>nl</b> regenscherm →	<b>en</b> stay dry →	<b>bo</b> རིན་ཆེན་གདུགས (n) →	
<b>no</b> paraply →	<b>en</b> staying dry →	<b>ca</b> barnilla (n) →	
<b>pl</b> parasol →		<b>ca</b> ombrel·la (n) →	

## umbrella is a type of...

- en a device to protect something →
- en union <sup>(n, act)</sup> →
- en canopy <sup>(n, artifact)</sup> →
- en defense <sup>(n, military)</sup> →
- de union →
- en mechanical device <sup>(n)</sup> →
- en protection →
- en scope →
- en shade →
- en shelter providing artifact <sup>(n)</sup> →
- en weather protection →

## Derived terms

- en exumbrella →
- en jumbrella →
- en subumbrella →
- en sunbrella →
- en umbrella organisation →
- en umbrella organization →
- en umbrella stand →
- en umbrella term →
- en umbrellabird →
- en umbrellaed →
- en umbrelliless →
- en umbrellalike →

## umbrella is capable of...

- en break in high wind →
- en be any color →
- en shade bathers →
- en shade you from the sun →
- en shade people from the sun →
- en shade a table →
- en shield one from rain or sun →






## Word forms

- en humbrella <sup>(n)</sup> →
- en umbrellaed <sup>(v)</sup> →
- en umbrellaing <sup>(v)</sup> →
- en umbrella <sup>(n)</sup> →
- en umbrellas <sup>(n)</sup> →
- en umbrellas <sup>(v)</sup> →

## Parts of umbrella

- en gore <sup>(n, artifact)</sup> →
- en handle <sup>(n, artifact)</sup> →
- en rib <sup>(n, artifact)</sup> →

## Symbols of umbrella

- mul  →
- mul  →
- mul  →
- mul  →
- mul  →

## Etymologically derived terms

- eo ombrelo →
- mt umbrella →
- tpi ambrela →

## Types of umbrella

- en gamp <sup>(n, artifact)</sup> →
- en beach umbrella <sup>(n)</sup> →
- en umbrella used as covering <sup>(n)</sup> →

## Synonyms

ar سِن (n, animal) →  
 ar سِن (n, body) →  
 ar ضِرْس (n, animal) →  
 ar ضِرْس (n, body) →  
 ca dent (n, artifact) →  
 ca dent (n, body) →  
 da bisse (n, body) →  
 da pløk (n, body) →  
 da tak (n, artifact) →  
 da tand (n, body) →  
 sh zub →  
 es diente (n, artifact) →  
 es diente (n, body) →  
 eu hagin (n, animal) →  
 eu hartz (n, animal) →  
 eu hartz (n, artifact) →  
 eu hartz (n, body) →  
 fi esiintyntyvä (n, artifact) →  
 fi hammas (n, body) →  
 fi rakenne (n, animal) →

## Types of tooth

en back tooth (n, body) →  
 en canine (n, body) →  
 en carnassial tooth (n, body) →  
 en chopper (n, body) →  
 en cog (n, artifact) →  
 en conodont (n, animal) →  
 en denticle (n, animal) →  
 en fang (n, animal) →  
 en front tooth (n, body) →  
 en incisor (n, body) →  
 en malposed tooth (n, body) →  
 en molar (n, body) →  
 en permanent tooth (n, body) →  
 en premolar (n, body) →  
 en primary tooth (n, body) →  
 en tusk (n, animal) →  
 de fang →  
 en adult cat tooth (n) →  
 en baby tooth →  
 en back tooth →

## tooth is used for...

en chew food →  
 en grinding →  
 en chewing food →  
 en crushing →  
 en eating →  
 en griding →  
 en ripping →  
 en archeological studies →  
 en attracting fairies →  
 en breaking food apart →  
 en cavities →  
 en creating smiles →  
 en cutting and ripping →  
 en fillings →  
 en frightening →  
 en grinding against another tooth →  
 en gripping →  
 en identifying creatures →  
 en keeping dentists in business →

## Related terms

en paste →  
 en tusk →  
 en tooth fairy (n) →  
 sh zub (n) →  
 sh zubina (n) →  
 sh zubić (n) →  
 sh zubni (a) →  
 en fang →  
 ab au (n) →  
 ady ٤٣ (n) →  
 ef tand (n) →  
 akk 𐎶𐎵𐎶𐎶 (n) →  
 ang top (n) →  
 ar ثغر (n) →  
 ar سن (n) →  
 ar ضاحك (n) →  
 ar ضرس (n) →  
 ar طاحن (n) →  
 ar عارض (n) →  
 ar ناجذ (n) →

## Ways of clean

- [en](#) bream (v, contact) →
- [en](#) brush (v, contact) →
- [en](#) disinfect (v, body) →
- [en](#) dry clean (v, contact) →
- [en](#) dust (v, contact) →
- [en](#) pipe-clay (v, contact) →
- [en](#) preen (v, contact) →
- [en](#) sanitize (v, contact) →
- [en](#) scavenge (v, contact) →
- [en](#) steam (v, contact) →
- [en](#) sweep (v, contact) →
- [en](#) vacuum (v, contact) →
- [en](#) wash (v, contact) →
- [en](#) wash up (v, contact) →

## Derived terms

- [en](#) clean out →
- [en](#) clean up →
- [en](#) clean as hound's tooth →
- [en](#) clean as whistle →
- [en](#) clean shaved →
- [en](#) clean sheet →
- [en](#) clean someone's clock →
- [en](#) clean sweep →
- [en](#) cleanability →
- [en](#) cleanable →
- [en](#) cleanaholic →
- [en](#) clean <sup>(v)</sup> →
- [en](#) cleanest →
- [en](#) cleaneth →
- [en](#) cleanish →
- [en](#) cleanliness →
- [en](#) clean <sup>(a)</sup> →
- [en](#) cleanness →
- [en](#) cleanroom →
- [en](#) cleanshaven →

## Causes of clean

- [en](#) bathing →
- [en](#) doing the housework is the house →
- [en](#) taking a bath →
- [en](#) washing your car →
- [en](#) doing housework is everything →
- [en](#) having a bath →
- [en](#) washing your hands →

## Things used for clean

- [en](#) cloth →
- [en](#) a soap →
- [en](#) Soaps →
- [en](#) a vent brush →

## Related terms

en wash →  
 en soap →  
 en tidy →  
 en antiseptic (a, wn) →  
 en antiseptic (a, wn) →  
 en decent (a, wn) →  
 en tidy (a, wn) →  
 en clean (a, religion) →  
 en clean (a, religion) →  
 en pure (a, wn) →  
 en decent (a, wn) →  
 en pure (a, wn) →  
 en tidy (a, wn) →  
 sh očistiti (v) →  
 sh prazan (a) →  
 sh trebiti (v) →  
 sh trijebiti (v) →  
 sh čist (a) →  
 sh čistiti (v) →  
 en polish →

## Similar terms

en antiseptic (a, wn) →  
 en antiseptic (a, wn) →  
 en cleanable (a, wn) →  
 en cleanly (a, wn) →  
 en complete (a, wn) →  
 en dry-cleaned (a, wn) →  
 en easy (a, wn) →  
 en legible (a, wn) →  
 en perfect (a, wn) →  
 en pristine (a, wn) →  
 en pure (a, wn) →  
 en scrubbed (a, wn) →  
 en spick-and-span (a, wn) →  
 en unaddicted (a, wn) →  
 en unarmed (a, military) →  
 en unqualified (a, wn) →  
 en unspotted (a, wn) →  
 en unsullied (a, wn) →  
 en unused (a, wn) →  
 en water-washed (a, wn) →

## Synonyms

ar أَزَالَ (v, change) →  
 ar طَاهَرَ (a, wn) →  
 ar طَهَّرَ (v, contact) →  
 ar غَسَلَ (v, change) →  
 ar غَسَلَ (v, contact) →  
 ar نَطَفَتَ (v, change) →  
 ar نَطَفَتَ (v, contact) →  
 ar نَظِيفَ (a, wn) →  
 ar نَقَّى (v, change) →  
 ca desmantellar (v, contact) →  
 ca desmuntar (v, contact) →  
 ca desvestir (v, contact) →  
 ca espellofar (v, change) →  
 ca net (a, wn) →  
 ca netejar (v, change) →  
 ca netejar (v, contact) →  
 ca netejar-se (v, stative) →  
 ca purificat (a, religion) →  
 ca rentar (v, change) →  
 ca rentar (v, contact) →

## clean requires...

en get the cleaning supplies →  
 en get soap →  
 en get a broom →  
 en mop the floor →  
 en want to clean →  
 en absence of dirt →  
 en buy a mop →  
 en check what needs cleaning →  
 en dispose of all grime →  
 en do it →  
 en find an appropriate tool →  
 en find where the dirt is →  
 en gather cleaning supplies →  
 en get some bleach →  
 en get a bucket of water →  
 en get a cleaning cloth →  
 en get dirty →  
 en get out a bucket and mop →  
 en get out your cleaning supplies →

The below screenshots are generated by AskNature Website (The Biomimicry Institute, n.d.).

asknature
COLLECTIONS
BIOLOGICAL STRATEGIES
INNOVATIONS
FOR EDUCATORS
ABOUT
DONATE
SEARCH

SEARCH: clean tooth

BIOLOGICAL STRATEGIES 41
INNOVATIONS 35
COLLECTIONS 4
RESOURCES 4
?

BIOLOGICAL STRATEGIES
X CLEAR ALL

### Functions


Break Down 7	+
Break Down Non-living Materials 2	+
Get, Store, or Distribute Resources 11	+
Maintain Community 4	+
<b>Make 4</b>	<b>+</b>
Modify 6	+
Move or Stay Put 5	+
Process Information 5	+
Protect From Physical Harm 20	+

### Living Systems

Animals 34	+
Plants 5	+

## Biological Strategies


We've curated more than 1700 strategies of living things that can serve as inspiration for human innovation. Whatever challenge you're looking to address, nature can serve as your model, measure, and mentor.



**BIOLOGICAL STRATEGY**

**Feathered "Teeth" Filter Food**


Blue whale



**BIOLOGICAL STRATEGY**

**How Fungi Can Clean Up Pollution**


Fungi




**BIOLOGICAL STRATEGY**

**Microbes Strip Plant Fibers Clean**


Bacteria



**BIOLOGICAL STRATEGY**



**BIOLOGICAL STRATEGY**



**BIOLOGICAL STRATEGY**



## FUNCTIONS PERFORMED

## MORE FROM THIS LIVING SYSTEM

**Modify Chemical Potential**

Building a dam on a flowing river creates a difference in water level on either side of the dam. The difference in water level is called a potential because it takes advantage of the abiotic tendency of water to seek its own level. Once there is an opening in the dam, water will rush from the higher level to the lower level until they become equal. The flow of water can be used to do work, like turning a...

[SEE MORE OF THIS FUNCTION](#)

**Catalyze Chemical Breakdown**

Life depends upon the building up and breaking down of biological molecules. Catalysts, in the form of proteins or RNA, play an important role by dramatically increasing the rate of a chemical transformation—without being consumed in the reaction. The regulatory role that catalysts play in complex biochemical cascades is one reason so many simultaneous chemical transformations can...

[SEE MORE OF THIS FUNCTION](#)

**Detoxification/Purification of Air/Water/Waste**

Ecosystems must be effective at cleaning air, water, and waste because so much of what is in the air, water, and waste is valuable to organisms as resources. In contrast to functions that detoxify or purify at the organism level, this is at a larger scale. To be effective at the ecosystem level, it isn't the individual efforts of a few organisms that detoxifies and purifies, but the actions of a wide diversity...

[SEE MORE OF THIS FUNCTION](#)

**Chemically Break Down Polymers**

The vast majority of biochemical assembly and break down processes—even by the most complex

**own contaminants.**

another's treasure" could easily have been  
h form a kingdom all on their own, come in  
e-celled yeasts to massive, web-like  
l. They make their way through life by  
—horse manure, fallen leaves, dead  
e natural chemicals they contain into a  
emselves. Some fungi can use the same  
k down artificial chemicals with which we

ey use to break or make chemical bonds. By  
other in a position that encourages them to  
vners to transform one substance into  
provide structure, produce energy, and

other living (or formerly living) things, fungi  
mes they can use to break down a wide  
d molecules they need to live. Scientists  
pollutants from the environment have  
mes to degrade these undesirable

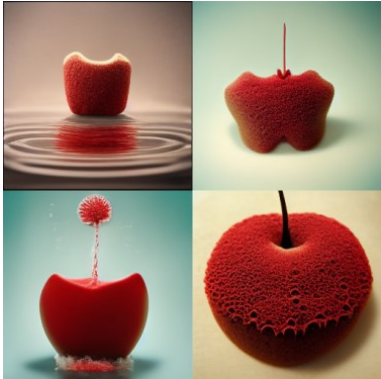


## 19. Text-image Generation Examples

a toothbrush in the shape of a woodpecker - @Natalie w (fast)



water flossing in the shape of an red apple sponge - @Natalie w (fast)



a transparent color schoolbag can transfer to a stylish coat with angel wing - @Natalie w (fast)

a toothbrush and toothpaste bottle in the shape of a woodpecker - @Natalie w (fast)



water flossing in the shape of a frog - @Natalie w (fast)



a transparent stylish coat and transparent cowboy's hat - @Natalie w (fast)

a toothbrush can change bristle length - @Natalie w (fast)



old school tooth brush with music - @Natalie w (fast)



dinosaurs shape balloon protect user from rain and wind - @Natalie w (100%) (fast)



a 3D crystal glass umbrella integrated with beer holder - @Natalie w (fast)



Ikea style lotus shape umbrella - @Natalie w (fast)



lotus shape huge umbrella in floral pattern - @Natalie w (fast)



dinosaurs-skin-style fit-size women's coat - @Natalie w (fast)



a raincoat in the shape of a cloud - @Natalie w (fast)



a fan mounted on human head - @Natalie w (fast)



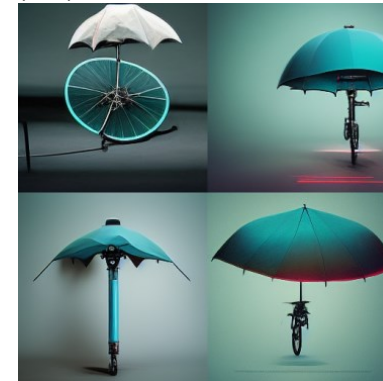
an umbrella in the shape of a drone - @Natalie w (fast)



a fan mounted on human head to protect from rain and wind - @Natalie w (fast)



an umbrella installed on a cool bike - @Natalie w (fast)



Not interesting (horrible) results  
a girl spray toothpowder into mouth - @Natalie w  
(fast)



a portable raincoat in the shape of Pill millipedes  
rolling their jointed skeletons into a ball - @Natalie  
w (fast)

