.track(ID): A Tool that Helps Students Track, Analyze, and Reflect on their Design Process

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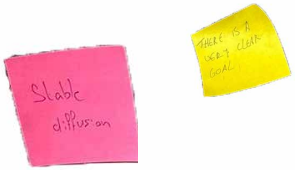
Abstract

For most Industrial Design students at the Technical University of Eindhoven, the end of a project looks the same: there is a lack of documentation of the performed work, making it hard to have a meaningful reflection on the design process. This report discusses the design of .track(ID) (pronounce: track it); an activity-tracking tool that provides live visualizations of the performed activities on a timeline, to support documentation and reflection. The burden of keeping track of activities is partially relieved by the application of artificial intelligent tools in the form of speech and image processing, combined with the GPT-3 large language model to generate activity logs. The design is the result of a process starting from an interest in designer-AI collaboration, which moved towards project tracking resulting from the hands-on data-guided approach. Testing of .track(ID) with students at the TU/e showed potential for further development of such a tool. Strengths, shortcomings, and further steps for possible application of the tool in the proposed context are discussed for future projects.

Introduction

Reflection is an important part of learning, but it plays an especially large role in Industrial Design (Hummels & Vinke, 2009). Although reflection is regarded as a continuous process, the educational setting focuses on reflection at the end of a project. Here, students often experience a lack of documentation to function as input.
.track(ID) is a tool developed within the Industrial Design department at the TU/e designed to enable students to track, analyze, and visualize their projects to gain more insight into their project activities. The first section of the tool is tracking a project. Users can use the tool to log their activities in a preset format. Proof of concept integration of Large Language Model ChatGPT allows some work to be taken over by AI (Introducing ChatGPT, n.d.). The tracking of data through the tool is done throughout the project and will form the dataset that the design is based on (including the visualizations shown in this report).
The second part consists of a data table, where the raw documented data can be assessed, altered, and filtered. This can be used as general project documentation, allowing the user to look up past activities and important moments.
The third part is where the user can extract the most value, as it allows the project data to be plotted on a timeline axis with different metrics and overlays. The user can look at the huge project in one overview, yet still dive into the details of each entry. The overall process can be assessed on for instance activity category, where the user can reflect on their goals, process, and effort during the project. This provides a starting point for reflective practice during and after the project and facilitates
the student with an objective view to reflect on.

This report shows the context, design process, design outcome, and evaluation of the proposed tracking and reflection tool. Possible future works are highlighted.



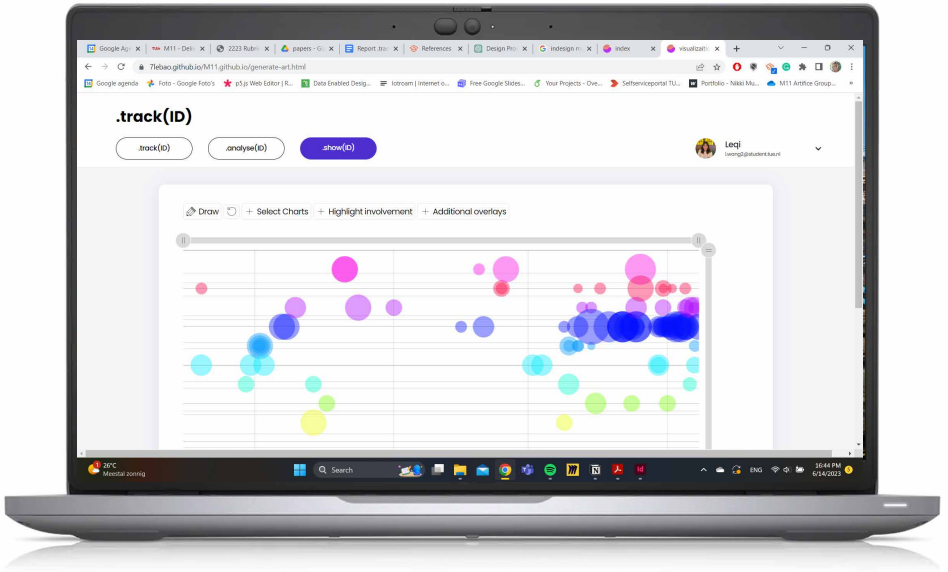


Figure 0.1, A laptop with .track(ID) running. Laptop image derived from:
https://teknoraks.com/products/dell-latitude-5420-laptop-14-fhd-intel-core-i5-16gb-ram-256gb-ssd-w11p

Related Works

Understanding the context - educational practices at TU/e

This project was developed in the Industrial Design (ID) department at Eindhoven University of Technology (TU/e). The department focuses on reflection as part of self-directed learning (Hummels & Vinke, 2009). Students are encouraged to work in a self-directed way, where they argue for their choices and learning goals. For example, students must write a Personal Development Plan (PDP) (TU/E, n.d.-a) for each semester and are assessed on their reflection on their learning activities at the end of the semester. The PDP contains students' long-term vision and competency desires and defines short-term goals that help them achieve this (TU/E, n.d.-b).

Hummels & Frens (2011) describe that the field of industrial design is changing due to, among other things, self-directed competency-centered learning. This is apparent at the TU/e, where education has shifted from the god-like (teacher knows best) teacher-student relationship to the new standard where the "novice designer learns to learn and teachers facilitate their learning" (Hummels & Frens, 2011).
The researchers propose the Reflective Transformative Design Process (RTDP) model that allows novice designers to learn and develop (Figure 1.1). The educational model of ID at the TU/e is based on this model (Figure 1.2) (Hummels & Vinke, 2009).

In Figure 1.2, seen is that reflective behavior is at the core of personal development (Hummels & Vinke, 2009). Schön (1983) describes how practical reflective behavior that happens in action, and reflections after the actions for better understanding, contribute to an expert's ability to implement expertise in situated cases (so-called, 'knowledge-in-action'). The RTDP model builds on Schön's work that illustrates reflective behavior is at the core of the design process.

Structured reflection

Structured reflection plays a large role in design processes, with it being regular and systemic. Conscious and systemic reflections allow designers to oversee and guide their design activities. This results in increased process effectiveness and efficiency (Reymen & Hammer, 2002).
Structured reflection within the design process was researched by Baumer et al. (2014) in a meta-analysis, where they conclude that reflective behavior is mostly seen as a tool, rather than a result. In the design process, reflection is unanimously seen as having a positive impact on the design process. In 15 of the papers, self-knowledge is described as a beneficial outcome of reflection. Here is a trend of data-driven introspection found, where collected data is presented back to the 'self.'

The documentation conflict

Reflection is enabled through documentation, as recalling previous tasks is essential for detailed reflections. Dalsgaard & Halskov (2012) describe why design documentation is valuable: well-documented Design Rationale improves the quality of the design process and the outcome.
In material-driven design, researchers have argued that the documentation itself can be valuable research output as well. Da Rocha et al. (2022a), describe how in craftsmanship the different directions explored are important pieces of information and part of the contribution, and that same format documentation can facilitate cross-pollination (Da Rocha et al., 2022b). The research of Rutten et al. (2022), also argues that documentation is part of the reflective practice.

Other experiments on documentation in the ID department at the TU/e include the 'library of skills' (Frens & Hummels, 2013), where students and professors could submit techniques and prototypes into a digital library. However, in reality, the project was abandoned after a year, due to the perceived unsuitable effort of documenting.

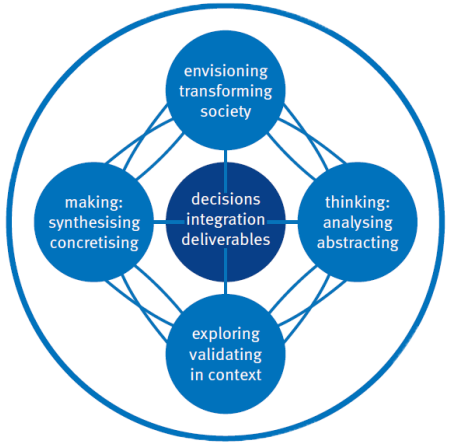


Figure 1.1, The RTDP framework (Hummels & Frens, 2011).

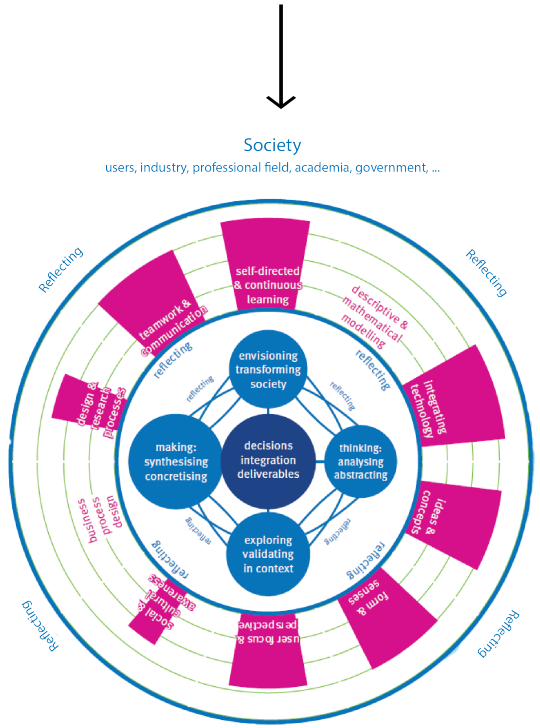


Figure 1.2, The RTDP framework as implemented in Industrial Design (Hummels & Vinke, 2009).

Rutten et al. (2022) continue to show the documentation struggles of designers: they conclude that consistent documentation is difficult and time-consuming and that existing tools do not necessarily fit the design process.
They also showcase how design documentation supports traceability and how it can build a reflective practice on design methods, in which they advocate for physical tools. This is also supported by the work of Da Rocha et al. (2022b).

Documentation & Reflection

Various researchers have attempted to combine the knowledge of reflection and documentation. For example, Dalsgaard & Halskov (2012), developed a documentation tool with the purpose of prompting reflection. Documentation challenges these researchers identified are that (1) the documentation and reflective process is time-consuming, and that, therefore, the benefits should exceed the input, (2) it is difficult to identify what to document and with what level of detail, and (3) the tool should be flexible and open (allowing for different types of entries), yet very low-effort and fast. The tool they designed proved to have multiple benefits: it stimulates sharing the reflection insights on the process between the involved, and it allows for a starting point to reflect on the balance between design and research.

In the setting of the TU/e ID department, Lévy et al. (2011) have worked on a tool that documents and visualizes the student's design process, to help students reflect: Luciole. Furthermore, the visualization tool aims to stimulate and improve communications about the design process with, for example, experts or student coaches.

The opportunities of AI

With the introduction of ChatGPT, large language models (LLMs) are now usable by AI novices. Specific use cases of the LLMs are generating, summarizing, rewriting, extracting, searching (similarity), clustering, and classifying (Amer, 2022).

Kascneci et al. (2023) illustrate opportunities for applications of LLMs, specifically ChatGPT, in the educational setting. They explain that for university students, the models allow for understanding and processing pieces of text, but also go deeper by providing sources and hinting at unexplored items.
Furthermore, LLMs have proven to increase curiosity in students' researching behavior, stimulate asking deeper questions, and can deeply understand and thoroughly process texts (Kasneci et al., 2023).

As the first implementation within documentation practices, ChatGPT has proven to relieve coders of their documentation tasks (Odendahl, 2023). Odendahl describes the LLM most often outperforms his own abilities and decreases time spent significantly. He describes that LLMs will change the role of coders in the future, such that "Code reviewing is the new programming" (Odendahl, 2023). It is no question that LLMs are also able to impact the documentation process of designers.

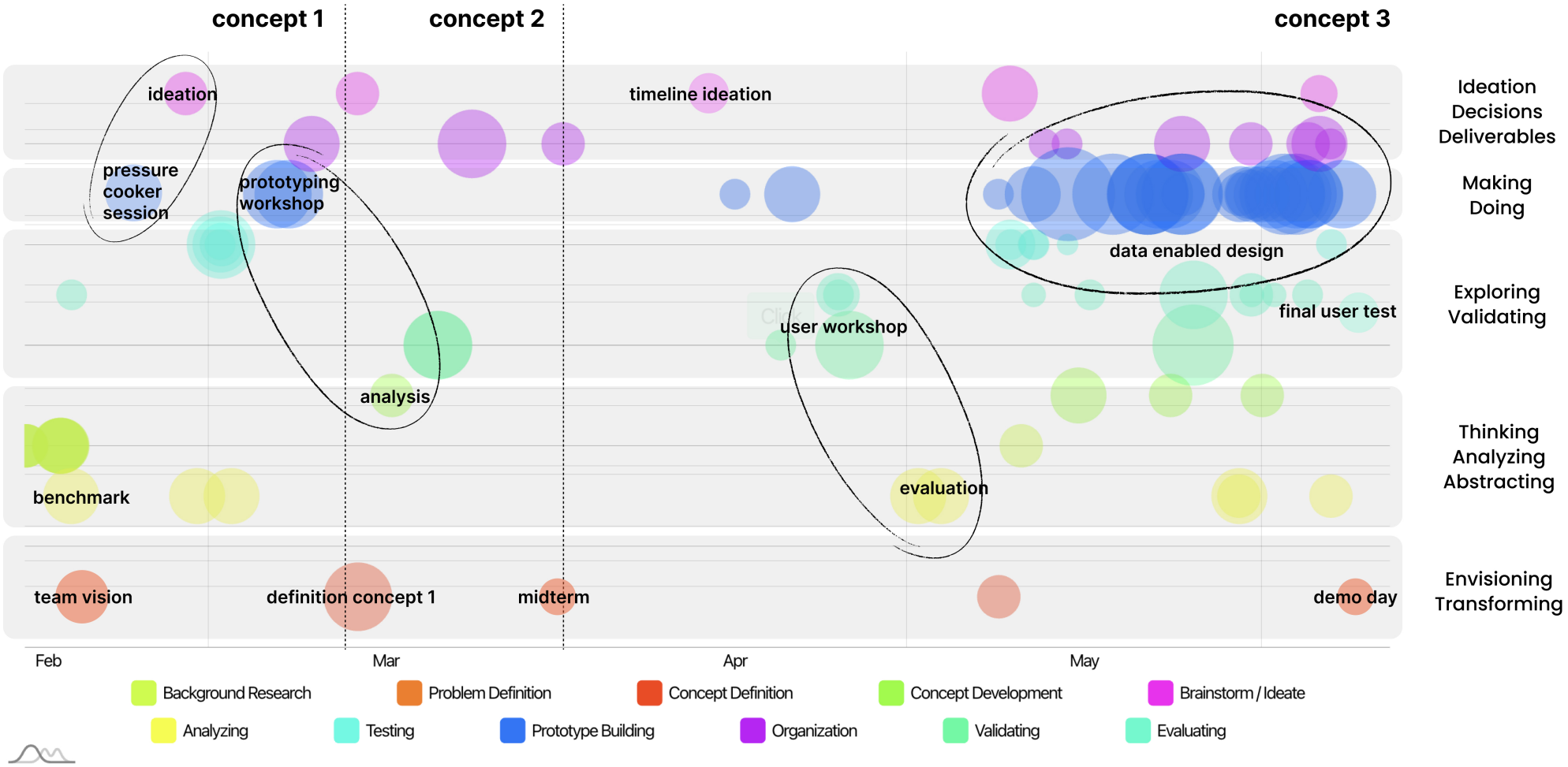


Figure 2.1, Overview of the significant activities within the design process.

Design Approach

The design approach was based on the Reflective Transformative Design Process (RTDP) (Hummels & Frens, 2009). A succession of various phases of the RTDP model has been performed, as shown in Figure 2.1. Within the course of the process, three concepts have been defined. The first concept focussed on background research and vision forming. Which informed later iterations. The second concept focussed on further developing the vision, design scope, and design through a hands-on approach aimed to gain a first-person perspective on the design challenge. The process for the final design focussed on a combination of user testing and prototyping.

Concept 1: AI for prototyping

As shown in Figure 2.1 the first concept was started by vision making and background analysis. The background analysis was performed by constructing a benchmark containing 40 examples of applications that use some form of Artificial Intelligence (AI). These were analyzed by affinity diagramming (Sharp et al., 2019), where the examples were grouped based on their usage goal (see Figure 2.2). This resulted in 7 possible AI applications:

- broaden views;
- focus views;
- inspire;
- critique;
- evaluate;
- gather knowledge;
- bring skill.

From the defined possibilities, the option to let AI help as a team member to bring extra skills in the prototyping was selected for further exploration. This was done with a rapid prototyping session, where four models of a computer mouse were made. Computer mouses were selected as it is a relatively organic shape that is challenging to recreate. Different materials were selected to explore the strengths and weaknesses of various prototyping techniques (Figure 2.3). The resulting concept was a "Fidelity machine" which would scan/digitalize and suggest changes to increase the fidelity of quick prototypes.

Figure 2.3, Four mouse models. One of styrodur foam, one of papier mache, one of foamboard, and of clay.

Figure 2.2, Benchmark cards after affinity diagramming.

Concept 2: timeline of activities

To evaluate the first concept, three design challenges of 20 minutes were executed by the team, with one observer and 3 participants. Two of the challenges were performed with the three designers in a group, and one with all designers working individually. Cards from the "Don't/Do This Game" by Donald Roos (2018) were used to construct a challenge with restrictions. After each session, a small evaluation/ reflection was done.

Although the questions defined before the start of the prototyping were "At what places can AI help in the prototyping process and how does the process itself change as a result?" the outcomes showed that the main trouble for the designers was not prototyping. The designers did not mind the prototypes looking rough and unfinished in the pressure-cooker challenges. They had more trouble managing their time.

This insight formed the input for a prototyping workshop provided by Luke Noothout. The team chose to prototype possible forms for a system that helps in the planning and time distribution of a design project. In two cases the results were physicalizations of a project process, the created models are shown in Figure 2.4.

These two sessions shifted the focus of the project toward project management. The final constructed concept aimed to create a timeline for projects based on the team's Miro board, where the timeline showed a connection between various ideas and the outcomes of the project with the use of a knowledge graph. That way teams could track activities in a specific period and also see if various ideas were part of the final concepts and reflect on why a certain branch of ideas was discontinued. Figure 2.5 shows the graphs that resulted from this concept (the explorations of and larger pictures of the graphs are shown in Appendix A).

Concept 3: Final concept

The final concept started with an evaluation of Concept 2. With a workshop, data was gathered to inform the design process. This was followed by a continuous ideation and prototyping phase.

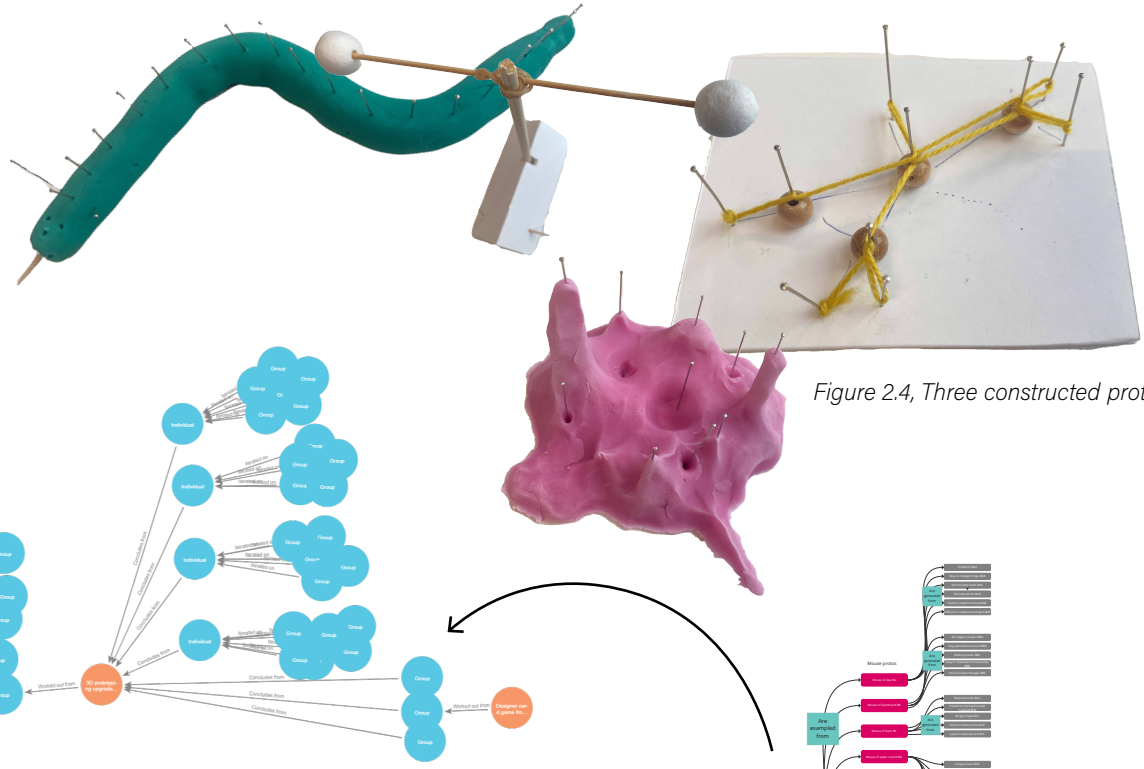


Figure 2.4, Three constructed prototypes.

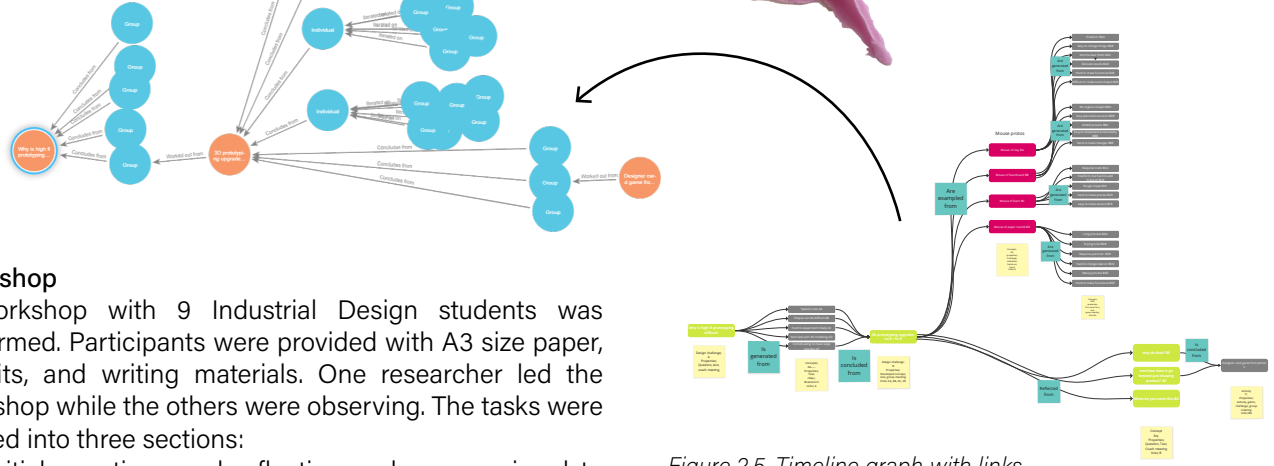


Figure 2.5, Timeline graph with links between subjects, right the miro concept, and left the Neo4j example developed.

Workshop

A workshop with 9 Industrial Design students was performed. Participants were provided with A3 size paper, post-its, and writing materials. One researcher led the workshop while the others were observing. The tasks were divided into three sections:

- initial questions and reflections, where we aimed to identify methods design students used to document and reflect
- timeline construction and reflection, where we asked participants to make a timeline of their project
- group discussion, where we identified potential for the proposed project tracking tool

The full workshop protocol, including ERB and participant informed consent forms, can be found in Appendix B. The data gathered in the workshop was analyzed with the use of analytic induction (Allard & Anderson, 2005; Fontana, 2015; Katz, 2001) as to create a theory to fit the outcomes to inform the further design process.

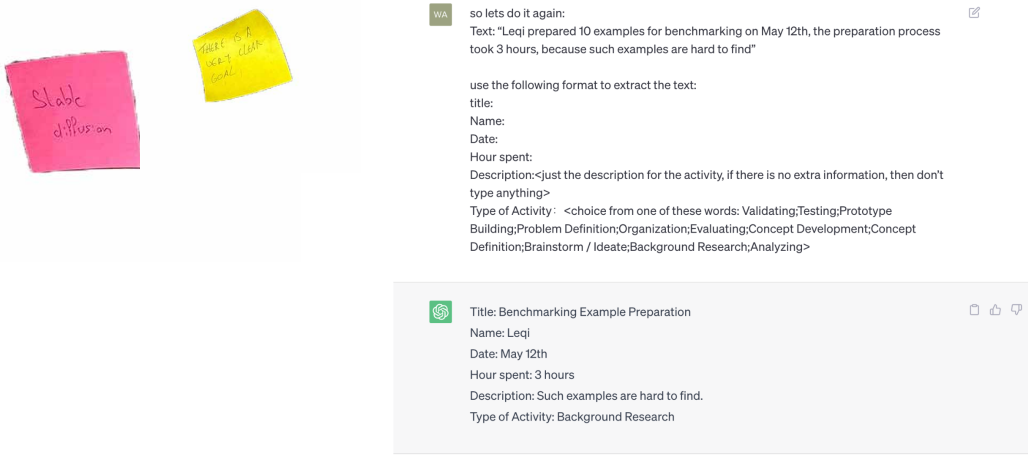


Figure 2.6, ChatGPT formatting text.

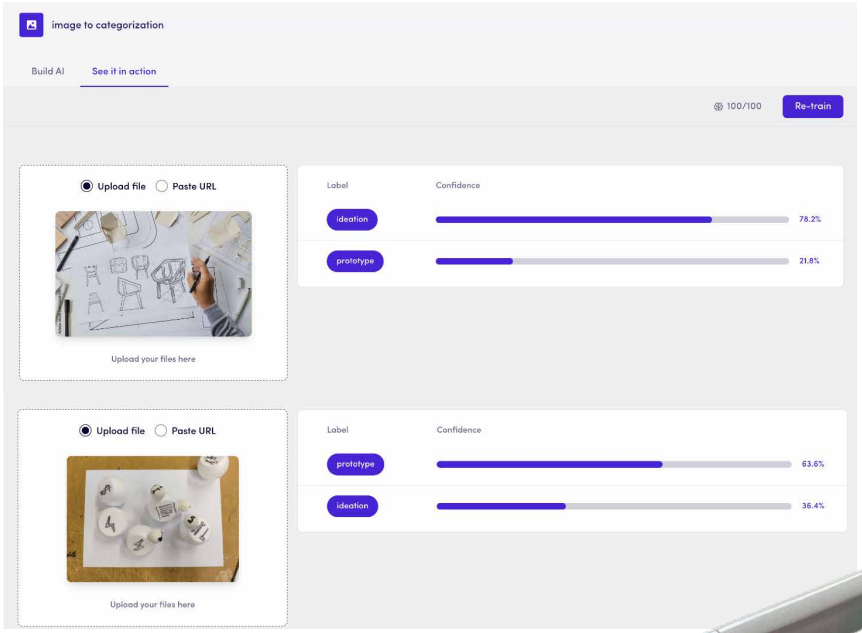


Figure 2.7, Levity.ai analyzing picture data.

The workshop showed that designers currently face a lack of oversight on performed activities. Although none of the participants could remember all project activities without documentation, only some had the means to quickly look up what they did. Initial reflections were mostly constructed using highlights and regrets of the project, but lacked deeper learning and a connection to future learning, with a strong focus on negative aspects. After making a timeline the reflections showed a more nuanced view of the project, as the full overview placed the emotions of single activities in the background. Making timelines in itself seems to be a reflective practice. The lack of documentation and the positive reactions of the participants on the creation of timelines showed potential for the concept.

AI experiments

The workshop showed the difficulty designers experience in tracking their activities which was supported by the research outlined in the related works. To decrease the burden of documentation three possibilities for the application of AI within the data-gathering were explored.

Input through natural text has been explored with the use of a Large Language Model (LLM) namely ChatGPT (Introducing ChatGPT, n.d.). First, ChatGPT is provided with a table that contains some initial data, to learn the data format. Then, after providing a text, a prompt was made to generate the formatted text (Figure 2.6).

Sound was explored by using Google text-to-speech API (Google, n.d.) to transform the sound into text, after which the natural language process is repeated.

For the image part, Levity was used to train the model by providing 20 pictures of prototyping and ideation as test sets. After the training is done, the accuracy was tested (Figure 2.7) (Levity, n.d.). Tests have also been performed with the YOLOv5 (Jocher, 2023) object recognition API to determine what was on a picture. The end result of all the experiments is a pre-filled card that the user can finish for submission (figure 4.2). Further explorations with the use of the GPT-3 API (OpenAI, n.d.) in Python have also been made with the help of ChatGPT (See ChatGPT thread in Appendix C).

Data-enabled design

In the final iteration a data-enabled design (DED) approach was used (Van Kollenburg & Bogers, 2019). The data-enabled design process emphasizes designing with real-time data, in which the data collection and design intervention are in a constant and simultaneous loop.
For .track(ID) this design methodology was implemented as the first data-collection probe. A simple web-based data tracker was made using P5.js and DataFoundry (Goudswaard, 2023; p5.js, n.d.; DataFoundry, n.d.; Funk et al., 2019). Several design students were invited to log their project activities. We also participated in the logging of our activities, to provide a dataset that could be used to prototype. The tracker also allowed us to stay in contact with the design context through real-time datasets. The logging consisted of filling out an activity card (Figure 2.8). They were free to choose when and what they logged. Intermediate evaluation was done, to ensure fitting context and to show intermediary graph results. These were then used to inform the iterative ideation and prototyping process. Figure 2.9 shows some of the explorations and prototypes made in this stage of the project.

Final user test

The gathered data, together with explorations of how to fill out the activity cards with the use of speech and pictures have been used to construct the final prototype.

The participants that logged activities received their personal visualizations, after which a semi-structured interview was performed. The goal of the user evaluation was to identify the strong points and weaknesses of the final design, and how the tool contributed to the participant's reflections. There was a particular focus on the evaluation of the visualization. The ERB form and participant informed consent form can be found in appendix D.
A second final evaluation was performed on demo day (TU/E, n.d.-c), where 20 designers were asked about their main highlights and regret of their project. Afterward, we analyzed whether in theory these "events" could be highlighted with .track(ID) and how this would be visible. This helped to define the added value the system could have for designers, as well as the limitations of its capabilities.

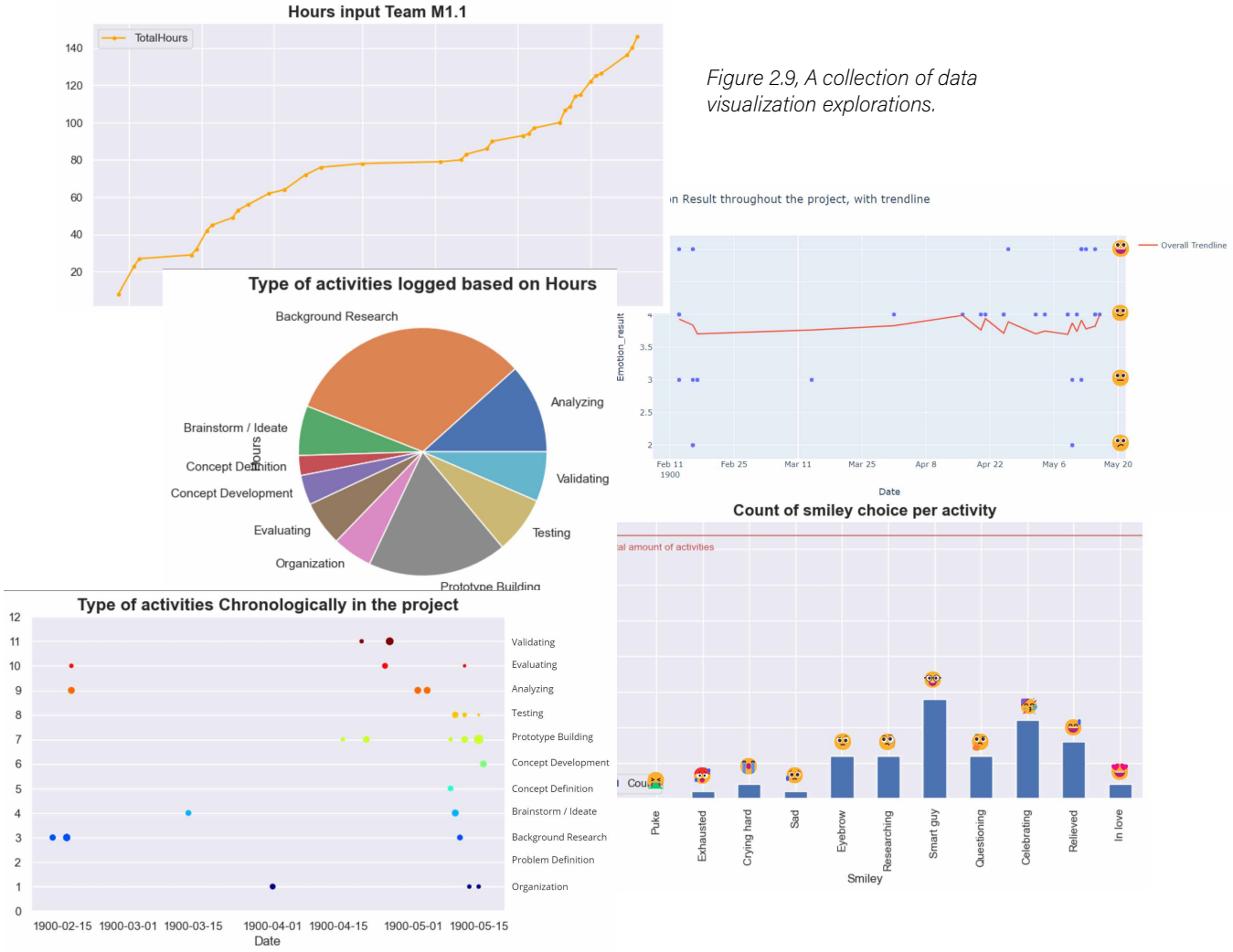


Figure 2.9, A collection of data visualization explorations.

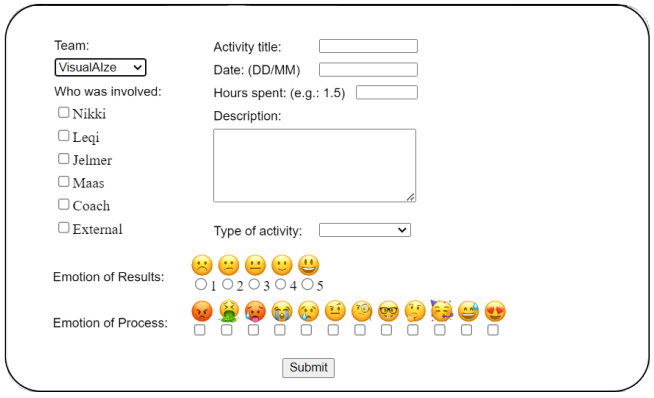


Figure 2.8, The activity card used for logging projects.

Results

Value proposition

The final design is called ".track(ID)", which is a web-based tool that helps document your design project activities and allows you to use this data for deeper insights. The target group of the product is the students of the industrial design department at the University of Technology Eindhoven. The mission is to help track, analyze, and reflect on project experiences, resulting in improved project outcomes and personal growth as designers.
The tool is accessible at https://7lebao.github.io/M11.github.io/index.

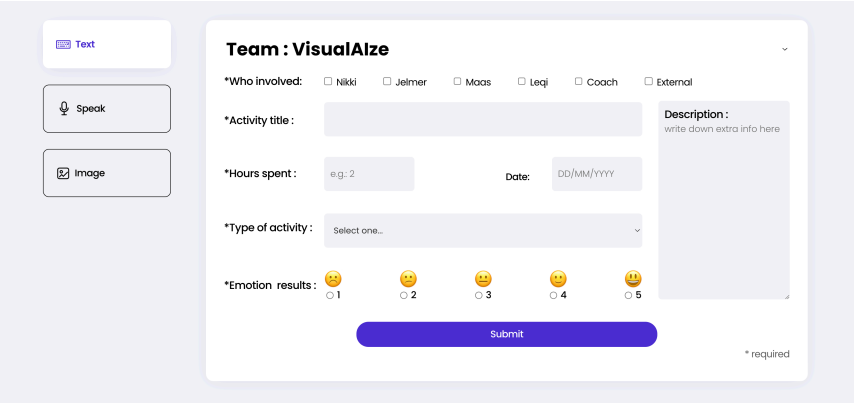


Figure 4.1, Interface of .track(ID).

Documentation of activities

This tool provides users with activity logging cards. The cards contain(Figure 4.1): who is involved, activity title, hours spent, date, type of activity, emotional result, and the extra description. Among the types of activities, there are 11 options: validating, testing, prototype building, problem definition, organization, evaluating, concept development, concept definition, brainstorming/ideating, background research, and analyzing. These types are based partly on the workshop's outcomes and partly come from our own experience. Regarding the emotional results, a 1-5 Likert scale combined with emojis is used to describe emotional result from sad to happy.

To alleviate the burden of documentation, a LLM is combined with the Google speech-to-text API and levity.ai for images. These are used to analyze and categorize already existing project documentation. The functions allow for sound and image to be analyzed into formatted entries (Figure 4.2), after which you are able to read, assess, and change your entries. A proof of concept implementation is integrated, where users can upload sound (Figure 4.3) and pictures (Figure 4.4) entries, where multiple AI algorithms analyze and pre-fill the cards for the user as described in the methods section (Figure 4.2). The logging options offer flexibility for users to adapt .track(ID) into their existing documentation habits.

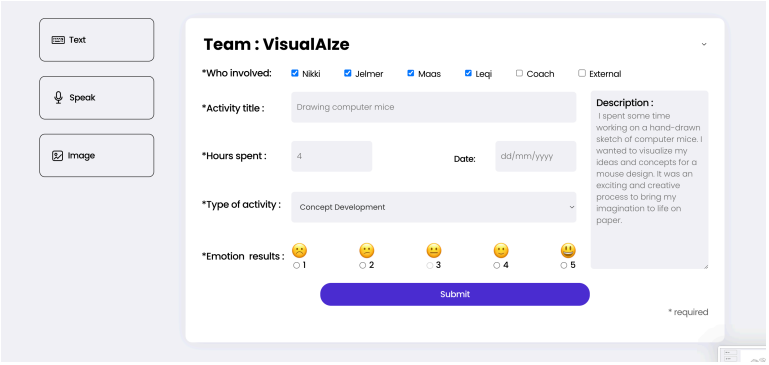


Figure 4.2, A pre-filled card by either speech or photo analyzation.

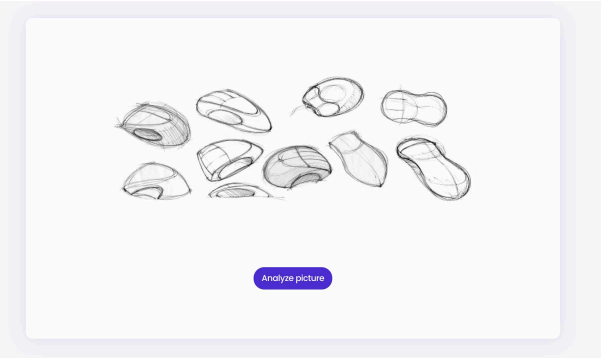


Figure 4.4, Interface of analysing the uploaded picture.

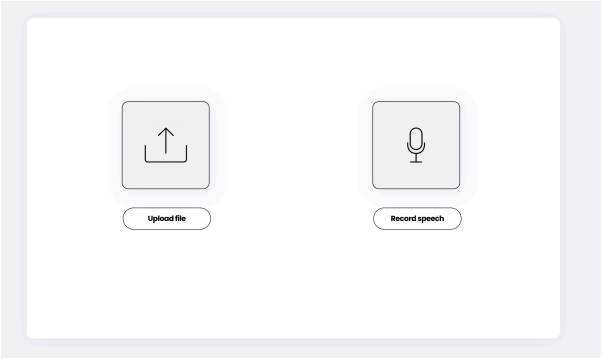


Figure 4.3, Interface of the .track(ID) audio integration.

Empowering reflection in-process and after

.analyse(ID)

After logging, the entries are displayed on the .analyse(ID) tab (Figure 4.5). Handsontable API (n.d.) was used to build the interface. It enables users to review all the submitted data and change any incorrect entries. The interface also allows for filtering the data before it is visualized. This can be done by category, timeframe, but also keywords in the description (actually on all columns), which makes the whole database more accessible and dissectable. The .analyse(ID) interface is a coupling layer from the raw data to the visualized data.

Select and filter the data for use .show(ID)!

Date	Title	Description	Type	Hours	Nikki	Leqi	Jelmer	Maas	Coach	Extern	Emotion
2023-06-08 00:00:00	Making the people involved	I finally fixed the highlighting of people involved	Prototype Building	4.0	0	0	0	4	0	0	5.0
2023-06-07 03:00:00	participant websites	Fixing up all the participants websites	Testing	1.0	0	0	0	4	0	0	5.0
2023-06-07 02:00:00	Demoday video	I shot and edited the video. Was much quicker than I expected, as all the filming was on my laptop and the editing was super easy! I am very happy with the result.	Organization	3.0	1	0	0	0	0	0	5.0
2023-06-07 00:00:00	Writing abstract	Writing the abstract pitch for the demoday website	Organization	1.0	0	0	0	4	0	0	5.0
2023-06-06 01:00:00	Video setup	Working on the story of the video and testing out some visuals; making sure I have a good template for the laptop and tested the video recording.	Organization	3.0	1	0	0	0	0	0	4.0
2023-06-05 03:00:00	Getting allignment between table and graph	Working on making a streamlined flow between the jsontable and amcharts	Prototype Building	4.0	0	0	0	0	0	0	5.0
2023-06-05 02:00:00	Working on the table	Figuring out how to transfer the data from one page of the HTML to another (to use in the visualization page)	Prototype Building	4.0	1	0	0	0	0	0	4.0
2023-06-04 02:00:00	Working on the table	Working out the Handsontable and imputting our CSV there	Prototype Building	4.0	1	0	0	0	0	0	5.0
2023-06-04	Trying to work on	Trying to get the filtering to work but to no	Prototype	3.0	0	0	0	4	0	0	1.0

Figure 4.5, The .analyse(ID) table interface.

.show(ID)

With .show(ID) you can re-evaluate your activities, and objectively look at the process in retrospect. The visualization in the .show(ID) is built on the AMcharts library, and it contains three different charts: categories (Figure 4.6 a), emotion results (Figure 4.6 b), and hours (Figure 4.6 c). The bullets are clickable to show the entry details. There are also additional overlays like highlighting individual participation, and a cumulative sum of hours. The visualizations are where the data comes out textual format into a visual language, and can highlight different problems and opportunities for the user.

Figure 4.6, The three possible charts, with on the x-axis the time of the activity. From left to right: a, The categories chart with on the Y-axis the category. b, The emotion result chart with on the Y-axis the emotion result entry. c, The Hours chart with on the Y-axis the number of hours spent on the activity.

Annotation

As most participants of the workshop annotated their timelines a drawing and annotation tool, which allows doodling, annotating, and marking was incorporated (Figure 4.7). These playful features allow users to immerse themselves in visual diagrams and record their experiences, connections, and reflections on the design process. More so, it helps with highlighting and recording insights, as well as sharing these insights with others.

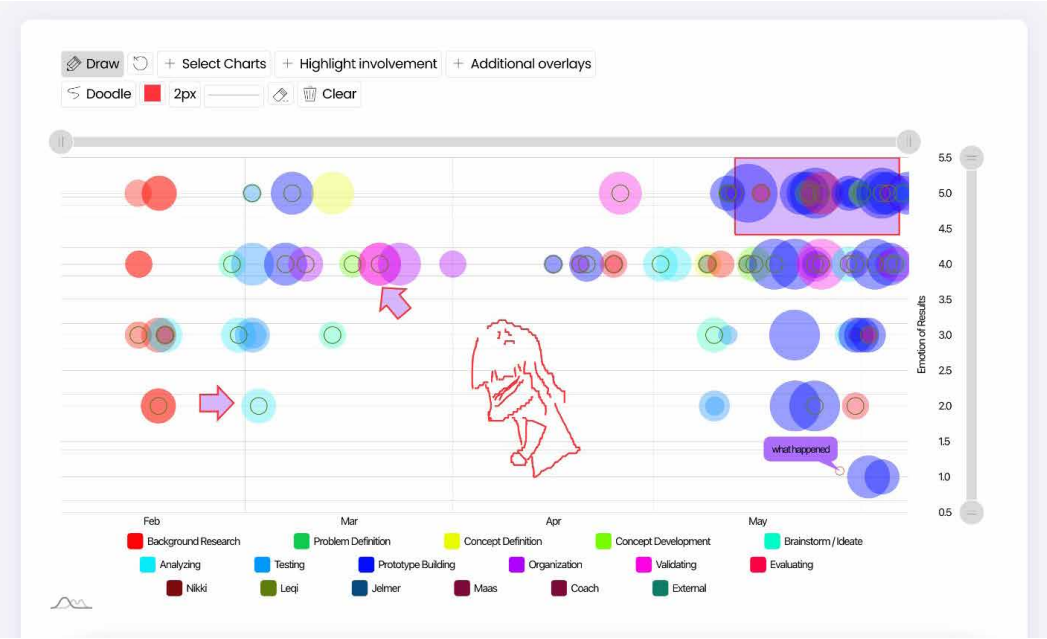


Figure 4.7, An annotated graph, highlighting the possibilities of the tool.

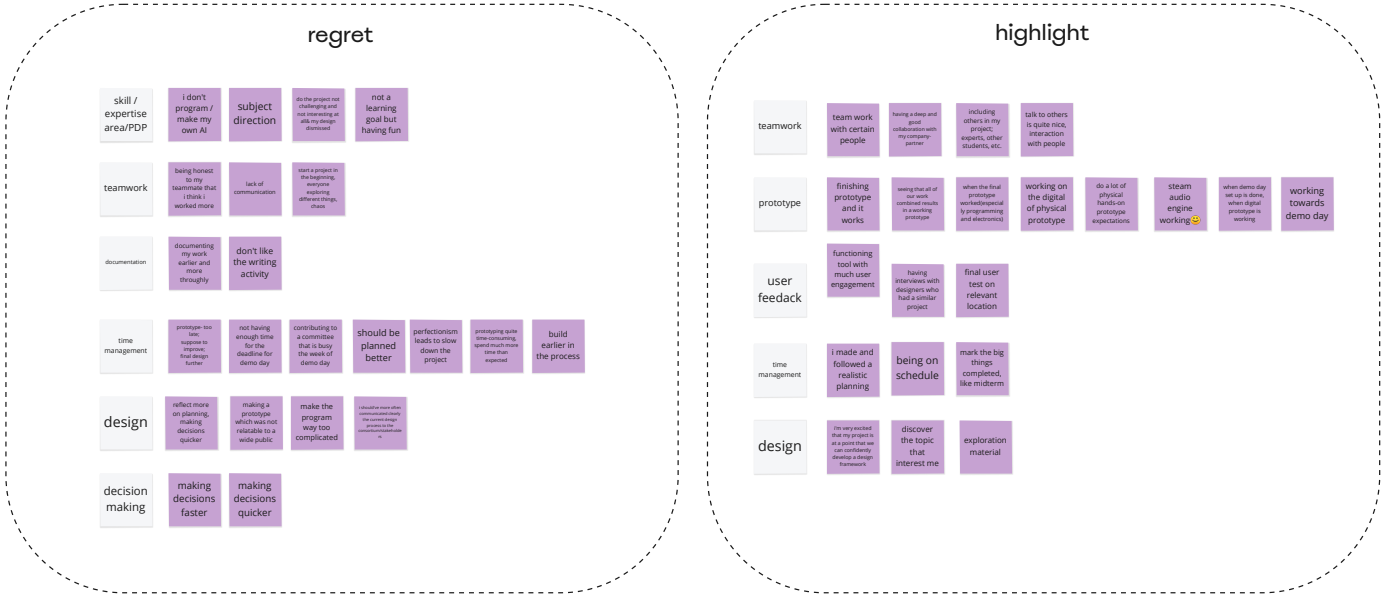


Figure 4.8, Collected highlights and regrets from 21 designers.

Deeper engagements

As described in the methods section we collected main highlights and regrets from designers (fig. 4.8). This data was analyzed and integrated into three use cases.

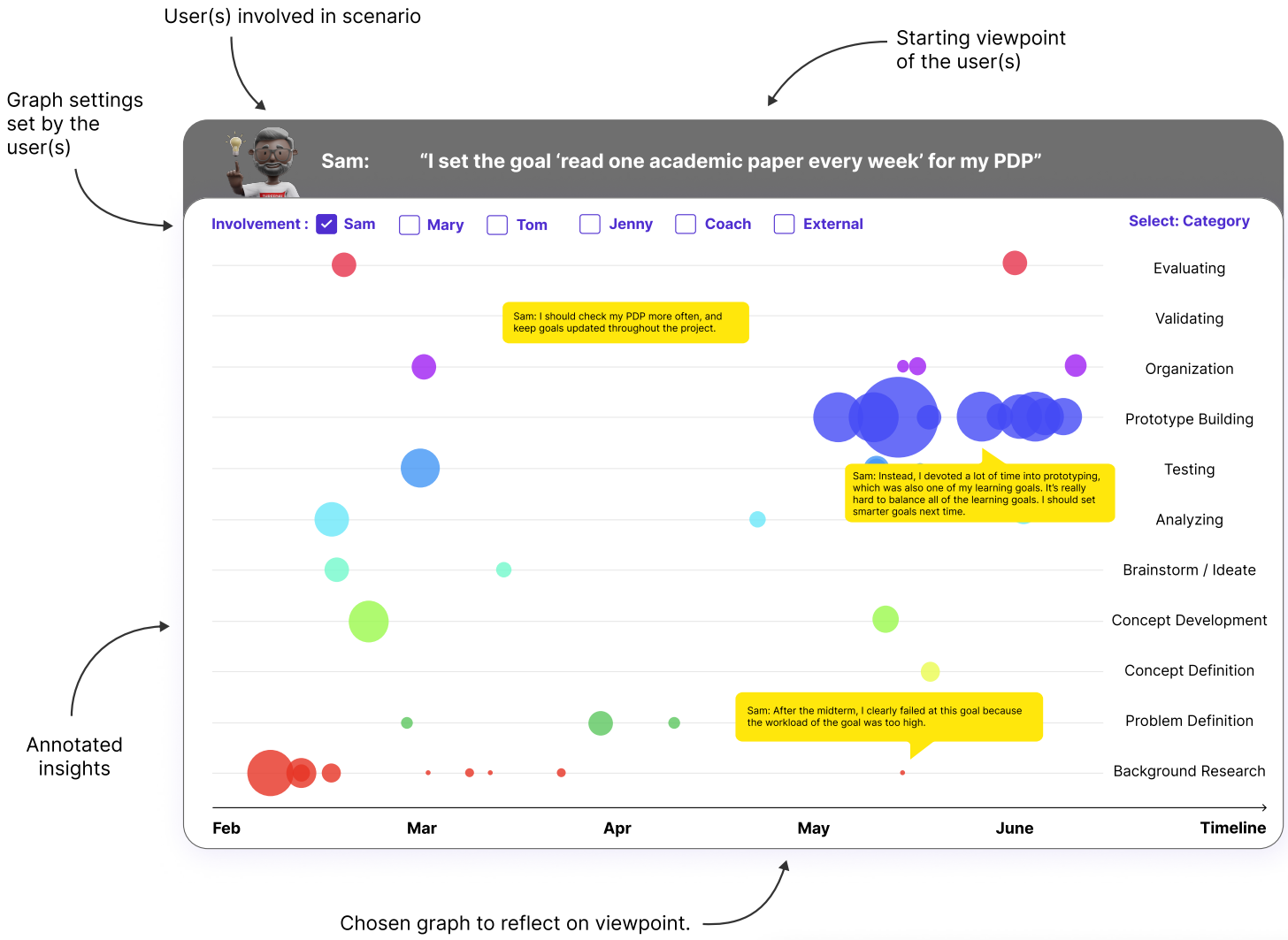


Figure 4.9, Use-case how specific goals can become visible in .show(ID).

First case: The visualization can show the fulfillment of specific goals. An example would be a goal to read 1 paper a week, the example (fig. 4.9) shows how this might look. It enables contextualization, going beyond a mere reminder of unmet reading goals. You can see that a lot of work instead was put into the prototyping. Facilitating reflection on activity choices, and perhaps smarter goal setting in the future.

VALUE PROPOSITION

- Accurately recalling events of your project - and being able to use your project documentation as support for your reflections.

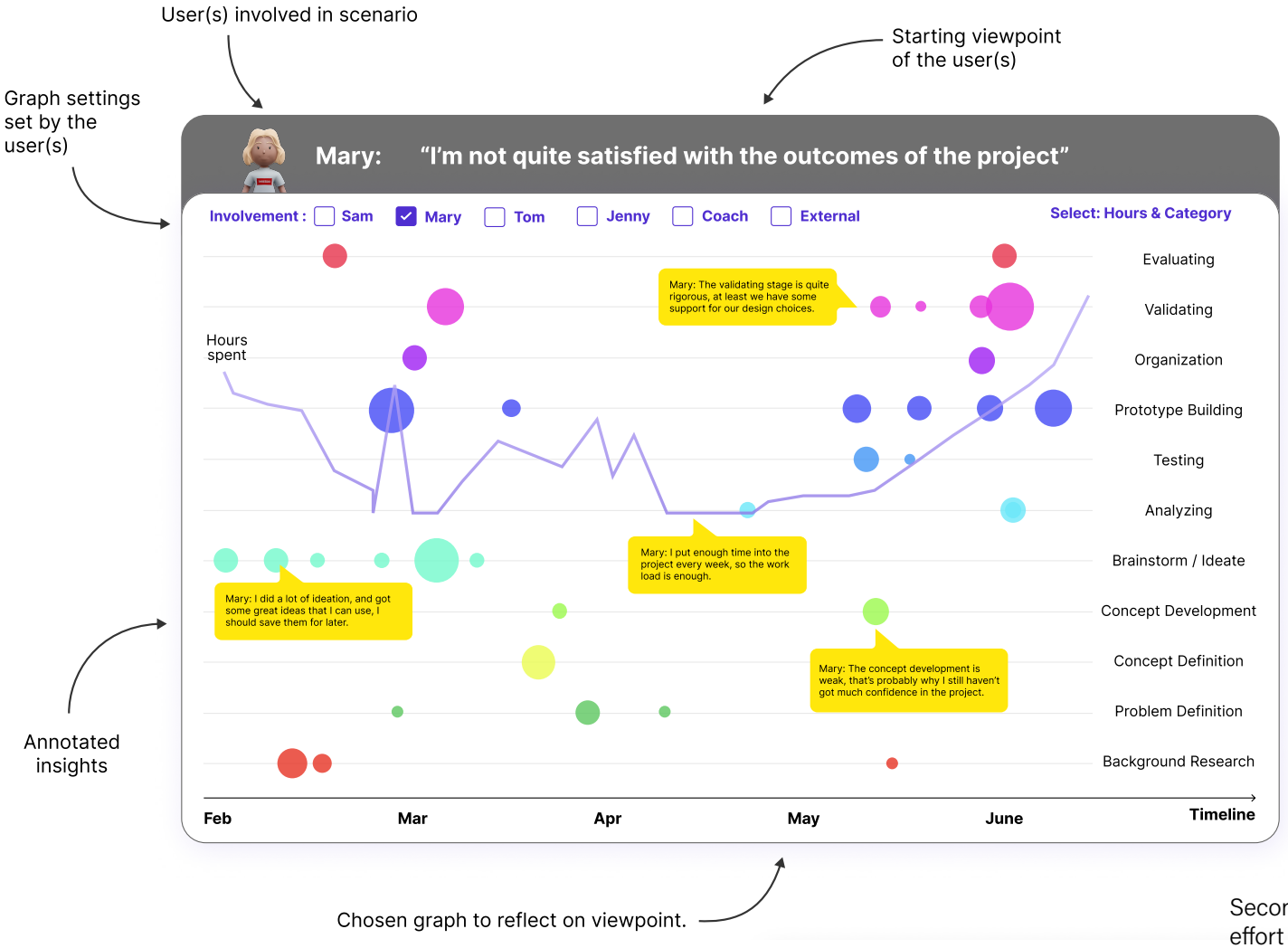


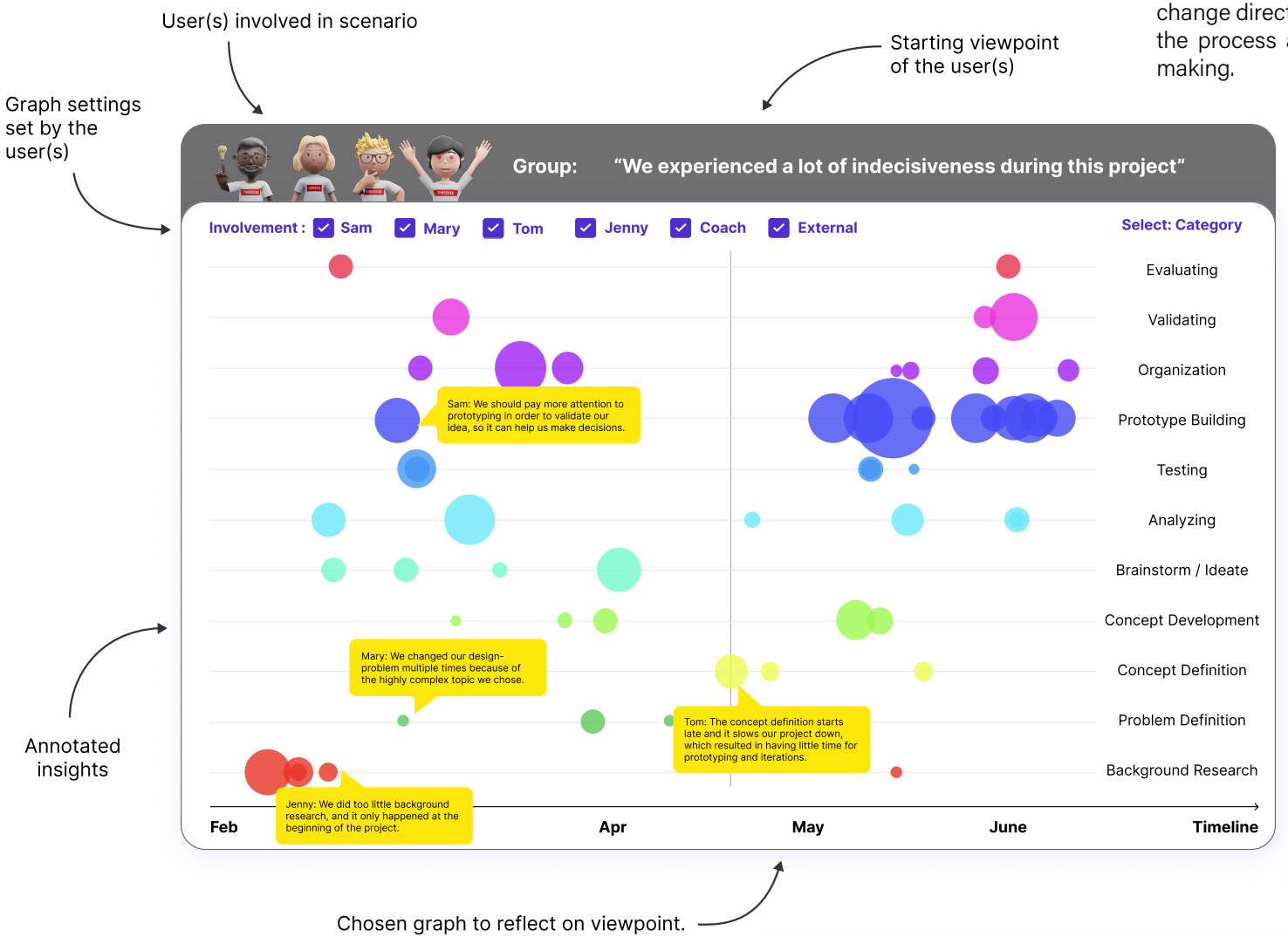
Figure 4.10, Use case showing how emotions can be analyzed and referred to in .show(ID).

VALUE PROPOSITION

- Having a more complete outlook on the project - and like that put thoughts into retrospect.

Second case: It provides a relatively objective view of the effort and quality of the project. The visualization can show the number of hours spent, and what kind of activities were done. Figure 4.10 shows a student is unsatisfied with the result of the project. And whilst this is an emotional feeling, the graph can help relativize the project for the user, like showing that a lot of hours were put into the project and that a lot of diverse activities were done. It however can also show that perhaps some activities were executed less frequently and might contribute to a more satisfactional result.

Third case: The tool can show the project process, to assist an individual or group in their process, by contextualizing certain project moments and related activities. Fig. 4.11 highlights the use case where a group encountered a lot of indecisiveness during their project. The graph can assist by showing where this moment occurred and potential reasons, such as inadequate prototyping at the start or a limited understanding of the design topic causing them to change direction multiple times. It assists in understanding the process and identifying factors influencing decision-making.



VALUE PROPOSITION

- Diving deep into your data to gain a deeper understanding of your insights, and find meaning in your project process.

Figure 4.11, Use case showing how the process can be dissected using .show(ID).

Final evaluation

After the midterm, we invited 8 ID projects to participate in our weekly data-gathering program. We conducted 4 interviews to gather students' opinions and insights on their individual visualizations.

.track(ID)

During the evaluation the participants rarely interacted with .analyse(ID), the overview was difficult and it was used for checking what the last entries logged were (fig. 4.13).

.analyze(ID)

During the evaluation the participants rarely interact with .analyse(ID), the overview was difficult and it was used for checking what the last entries logged were. (fig. 4.13)

	question	P1	P2	P3	P4
.track(ID):	When and how did you use the data-logger?	begining of morning, lunch spare time, at the end of the day,	usually after activity	Recap moments, group meetings When in the entire project pobably individually. Probably aslo every meeting	End of every day, really late, even in bed sometimes. Phone, quickly log, sometimes it is quick and some descriptions are quite long, multiple logs.
	How did you feel using the data-logger?	forget about the "speak and image"	struggle to fill in the card like the emoji, get familiar with yourself	pretty nice, Good to have oversight of the completed tasks. Pinpoint what the difficulties were is much easier	sometimes I forgot, so logged back a bit. Realising the value for yourself, finish your day planning etc. Fullfilment, Positive or negative
	Did you miss anything in the data-logger?	miss type of activity; missing report writing, demo day, atc.	missing types; combine multiple task in one card	Research project: categories are not really applicable for these projects. Maybe nice to choose a custom category. Description doesn't really encourage you to write down your learning goals, so maybe prompt questions.	No, but I had an interview earlyer that the difference between the emojis were a bit unclear, everyone has their own interpretion. Within a category you sometimes want an addition category, seperate coding and electronics and materials
			ups downs interesting design element		

Figure 4.12, Interview results from the final evaluation of .track(ID).

	question	P1	P2	P3	P4
.analyze(id)	How was it to interact with the table? How did you approach this?	names are wrong; scroll quickly, check by week,		The table is a bit much for an entire project, so a bit more visual would be nice. Didn't really interact with it.	Started with the order of categories, on date to have an overview, and horus. quite clear. Emotion result is in numbers, instead of the emojis hard to relate to again
	did you change data/ check validity of the data	too much data, hard to read		**Data wasn't checked, but maybe a possibility to make notes**	No, did not know it worked. Saw that you can filter.
			ups downs interesting design element		

Figure 4.13, Interview results from the final evaluation of .analyse(ID).

.show(ID)

Evaluating the three charts (fig. 4.14): the participants highlighted that the visualization is sufficient for data exploration and recall. However, some users would prefer a single graph instead of multiple options, and value additional overlays for more information.

The annotations got mixed responses. Some liked the playfulness and drawing aspects, one user was happy to write down keywords and big findings quickly. A downside was that the visual aspects would not update with chart changes. One user did not like it at all as it would “mess up” the chart.

	question	P1	P2	P3	P4
.show(id)	How did you start	select category	scrolling to see why its empty	It seems a bit weird if it is empty, so just clicking stuff until it appears	It was empty started to play around, saw draw and wanted to draw, but couldnt. First category, then try to figure out what is happening. Zooming in and out, valuable if you want certain timespan. Then highlighted coach, saw not too much coach involvement. Sum of hours was a bit unclear at the start. ANd then looking at other graphs, emotion still numbers.
	Were there problems when visualizing your data	coach and me same color; suffcient enough, combine the category with emotion with hours spent on	too much horizontal line on the graph; when click some information are too long; see emojis on the category bubble, and don't like the emotion of results chart;	The clicking isn't nice, you want to see the title instead of first having to click	Not possible filter within the graph (unclear is that the filtering etc. is in the analyse.Need to integrate the)
	Was it difficult to work with the data	click instantly and more easy;	prefer a combined one graph and can hide& show things sum of hour & its y axie	I don't think so, but for a year it is going to be harder to read	
	What graphs did you use?	hours by type of activity, user has a sketch; don't use" hour chart"	category:effort i put into; easily flash back the pasted activities	Also used it to already reflect, so then you would want to filter. Emotion would be most intersting, and hours the least interesting. Logged ours are not too interesting. Although hours might be interesting for people that do an internship.	All
	what do you think of the graph's design elements?	love transparent ball and its color; smooth animation; curisou about how would the yearly visualizaiton look like; emotion of result lay over on top of other graph; involvement circle should be more obvious;	like the big bubble represent hours spent; other element like the level of actively involved; if possible, put in my own reflection	It all looks very logical.Maybe the size is not too important. There is no clear defined axis. Will be messy for large projects	The design is quite clear, there is a lot of different categories, so there could be a lot more different colors. It is pretty clear. Transparency is nice. What do the lines on the background actually mean, the lines there.Coach and me colorwise are very similar.
	drawing function	may use it to take note, once is enough	like the comment one: put keywords etc.	Usefull for drawing relations, but it depends what category. Hours is logical to use drawing, but categories not	DIdn't use it, it only messed it up, just used for fun a bit. Maybe when there was more emotion I can draw own lines

ups downs interesting design element

Figure 4.14, Final evaluation results of .show(ID).

Content

When asked about the insights gained from the graph there were some interesting findings (fig. 4.15), with the emotion over time by P4 for instance. However, often noted was that the limited amount of data made it difficult to find interesting trends. Another user noted it was a miss that it was not clearly visible what was gained by doing the activity and not just what was done, which would contribute to the reflection.

	question	P1	P2	P3	P4
About the content	• What insights did you derive from the tool? • What surprised you? • What did you already know?	do a lot of organization-demo day and BR ; surprise about the big gap in type of activity	show activity orders, compressed timeline, wish to place the activity in timeline freely; main activity i did, point out the **learning point** etc.;	For the reflections I'd select the bad emotions and see if there are themes. Also use who is involved.	Tried to look at relations between emotion over time, mostly frustration with prototype, mostly the same subcategory of prototype building. Same struggle so I saw that. Didn;t have a lot of user involvement. or category of testing in terms of hours. Looked at ecternal involvement, and I believe I could've done better this project, so now its a few dots but That would've been better
	Did you learn anything that you will use in your reflection?	for now its too short, logical visualization	no, just the track tools, doesn't show what i learn from each activity;	Too little points to take it out of the current visualizatoin	Struggling with the mechanism I knew, But the low involvement was what I saw and thought about. little coach involvements also really saw. Per category testing low also clearly visible.
					● ups ● downs ● interesting ● design element

Figure 4.15, Interview results when asked about the content of the visualizations.

	question	P1	P2	P3	P4
Future	• Would you use a tool like this? • Why?	yes, but it hard to get into a habit, mostly use it for doing a project; not a website, but a computer function in the background	wish just generate the whole reflection and modify on it; similar tools never stick to it for a long time, concetration lose, suggest automaticly put data into tool; human working ways are differents because designer do so many things in their mind and cant really be represented by activities and hours; try	It would make the reflection process a lot easier, so would possibly use. But need to build a habit to be consistent. Would use it if it is easy to use on phone, Ipad or laptop (ideally all 3). So it can easily be tracked	Yes for sure, I think it maybe could really help if you have all the categories used, because now you have limited time. It is low threshold, but if you are doing other activities the logging will take longer, you want to have a detailed description, so then it will become more work.
	What do you think is most important for this?	nice output will attract people to use, but the difficult part is the continouse logging	category, hours, activity, learning points would be nice, a good way to writing reflection	Ease of use is most important for adoption. Be part of the full habit (reminders). Not opening an extra application.	Discovering things you are not directly aware about. Visualisations would also be important, you could get process overview. Or confirmation on what you did.
					● ups ● downs ● interesting ● design element

Figure 4.16, Participants' responses when asked if they would use .track(ID) in the future.

Future

When asked about using this tool in the future (fig. 4.16). Some noted they found the graph useful for doing the project, and it makes the reflection process easier. But they also express concerns about the difficulty of making logging into a habit. One participant had a different opinion and noted that designers do so many things in their mind, that are not easily represented by activity logs and hours.

Lastly, a nice visualization and the potential to discover new insights are the two most important elements that motivate the use of the tool.

Discussion

Limitations, assumptions and future work

.track(ID) is a prototype, there are assumptions that have not been tackled but should be considered in further development. These limitations will be discussed from three different fronts, .track(ID), .analyze(ID), and .show(ID). After which general implications of the system as a whole will be discussed.

.track(ID)

Documenting activities

To reflect on documentation challenges we interviewed Caroline Hummels. She highlighted that in their work, getting people to document was the biggest challenge. Within the transformative practices squad (OSIRIS Student Mobile, n.d.), they let students deliver tool-based diary entries as their design report, but even that was not enough motivation. In our user evaluation, we asked 8 project groups to track their project, 5 of which tracked less than 10 activities over 3 weeks, showing how little there was tracked.

Social influence

Caroline Hummels also highlighted the impact of social influence, where logging activities not only benefit the user but the ecosystem around it. In other systems, like open source projects, someone might not know if their work benefits another but still decides to document their work and share it on GitHub (GitHub, n.d.). An example is that one of the participants in our study put a reminder in their agenda: 'log activities for Maas.' This points directly to the social influence and motivation that should be further explored.

Curriculum integration

Going even further in the social influence in documentation, it would be possible to think about the integration of .track(ID) in the education curriculum. A course given to bachelor students is Professional Identity and Vision (TU/E, n.d.-b), where students must define goals and reflect on these. .track(ID) could be integrated to help students track their first project and use it to reflect in a structured, activity-based manner.

Templating and examples

Another potential motivator is templating. If logged and visualized projects are visible to others, they might inspire and guide further use, and function as a repository of skills alike the library of skills (Frens and Hummels, 2013).

Customizability

During the project we found that there are different data demands, dependent on the type of project, group or individual, application area, and personal preferences. It would be valuable to have a customizable and flexible .track(ID) interface, which can be adapted depending on the project's needs.

Artificial intelligence

We focused on collecting data from users, along with decreasing the burden of documentation. As described before, multiple AI agents were tested as a proof-of-concept implementation. This should be developed further before implementation, as prompts regularly had to be modified. It is clear that an AI trained in the classification of this kind of data would be way more valuable.

The collaboration between humans and AI in .track(ID) is of high importance, since if the data analyzed is not largely correct, corrections will have to be made. It is questionable if high accuracy is necessary. It would not matter if the hour estimate is off, or if the categorization is wrong in 10% of the cases, as this can even be difficult to estimate for humans

To reduce inaccuracies a confidence filter could be integrated, where you can sort the rows in .analyse(ID) based on the AI categorization confidence and check for false entries.

.analyse(ID)

User-friendliness

.analyze(ID) consists of a table with filtering functions as described before. However, the UI is not as inviting as we would like. We received feedback that simple actions like filtering and displaying are not trivial. We envisioned the interactions with .analyse(ID) as a reflective practice in itself. However, when functions are difficult to access this obstructs the gathering of insights. Thus, this interaction needs to be more designed, and documented.

Role of AI

In the .analyse(ID) tab we discussed a potential AI for synthesizing categories, generating multiple entries from one activity, or merging multiple activities into single entries (e.g. a weekly summary). These data aggregations would be very interesting to investigate in future work.

Accuracy here becomes more important, as the AI, in this case, is synthesizing new things beyond just categorization and extraction of information. Inaccuracies like faulty summaries, would be more problematic, as the number of entries would be lower.

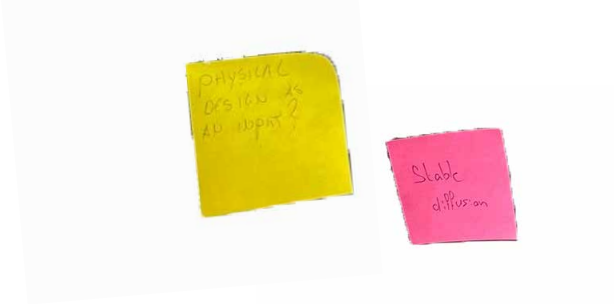
.show(ID)

Extracting insight

Generating insight from the graphs was one of the main challenges of the project. We doubted between providing a fully made informative visual or an interactive explorative graph.
We made the choices in the design based on our own project log of a couple of weeks and during the development got more and more data to work with, meaning the graph requirements changed over time.
It would be important to track some complete design projects to explore the demands of the graphs further.

Design of the UI

In .show(ID) choices were made where the complexity of graphing took high importance compared to the ease of use. We designed it this way to force users to dive into their data before they could see the graph. This is based on the insight that timeline creation is a reflective practice, which refrained us from taking over the full process.
Reducing this barrier of investment in the tool might encourage easier explorations. We propose a modular approach to graphing, where the interface changes on what complexity the users wishes to see. This way novice users are supported better, but the experienced user can still explore all parts of the documentation data.



Role of the AI

Two potential roles of AI not implemented in the design are: AI visualizing the data, or AI highlighting the potential interesting areas to look at.
After some explorations, like beautiful.ai (Beautiful.ai, n.d.) the decision was made not to incorporate visualizing ai, as the AI tools did not provide in-depth information. The "objective" data would not be translated well in a visual way, making it hard to get concrete reflection pointers.
AI highlighting was also not implemented. We want to entice users to interact and find these areas themselves. It would be possible for an algorithm to look at a full dataset and find interesting areas: combinations or pivot points in content, process, or activities. Based on those areas the AI could prompt questions to reflect on. Since the choice was made not to incorporate it, it remains unclear what the influence of such a suggestive AI would be on the reflection process of users.

Doing as reflective practice

Something we touched on is what the tool should do and how much the user should do. In our study, we found that the making of the timeline enables reflection in itself. However, with .track(ID) the user is not involved in the making of the timeline. While this increases accuracy and exploration, it removes the making and reflective properties of such activity.
Choices in interaction were made to attempt to facilitate this timeline-making in the best way, like not just presenting the graph but having to look at the data and then decide what axis to use. In hindsight, it is up for discussion if these activities actually generate this specific reflective thinking. And how this could be facilitated even better. Further research to evaluate this would be needed.

Unintended Outcomes and Privacy

In our tool, we refrained from direct comparisons between team members in hours or activity counts. However, an unintended outcome is that our tool could be used to count individual activity contributions. The system could, therefore, still allow comparisons about the amount of work between team members to be made. In the end, the system has been designed specifically to support reflection, rather than being just a tracking tool, but it still has the potential to be used in that way.

Conclusion

.track(ID) is a documentation tool that provides an easy, all-in platform to document, analyze, and reflect on the design project process. The tool consists of three parts, .track(ID), .analyse(ID), and .show(ID). These parts were developed using a DED approach, where simultaneously data was collected through a digital documentation card, and the visualizing aspect was iterated on with the collected data.
The tool has been deployed on 4 design projects and iteratively evaluated and improved on over the course of 4 weeks. After the final evaluation, the tool has been found to provide an objective view into the process and allows for insights like reflecting on activities, contextualizing events, and exploring opportunities within the process.
Next to that, a prototype was constructed which consisted of the full design system in one website. With proof of concept AI integration into the documentation process, the coupling layer as an interactive table, and finally the visualization tab with interactive charts of the project data.

.track(ID) provides an objective look into a difficult process, although some aspects, such as the difficulty to get people to log their activity, should be investigated and designed further.

:e is available at: https://7lebao.github.io/M11.github.io/index.

Acknowledgements

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Further, we would like to thank all our participants that participated in the long evaluation, for the invested time in tracking, and the interviews. As well as the participants in the workshop.

We would also like to acknowledge thanks to Amcharts, Handsontable, Chatgpt, and Google for their open-source APIs and libraries for application in .track(ID).

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Appendices | Table of Content

Appendix A | Exploration of project timelines

As part of the second concept, the team explored various possible timelines that could be made for projects. They especially focussed on what they could show in various graphs. This document shows pictures of the graphs that were explored.

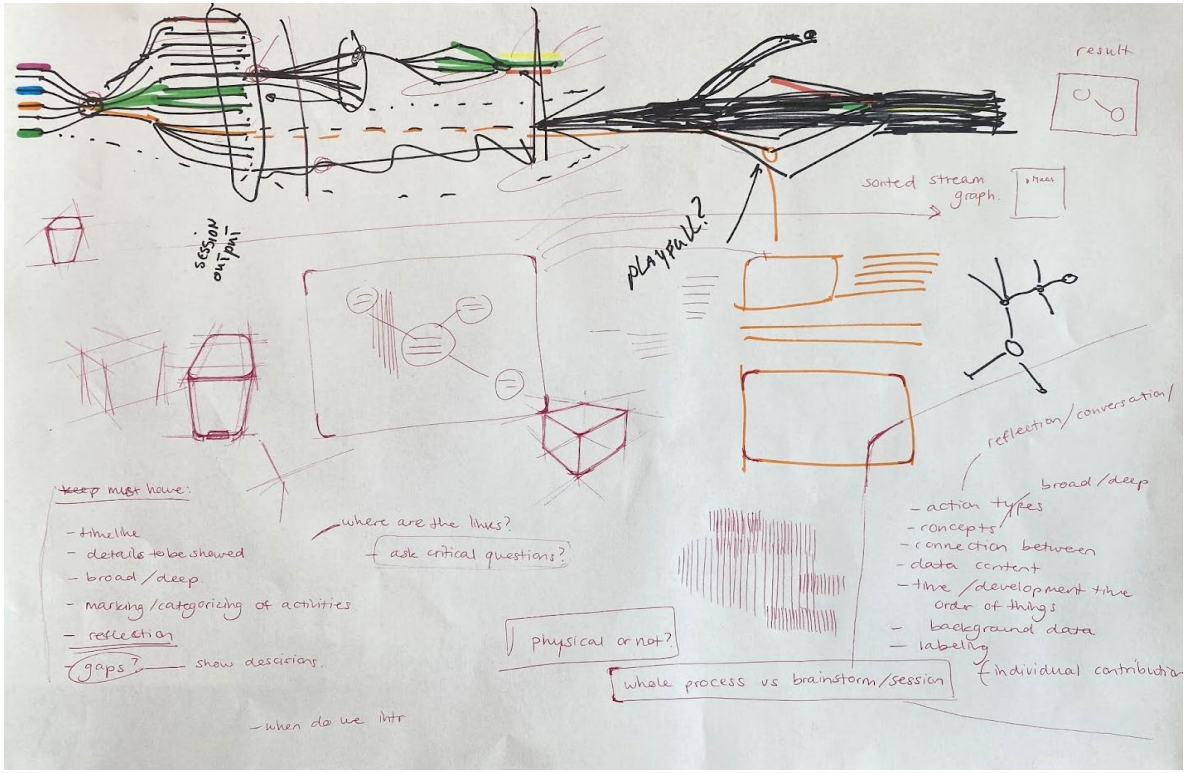


Figure 1| First exploration into possible graphs

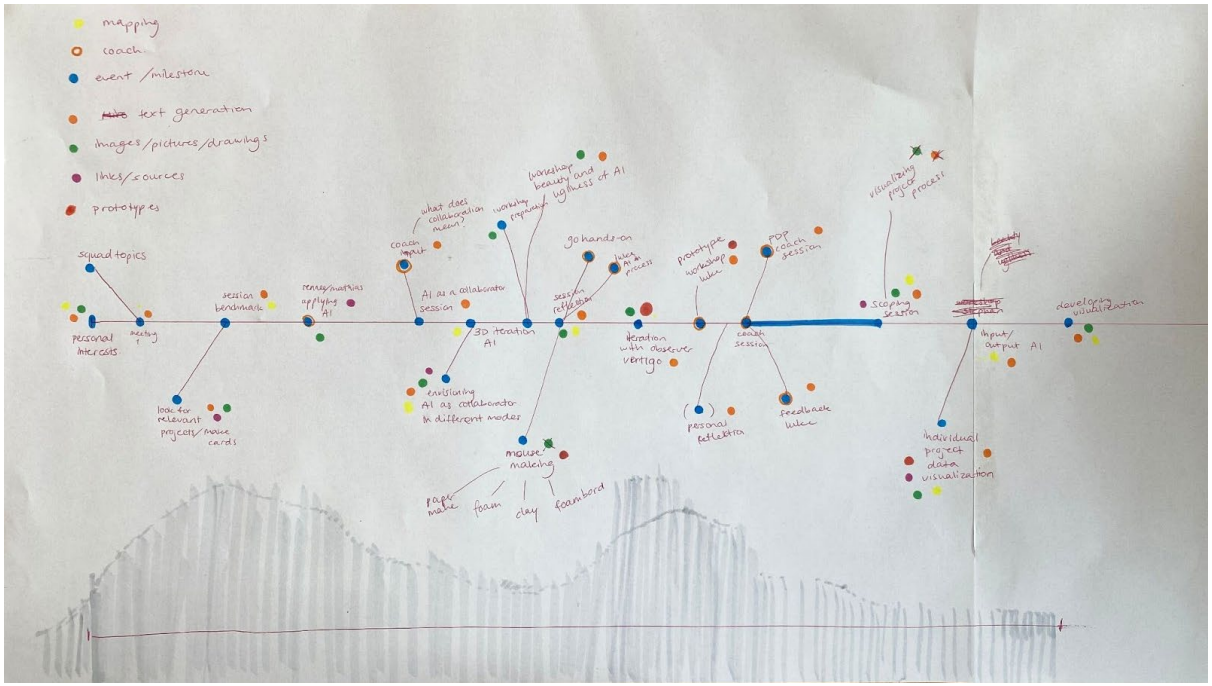


Figure 2 | Second exploration of possible graphs

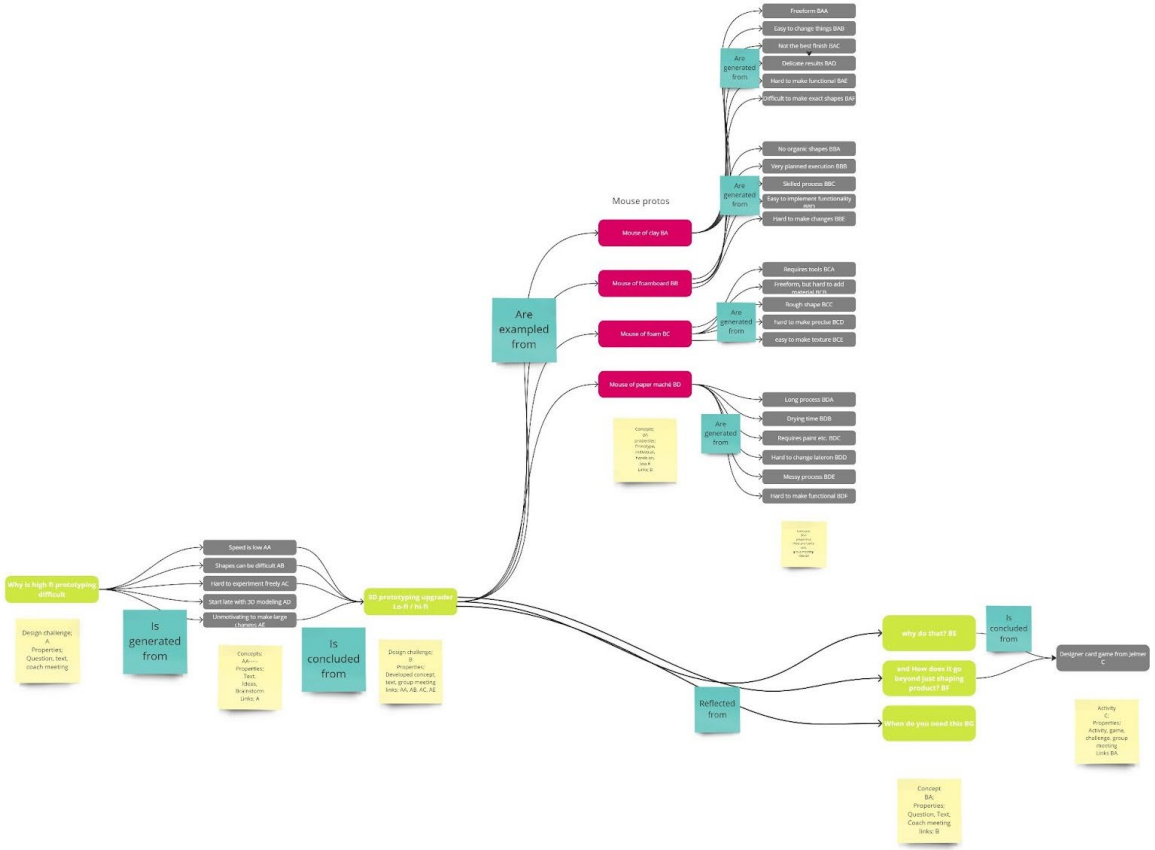


Figure 3 | Exploration of timeline with relationships of the teams activities of the first weeks

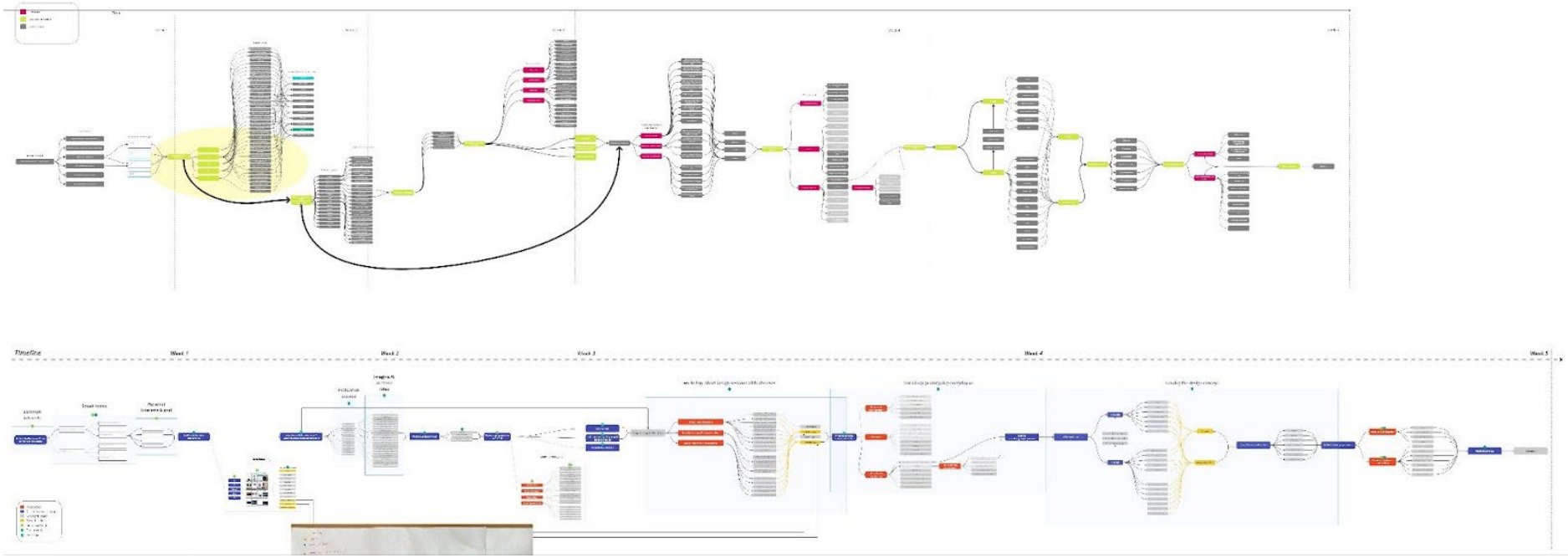


Figure 4 | Exploration of the first few project weeks in relationship-based timelines

Note: The graphs in figure 4 are too small to clearly view. You can download the full version at:
https://www.dropbox.com/scl/fo/tihu5lia04a9lb2pnlafi/h?dl=0&rlkey=ndhpgj4ucpjaxals388hyr9fv

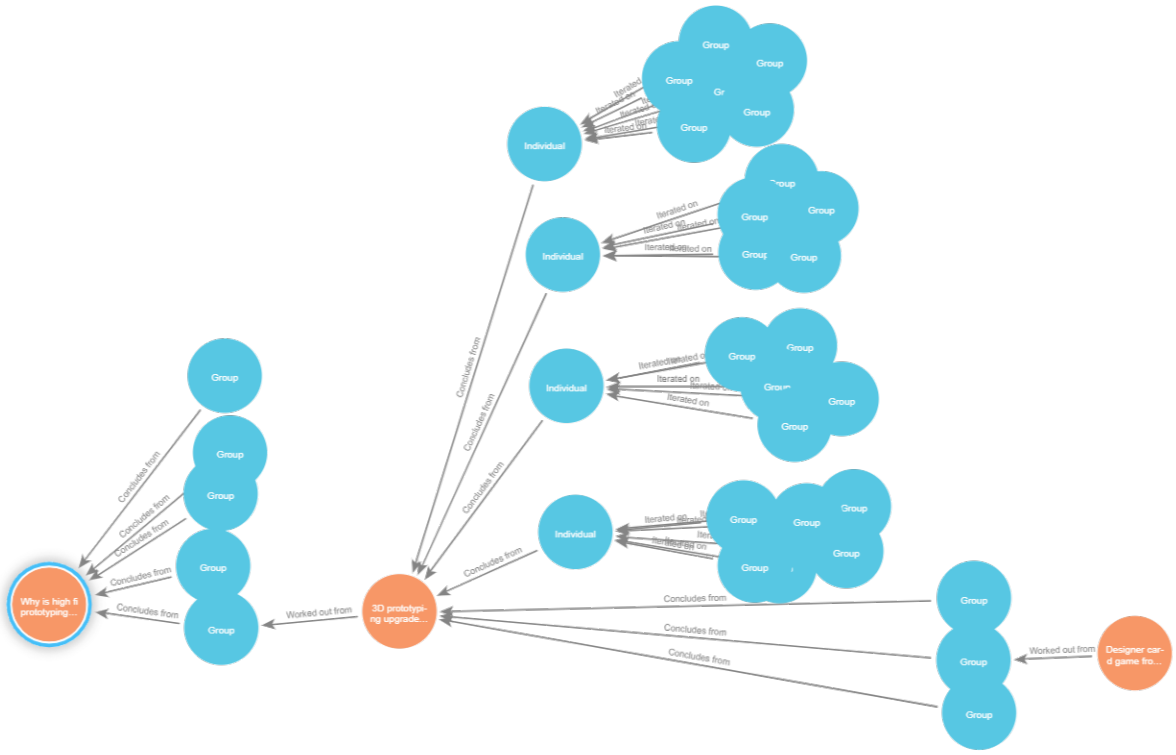


Figure 5 | The Neo4j example of the same relationships shown in Figure 3

Appendix B | Workshop protocol, ERB, informed consent and results

Introduction

Context and Purpose

The study is performed by four students of the Eindhoven University of Technology (TU/e). They all study MSc Industrial Design. The study is part of the first design project of the Master's curriculum, and is performed within the ARTIFICE squad. This squad focusses on the aesthetics and ethics of Artificial Intelligence (AI).

The project of the researchers looks into the design of an AI-powered tool that supports Industrial Design students in the documentation of their process in the course of their design projects. Ultimately, the aim of the documentation is to create a tool that can also function as a reflection tool during the design process. The need for such a design has been identified by experiencing a few rounds of pressure-cooker design challenges. The researchers found that tracking and reflecting upon the process was an essential part of guiding the process in order to meet the goals for the design challenge.

This study aims to evaluate whether a group of Industrial Design students from the TU/e feel the same need for documentation and reflection. The need will be evaluated by an observation of the need in the form of a workshop about reflecting, as reflecting is a process highly based on actions. The outcome of the study will function as an input for the design team within the further development of their conceptual direction and design.

Target population and recruitment strategy

The target population for this study consists of Industrial Design students at the Eindhoven University of Technology, with prior experience in the execution of design projects. Preferably the recruited students are currently working on either a design project or a research-through-design project. Participants will be recruited with voluntary sampling, either via a message on a social media platform (of which Microsoft Teams and WhatsApp will be used), or by personally being invited by one of the researchers in person. Age, gender, or other basic demographics are not considered during this study.

Research questions

This research/workshop aims to answer the following questions:

1. What problems do students encounter when engaging in project work, especially related to planning and organization?

2. How do groups/ individuals document and reflect on their projects?

3. What would be the potential of a timescale-based documentation and reflection tool?

Participant's introduction to the study

You have been invited to take part in research project M1.1 – AI guided design process tracking, because you have responded to our invitation on teams or via personal outreach to join the workshop.

Participation in this research project is voluntary: the decision to take part is up to you. Before you decide to participate we would like to ask you to read the following information, so that you know what the research project is about, what we expect from you, and how we deal with processing your personal data. Based on this information you can indicate via the consent declaration whether you consent to take part in this research project and the processing of your personal data.

Participation in this research will take approximately 1 hour and 15 minutes, which you are asked to do various tasks related to your project. We will ask you to make a timeline of and reflection on your project. This allows us to identify problems, challenges, and opportunities that design students have encountered in relation to managing and communicating the design process. It also will look into the various ways that parts of the design process can be clustered and visualized. The data collected in this study is used to inform the design process of a tool that aims to support designers in tracking the design process in order to facilitate communication and reflection.

You may of course always contact the researchers via j.d.braamskamp@student.tue.nl, if you have any questions, or you can discuss this information with people you know.

Method

This study will be conducted in a workshop setting. Groups of participants will be asked to perform various tasks. For the setup of the workshop participants are provided with A3 size paper, post-it notes, and pens and other writing materials. The main setup of the workshop consists of a large screen to show the participants the slides with the instructions.

One of the researchers leads the workshops. The other researchers observe the workshop and take notes. The focus is on the questions and remarks that participants make, together with the answers they provide to questions of the workshop leader.

Workshop phases

The workshop consists of three phases: initial questions and reflections, timeline construction and reflection, and group discussion. Each phase has a different focus and a slightly different testing task. Below, the various phases are discussed in more depth.

Initial questions and reflections

The first phase of the workshop focuses on identifying the ways the participants document their project work, reflect upon that work, and evaluate their project. This is done by asking participants to fill out a questionnaire in Mentimeter. These questions were:

1. How do you document your project process?
2. When documenting your project, do you do this together or individually (if in a group project)?
3. How often do you document during your project and why?
4. When documenting your project, what triggers reflection?
5. What do you normally struggle with when documenting your project?

After filling out these questions, participants are asked to make a reflection on their current project. They are provided with paper and writing materials. The researchers do not ask for a specific kind of reflection (e.g. a written text or a drawn graph), to provide participants the freedom to adopt their preferred strategy. After making the reflections, participants are asked to comment on the progress in a group setting. Researchers will be taking notes of the answers.

Timeline construction and reflection

The second phase of the workshop focuses on the evaluation of a timeline tool in the documenting and reflection process. Participants are asked to construct a timeline for their current project (either individually or in a group, depending on their project). Again, the participants are free to adopt any strategy that fits them. After the timelines have been constructed, participants are again asked about their experience in a group discussion.

Group discussion

In the final phase of the workshop participants are asked to join the Mentimeter a second time to answer final questions, that aim at starting a more broad group discussion. These questions are:

- What was difficult during the whole process and why?
- Do you think the workshop was useful and why?

An unstructured interview follows, where participants are asked to discuss the differences between the two reflections they made and what their preferences are. The goal of this phase is the identification of dos and don'ts for the design of a timeline tool that aims at providing input for continuous reflection on a project's process.

Post-workshop measures and data analyzation

Pictures are taken of the constructed materials to document the work of the participants. These pictures will be used in the analyzation of the workshop outcomes. The collected data will be analyzed with the help of analytic induction. The researchers go over all work provided by the participants and note what they saw on the adopted strategy, the created content, the outcomes, and unclassified remarks. The research tries to find similarities in all works, constructing theories that fit all of the collected data. These theories are used as influx for the design process that follows the workshop.

Ethical consideration

For data handling and storage Microsoft OneDrive will be used. The answers on the Mentimeter questions will be collected on the Mentimeter server and then transferred to OneDrive. The participants will sign a consent form (see Appendix B | Participant informed consent form). Other ethical considerations such as how

long the data will be stored are described in the ethical review form (see Appendix C | ERB form. For the signed version, please contact one of the researchers) which has been approved by the ethical review board of the TU/e (Appendix D | Approval of the study by the ethical review board).

Participants

For this research 10 participants were recruited that were engaged in 8 projects. All of the participants are Industrial Design students at the Technical University of Eindhoven. All participants have experience in design projects.

Results

The following pages show the notes made during the analysis of the workshop.

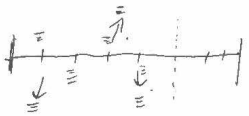
session 2.2.
individual reflection
individual project.

First:
double diamond timeline

design qn.
desktop research
define.
personal
↓
future plan.

what did I do?
↓
main points

iPad
- equally space.
- plan



too much time spending

small category.

question oriented

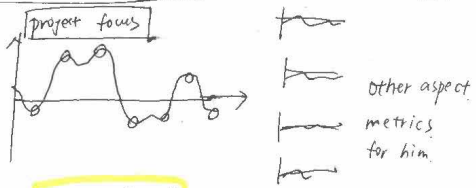
---

session 2.3
individual research project

First

scope
iteration
difficulty
after meeting

important phase netrual
↓
self experience negative.

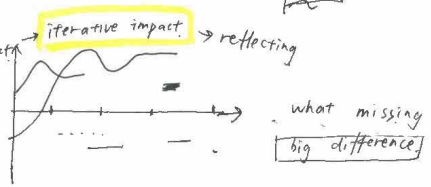


second.

scoping
coaching
demo
(future idea)

plan
coach
...

different aspect of the project
more than one line.
obstracted



---

session 2.4
group research project & reflection

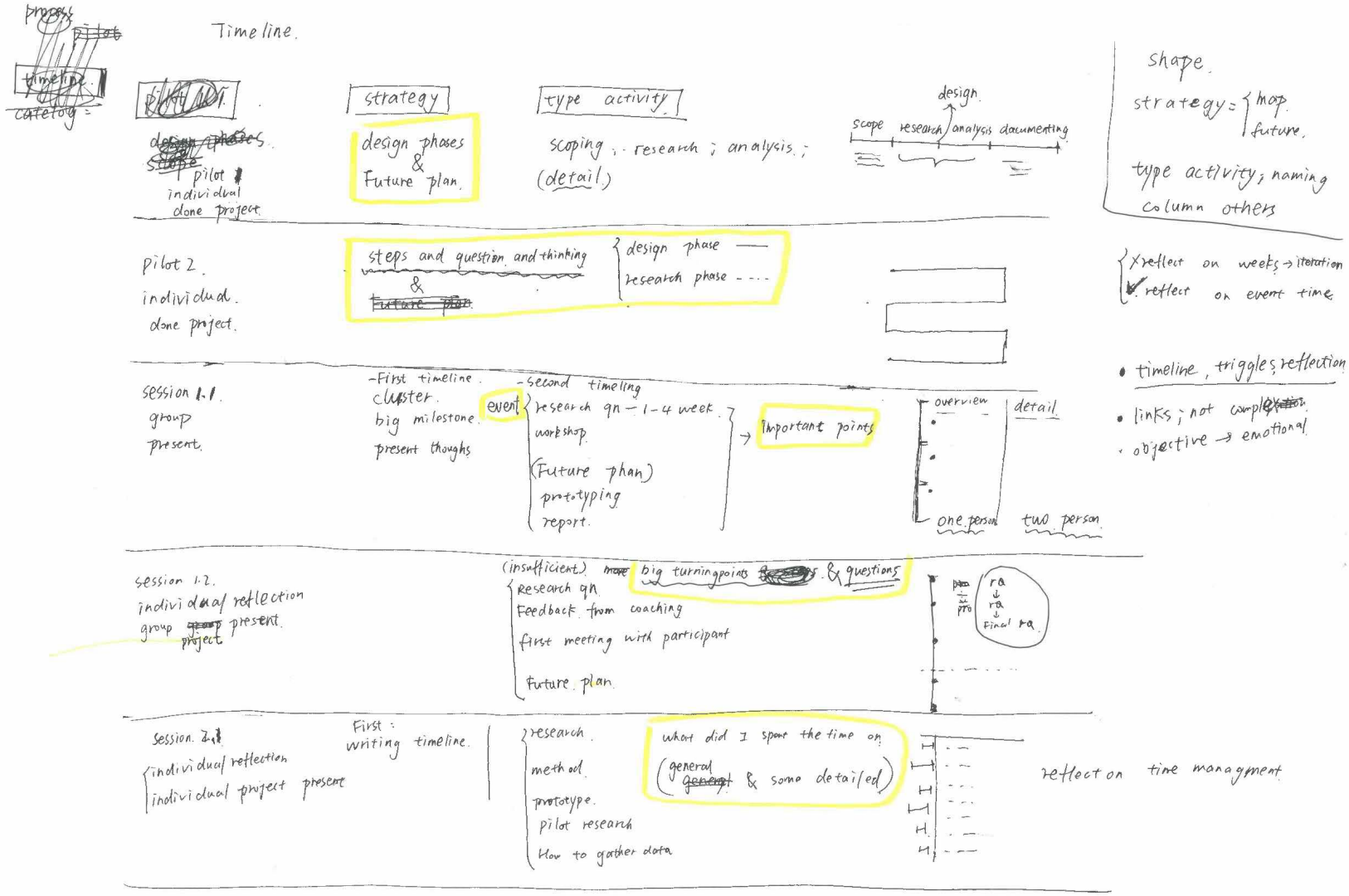
First.
ordered things

second.
concept phase
doing phase
Future

big → small
activities

---

big milestone / decision making
~~research question~~
↓
event. based.


process
timeline
category
Timeline
strategy
design phases & Future plan
type activity
scoping ; research ; analysis ; (detail)
design
scope research analysis documenting
Shape
strategy = { map, future,
type activity; naming column others
pilot 1
individual
done project
pilot 2
individual
done project
steps and question and thinking & Future plan
design phase
research phase
X reflect on weeks → iteration
✓ reflect on event time
• timeline, triggles, reflection
• links; not complex
• objective → emotional
session 1.1
group
present
-First timeline
cluster
big milestone
present thoughs
-second timeling
event
research qn — 1-4 week
workshop
(Future phan)
prototyping
report
→ Important points
overview
detail
one person
two person
session 1.2
individual reflection
group project present
(insufficient) big turningpoints & questions
Research qn
Feedback from coaching
first meeting with participant
future plan
ra
ra
ra
Final ra
session 2.1
individual reflection
individual project present
First : writing timeline
research
method
prototype
pilot research
How to gather data
what did I spent the time on
(general & some detailed)
reflect on time managment

Session 2.3

Strategy	Contents	Outcomes	Remarks	
◦ Timeline and graphs	◦ Visual ↳ line ↳ colours	◦ phases ◦ visual graphs of emotion and focus	◦ strong emotional input ◦ some previous experience ◦ future steps to tackle the lead points	Reflection 1
	◦ Visual ↳ colours ↳ lines / graphs	◦ multiple singulformes phases are sketched ◦ (1) Broad categories	◦ abstract	Timeline
◦ Sticky notes over the timeline	◦ Textual ◦ arrows / lines	◦ Overlay of process and learning	◦ Shorter than reflection 1	Reflection 2

Session 2.41

◦ List of activities (not chronological) ↳ ordered activities ◦ 1 line multi phased	◦ Textual ↳ bullet points	◦ Activity based	◦ Started alone ◦ First process reflection	Reflection 1
	◦ Textual ◦ Same colours	◦ (1) Broad categories and phases ↳ activity based	◦ Same emotional input	Timeline
◦ Sticky notes over timeline	◦ Textual	◦ Leaning to activity what to do	◦ Short notes ◦ More process, still very activity based	Reflection 2

General Remarks

- Overlay reflecting seems to be logical for most
  - although it would focus reflections on activities
- Most participants (N-1) made broad categories for the timeline, based on general design and research processes
- Based on notes we see in the timelines it is a reflective task → what part should we do
- Only 1 participant actively used notes made before to construct the timeline
  - how valuable are notes can it be done without actively tracking progress?
- Emotions seem to level and towards neutral
- There seems to be a tendency to go towards broad timelines and reflections

Session 1.2

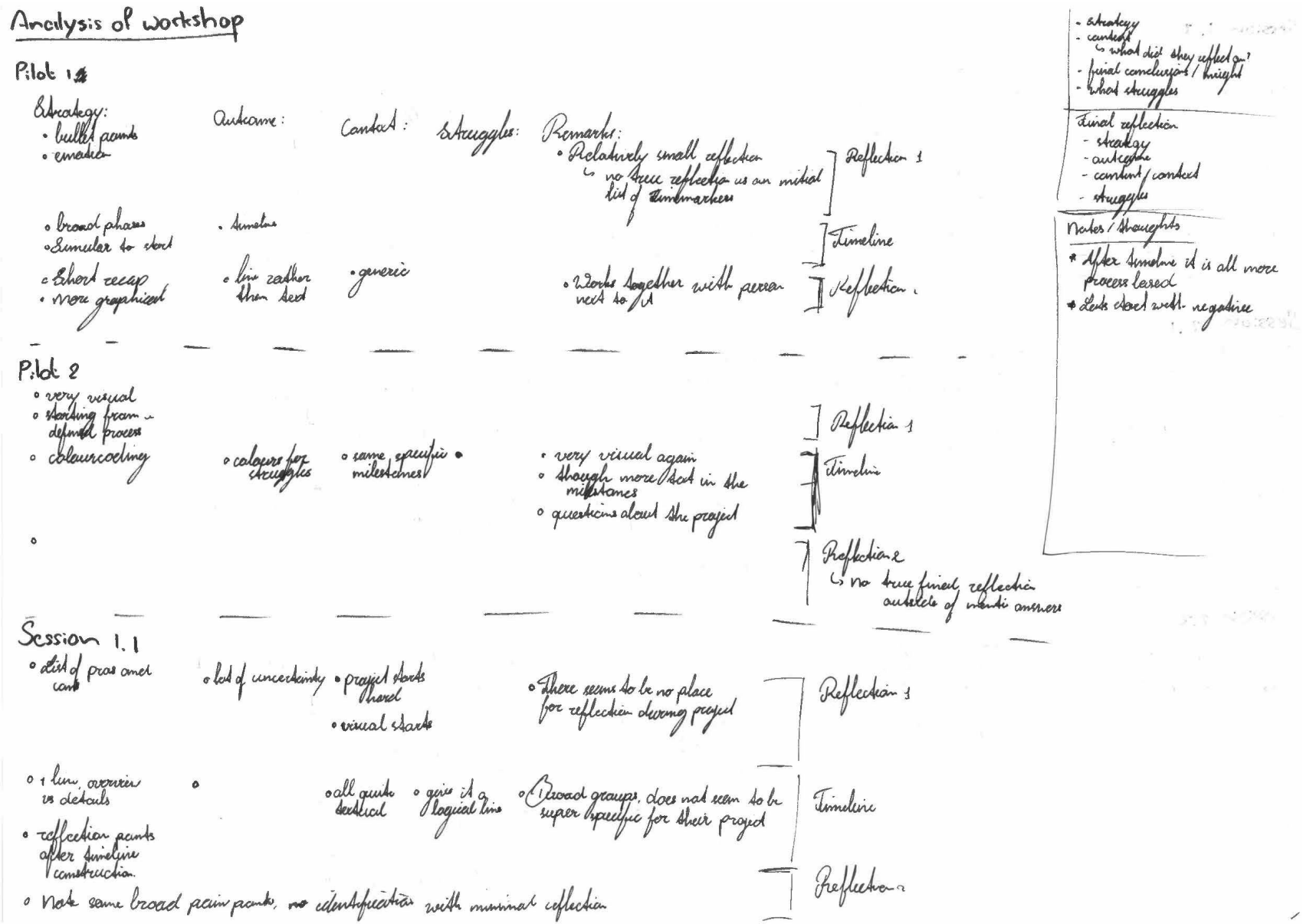
Strategy	Content	Outcomes	Remarks	
◦ pros vs cons list	◦ textual ◦ use of sticky notes ◦ very small writing		◦ Same copy behaviour	Reflection 1
◦ 1 main line with milestones	◦ textual remarks ◦ same sticky notes	◦ Same unreliable reflection		Timeline
◦ pros vs cons (stay the same) ☐ ☒ ☐ ☐ ☒ ☐	◦ All text	◦ Points less focussed on specific told actions	◦ Emotional response	Reflection 2

Session 2.1

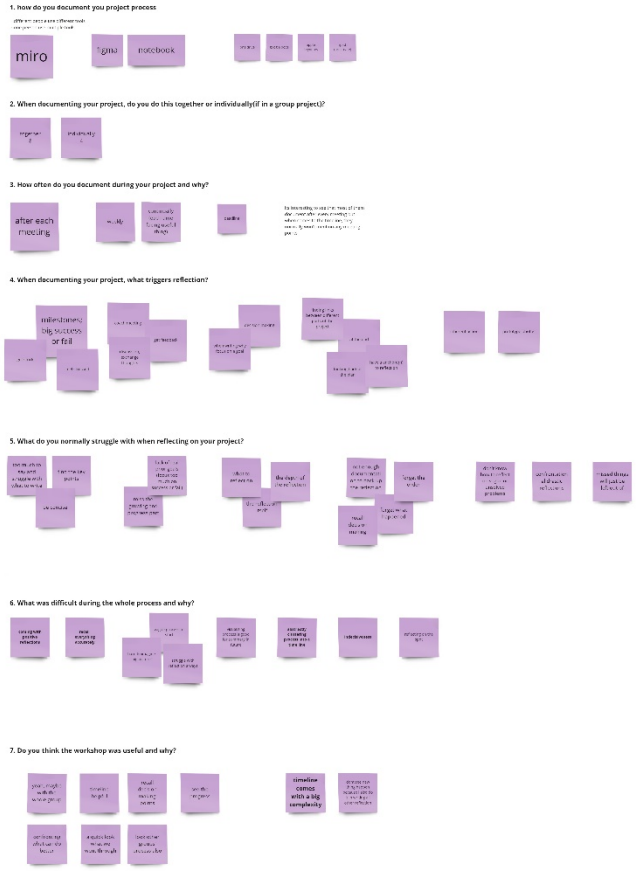
◦ Started writing rather fast (talking to himself)	◦ text ↳ running text instead of bulled points	◦ More emotional, not absolute	◦ textual timeline ↳ not really learning points	Reflection 1
◦ Defining multiple stages, then drawing specific lines	◦ text (very little varied words) ◦ line	◦ General categories not specific	◦ All out of top of head	Timeline
◦ Writing to himself	◦ text	◦ Does not see difference to reflection 1 ◦ Says controlling project is challenging	◦ Moving away from specific steps towards the whole process	Reflection 2

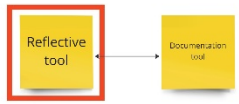
Session 2.2

◦ Small drawing and bullet point above ↳ numbering points	◦ text → not fully fluent ◦ visual elements for logic operations		◦ partial chronological ◦ uses project materials	Reflection 1
◦ Single line, milestones	◦ mostly textual	◦ Short planning future (about 1/3 paper) ◦ No full reflection	◦ milestones known as equally spaced	Timeline
◦ Bullet points	◦ textual	◦ planning and process based ◦ some project specific actions	◦ Some reflection about amount of reflection ◦ Mostly negative but also positive about what he did	Reflection 2


Analysis of workshop
Pilot 1
Strategy:
• bullet points
• emoticon
Outcome:
Context:
Struggles:
Remarks:
• Relatively small reflection
↳ no true reflection as an initial list of timemarkers
Reflection 1
Timeline
Reflection 2
• broad phases
• timeline to start
• short recap
• more graphical
• timeline
• line rather than text
• generic
• Works together with person next to her
Pilot 2
• very visual
• starting from a defined process
• colourcoding
• colours for struggles
• same specific milestones
• very visual again
• though more text in the milestones
• questions about the project
Reflection 1
Timeline
Reflection 2
↳ no true final reflection outside of initial answers
Session 1.1
• list of pros and cons
• lot of uncertainty
• project starts herel
• visual starts
• There seems to be no place for reflection during project
Reflection 1
• 1 line overview vs details
• reflection points after timeline construction
• all quite technical
• give it a logical line
• Broad groups, does not seem to be super specific for their project
Timeline
• Note some broad main points, no identification with minimal reflection
Reflection 2
- strategy
- context
↳ what did they reflect on?
- final conclusions / insight
- what struggles
Final reflection
- strategy
- outcome
- content / context
- struggles
Notes / thoughts
* After timeline it is all more process based
* Feels short with negative

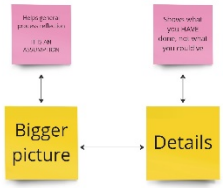
The following pages show the notes made to draw conclusions from the workshop.





Choose one focus; what is more valuable for us and what is the use of it? What role does the tool take?

A tool that aids reflection



Goes hand in hand with purpose of the tool?

How deep does the collected data have to be? What is needed to reflect, and where do we stop in detail?

When automating documentation/visualization of the project process: what do we take away? What do we facilitate?

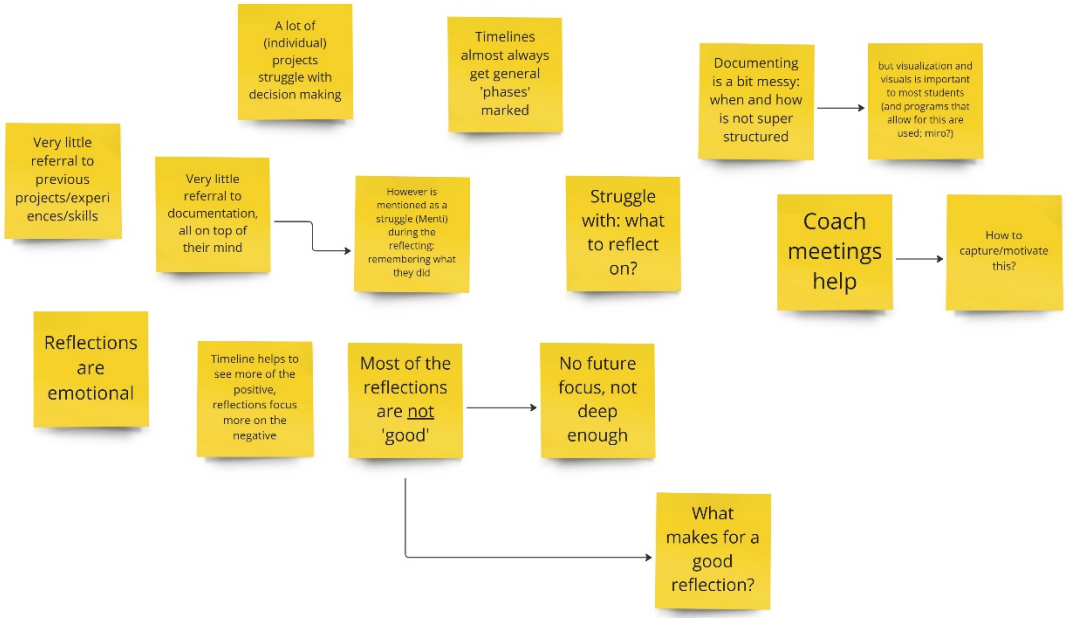
What should the visualization look like?
What value of the visualization do we provide?
And where does the AI come in?

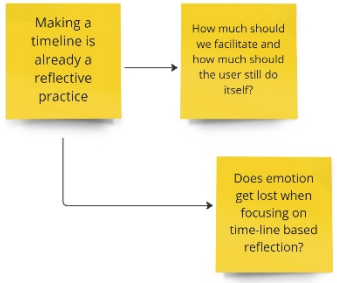
Follow groups:
We should have access/ provide ourselves with the process data of different project groups, in order to design with and for different projects.
We should track the projects to see how other projects are developing as well, to see what data is needed within our tool.
This also provides us with the data we need to implement our end tool for those projects, to do a validation session and visualize their process.

How do we want to track groups? How do we want to include them in the process?

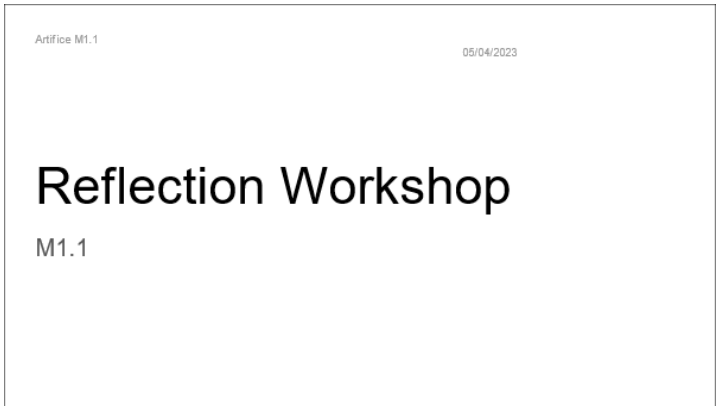
Make a list of demands for our end-product

Start designing

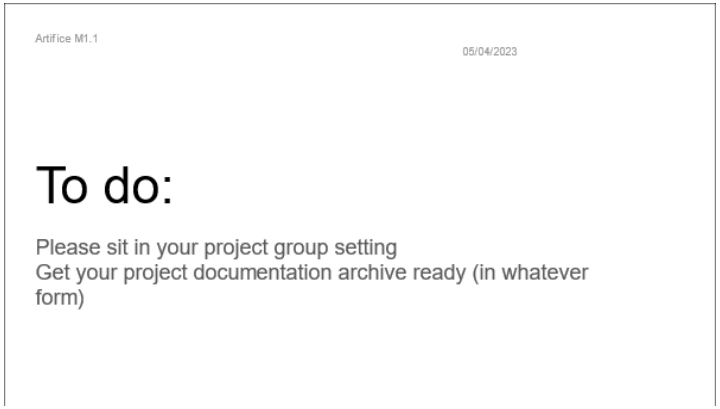




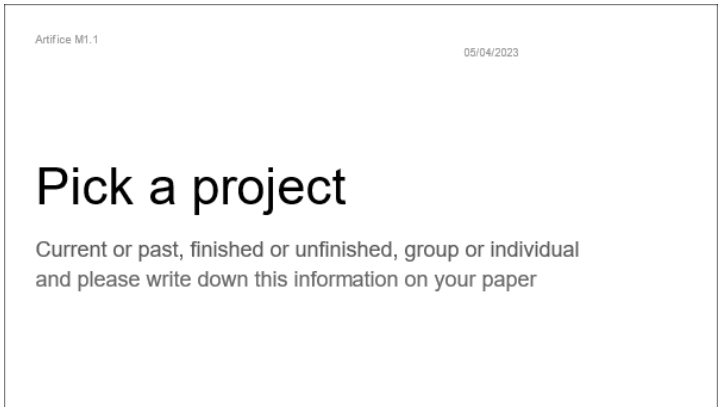
Workshop slides



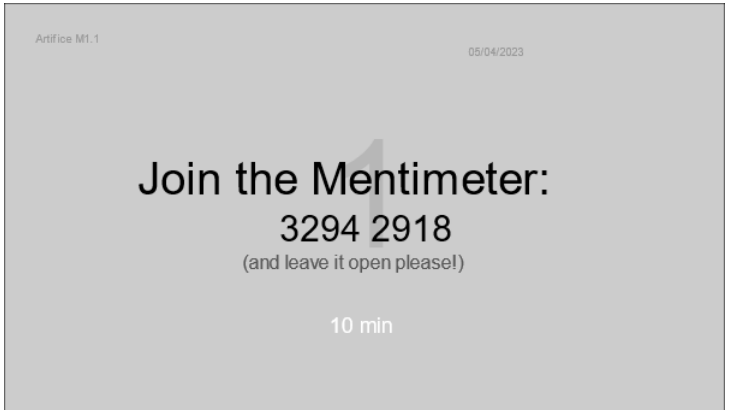
Slide | 1



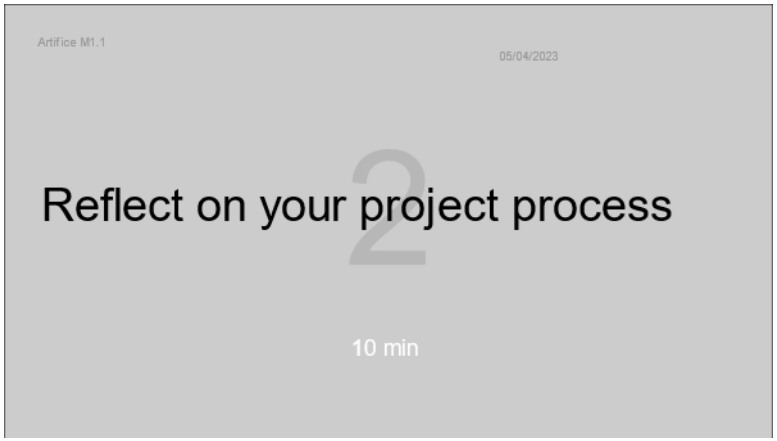
Slide | 2



Slide | 3

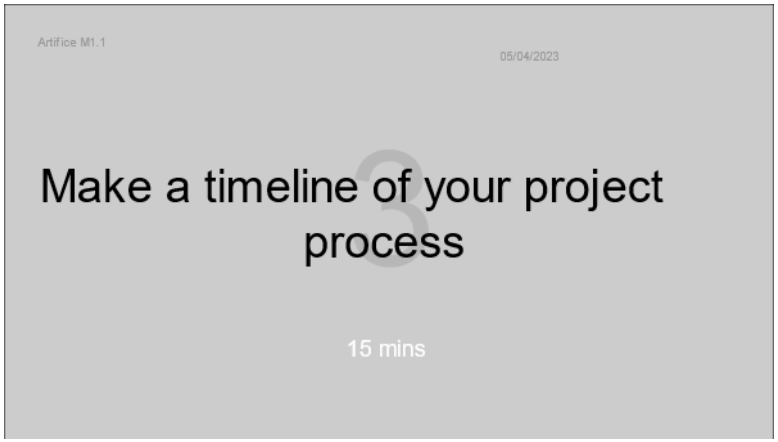


Slide | 4

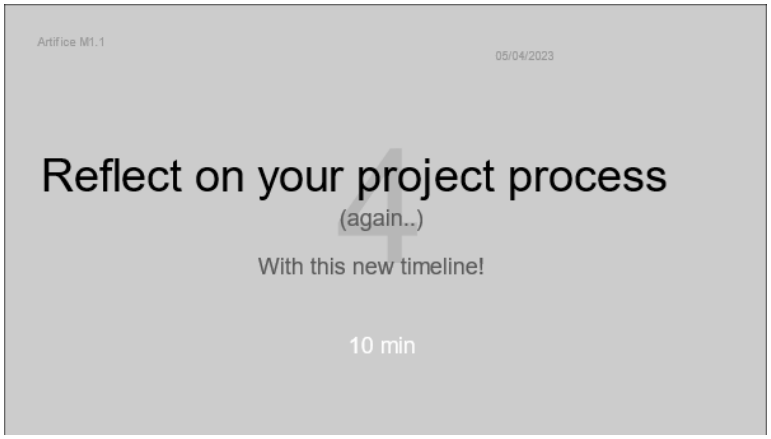


Slide | 5

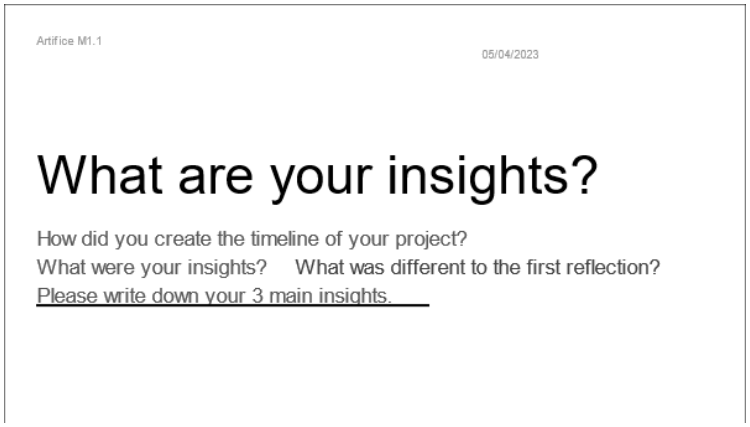
Slide | 6



Slide | 7

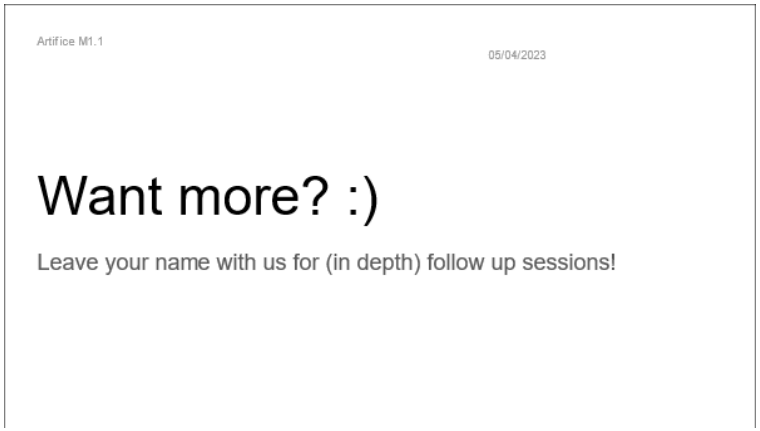


Slide | 8



Slide | 9

Slide | 10


Artifice M1.1
05/04/2023
Want more? :)
Leave your name with us for (in depth) follow up sessions!

Slide | 11

Participant informed consent form

Information sheet for project "M1.1 – AI guided design process tracking"

Introduction

You have been invited to take part in research project M1.1 – AI guided design process tracking, because you have responded to our invitation on teams or via personal outreach to join the workshop.

Participation in this research project is voluntary: the decision to take part is up to you. Before you decide to participate we would like to ask you to read the following information, so that you know what the research project is about, what we expect from you and how we deal with processing your personal data. Based on this information you can indicate via the consent declaration whether you consent to take part in this research project and the processing of your personal data.

You may of course always contact the researchers via j.d.braamskamp@student.tue.nl, if you have any questions, or you can discuss this information with people you know.

Purpose of the research

This research project will be managed by Mathias funk.
The purpose of this research project is to identify problems, challenges and opportunities that design students have encountered with relation to the managing and communicating of the design process. It also will look into the various ways that parts of the design process can be clustered and visualized. The data collected int his study is used to inform the design process of a tool that aims to support designers in the tracking the design process in order to facilitate communication and reflection.

Controller in the sense of the GDPR

TU/e is responsible for processing your personal data within the scope of the research. The contact details of TU/e are:
Technische Universiteit Eindhoven
De Groene Loper 3
5612 AE Eindhoven

What will taking part in the research project involve?

You will be taking part in a research project in which we will gather information by:

- Interviewing you about your experiences in the tracking and visualizing of your design processes. Notes of your answers will be written down.

- Group discussion of the previous experiences. Notes of the discussion will be written down.
- Observation of the visualizations of your current design process. Pictures of the created visualizations will be stored temporarily.

For your participation in this research project you will not be compensated.

Potential risks and inconveniences

Your participation in this research project does not involve any physical, legal or economic risks. You do not have to answer questions which you do not wish to answer. Your participation is voluntary. This means that you may end your participation at any moment you choose by letting the researcher know this. You do not have to explain why you decided to end your participation in the research project.

Withdrawing your consent and contact details

Participation in this research project is entirely voluntary. You may end your participation in the research project at any moment, or withdraw your consent to using your data for the research, without specifying any reason. Ending your participation will have no disadvantageous consequences for you.
If you decide to end your patricipation during the research, the data which you already provided up to the moment of withdrawal of your consent will be used in the research.
Do you wish to end the research, or do you have any questions and/or complaints? Then please contact the researchers via j.d.braamskamp@student.tue.nl.
If you have specific questions about the handling of personal data you can direct these to the data protection officer of TU/e by sending a mail to functionarisgegevensbescherming@tue.nl. Furthermore, you have the right to file a complaint with the Dutch data protection authority: the Autoriteit Persoonsgegevens.
Finally, you have the right to request access, rectification, erasure or adaptation of your data. Submit your request via privacy@tue.nl.

Legal ground for processing your personal data

The legal basis upon which we process your data is consent.

What personal data from you do we gather and process?

Within the framework of the research project we process the folllowing personal data:

Category	Personal data

Contact data	*Name, e-mail adress*
Project Profile	*Project title, conceptual direction, project process/methods*
Design experience	*Study progress (e.g. bachelor or master year ….), years of experience*

Within the framework of the research project your personal data will be shared with:

· Storage solution: SURF ResearchDrive

Confidentiality of data

We will do everything we can to protect your privacy as best as possible. The research results that will be published will not in any way contain confidential information or personal data from or about you through which anyone can recognize you, unless in our consent form you have explicitly given your consent for mentioning your name, for example in a quote.

The personal data that were gathered via interviews, discussions and observations and other documents within the framework of this research project, will be stored on SURF ResearchDrive.

The raw and processed research data will be retained for a period of 6 months. Ultimately after expiration of this time period the data will be either deleted or anonymized so that it can no longer be connected to an individual person. The research data will, if necessary (e.g. for a check on scientific integrity) and only in anonymous form be made available to persons outside the research group.

This research project was assessed and approved on May 16, 2023 by the ethical review committee of Eindhoven University of Technology.

Consent form for participation by an adult

By signing this consent form I acknowledge the following:

1. I am sufficiently informed about the research project through a separate information sheet. I have read the information sheet and have had the opportunity to ask questions. These questions have been answered satisfactorily.

2. I take part in this research project voluntarily. There is no explicit or implicit pressure for me to take part in this research project. It is clear to me that I can end participation in this research project at any moment, without giving any reason. I do not have to answer a question if I do not wish to do so.

Furthermore, I consent to the following parts of the research project:

3. I consent to processing my personal data gathered during the research in the way described in the information sheet.

YES ☐ NO ☐

4. I consent to using my answers for quotes in the research publications – without my name being published in these.

YES ☐ NO ☐

Name of Participant:

Signature:

Date:

Name of researcher:

Signature:

Date:

ERB Form

The following pages show the ERB form made for the workshop and approved by the ethical review board of the Technical University of Eindhoven. The signed form and the approval letter from the review board are available on file (because of privacy reasons). Please contact one of the researchers if you wish to see them.

Part 1: General Study Information		
1	Project title	M1.1 – AI guided design process tracking
2	Name of the researcher/student	Jelmer Braamskamp Maas Goudswaard Nikki Mureau Leqi Wang
3	Email of the researcher/student	j.d.braamskamp@student.tue.nl m.p.goudswaard@student.tue.nl n.c.b.mureau@student.tue.nl l.wang2@student.tue.nl

4	Supervisor(s) name(s) *Additional explanation: Please write down the name of your direct supervisor. You can mention several supervisors if appropriate, but at least one supervisor should be mentioned.*	Mathias Funk
5	Supervisor(s) email address(es) *Additional explanation: Please give the email address of the supervisor(s) mentioned in question 4.*	m.funk@tue.nl
6	Department	Industrial Design
7	Are you a student and is this application for educational purposes?	☐ Yes, Bachelor. Course: ☒ Yes, Master. Course: DPM115 Project 1 Design (within DFP008 ARTIFICE) ☐ No
8	Research location *Additional explanation: Where will the data collection take place? On campus, in a company, in public space, etc.*	On the TU/e campus, Eindhoven, The Netherlands. Atlas 2nd floor, ARTFICE squad space

9	Start date data collection *<u>Additional explanation</u>: Please state when your data collection will start. Please note that you do not have to provide information about your complete (PhD) project, but only on this particular sub-study that you are submitting for approval in this form.*	April 25, 2023
10	End date data collection	June 30, 2023
11	Does your project receive external funding (e.g., NWO, relevant for special regulations from funders)?	☐ Yes. Name Funder: ☒ No

12	Which internal and external parties are involved in the study? Think about sharing data or information between TU/e and other universities, commercial companies, hospitals, etc. *<u>Additional explanation</u>: Describe all internal and external parties that are involved in the study or project, including:* · *human participants (e.g., people being interviewed, people participating in online surveys, patients, etc.);* · *researchers or research groups at the TU/e who participate in the study;* · *(Researchers at) other universities/institutions that provide data/services, help analyzing the data, etc.;* · *(commercial) partners, companies, government bodies, municipalities, consultancy firms, hospitals or care institutions that provide data (e.g., contact details of participants, data for further analysis).* *Indicate which role each party plays: who defines the means and purposes in the study, who will supply the data (external parties?), who will process/handle the data, who will be able to access the data during and after research (only researchers at TU/e or also others)?*	Human participants – Adult Industrial Design Students Staff of the TU/e – Supervisors of the study Designers – Conduct the workshop/study
13	Have any special agreements already been made with an external party, such as a Non-Disclosure Agreement (NDA) or a data sharing agreement?	☐ Yes, namely: ☒ No

14	Has your proposal already been approved by an external Ethical Review Board or Medical Ethical Review Board? *Additional explanation: For example, when you are collaborating with another university and the project has been approved by their Ethical Review Board, or when you received a WMO-waiver from a Medical Ethical Review Board.*	☐ Yes ☒ No
15	If yes: Please provide the name, date of approval and contact details of the ERB. Please also include the registered number for your project approval. Additionally, please send in the Ethical Review Form upon which ethical approval was granted together with this form.	

16	Have you already performed a Data Protection Impact Assessment (DPIA) for this or a very similar project? ***Please read the information below: a DPIA is not the same as a regular privacy impact assessment. More detailed questions on privacy will follow in the section below.*** *Additional explanation: A Data Protection Impact Assessment (DPIA) is a formal document that must be drafted under the guidelines of the General Data Protection Regulation (GDPR)* ***if you process personal data that are likely to result in high privacy risks for participants.*** *Think of research with vulnerable people, high-risk medical research,* *The Dutch DPA (Autoriteit Persoonsgegevens) and our website provides more information about a DPIA.*	☐ Yes ☒ No If yes: Please provide details about the DPIA here and send in the DPIA documentation together with this form.

Part 2: Medical study

1	Does the study have a medical scientific research question or claim? *Additional explanation: Medical/scientific research is research which is carried out with the aim of finding answers to a question in the field of illness and health (etiology, pathogenesis, signs/symptoms, diagnosis, prevention, outcome or treatment of illness), by systematically collecting and analyzing data. The research is carried out with the intention of contributing to medical knowledge which can also be applied to populations outside of the direct research population. If your research contains questions about health and health related parameters (such as well-being, vitality, feelings of anxiety or stress) but your research question is not primarily medical, then you can answer 'no' to this question.*	☐ Yes* ☒ No *If yes or in doubt, please contact Susan Hommerson via s.m.hommerson@tue.nl

Part 3: Use of (medical) devices in the study

1	Does your research include a device? *Additional explanation: A device is a complete piece of physical hardware that is used to compute or support computer functions within a larger system. Devices can be divided into input-, output-, storage-, internet of things-, or mobile device.*	☐ Yes, not self-made ☐ Yes, self-made ☒ No
2	Please describe your device or link to an online description of the device	

3	Will you use a device that is 'CE' certified for **unintended use** (meaning you will use existing CE certified devices for other things than they were originally intended for) or use a device that is not 'CE' certified? *Additional explanation: You can find more information about CE certification on https://ec.europa.eu/growth/single-market/ce-marking_en.*	☐ Yes ☒ No
4	If yes: Do you use a device or software that has a medical purpose such as diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease or injury?	☐ Yes, my device or software currently has a medical purpose ☐ Yes, my device or software could have a medical purpose in the near future ☐ No ☐ I'm not sure

Part 4: Information about the study

1	What are your main research questions? *Additional explanation: You need to provide at least one clear research question.*	What previous problems and under what circumstances did design students encounter with regards to managing, visualizing and reporting their design process? When looking at the project the designers are currently working on, how would they categorize the various activities, insights, and ideas they have generated up to this point? How would the design students visualize their process up to this point?

2	Description of the research method *Additional explanation: For example, interview, survey, experiment, user-test, Randomized Experiment, focus groups, pilot study, observation, etc.*	The research will be conducted in the form of a workshop that itself consists of three phases. Throughout the three phases the participants are asked to answer a few questions about their process (survey). Phase 1: Semi-structured interview and group discussion about previously encountered problems, opportunities and challenges. Phase 2: Observations of clusters and categorizations made by students. Phase 3: Observations of the visualizations made, and interview on the decisions made.

3	Description of the research population, in- and exclusion criteria *Additional explanation: Please describe which persons are eligible for your study. What criteria are used to select participants in your study, and what criteria are used to exclude possible participants?* *For example: We will randomly select participants from the JSF participant database with good vision and older than 18 years.*	Participants are included if they are Industrial Design students at the Technical University of Eindhoven over the age of 18. They must currently be working on a design project.

4	Description of the measurements and/or stimuli/treatments *<u>Additional explanation</u>: Think about your outcome measures and the variables you will be collecting and describe them in a way such that another person understands what the participant will experience.* *For example: Participants will perform task A and see pictures from database B, and we measure validated Scale 1.*	Phase 1: participants are asked to discuss various problems, challenges and opportunities they have encountered in the past. They are asked to have a group discussion, where notes will be taken by the researchers. Phase 2: participants are asked to look at their current project (or previous projects) and cluster the various materials they have generated into categories. For this they can make use of provided paper, markers and post-its. Phase 3: participants are asked to create a rough visualization of their current (research through) design project. These visualizations will be gathered. Throughout the workshop participants are asked to answer a few questions about their projects and process. These questions can be answered anonymously.

5	Describe and justify the number of participants you need for this study. Also justify the number of observations you need, taking into account the risks and benefits. *Additional explanation: Think about if you need 3 or 30 participants for example, and why? Do they need to provide their input once, or several times, and why?*	At least 3 groups are needed in order to create a broader view of design contexts. By using at least 3 projects a broader view is created. No more than 7 groups are needed, as not to make the diversity in projects too large.
6	Explain why your research is societally important. What benefits and harm to society may result from the study? *Additional explanation: What benefit will the results of your study have to society in general?*	The research aims to identify needs and goals of possible end users of a design that helps designers keep track and explore the design field. In an optimal situation this might result in design projects that explore the field of possibilities better, in order to create designs that solve solutions in a more seamless way. A risk might be that, inadvertently, the process turns out to be narrower instead of broader due to biases in the design. Societal impact of this will probably be limited, as the system always has to be monitored by human designers.

7	Describe the way participants will be recruited *Additional explanation: How will you recruit participants for your study? For example, by using flyers, personal network, panels, etc.*	Participants will be recruited with the use of messages in the Microsoft Teams environment of the ARTIFICE squad at Industrial design of the TU/e. Next to that recruitment via personal messages to acquaintances of the researchers will be used.
8	Provide a brief statement of the risks you expect for the participants or others involved in the study and explain. Also take into consideration any personal data you may gather and associated privacy issues. *Additional explanation: Risks for the participants can be anything from risk of data breach to risk of safety or well-being. Describe these possible risks and describe the way these risks are mitigated.*	Expected risks for participants are minimal. There might be mild discomfort as a result of the design challenge, if the challenge is related to a field where the participants has got an emotional connection to. Further risks exist in the in interview, where the participant might not feel at ease to share all thoughts (mental wellbeing risk). No personal data of the participant will be collected, meaning no risks of privacy breach is expected.

Part 5: Self-assessment checklist

Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	**Yes**	**No**

1a	Does the study involve human material? (e.g., surgery waste material derived from non-commercial organizations such as hospitals)		x
1b	Will blood or other (bio)samples be obtained from participants? (e.g., hair, sweat, urine or other bodily fluids or secretions, also external imaging of the body)		x
2	Will the participants give their consent – on a voluntary basis – either digitally or on paper? Or have they given consent in the past for the purpose of education or for re-use in line with the current research question?	x	
3	Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator? *Additional explanation: Think about doing research on your own students or on your own employees. When there is a dependency or power imbalance between you and the research participants, you need to answer 'yes' to this question.*		x
4	Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children (<16 years of age), people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups)		x

5	Will participating in the research be burdensome? (e.g., requiring participants to wear a device 24/7 for several weeks, to fill in questionnaires for hours, to travel long distances to a research location, to be interviewed multiple times)?		x
6	May the research procedure cause harm or discomfort to the participant in any way? (e.g., causing pain or more than mild discomfort, stress, anxiety or by administering drinks, foods, drugs, or showing explicit visual material)		x
7	Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants? *Additional explanation: For an explanation of what is considered a reasonable compensation, see the topic participant fees from the HTI group*		x
8a	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)		x
8b	If yes: Will you be observing people without their knowledge in public space? (e.g. on the street, at a bus-stop)		x
9	Will the study involve actively deceiving the participants? (e.g., 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)		x

10	Will participants be asked to discuss or report sexual experiences, religion, alcohol or drug use, suicidal thoughts, or other topics that are highly personal or intimate? *<u>Additional explanation</u>: Think about your research population. For some participants, particular topics can be considered sensitive or intimate, whereas the same topics will not be perceived as such by other participants.*		x

Part 6: Self-assessment on privacy

The following questions (1-10) concern privacy issues, as laid down in the General Data Protection Regulation (GDPR). The Data Stewards and – if necessary – privacy team of TU/e will assess these questions. In some cases, more information is required to assess the privacy risks. If this is the case, you will be notified that the Data Stewards team will contact you.

The GDPR defines 'personal data' as any information relating to an identified or identifiable natural person ('data subject'). Personal data also includes data that indirectly reveals something about a natural person. Personal data can lead to the physical, physiological, genetic, mental, economic, cultural or social identity of a natural person. There are two main categories of personal data: regular personal data and special category personal data.

If you are not sure whether some of these questions below should be answered with a Yes or No, please contact a Data Steward first through rdmsupport@tue.nl.

Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	**Yes**	**No**

1	Will the study involve discussion/collection/processing of **regular** personal data, or will you collect and (temporarily) store video or voice recordings for the purpose of conducting interviews? *Additional explanation: For example, name, address, phone number, email address, IP address, gender, age, video or interview recordings? If you are not sure whether your data contains personal data, please contact the Data Stewards Team (rdmsupport@tue.nl).*	x		
1A	If yes: Please describe which regular personal data you will collect in this study?	Data about the current projects of the participants will be gathered via the visualizations that they are asked to create.		
2	Will the study involve discussion/collection/processing of **special category** personal data or other **sensitive data**? *Additional explanation: Examples of special category personal data are race, religion, health information, political views, genetic or biometric data for the unique identification of a person, sexual preference, etc. Health information concerns personal data of the physical or mental health of persons, including the provision of health care. Examples of other sensitive data is information such as communication data, financial records or credit scores, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, criminal records, data of vulnerable persons (children, people with disabilities, refugees), BSN number etc. Please be aware that the use of special category personal data in research requires extra security measurements in order to safeguard the privacy of data subjects and to comply with the GDPR. Processing of this special category data is prohibited, except for specific purposes and under certain circumstances. If you need to process special category data, please consult the data stewards at rdmsupport@tue.nl.*		x	

2A	If yes: Please describe which special-category personal data and/or sensitive data you will collect in this study?		
If you answered yes to either question 1 or 2, please answer the questions below. If you answered no to both questions, you can skip this part and continue onto part 6. Also, if an answer to any of the following questions is 'yes', please contact a Data Steward at rdmsupport@tue.nl			
		Yes	**No**
3	Will your project involve the processing of personal data on a **large scale**? *<u>Additional explanation</u>: In general, any processing that involves more than 10.000 data subjects should be considered "large scale". However, if the data of approximately 1000 persons (or more) are involved, the data processing may still be considered large scale. In that case, besides the number of persons involved in the study, one should also assess (i) the amount of data collected from these persons taking into account the type/risk level of the personal data, (ii) the duration of the data processing, (iii) the geographic scope or extent of the processing. For example, if you would collect and process data across several European countries with 10+ socio-economic data items of 1200 individual persons for several years in a row, that is likely "large-scale processing". Other examples of a large-scale processing activity are:* · *Monitoring driving behavior of road users on Dutch highways* · *Collecting data of Covid patients* · *A hospital that processes patient data as part of its usual operations* · *A transport company that processes travel information of people who travel by public transport in a certain city. For example, by tracking them through travel maps.*		x

4	Does this processing activity involve the use of new or innovative technologies? *Examples of a new technology: combining fingerprints and facial recognition for physical access control, the use of bodycams in public spaces, the use of new technical methods in conducting research such as AI. This question also refers to new technologies that have not been deployed by TU/e so far.*		x	
5	Does your study involve systematic (c.q. automated) monitoring of persons? *Additional explanation: Consider data processing activities that have the purpose of observing, monitoring or controlling individuals, for example in circumstances where the individuals are not aware by whom their personal data is collected and how it is used. Examples of such activities are using camera systems to monitor driving behavior on highways, monitoring email inactivity or employee phone use, certain applications of machine learning and artificial intelligence.*		x	
6	Does the study involve collaborations (with third parties) in which data are shared or exchanged in order to link or combine data? *Additional explanation: This may often apply in a collaboration between the university and a commercial party, contract research, etc. It is important to assess this for all data in the entire project, not just your own data.* *An important consideration in this situation is whether the person whose data is involved could have expected that data from these different databases or sources of information were to be combined. For example, it is less likely for data subjects to expect that databases from different parties will be combined and the results are used for different purposes than one could reasonably expect; this may apply for example in a collaboration between the university and a commercial party.*		x	

7	Will the study include data processing activities that prevent data subjects from exercising their rights or using a service or contract? *Additional explanation: Examples include processing operations carried out in public places that people cannot avoid (train station, airport, shopping mall, public university premises, etc.) or processing operations whose purpose is to allow or not allow data subjects to use a service or enter into a contract (examples: by refusing to pay a benefit, not being able to apply for a loan, etc.).*		x	
8	Will the study process personal data to score, rank or profile persons? *Additional explanation: Examples: monitoring (highway) roads to give road users a "score" based on their detected driving behavior, a bank assessing its customers based on their creditworthiness, or an organization building behavioral and marketing profiles based on use of their website or navigating their website.*		x	
8	Does your data processing include activities that involves composing "**blacklists**" – and, in particular, in relation to sensitive or special category data, such as communication data, financial records or credit scores, genetic data, biometric data, health data, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, etc. *Additional explanation: This situation will not be a common occurrence in research, but you may indirectly be involved in this. In general, this typically concerns processing operations involving personal data relating to criminal convictions and offences, data relating to unlawful acts, data concerning unlawful or annoying behaviour or data concerning bad payment behaviour by companies or individuals are processed and shared with third parties (blacklists or warning lists, as used, for example, by insurers, hospitality companies shopping companies, telecom providers as well as blacklists relating to unlawful behavior of employees, for example in the healthcare sector or by employment agencies, etc.).*		x	

9	Will personal data be transferred or shared outside the EU/EEA? EU data protection rules apply to the European Economic Area (EEA), which includes all EU countries and non-EU countries Iceland, Liechtenstein and Norway. *Additional explanation: The GDPR has drafted additional requirements for transfers data outside of the EU/EEA. Typically, additional safeguards must be implemented to protect the personal data of residents in the European Union. For example, if you collaborate with an American, Indian or Chinese university or other third party outside the EU/EEA, you must first check whether this is allowed and under which conditions this is allowed. Another typical example is storage of data on American providers of cloud (storage) services. Please contact the data stewards first to discuss this.*		x	
10	Will any raw or anonymized personal data or any other sensitive data or research results from the project possibly be transferred to a high-risk country*? ***High risk countries**: China, Russia, Iran, Turkey, and North Korea.* *If personal data or other potentially sensitive data is exchanged with one of these countries, or if part of the data processing takes place in one of these countries: **an advice from the Data Protection Officer, the kennisveiligheidsteam (Knowledge Security team), and the CISO (Chief Information Security Officer) is ALWAYS required.***		x	

Part 7: Data processing, storing and archiving

1a	Is consent your legal basis for processing the personal data in your study? *Additional explanation: What is a legal basis? One of main principles in the GDPR is to ensure that personal data is processed lawfully, fairly, and transparently. To comply with this principle, the processing of personal data also requires that you have a valid legal basis for the personal data processing activity.* *In research projects, the legal basis is often but not always consent. However, it is possible that it is not clear or not possible to establish whether to use consent as a legal basis.* *Some examples where consent may not be applicable as legal basis are covert research, data collection in public spaces, secondary data analysis of existing data, data that are transferred to you by a third party, consent is not possible or would require disproportionate effort, etc. In that case, please indicate which legal basis you think that applies or (preferably) contact a data steward first.*	☒ Yes ☐ No
1b	If yes: Please briefly explain how you will obtain consent from participants and send in your draft of the information letter and consent statement together with this form. You can download a suitable template here.	The participants are told in the recruitment message that participant is voluntary. An information letter is provided to inform the participants about the goal of the study. A consent form is provided to the participants.
1c	If no: Please briefly explain on which legal basis - other than consent - you will process the personal data in your study.	

2	In which way will you collect and process the (personal) data? *<u>Additional explanation</u>: Please describe which software (e.g., LimeSurvey, Atlas Ti, Qualtrics), tools (electronic lab journals, information management systems, etc.), technologies, apps or devices (Internet-of-Things, Fitbit, etc.), techniques (monitoring, interview, survey), special data environments (e.g., Living Lab), etc. you will use to collect or process data?*	Data is collected by observation of the experiment and a semi-structured interview. The data is processed with the use of Microsoft word to keep track of research notes. Further data with the use of answering questions is gathered with the help of MentiMeter.
3	Where will the data and in particular the personal data be stored during and after completion of the study? If you have already uploaded your Data Management Plan, you can refer to your Data Management Plan. *<u>Additional explanation</u>: Please address the following:* · *Where will you store your data during the study and after you have completed the study? University supported-storage facilities are SURFdrive, SURF Research Drive, Ceph, departmental drives (this includes BE Project Drive), and the TU/e instance of Microsoft OneDrive. For most personal data, the use of SURF Research Drive, departmental drives (including BE Project Drive) and SURFdrive is required.*	The data will be stored on a secure server of Surfdrive. The gathered data will be deleted after the end of the study, with the addition of two months. The data will be deleted on or before August 14, 2023.

4	Which security measures are applied? *Additional explanation: Please address these questions:* · *Is access to your (personal) data restricted? If yes, how (access control, password protection, etc.)?* · *Who will have access to the data during and after completion of the study?* · *Will you anonymize or pseudonymize the data?* · *Is Bitlocker (Windows), FileVault (Mac) or similar hard-drive encryption active on your laptop?* · *What will you do with the data after your project has come to results? Do you need to keep all data?* · *How long will you store the data after completion of the project, or can/will (part of) the data be destroyed?* · *Will you or your supervisor want to keep the data for new or future research/reuse? Will you share (raw) data with others? If yes, how and how do you ensure that this is secure?* · *If access restrictions are required during and after the study, please explain how this is arranged.*	Access to the raw data is restricted to the researchers and their supervisor. The data will be password and MFA protected. Data in reports and publications will be anonymized. The gathered data will not be used in future research.

Part 8: Closures and Signatures

1	Enclosures (tick if applicable): ☒ Informed consent form; ☐ Informed consent form for other agencies when the research is conducted at a location (such as a school); ☐ Text used for ads (to find participants); ☐ Text used for debriefings; ☐ Approval other research ethics committee; ☐ The survey the participants need to complete, or a description of other measurements; ☐ Any other information which might be relevant for decision making by ERB; ☐ Data Protection Impact Assessment checked by the privacy officer ☐ Data Management Plan checked by a data steward	

2	Signature(s) Signature(s) of researcher(s) Date: April 24, 2023 Signature research supervisor (if applicable) Date: April 24, 2023	

Appendix C | ChatGPT Thread

The full thread can be found via the following link:
https://chat.openai.com/share/58c33e28-5c2b-45ec-83e3-c7cfd40448c9

A thread used to explore chatGPT capabilities in the processing of data can be found via:
https://chat.openai.com/share/d848ca9f-196d-469f-aae9-b4cf1ca56368

The threads have been created with the use of the ChatGPT version of May 24th, 2023.

Appendix D | Final user test

ERB Form

The following pages show the ERB form made for the workshop and approved by the ethical review board of the Technical University of Eindhoven. The signed form and the approval letter from the review board are available on file (because of privacy reasons). Please contact one of the researchers if you wish to see them.

Part 1: General Study Information		
1	Project title	M1.1 – AI Guided Design Process Tracking and Reflecting
2	Name of the researcher/student	Jelmer Braamskamp Maas Goudswaard Nikki Mureau Leqi Wang

3	Email of the researcher/student	j.d.braamskamp@student.tue.nl m.p.goudswaard@student.tue.nl n.c.b.mureau@student.tue.nl l.wang2@student.tue.nl
4	Supervisor(s) name(s) *Additional explanation: Please write down the name of your direct supervisor. You can mention several supervisors if appropriate, but at least one supervisor should be mentioned.*	Mathias Funk
5	Supervisor(s) email address(es) *Additional explanation: Please give the email address of the supervisor(s) mentioned in question 4.*	m.funk@tue.nl
6	Department	Industrial Design
7	Are you a student and is this application for educational purposes?	☐ Yes, Bachelor. Course: ☒ Yes, Master. Course: DPM115 Project 1 Design (within DFP008 ARTIFICE) ☐ No

8	Research location *Additional explanation: Where will the data collection take place? On campus, in a company, in public space, etc.*	On the TU/e campus, Eindhoven, The Netherlands
9	Start date data collection *Additional explanation: Please state when your data collection will start. Please note that you do not have to provide information about your complete (PhD) project, but only on this particular sub-study that you are submitting for approval in this form.*	May 12, 2023
10	End date data collection	June 30, 2023
11	Does your project receive external funding (e.g., NWO, relevant for special regulations from funders)?	☐ Yes. Name Funder: ☒ No

12	Which internal and external parties are involved in the study? Think about sharing data or information between TU/e and other universities, commercial companies, hospitals, etc. *<u>Additional explanation</u>: Describe all internal and external parties that are involved in the study or project, including:* · *human participants (e.g., people being interviewed, people participating in online surveys, patients, etc.);* · *researchers or research groups at the TU/e who participate in the study;* · *(Researchers at) other universities/institutions that provide data/services, help analyzing the data, etc.;* · *(commercial) partners, companies, government bodies, municipalities, consultancy firms, hospitals or care institutions that provide data (e.g., contact details of participants, data for further analysis).* *Indicate which role each party plays: who defines the means and purposes in the study, who will supply the data (external parties?), who will process/handle the data, who will be able to access the data during and after research (only researchers at TU/e or also others)?*	Human participants – Adult students at the TU/e Staff of the TU/e – Supervisors of the study Designers – Conducting the study
13	Have any special agreements already been made with an external party, such as a Non-Disclosure Agreement (NDA) or a data sharing agreement?	☐ Yes, namely: ☒ No

14	Has your proposal already been approved by an external Ethical Review Board or Medical Ethical Review Board? *Additional explanation: For example, when you are collaborating with another university and the project has been approved by their Ethical Review Board, or when you received a WMO-waiver from a Medical Ethical Review Board.*	☐ Yes ☒ No
15	If yes: Please provide the name, date of approval and contact details of the ERB. Please also include the registered number for your project approval. Additionally, please send in the Ethical Review Form upon which ethical approval was granted together with this form.	
16	Have you already performed a Data Protection Impact Assessment (DPIA) for this or a very similar project? ***Please read the information below: a DPIA is not the same as a regular privacy impact assessment. More detailed questions on privacy will follow in the section below.*** *Additional explanation: A Data Protection Impact Assessment (DPIA) is a formal document that must be drafted under the guidelines of the General Data Protection Regulation (GDPR)* ***if you process personal data that are likely to result in high privacy risks for participants.*** *Think of research with vulnerable people, high-risk medical research,* *The Dutch DPA (Autoriteit Persoonsgegevens) and our website provides more information about a DPIA.*	☐ Yes ☒ No If yes: Please provide details about the DPIA here and send in the DPIA documentation together with this form.

Part 2: Medical study

1	Does the study have a medical scientific research question or claim? *Additional explanation: Medical/scientific research is research which is carried out with the aim of finding answers to a question in the field of illness and health (etiology, pathogenesis, signs/symptoms, diagnosis, prevention, outcome or treatment of illness), by systematically collecting and analyzing data. The research is carried out with the intention of contributing to medical knowledge which can also be applied to populations outside of the direct research population. If your research contains questions about health and health related parameters (such as well-being, vitality, feelings of anxiety or stress) but your research question is not primarily medical, then you can answer 'no' to this question.*	☐ Yes* ☒ No *If yes or in doubt, please contact Susan Hommerson via s.m.hommerson@tue.nl

Part 3: Use of (medical) devices in the study

1	Does your research include a device? *Additional explanation: A device is a complete piece of physical hardware that is used to compute or support computer functions within a larger system. Devices can be divided into input-, output-, storage-, internet of things-, or mobile device.*	☐ Yes, not self-made ☐ Yes, self-made ☒ No

2	Please describe your device or link to an online description of the device	
3	Will you use a device that is 'CE' certified for **unintended use** (meaning you will use existing CE certified devices for other things than they were originally intended for) or use a device that is not 'CE' certified? *Additional explanation: You can find more information about CE certification on https://ec.europa.eu/growth/single-market/ce-marking_en.*	☐ Yes ☒ No
4	If yes: Do you use a device or software that has a medical purpose such as diagnosis, prevention, monitoring, prediction, prognosis, treatment or alleviation of disease or injury?	☐ Yes, my device or software currently has a medical purpose ☐ Yes, my device or software could have a medical purpose in the near future ☐ No ☐ I'm not sure

Part 4: Information about the study

1	What are your main research questions? *Additional explanation: You need to provide at least one clear research question.*	What does the process of students engaging in a design project look like in terms of activities and emotions?
2	Description of the research method *Additional explanation: For example, interview, survey, experiment, user-test, Randomized Experiment, focus groups, pilot study, observation, etc.*	Participants are asked to fill out a template of their performed activities at the end of each week. The template provides cards where the participants can name the activity with a small description, who they did the activity with, and what emotions they felt during and after (with the help of emoticons). Participants are asked to write a project reflection with the help of the visualization that the research construct based on the gathered data. This reflections serves as input for a final interview, where participants are asked about their experience with the use of the visualization in the reflection process.

3	Description of the research population, in- and exclusion criteria *Additional explanation: Please describe which persons are eligible for your study. What criteria are used to select participants in your study, and what criteria are used to exclude possible participants?* *For example: We will randomly select participants from the JSF participant database with good vision and older than 18 years.*	The population exists of students at the Technical University of Eindhoven that are currently engaged in project work. All participants need to be over the age 18. Students within the departments of Industrial Design and/or Built Environment are preferred. Participants will be recruited by convenience sampling, recruiting acquaintances of the researchers.
4	Description of the measurements and/or stimuli/treatments *Additional explanation: Think about your outcome measures and the variables you will be collecting and describe them in a way such that another person understands what the participant will experience.* *For example: Participants will perform task A and see pictures from database B, and we measure validated Scale 1.*	The tests provide a list of activities in a chronological order, where the nature of the activity and outcome are recorded, as well as the category of people that were involved with the activity and the emotional experience during and after the activity. Participants are asked to write a project reflection with the visualization provided by the researchers, based on their progress data. The reflections are sued as input for the interview.

5	Describe and justify the number of participants you need for this study. Also justify the number of observations you need, taking into account the risks and benefits. *Additional explanation: Think about if you need 3 or 30 participants for example, and why? Do they need to provide their input once, or several times, and why?*	For this test approximately 5 projects would have to be tracked, in order to show how the design of the system could process the differences between projects. For this a weekly log is needed in order to construct a timeline that fits the project more than just a general timeline with superficial milestones.
6	Explain why your research is societally important. What benefits and harm to society may result from the study? *Additional explanation: What benefit will the results of your study have to society in general?*	This research aims to further develop and show a tool that helps students to track the progress of their project and reflect on this process whilst still engaging in the project, rather than at the end. This is attempted in order to support students in the guiding of their process and learning goals, in the end to improve the quality of produced designs.
7	Describe the way participants will be recruited *Additional explanation: How will you recruit participants for your study? For example, by using flyers, personal network, panels, etc.*	Participants will be recruited by a personal outreach by one or more of the researchers. For this outreach social media will be used, mostly WhatsApp and Microsoft Teams.

8	Provide a brief statement of the risks you expect for the participants or others involved in the study and explain. Also take into consideration any personal data you may gather and associated privacy issues. *<u>Additional explanation</u>: Risks for the participants can be anything from risk of data breach to risk of safety or well-being. Describe these possible risks and describe the way these risks are mitigated.*	The expected risks from this tests are minimal. There might be mild discomfort resulting from the noting of the emotion students felt during a certain activity, but as the template is self-reporting this discomfort is thought to be minimal. Next to that there is a further risk that participants might not feel at ease to share all thoughts (mental well-being). No personal data from participants will be collected, in order to try and minimize this risk.

Part 5: Self-assessment checklist

Note: answers in the blue boxes indicate that your research is eligible for fast-track approval		**Yes**	**No**
1a	Does the study involve human material? (e.g., surgery waste material derived from non-commercial organizations such as hospitals)		X
1b	Will blood or other (bio)samples be obtained from participants? (e.g., hair, sweat, urine or other bodily fluids or secretions, also external imaging of the body)		X

2	Will the participants give their consent – on a voluntary basis – either digitally or on paper? Or have they given consent in the past for the purpose of education or for re-use in line with the current research question?	X	
3	Are the participants, outside the context of the research, in a dependent or subordinate position to the investigator? *<u>Additional explanation</u>: Think about doing research on your own students or on your own employees. When there is a dependency or power imbalance between you and the research participants, you need to answer 'yes' to this question.*		X
4	Does the study involve participants who are particularly vulnerable or unable to give informed consent? (e.g., children (<16 years of age), people with learning difficulties, patients, people receiving counselling, people living in care or nursing homes, people recruited through self-help groups)		X
5	Will participating in the research be burdensome? (e.g., requiring participants to wear a device 24/7 for several weeks, to fill in questionnaires for hours, to travel long distances to a research location, to be interviewed multiple times)?		X
6	May the research procedure cause harm or discomfort to the participant in any way? (e.g., causing pain or more than mild discomfort, stress, anxiety or by administering drinks, foods, drugs, or showing explicit visual material)		X

7	Will financial inducement (other than reasonable expenses and compensation for time) be offered to participants? *Additional explanation: For an explanation of what is considered a reasonable compensation, see the topic participant fees from the HTI group*		X
8a	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)		X
8b	If yes: Will you be observing people without their knowledge in public space? (e.g. on the street, at a bus-stop)		X
9	Will the study involve actively deceiving the participants? (e.g., 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)		X
10	Will participants be asked to discuss or report sexual experiences, religion, alcohol or drug use, suicidal thoughts, or other topics that are highly personal or intimate? *Additional explanation: Think about your research population. For some participants, particular topics can be considered sensitive or intimate, whereas the same topics will not be perceived as such by other participants.*		X

Part 6: Self-assessment on privacy

The following questions (1-10) concern privacy issues, as laid down in the General Data Protection Regulation (GDPR). The Data Stewards and – if necessary – privacy team of TU/e will assess these questions. In some cases, more information is required to assess the privacy risks. If this is the case, you will be notified that the Data Stewards team will contact you.

The GDPR defines 'personal data' as any information relating to an identified or identifiable natural person ('data subject'). Personal data also includes data that indirectly reveals something about a natural person. Personal data can lead to the physical, physiological, genetic, mental, economic, cultural or social identity of a natural person. There are two main categories of personal data: regular personal data and special category personal data.

If you are not sure whether some of these questions below should be answered with a Yes or No, please contact a Data Steward first through rdmsupport@tue.nl.

	Note: answers in the blue boxes indicate that your research is eligible for fast-track approval	**Yes**	**No**
1	Will the study involve discussion/collection/processing of **regular** personal data, or will you collect and (temporarily) store video or voice recordings for the purpose of conducting interviews? *<u>Additional explanation</u>: For example, name, address, phone number, email address, IP address, gender, age, video or interview recordings? If you are not sure whether your data contains personal data, please contact the Data Stewards Team (rdmsupport@tue.nl).*	X	

1A	If yes: Please describe which regular personal data you will collect in this study?	Data about the current projects of the participants and what group the belong to (in order to be able to contact participants for an interview).	
2	Will the study involve discussion/collection/processing of **special category** personal data or other **sensitive data**? *Additional explanation: Examples of special category personal data are race, religion, health information, political views, genetic or biometric data for the unique identification of a person, sexual preference, etc. Health information concerns personal data of the physical or mental health of persons, including the provision of health care. Examples of other sensitive data is information such as communication data, financial records or credit scores, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, criminal records, data of vulnerable persons (children, people with disabilities, refugees), BSN number etc. Please be aware that the use of special category personal data in research requires extra security measurements in order to safeguard the privacy of data subjects and to comply with the GDPR. Processing of this special category data is prohibited, except for specific purposes and under certain circumstances. If you need to process special category data, please consult the data stewards at rdmsupport@tue.nl.*		x
2A	If yes: Please describe which special-category personal data and/or sensitive data you will collect in this study?		
If you answered yes to either question 1 or 2, please answer the questions below. If you answered no to both questions, you can skip this part and continue onto part 6. Also, if an answer to any of the following questions is 'yes', please contact a Data Steward at rdmsupport@tue.nl			
		Yes	**No**

3	Will your project involve the processing of personal data on a **large scale**? *<u>Additional explanation</u>: In general, any processing that involves more than 10.000 data subjects should be considered "large scale". However, if the data of approximately 1000 persons (or more) are involved, the data processing may still be considered large scale. In that case, besides the number of persons involved in the study, one should also assess (i) the amount of data collected from these persons taking into account the type/risk level of the personal data, (ii) the duration of the data processing, (iii) the geographic scope or extent of the processing. For example, if you would collect and process data across several European countries with 10+ socio-economic data items of 1200 individual persons for several years in a row, that is likely "large-scale processing". Other examples of a large-scale processing activity are:* · *Monitoring driving behavior of road users on Dutch highways* · *Collecting data of Covid patients* · *A hospital that processes patient data as part of its usual operations* · *A transport company that processes travel information of people who travel by public transport in a certain city. For example, by tracking them through travel maps.*		X
4	Does this processing activity involve the use of new or innovative technologies? *Examples of a new technology: combining fingerprints and facial recognition for physical access control, the use of bodycams in public spaces, the use of new technical methods in conducting research such as AI. This question also refers to new technologies that have not been deployed by TU/e so far.*		X

5	Does your study involve systematic (c.q. automated) monitoring of persons? *Additional explanation: Consider data processing activities that have the purpose of observing, monitoring or controlling individuals, for example in circumstances where the individuals are not aware by whom their personal data is collected and how it is used. Examples of such activities are using camera systems to monitor driving behavior on highways, monitoring email inactivity or employee phone use, certain applications of machine learning and artificial intelligence.*		X
6	Does the study involve collaborations (with third parties) in which data are shared or exchanged in order to link or combine data? *Additional explanation: This may often apply in a collaboration between the university and a commercial party, contract research, etc. It is important to assess this for all data in the entire project, not just your own data.* *An important consideration in this situation is whether the person whose data is involved could have expected that data from these different databases or sources of information were to be combined. For example, it is less likely for data subjects to expect that databases from different parties will be combined and the results are used for different purposes than one could reasonably expect; this may apply for example in a collaboration between the university and a commercial party.*		X
7	Will the study include data processing activities that prevent data subjects from exercising their rights or using a service or contract? *Additional explanation: Examples include processing operations carried out in public places that people cannot avoid (train station, airport, shopping mall, public university premises, etc.) or processing operations whose purpose is to allow or not allow data subjects to use a service or enter into a contract (examples: by refusing to pay a benefit, not being able to apply for a loan, etc.).*		X

8	Will the study process personal data to score, rank or profile persons? *Additional explanation: Examples: monitoring (highway) roads to give road users a "score" based on their detected driving behavior, a bank assessing its customers based on their creditworthiness, or an organization building behavioral and marketing profiles based on use of their website or navigating their website.*		X
8	Does your data processing include activities that involves composing "**blacklists**" – and, in particular, in relation to sensitive or special category data, such as communication data, financial records or credit scores, genetic data, biometric data, health data, camera surveillance data, location/GPS data, internet-of-things data, employee monitoring, observing or influencing behaviour, etc. *Additional explanation: This situation will not be a common occurrence in research, but you may indirectly be involved in this. In general, this typically concerns processing operations involving personal data relating to criminal convictions and offences, data relating to unlawful acts, data concerning unlawful or annoying behaviour or data concerning bad payment behaviour by companies or individuals are processed and shared with third parties (blacklists or warning lists, as used, for example, by insurers, hospitality companies shopping companies, telecom providers as well as blacklists relating to unlawful behavior of employees, for example in the healthcare sector or by employment agencies, etc.).*		x
9	Will personal data be transferred or shared outside the EU/EEA? EU data protection rules apply to the European Economic Area (EEA), which includes all EU countries and non-EU countries Iceland, Liechtenstein and Norway. *Additional explanation: The GDPR has drafted additional requirements for transfers data outside of the EU/EEA. Typically, additional safeguards must be implemented to protect the personal data of residents in the European Union. For example, if you collaborate with an American, Indian or Chinese university or other third party outside the EU/EEA, you must first check whether this is allowed and under which conditions this is allowed. Another typical example is storage of data on American providers of cloud (storage) services. Please contact the data stewards first to discuss this.*		X

10	Will any raw or anonymized personal data or any other sensitive data or research results from the project possibly be transferred to a high-risk country*? ***High risk countries**: China, Russia, Iran, Turkey, and North Korea.* *If personal data or other potentially sensitive data is exchanged with one of these countries, or if part of the data processing takes place in one of these countries: **an advice from the Data Protection Officer, the kennisveiligheidsteam (Knowledge Security team), and the CISO (Chief Information Security Officer) is ALWAYS required.***		X

Part 7: Data processing, storing and archiving

1a	Is consent your legal basis for processing the personal data in your study? *Additional explanation: What is a legal basis? One of main principles in the GDPR is to ensure that personal data is processed lawfully, fairly, and transparently. To comply with this principle, the processing of personal data also requires that you have a valid legal basis for the personal data processing activity.* *In research projects, the legal basis is often but not always consent. However, it is possible that it is not clear or not possible to establish whether to use consent as a legal basis.* *Some examples where consent may not be applicable as legal basis are covert research, data collection in public spaces, secondary data analysis of existing data, data that are transferred to you by a third party, consent is not possible or would require disproportionate effort, etc. In that case, please indicate which legal basis you think that applies or (preferably) contact a data steward first.*	☒ Yes ☐ No
1b	If yes: Please briefly explain how you will obtain consent from participants and send in your draft of the information letter and consent statement together with this form. You can download a suitable template here.	The participants are told in the recruitment message that participation is voluntary. A information letter is provided to inform the participants about the goal of the study. A consent form is provided to the participants.
1c	If no: Please briefly explain on which legal basis - other than consent - you will process the personal data in your study.	

2	In which way will you collect and process the (personal) data? *Additional explanation: Please describe which software (e.g., LimeSurvey, Atlas Ti, Qualtrics), tools (electronic lab journals, information management systems, etc.), technologies, apps or devices (Internet-of-Things, Fitbit, etc.), techniques (monitoring, interview, survey), special data environments (e.g., Living Lab), etc. you will use to collect or process data?*	Data is collected by letting participants fill out a template, that uploads the data to a DataFoundry server.
3	Where will the data and in particular the personal data be stored during and after completion of the study? If you have already uploaded your Data Management Plan, you can refer to your Data Management Plan. *Additional explanation: Please address the following:* · *Where will you store your data during the study and after you have completed the study? University supported-storage facilities are SURFdrive, SURF Research Drive, Ceph, departmental drives (this includes BE Project Drive), and the TU/e instance of Microsoft OneDrive. For most personal data, the use of SURF Research Drive, departmental drives (including BE Project Drive) and SURFdrive is required.*	The data will be stored on data foundry. The gathered data will be deleted after the end of the study, with the addition of two months. The data will be deleted on or before August 14, 2023

4	Which security measures are applied? *Additional explanation: Please address these questions:* · *Is access to your (personal) data restricted? If yes, how (access control, password protection, etc.)?* · *Who will have access to the data during and after completion of the study?* · *Will you anonymize or pseudonymize the data?* · *Is Bitlocker (Windows), FileVault (Mac) or similar hard-drive encryption active on your laptop?* · *What will you do with the data after your project has come to results? Do you need to keep all data?* · *How long will you store the data after completion of the project, or can/will (part of) the data be destroyed?* · *Will you or your supervisor want to keep the data for new or future research/reuse? Will you share (raw) data with others? If yes, how and how do you ensure that this is secure?* · *If access restrictions are required during and after the study, please explain how this is arranged.*	Access to the raw data is restricted to the researchers and their supervisor. The data will be password and MFA protected. Data in reports and publications will be anonymized. The gathered data will not be used in future research.

Part 8: Closures and Signatures

1	Enclosures (tick if applicable): ☒ Informed consent form; ☐ Informed consent form for other agencies when the research is conducted at a location (such as a school); ☐ Text used for ads (to find participants); ☐ Text used for debriefings; ☐ Approval other research ethics committee; ☒ The survey the participants need to complete, or a description of other measurements; ☐ Any other information which might be relevant for decision making by ERB; ☐ Data Protection Impact Assessment checked by the privacy officer ☐ Data Management Plan checked by a data steward	

2	Signature(s) Signature(s) of researcher(s) Date: May 12, 2023 Signature research supervisor (if applicable) Date:	

Participant informed consent form

Information sheet for research project "[M1.1 – AI Guided Design Process Tracking and Reflecting]"

1. Introduction

You have been invited to take part in research project "M1.1 – AI Guided Design Process Tracking and Reflecting",because you are in the contact list of one of the researchers and are currently engaged in a (design) project.

Participation in this research project is voluntary: the decision to take part is up to you. Before you decide to participate we would like to ask you to read the following information, so that you know what the research project is about, what we expect from you and how we deal with processing your personal data. Based on this information you can indicate via the consent declaration whether you consent to take part in this research project and the processing of your personal data.

You may of course always contact the researcher via j.d.braamskamp@student.tue.nl, if you have any questions, or you can discuss this information with people you know.

2. Purpose of the research

This research project will be supervised by Mathias Funk.
The purpose of this research project is to gather data about the progress of project based activities. This data is used in order to create and test visualisations that can be used as a reflectional tool. The gathered data will be used as input for the design process of this project and might be used in a report.

3. Controller in the sense of the GDPR

TU/e is responsible for processing your personal data within the scope of the research. The contact details of TU/e are:
Technische Universiteit Eindhoven
De Groene Loper 3
5612 AE Eindhoven

4. What will taking part in the research project involve?

You will be taking part in a research project in which we will gather information by:

§ Asking you to fill out a Miro template about your performed project activities and the emotions you felt during these activities at the end of each week for a period of 6 week.

§ Interviewing you about your opinion of the visualization of your process that will be provided to you at the end of the data collection.

For your participation in this research project you will not be compensated.

5. Potential risks and inconveniences

Your participation in this research project does not involve any physical, legal or economic risks. You do not have to answer questions which you do not wish to answer. Your participation is voluntary. This means that you may end your participation at any moment you choose by letting the researcher know this. You do not have to explain why you decided to end your participation in the research project.

6. Withdrawing your consent and contact details

Participation in this research project is entirely voluntary. You may end your participation in the research project at any moment, or withdraw your consent to using your data for the research, without specifying any reason. Ending your participation will have no disadvantageous consequences for you.

If you decide to end your patricipation during the research, the data which you already provided up to the moment of withdrawal of your consent will be used in the research.
Do you wish to end the research, or do you have any questions and/or complaints? Then please contact one of the researchers:

- Jelmer Braamskamp - j.d.braamskamp@student.tue.nl
- Maas Goudswaard - m.p.goudswaard@student.tue.nl
- Nikki Mureau - n.c.b.mureau@student.tue.nl
- Leqi Wang - l.wang2@student.tue.nl

If you have specific questions about the handling of personal data you can direct these to the data protection officer of TU/e by sending a mail to functionarisgegevensbescherming@tue.nl. Furthermore, you have the right to file a complaint with the Dutch data protection authority: the Autoriteit Persoonsgegevens.

Finally, you have the right to request access, rectification, erasure or adaptation of your data. Submit your request via privacy@tue.nl

7. Legal ground for processing your personal data

The legal basis upon which we process your data is consent.

8. What personal data from you do we gather and process?

Within the framework of the research project we process the folllowing personal data:

Category	Personal data
Contact data	*Name, e-mail*
Student data	*Activities for your project*
Emotional data	*Information about the emotions you felt during the activities*

Within the framework of the research project your personal data will be shared with:

- *Storage solution: DataFoundry (Netherlands)*

9. Confidentiality of data

We will do everything we can to protect your privacy as best as possible. The research results that will be published will not in any way contain confidential information or personal data from or about you through which anyone can recognize you, unless in our consent form you have explicitly given your consent for mentioning your name, for example in a quote.

The personal data that were gathered via online surveys, interviews, and other documents within the framework of this research project, will be stored on storage facilities that are supported by the ICT service of TU/e, in this case SURF ReserachDrive, which is password and MFA protected.

The raw and processed research data will be retained until August, 2023. Ultimately after expiration of this time period the data will be either deleted or anonymized so that it can no longer be connected to an individual person. The research data will, if necessary (e.g. for a check on scientific integrity) and only in anonymous form be made available to persons outside the research group.

This research project was assessed and approved on [date] by the ethical review committee of Eindhoven University of Technology.

Consent form for participation by an adult

By signing this consent form I acknowledge the following:

1. I am sufficiently informed about the research project through a separate information sheet. I have read the information sheet and have had the opportunity to ask questions. These questions have been answered satisfactorily.

2. I take part in this research project voluntarily. There is no explicit or implicit pressure for me to take part in this research project. It is clear to me that I can end participation in this research project at any moment, without giving any reason. I do not have to answer a question if I do not wish to do so.

Furthermore, I consent to the following parts of the research project:

3. I consent to processing my personal data gathered during the research in the way described in the information sheet.

YES ☐ NO ☐

4. I consent to making (sound/image) recordings during the interview and to processing my answers into a transcript.

YES ☐ NO ☐

5. I consent to using my answers for quotes in the research publications – without my name being published in these.

YES ☐ NO ☐

Name of Participant:

Signature:

Date:

Name of researcher:

Signature:

Date: