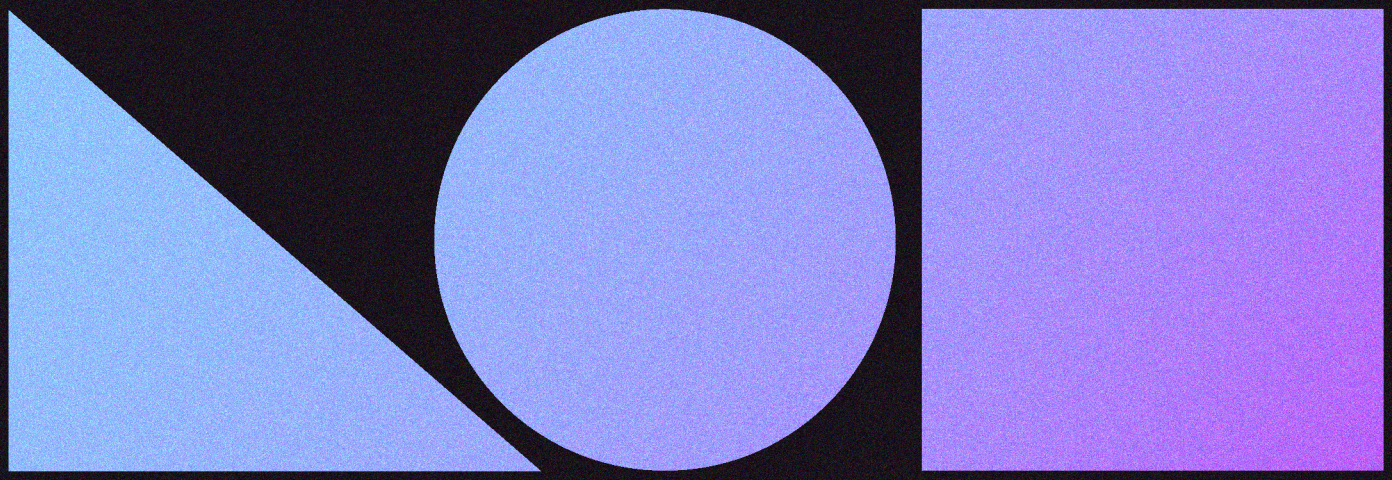

Power-full Reflexivity

Unveiling Power Dynamics to Foster Participatory Decision-Making in Organizations

MSc Design for Interaction
June 2023
Master Thesis

Hyerin Kang

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Supervisory team:

Dr. S. Chandrasegaran (Chair)

Dr. H. Verma (Mentor)

Company supervisor:

Dr. R. Bertossa (Mentor company)

Delft University of Technology

Industrial Design Engineering

Landbergstraat 15, 2628

CE Delft, the Netherlands

+31 15 27 89807

CGI Netherlands GTO Amstelveen

Handelsweg 53 Amstelveen 1181 ZA

+31 88 564 0000

Abstract

Academically, the application of participatory practices that involve the people who will use the products or services has become widely recognized and essential. However, many organizations struggle with implementing this concept within their organizational context, particularly when it comes to participatory decision-making. It is common for decisions to be made by a few individuals with authority, significantly impacting others who feel limited in their ability to influence the outcome. Consequently, there is a pressing need to develop innovative solutions to address these challenges.

This project, conducted in collaboration with CGI Netherlands GTO, aims to bridge the gap between the theoretical emphasis on participatory value and its practical application in organizations. Two research questions are formulated to guide the investigation: “How can participatory decision-making be integrated into GTO?” and “How can hierarchical structures and power imbalances in decision-making be overcome to embrace participatory decision-making?”

To address these questions, a proposed reflexivity exercise, known as Power-full Reflexivity, is introduced. The goal of this exercise is to assist individuals in positions of authority in recognizing the power dynamics inherent in the decision-making process. The ultimate objective is to facilitate the meaningful involvement of individuals who are affected by the decisions and have experienced the issues, granting them greater access and agency within the decision-making process. It is believed that the use of Power-full Reflexivity by decision-makers will enhance the participatory value in their decision-making practices, benefiting individuals through increased agency and fostering a collaborative and participatory environment within the organization.

Contents

01

Project Introduction

Chapter 1 introduces the research topic, raising its relevance to the reader. Subsequently, the project's client, context, and problem are demonstrated. Next, the research questions, the rationale, and how the research questions are addressed throughout the graduation project are explained. Finally, the project approaches are explained.

1.1 General Introduction

Organizations strive to make optimal decisions in the contemporary business landscape by considering all the potential consequences. However, despite these efforts, decision-making processes frequently face numerous challenges. Commonly, many teams encounter side effects from decision-making ills, such as bad choices, endless arguments, lost opportunities, and wasted time. In addition, many teams face obstacles while making crucial strategic choices. For example, members hit an impasse because their sight remains on their interest instead of the organization's overall interest. Another example of a common obstacle is when there is uncertainty about who is accountable for the decision, leading to revisiting the choices. Additionally, if team members are unsure of how to resolve conflicts constructively, discussions may turn into personal attacks (Garvin & Roberto, 2003).

This graduation project attempts to resolve the decision-making ills through participatory decision-making practice. Achieving successful group decision-making means utilizing the diverse array of expertise and abilities present in the team. It requires promoting individuals to express their opinions and inviting difference rather than fearing it. Furthermore, it requires effort to comprehend one another, particularly when faced with the stress and inconsistencies that often cause team members to withdraw. Essentially, it means functioning according to participatory values (Kaner et al., 2014).

This project, conducted in collaboration with CGI Netherlands GTO, seeks to bridge the gap between theoretical emphasis on participatory value and its practical application in organizations. The project context revolves around two groups in GTO, Tooling team and solving teams. The Tooling team provides customized support to the solving teams. However, one of the Tooling team's services, the dashboard building, had low demand from the solving team. Thus, the project's initial goal was to regain the trust of the solving teams to increase the need for the service. This problem was hypothesized to be caused by the lack of collaboration between the two teams, leading to a first research question,

"How to bolster collaboration between teams to co-design a sustainable and effective dashboard?"

The first research question was addressed by theoretical and empirical research. The research discovered a past decision that initiated the Tooling team's dashboard-building service. When the decision was made, the decision-making members couldn't reflect most of the solving team members' perspectives, which brought about the solving teams' lack of coordination and collaboration toward the service provided by the Tooling team. This finding prompted readjusted research questions as follows:

"How can participatory decision-making be integrated into GTO?"

"How to move away from hierarchical structures/power imbalance in decision-making to embrace participatory decision-making?"

Subsequently, various ideas were prototyped and evaluated, and a reflexivity exercise was developed, which is called Power-full Reflexivity. It aims to aid those in a position of authority in identifying the power dynamics in the decision-making process, having the ultimate goal to enable individuals who have experienced the issue and who will be most impacted by the decision to have greater access to the process. Instead of directly addressing or mentioning the power imbalance, the design aims to make the latent aspects of power more salient, enabling individuals within the teams to self-regulate. By doing so, it challenges the current status quo and demands action to initiate change.

1.2 Initial Assignment

1.2.1 Client

Founded in 1976 in Canada, CGI is among the world's largest IT and business consulting services firms. CGI is an insights-driven and outcome-based organization to help accelerate returns on clients' IT and business investments (CGI: About us, n.d). One department of CGI Netherlands, Global Technology

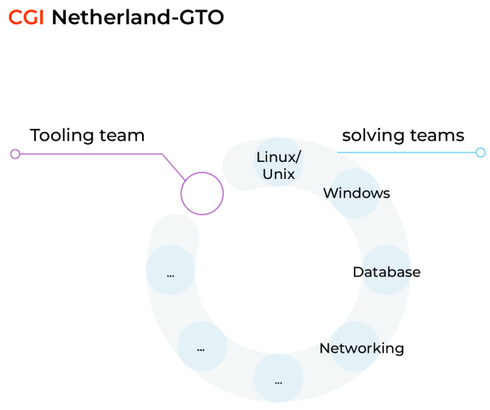


Figure 1. 1 Organizational structure, the relationship between the Tooling team and the solving teams

Operations (GTO), takes care of internal and external client IT infrastructure by monitoring their assets and solving problems. One department of GTO consists of eight teams, which can be grouped into two categories according to their function: the Tooling team and the solving teams.

Figure 1. 1 shows the organizational structure, the relationship between the Tooling team and the solving teams. The solving teams serve external clients to solve the specific clients' IT asset issues. They are technical experts in specific IT areas that they are taking charge of such as Linux/Unix, Windows, Databases, and Networking. The Tooling team works internally for the solving teams. In other words, the Tooling team works indirectly for the solving teams' external clients. Three developers from the Tooling team are handling scripting languages, such as Python, PHP, HTML, Javascript, Bash, and Powershell. They support the solving teams by making and managing software to monitor clients' IT assets.

1.2.2 Context & Problem

The Tooling team is a service provider, and the solving teams are clients. The Tooling team uses several tools to support the solving teams. They are dedicated to assisting the solving teams, so the teams' goal is to provide tailored service to the solving teams via tools.

A few years ago, a tool called "Splunk" was introduced in GTO to support the solving teams to give information about their daily job. The Tooling team lent support by building dashboards in Splunk. In total 14 dashboards were made for different purposes. Each dashboard was made for different teams, some of which are owned by more than one team. However, the solving teams' use of dashboards has dwindled over time, and feedback meetings to improve the dashboard decreased and eventually stopped. The purpose of adopting Splunk was to help the solving teams to work efficiently using dashboards, but their adoption was minimal and unconvincing. Hence, the Tooling team requested this issue be examined to find out what the shortage was in the built dashboard and how to improve the usefulness of Splunk dashboards, which would lead to an increased need for dashboard assignment.

1.3 Research Questions

I had two hypotheses for what caused the current problem. First, the Tooling team needed to involve the client more as an active partner to share and exchange the creation process and the product's value. The Tooling team focused solely on meeting client requirements to create a high-quality product, which aligns with the principles of "engineering and product centricity" mindset of the organization (G. M. Fuentes & Smyth, 2016). The product-centricity is the opposite concept of customer-centric service. Whereas the product-centric mindset focuses on delivering high-quality products, the customer-centric mindset puts customer needs and success in first place(Harre & Nielsen, 2020). In a product-centricity mindset, after the service delivery, the service values are shared and assessed by the stakeholders and project users (Vargo & Lusch, 2004), and the service value may either positively or negatively influence them. In contrast, Fluentes(2019) states that in a customer-centric service, the stakeholders are partners of the project instead of passive actors, improving the service experience by the notion that the customer is the co-creator of value. When a value proposition is designed with the relevant stakeholder from an early project stage, the stakeholder has an enhanced experience of the outcome by understanding its value.

Second, I considered that the Tooling team's proactive attitude and ability to lead the customer as a co-value sharer is significant to bring such a collaborative setting. One of the skills needed is understanding and translating the client's needs. The Tooling team needed assistance understanding and translating the client's needs, particularly in dashboard assignments where clients needed to envision what they wanted. This type of need cannot be easily expressed verbally, and the Tooling team's ability to tangibly demonstrate the client's needs fell short. Going back to the first point, providing customer-centric service requires the Tooling team to understand and translate the client's needs and usher the solving teams in recognizing and eliciting those needs.With these hypotheses in mind, an initial general research question was formulated:

"How to bolster collaboration between teams to co-design a sustainable and effective dashboard?"

Multiple interviews were conducted to answer the initial general question (Chapter 3). The interview results revealed that the reason for the lack of active collaboration was present prior to the start of the collaboration. The solving team members referred to as engineers, felt that their thoughts were not considered when the decision was made regarding selecting the tool that would be used in collaboration with the Tooling team. Without knowing why such decisions were made, the solving teams felt they just received a solution they had to work with. Based on this finding and extra analysis, I discovered that the problem was due to a lack of involvement of key stakeholders in decisions they were directly concerned with. Furthermore, the literature review revealed that power imbalance among stakeholders of key decisions makes participatory practices in decision-making challenging in organizations. Based on these findings, two more

contextual research questions were formulated that redefined the scope of the research and shaped the design direction.

"How can participatory decision-making be integrated into GTO?"

"How to move away from hierarchical structures/power imbalance in decision-making to embrace participatory decision-making?"

Chapter 4 will give a detailed explanation of the redefined problem being a power imbalance and a solution approach will be given.

1.4 Project Approach

The project followed the Double Diamond method, as shown in Figure 1. 2. All the activities conducted in the project were used either for: (1) the diverging mindset, exploring an issue more widely or deeply, or (2) the converging mindset, taking focused action (Design Council, 2019). The broadening and narrowing of the scope of the project are represented in the four processes of the methods: Discover, Define, Develop, and Deliver. The process was carried out in an iterative manner. For example, interviews and literature reviews were conducted interchangeably, enabling a comprehensive exploration of how the literature comments on the issues raised during the interviews.

The research used the semi-structured interview during the empirical research (Chapter 3) and design/ prototype evaluations (Chapters 6, 7). The collected data through the semi-structured interviews were analyzed using Grounded Theory Method (Blaser &Strauss, 1957)

In the ideation process (Chapter 5), the Integrated Creative Problem Solving (iCPS) (Buijs & Van der Meer, 2013) approach was used to structure the creative workshop with student designers. The workshop was planned with different activities following methods such as H2's (Prince,1970; Nolan, 1989) Brainstorming (Osborn, 1953), and Hits and Dots (Buijs & van der Meer, 2013).

During the conceptualization process (Chapter 6), several pilot and formal evaluations were conducted with the potential users. At the end of the conceptualization process, an expert consultation was used to specify the design direction, leading to the final design's development. Lastly, The final design's evaluation was accompanied by a 5-point Likert scale survey (Likert, 1932) besides the semi-structured interview.

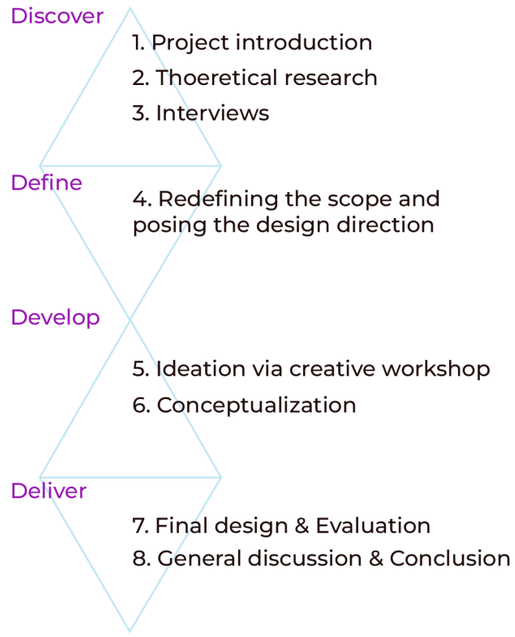


Figure 1. 2 Project process

02

Theoretical Research

Chapter 2 introduces the readers to various theoretical perspectives that led to discovering opportunity areas to resolve the project's problem. The first perspective delves into collaboration, problem- solving, and individual adjustment toward organizational innovation. The second part gives an understanding of power and democracy.

2.1 Theoretical Research Approach

This part consists of literature research conducted during various phases of the project. The first part of the literature research was focused on exploring the theoretical grounding of the problems identified in the interviews with the GTO members. The interviews are analyzed in Chapter 3.

Initially, the research focused on the condition for collaboration (Section 2.2), the skill needed for problem-solving (Section 2.3), and the difficulty in adapting to changes in the client's perspective (Section 2.4).

After defining the core problem as an absence of participatory decision-making that derives from power imbalance between the members, which is elaborated in Chapter 4, literature was researched about power, the kinds of power, and participatory practice (Section 2. 5). Consequently, to find solution approaches, the concept of democracy and the design approaches that tried to realize democracy was researched (Section 2.6).

2.2 The Condition for Collaboration

2.2.1 Establishing a common knowledge

In Section 1.3, two hypotheses were raised, which could have caused the current problem of poor collaboration between teams. The first hypothesis was that the Tooling team could not involve the client as active partners to share and exchange the creation process and the product's value. In other words, instead of providing customer-centric service, they stayed in an engineering and product mindset. So, what are the determinants for a collaborative team that delivers customer-centric service?

In literature, common knowledge between different collaborators was key to the project's success. Common knowledge refers to the essential understanding of a topic shared by organization members who are engaged in communication (Demsetz, 1991). In Information System Development(ISD), the success of the development does not solely depend on the skills or knowledge of the Information System (IS) developers, but it depends on the user's knowledge of the technical issue (K. M. Nelson & Cooprider, 1996). When applied to the case of GTO, the common knowledge would be the aggregate of both teams' knowledge. For example, for the Tooling team, it could be the knowledge of the solving team's problem and needs, workarounds, and problem-solving ability and skill through the tool called Splunk. Then on the solving teams' side, it could be their understanding of the possibilities and limitations of the tool, knowledge of their data and the connection between the data, and lastly, an understanding of their problem and a concrete desired effect that needed to be externalized.

A similar notion to the common knowledge, is community knowledge (Zhang et al., 2009). Scardamalia indicated that to establish community knowledge, collective cognitive responsibility is required. In the business world, it is called an organization's corporate knowledge (Scardamalia & Bereiter, 2006). The responsibility of members to grow community knowledge consists of work such as sustaining and advancing knowledge collectively, learning collaboratively as well as achieving personal growth.

An example is the Boeing 787 aircraft, built by nearly 5000 engineers from different countries. The construction happened on multiple sites over a long period, but all parts fitted together nicely (Gates, 2005). Engaging in a collaborative creative challenge, team members should understand the high-level goal and apportion responsibilities because nothing can be done individually. Given the nature of the work, which involves an interrelated network of ideas, sub-goals, and designs, success depends on all members rather than a leader. The purpose of sharing responsibility is to establish effective workflow, to assign and attain practical assignments, to understand and help team dynamics (Gloor,

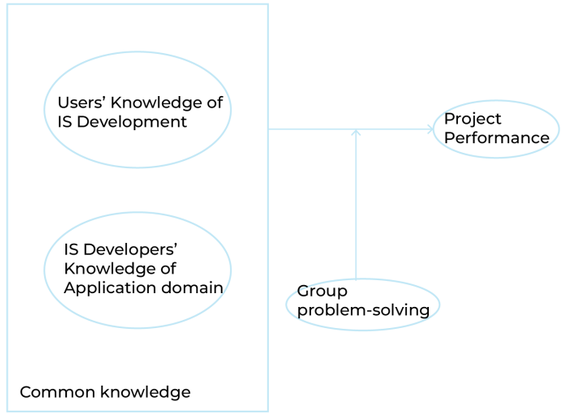


Figure 2. 1 Common knowledge adopted from Tesch et al.(2009)

2006), to be conscious when activities and ideas appear (Scardamalia, 2002; Scardamalia & Bereiter, 2006), and to manage the process as a whole.

Of course, collective knowledge requires setting timelines, specified goals, and deadlines. The idea of collective responsibility is to engage all members in deciding deadlines, be serious about achieving goals, and redefine goals and schedules when needed (Zhang et al., 2009).

Only through teams' collaboration to gain enough common knowledge, can they gain long-lasting and efficient results. According to the theory of knowledge integration, a successful knowledge integration guarantees the success of the project, and this can be done through two factors: 1) the amount of basic common knowledge that exists between participants and 2) the level of coordination or communication among team members (Tesch et al., 2009). Another external determinant as an enabler of knowledge transfer is organizational culture to foster cooperation and collaboration which encourages employees to share and collaborate (Goh & Richards, 1997).

2.2.2 Making the goal clear and shared

One of the reasons that caused a difficulty for the solving team members to adapt to the change might be that others chose a tool called Splunk, and the reason for the decision was not clear to the solving team because it was not efficiently communicated to all members. Concerning the matter, Katzenbach and Smith(2000) noted it is central for a team to have a shared commitment, which motivates the team to perform as a collective unit instead of individuals. Furthermore, the time invested in shaping the purpose and translating the purpose into specific performance goals determines the team's success.

Heidrich et al. (2007) also indicated that higher goals need to be translated into operational goals in software-intensive organizations. All software developed within a business that varies in size and environment encompasses larger business goals, strategies, and measures of success. While all business strategies are employed to achieve business objectives, the problem is that these objectives are not addressed explicitly enough. Thus, one cannot check if one has achieved the objectives or not. Moreover, it is vague whether the higher objectives are translated into lower-level business objectives for each project.

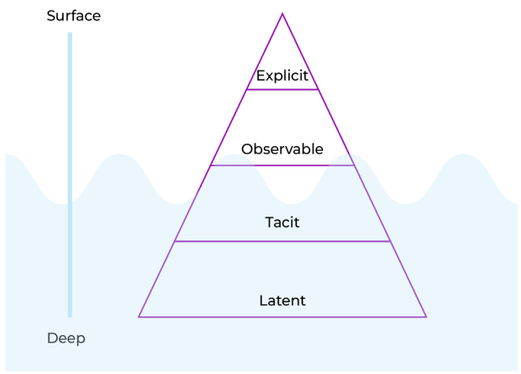
Considering that GTO is in pursuit of agile working methods, other authors remarked on the difficulty in attaining shared goals among members. Stray et al.(2021) mentioned that establishing a shared goal is central to the agile team. However, goal implementation can be more challenging in a large-scale agile organization. Obstacles in forming shared goals involve goals that are not known to teams, management setting the goals without involving the teams and replacing goals with deliverables and deadlines. Similarly, because the solving team did not fully understand the reason behind the decision, they could not achieve buy-in from the members in implementing the decision.

2.3 The Skill Needed for Problem Solving

2.3.1 Discovering user needs

The second hypothesis in Section 3.2 mentioned that the Tooling team had difficulty understanding and translating the client's needs, particularly in visualizing dashboards that the clients wanted. These types of needs cannot be easily expressed verbally, and the Tooling team's ability to tangibly demonstrate the client's hidden needs fell short.

Using special methods can lend support to gain a deeper knowledge of the users, even if it is not expressed verbally. There are four levels of knowledge: explicit, observable, tacit, and latent. The first two can be spotted relatively easily. Explicit knowledge can be put into words and is easily shared with others, for instance, "The new year will be on Sunday." Observable knowledge is obtained by observing an occurrence or behavior of people. The last two are more difficult. Tacit knowledge refers to something hard to communicate verbally, even though



The levels of knowledge. Adopted from Convivial Toolbox (Sanders & Stappers, 2012)

you might know most likely. Finally, latent knowledge refers to thoughts and ideas one has not experienced yet, but opinions can be developed based on past experiences. Latent knowledge will be identifiable in the future, but it is hard to express in the present (Sanders & Stappers, 2012).

Figure 2. 2, which is adopted from Sanders and Stappers (Sanders & Stappers, 2012), shows the four levels of knowledge in the pyramid floating in the water. The first two layers, explicit and observable knowledge that people know are like the tip of the iceberg. Then, it requires energy to look beneath the water's surface to

get to know the tacit and latent levels. The author states that generative design research tools and techniques equip one to acknowledge people's tacit and latent knowledge. Therefore, referring to such design research tools can lend the opportunity to develop new inquiry methods that apply to GTO.

2.3.2 Overcoming design fixation & more focus on problem framing

From the interview with one of the solving team managers, he assumed that one of the reasons for the problem would be calling the new project "Splunk" assignment instead of a dashboard assignment because the solving teams felt more emotionally distant that they had to use the new tool. Accompanied with the naming issue, the solving teams took a long time to come up with their existing problems that dashboards could solve.

Already deciding on a solution even before a thorough problem exploration can be a danger to problem-solving. One of the dangers is called design fixation. Jansson and Smith(1991) state that design fixation is a counterproductive phenomenon making one blind by adhering to a limited set of ideas in the design process. There are two types of fixations: functional fixedness and mental set.

The functional fixedness can be observed when an object is used merely by the limited modes it was designed. The use of an object is restricted to previously known functions. Another type of fixation is the 'mental set'. In Luchins et al.'s study(1959; 1970), an experiment was conducted in which ten mathematics/word problems were given to subjects. The first nine problems could be solved by a complicated algorithm except for the last one, which could be solved by a more straightforward and obvious alternative method. However, most subjects were so fixated on using the same approach they used for the first nine that they didn't recognize the other simple way on the last problem. As a result, they took a long time or couldn't solve it. Examples accompanying design problems can restrict one's thinking to certain concepts. It could have brought a more comprehensive range of design ideas if not fixated on examples, and Jansson and Smith refer to this as "design fixation."

Before trying to implement or define the best solution, first, one should take enough time to define the problem. Defining a problem is the beginning of the design process. Therefore, a problem solver must be careful if they misinterpret the tasks, leading to the wrong solution. The way to prevent this is to examine the problem from various perspectives. Adams et al. (2003) note that professional designers display more problems than novice designers. The large scope of factors in design determines this 'broadness' of the problem perception, which can be found in the lists of topics, a problem definition space, the amount of the gathered information, and the time spent in setting the problem during problem-solving.

2.4 Difficulty in Adapting to Changes- In the Solving Teams' Perspective

From the interview with the colleagues, it was learned that the client, the solving team members, needed more convincing in using the newly adopted tool called Splunk, with which the service provider, the Tooling team, could deliver dashboard building service. However, despite the Tooling team's continued effort to persuade the solving teams of the new tool's potential, they were still not convinced enough. Furthermore, disagreement was discovered about the tools' adoption among the solving team members.

Concerning the adoption of new tools, the tools' specialty should appeal to the potential customer, but often customers do not know what it is or how to use it, so it is not as meaningful to them as it is supposed to be. However, the benefits of using Splunk were communicated, but somehow it could not convince the solving team. The benefit was that it allows users to easily monitor and search through big data with an overview of multiple sets of data. The users can look for information in one place instead of going through multiple sources.

So, why are solving teams hesitant to try the new tool? One reason might be that every change requires effort to adapt. It should be noted that everyone's capacity to accommodate a new environment can differ, and this affects individuals' attitudes toward the change. In adopting the new tool, training and self-motivation are required to learn the new technology. Tulenheimo (2015) calls it the challenge of social aspects of new implementations. Engineers become experts in a specific tool after using it for a long time. While one seldom has the time and motivation to get trained in new software, getting used to different software and new routines can be overwhelming for a conservative.

Another reason might be the impossibility of fully understanding the benefit of conforming to the change. For example, Tulenheimo (2015) noted that clients could not efficiently differentiate a new tool from other known tools, which, in the author's research context, happened in selling a new building information modeling (BIM). Because customers are unaware of the new model, they could not express what they want and need. Similarly, even as-built models that offer

higher performance than the original model do not sound novel to the customer due to their lack of knowledge on how to use them.

2.5 Power

Section 1.3 mentioned a change in the research direction, which led to two readjusted research questions related to participatory decision-making and moving away from power imbalances within a company. This section will explain the theoretical basis of the two readjusted research questions, which include the different kinds of power, the understanding of power, and how power dynamics relate to participatory practice.

2.5.1 The forms of power

To understand what power is, there are three forms of power that expand the meaning of how individuals' power can relate to one another. The three forms of power are 'power-over', 'power-with', and 'power-from-within'. Table 2. 1 explains these three forms of power.

Forms of power	Explanation
Power-over or Coercion	'Power-over' is to exert power over other groups or people and to let another person do something. It is closely related to employing organizational resources, such as a position as project leader, access to resources, a capacity to resolve the unclarity, setting an agenda, or enrolling (Pitkin, 1973). Power-over is opposed to the belief of 'power-with' which says that power can be a co-possession of multiple stakeholders.
Power-with	'Power-with' is a jointly developing power. Instead of a few people controlling a situation, 'power-with' grants power over collaborating partners so that they develop it together. 'Power-with' calls for equal power between individuals and sets the stage for a fair fight (Metcalf & Urwick, 2004).
Power-from-within or empowerment	Starhawk (2012) continued furthering the notion of 'power-with' to 'power-from-within'. The 'power-from-within' first recognizes the power that resides in oneself, the ability to control resources, make plans, and shape actions. Moreover, in a collaborative group, each individual's 'power-from-within' can be fostered and empowered, developing a collective power or solidarity (Starhawk, 2012).

Table 2. 1 The three forms of power

The understanding of power-with and power-from-within would lead to the acknowledgment and a greater appreciation of an individual's strengths.

2.5.2 Five forms of power manifested in service design practice

Goodwill et al.(2021) outlined a framework for power literacy in service design which comprises five forms of power that manifest in service design practice.

Forms of power	Explanation
Privilege power	Privilege power comes from unearned advantages such as social position or identity that allow influencing a design process. It can include power derived from race, gender, body state, etc.
Access power	Access power is an ability to influence who is included and excluded from a design process. Who is involved in the process and the extent to which various stakeholders are granted access to the process can have a significant impact on power dynamics and how the process is shaped.
Goal power	Goal power refers to the ability of designers to form the project, including how the problems are formulated, goals are chosen, and how the whole project is structured. How problems and the goal is established can support certain individuals' interest, and empower or discourage certain individuals from participation, especially marginalized ones, and affect the outcome of the decision-making process.
Role power	Role power refers to the ability to regulate the degree of involvement of the participants who have already been given access to the projects. This includes roles assigned to actors and the ability of each participant to influence decision-making that results in hierarchies.
Rule power	Rule power is the ability to decide the way of working used by the participants in the project.

Table 2. 2 The framework for power literacy in service design adopted from Goodwill et al.(2021)

The work aimed to make designs more participatory and equitable by enabling designers to have a deeper understanding of power, privilege, and social structures. The five forms of power are privilege power, access power, goal power, role power, and rule power. Table 2. 2 explains these forms of power.

2.5.3 Participatory practice

Two methods, participatory decision-making and co-design, view end users' participation in the process as its principle.

First, participatory decision-making means using the full range of knowledge and abilities in membership. It entails getting people to speak up and welcome diversity rather than avoiding it. It entails a struggle to comprehend one another despite the obstacles and conflicts that put the group at a standstill (Kaner et al., 2014).

Second, the co-design approach holds individuals' participation as its crucial value. Co-design refers to designing with, not for, people. Co-design's main goal is to uplift the voices and contributions of people with lived experience. People with lived experience refers to someone who has been impacted by one or more issues (McKercher, 2020).

McKercher states that power imbalances affect who can take part in co-design. Because often, during the design process, people with less power cannot exercise power equally. Hence, the author suggested a few ways to address the power imbalance: addressing power differentials between individuals and groups, the cultural change in systems and organizations, the need to increase collective power literacy, and implementing roles to care for co-design (McKercher, 2020).

2.6 Design and Democracy

2.6.1 Three perspectives of democracy

Knutz et al., (2014) mentioned that according to Max Weber, a pioneer of the modern notion of democracy, democracy is seen as "a political system in which people are defined as participants in the polity (the state) rather than as passive subjects." To Weber, being a citizen allows one to participate in the decision-making process, policy formulation, and leader election. Having this concept as a foundation, Kuntz expounds on three conceptions of democracy: Liberal, Deliberative, and Participatory Democracy.

First, Liberal Democracy puts individuals highly, so each one's preferences become the constituents of the democratic process. For instance, free and fair elections and a competitive political environment are of interest to Liberal Democracy.

Second, the focus of Deliberative democracy is on a public debate rather than the election process. Arguments and deliberation (rather than voting) are used for political participation, and the concept favors the idea of involving different interests and attaining mutual respect for different political voices. It supports citizens' public debate and communication instead of political debate between opinion leaders.

Third, Participatory Democracy thinks that actual citizen engagement is the focus of democracy, rather than having a debate (Deliberative democracy) and the election processes (Liberal democracy). The citizen's engagement goes beyond the domain of politics, such as workplaces or communities, through the citizen's voluntary initiation. They are capable of producing public values through action. The need for government involvement in participatory democracies is reduced – or not needed at all.

2.6.2 Design for democracy

Based on three Democratic concepts, Knutz et al. (2014) introduce three design research approaches for democracy: participatory design, adversarial design, and activism design.

The first approach is participatory design. Its focus is recently on "democratic innovation." Two perspectives view this slightly differently. The first view of democratic innovation involves stakeholders and lead users (von Hippel, 2005) in making discrete objects and products. It is innovative because the stakeholders and lead users take the initiative by taking control and power. However, the first view received critics that the precondition of democracy is the market industry which depends on producing novel products, a product-centric view.

The second view, adversarial design stems from the second view of democratic innovation, which views it as a process for radical social change in developing services, systems, and environments through political protest. By doing so, it underpins more sustainable lifestyles and consumption habits. In contrast to a product-centric approach, they stress increased citizen participation. Moreover, designers' ability to construct agonistic spaces is central. It also highlights spaces, wherein narrow markets are protected, and marginalized groups are empowered (Björgvinsson et al., 2010). In agonistic spaces, a society's existing political structures and power are revealed and contested. Nevertheless, the critiques point to uncertainties about how it could enable people and citizens to participate

actively in social change and how it may equip people with the power to unsettle the power structure.

The third approach, design activism, is not taking a form of political protest. Instead, it resists in a designerly or artistic way to overturn and unsettle power structures to redistribute bodies, ways of doing, acting, roles, and identities.

It relies on ‘disruptive aesthetics’, an aesthetic effect that disrupts systems made by the power that decides who has the right to say, who has to listen, and what is regarded as right. Moreover, Ranciére’s concept of ‘aesthetic dissensus’ interweaves art and politics. It is not a result of attempts to overthrow institutional power. Instead, it emerges from non-violent actions that disrupt the established ways power is exerted over certain groups in society. This disruption can create openings for new forms of participation and identity formation. While similar to agonistic spaces, the difference is that aesthetic dissensus emphasizes the role of critical artistic practice in rupturing power structures rather than political action.

While these three design approaches for democracy are not entirely exclusive from each other, they accentuate different aspects to bring democracy through design. These three approaches will serve as a guide for distinguishing the objectives of the prototype ideas being developed.

03

Interviews: An Exploration of the Problem’s Context

Chapter 3 presents the empirical research through interviews with the GTO colleagues., including the Tooling team and the solving team members, and the managers of GTO related to the project context.he interview approach, the interview results, and the opportunity space found from the interviews are shared.

3.1 Interview Approach for the Tooling Team and the Solving Team

3.1.1 Goal, participants, procedure, data collection

» **Goal, participants, and procedure**

To understand the problem's context, I engaged in semi-structured , virtual interviews with the GTO colleagues. The overall interview aimed to gain a contextual understanding of the problem and verify the hypothesis. In total, I interviewed nine people (See Table 3. 1), and all were interviewed individually. Each interview lasted about one hour on average. Occasionally, the interviewees were approached afterward if there was some missing information, for instance, to understand how each dashboard was made chronologically.

Interviewee	Detail
Four solving team members	Rob, Mark, Ryno, Joe
Two Tooling team members	Ray, Andi
Three managers of GTO	Head manager of GTO: Cedric the Tooling team's manager: Lukas One of the solving teams' managers: Alex

Table 3. 1 Overview of interviewees, assigned with pseudonynns

» **Data collection**

All interviews were audio recorded and transcribed, and the data was analyzed following the variation of the Grounded Theory Method (Glaser & Strauss, 1967) that emphasizes openness and creativity in interpreting data. Using an Atlas program, a tool that supports analyzing unstructured data such as interview trascripts, the interview transcript was filtered to identify the meaningful texts , and they were analyzed into two levels: code and concept. The meaningful text was first marked and labeled with code. Then, when similar quotations appeared, they were grouped to form concepts.

3.1.2 Data analysis approach: identifying the mutual understanding between the Tooling team and the solving team

The goal of the interview with the Tooling team and solving teams was to investigate how the teams interacted with each other during a dashboard assignment. The general questions for the solving teams and the Tooling team are found in Appendix A, and the more specified questions employed to identify mutual understanding between them are in Appendix B.

One part of the interview questions aimed to see if mutual understanding was established between the collaborating partners.

» **Groups of peopole and interactions identified in the context**

During dashboard building, interactions that involved three different groups of people were identified:

1. Tooling team members

2. Representative/ contact person of the solving teams (which are also members of the solving teams)

3. Solving team members

Interactions between these groups can be divided into two sections:

1. Between the Tooling team and the contact person.

2. Between the contact person and the solving team.

An overview of the interactions is visualized in Figure 3. 1.

The "levels of mutuality of knowledge" by Dillenbourg and Traum (2006) were adapted to fit the interactions. Criteria were developed for each interaction, to match the different perspectives. Table 3. 2 and 3. 3 are for the interaction between the Tooling team and the contact person. Table 3. 2 from the perspective of the Tooling team and Table 3. 3 from the perspective of the contact person. Table 3. 4 and 3. 5 are for the interaction between the contact person and the rest of the solving team members. Table 3. 4 from the perspective of the contact person and Table 3. 5 from the perspective of a member of the solving team.

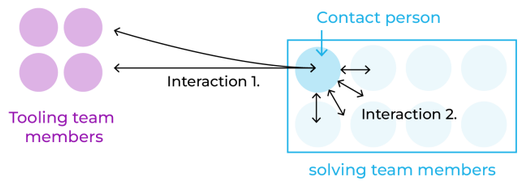


Figure 3. 1 The overview of the interactions

Using these criteria, interview questions were prepared to reveal one's degree of initiative and motivation to partake in the process, one's understanding of the problem, and problem-seeking initiative based on problem understanding. For instance, Table 3. 2 was used to create the Tooling team interview questions. The

questions inquire if the Tooling team understood the clients' problem and thought together with the solving team on how to solve it by considering a deeper solution than merely providing a tool-based solution. If all the answers are "yes", the Tooling team's mutual understanding would be at "understand level (level 3)".

The questions are, for instance, "How was your understanding of the client's problem?" and "Why did you think the dashboard would solve their problem?" to deduce the level of mutual understanding. Conversely, questions asked for the solving team are, for instance, "What kind of questions did the Tooling team ask you?", "Did you understand the purpose of the questions?", "Did you also have some questions for the Tooling team?" and "Were there any agreements or disagreements between you and the Tooling team? If there was, can you tell me about it? If there was any disagreement, how did you try to solve it?" The interview questions employed to identify mutual understanding are in Appendix B

Figure 3.2 Mutual level of understanding analysis diagram

The solving team members interviewed and introduced in this chapter were all contact persons. Thus, the mutual understanding between the contact person and the solving team members will be presumed from the perspective of the contact person into one level.

Section 4.2.3 analyzes the interviews, focusing on the process of dashboard building based on the criteria in Tables 3. 2, 3. 3, 3. 4, and 3. 5. Each step in the process will be analyzed, resulting in levels of mutuality of knowledge for each dashboard. This is visualized according to Figure 3. 2.

Criteria used to identify the mutual level of understanding between the Tooling team and the solving team (From the Tooling team's perspective)

Levels of mutuality of knowledge	(Level 1) access: A can infer that B can (not) access X	(Level 2) perception: A can infer that B has (not) perceived X	(Level 3) understanding: A can infer that B has (mis-)understood X	(Level 4) agreement: A can infer that B (dis-) agrees on X
Criteria	The Tooling team delivered the work to the client without meaningful interaction with one another. Unilateral relationship.	The Tooling team gathered the information(answers) from the solving team, focused on merely implementing the dashboard. Unilateral relationship Not reasoning why clients have such needs and why the dashboard will be the best solution for the problem. One doesn't understand the requirements and information. (e.g., meaning behind the metrics.	The Tooling team seemed to understand the solving team's problem and thought together with the client how to solve the problem together by considering a more profound solution than merely providing tool-based solution.	They explored the possibilities and limitations of the solution with the client.

Table 3. 2 Criteria used for assessing interaction between the Tooling team and solving team: when the interviewee was the Tooling team member.

Criteria used to identify the mutual level of understanding between the Tooling team and the solving team (From the contact person's perspective)

Levels of mutuality of knowledge	(Level 1) access: A can infer that B can (not) access X	(Level 2) perception: A can infer that B has (not) perceived X	(Level 3) understanding: A can infer that B has (mis-) understood X	(Level 4) agreement: A can infer that B (dis-) agrees on X
Criteria	Unilateral relationship. The work of Tooling team's work was delivered without meaningful interaction with one another. No interaction, but service is provided. E.g., 'the Tooling team did something for us, but I don't know exactly the purpose of it'.	The contact person answered the questions but didn't understand the purpose of the questions asked by the Tooling team. E.g., 'I gave the answers to the questions they asked. I don't know why they asked these questions. I can only give answers to questions that I know.'	The contact person understood the problem and the need for it to be solved. He thought about the best solution together with the Tooling team. (Not tool centered)	They explored the possibilities and limitations of the solution with the client.

Table 3. 3 Criteria used for assessing the interaction between the Tooling team and solving team: when the interviewee was a contact person from a solving team.

Criteria used to identify the mutual level of understanding between the contact person and the rest of the solving team (From the contact person's perspective)

Levels of mutuality of knowledge	(Level 1) access: A can infer that B can (not) access X	(Level 2) perception: A can infer that B has (not) perceived X	(Level 3) understanding: A can infer that B has (mis-) understood X	(Level 4) agreement: A can infer that B (dis-) agrees on X
Criteria	Other members knew that I was working with the Tooling team.	Other members checked the content of the progress.	Other members checked the progress, and they shared ideas about it.	We agree or disagree with the thoughts or suggestions.

Table 3. 4 Criteria used for assessing the interaction between the contact person and the rest of the solving team: when the interviewee was a contact person.

Criteria used to identify the mutual level of understanding between the contact person and the rest of the solving team (From the solving team's perspective)

Levels of mutuality of knowledge	(Level 1) access: A can infer that B can (not) access X	(Level 2) perception: A can infer that B has (not) perceived X	(Level 3) understanding: A can infer that B has (mis-) understood X	(Level 4) agreement: A can infer that B (dis-)agrees on X
Criteria	The contact person worked with the Tooling team on behalf of our team. The progress was not known to us.	The contact person asked for some ideas from the team members. We gave our answers, but we didn't think that we made the decision. (passive attitude)	The contact person asked for some ideas. Understanding the subject, we gave our ideas.	We agree or disagree with the thoughts or suggestions.

Table 3. 5 Criteria used for assessing the interaction between the contact person and the rest of the solving team: when the interviewee was a solving team member.

3.2 Interview Approach for Managers

The interview setting was the same as the way described for the solving team and the Tooling team. The questions posed to the managers focused on two main areas: the decision-making process and how well the decision about choosing Splunk aligned with other team members, particularly with the solving teams. Additionally, the managers were asked how they communicate with each other across different positions. A detailed record of the questions is in Appendix C, and the interview results are presented in Section 3.5.

3.3 Interview Results: Analyzing the Context

This section expounds on the data gathered from the interviews to gain a deeper understanding of the context. First, it will be explained how the tool was adopted and how GTO received the tool (Section 3.3.1). Second, a description will be given of how the solving team uses the completed dashboards (Section 3.3.2). Third, the problem-solving processes, the interaction between the two teams, and the understanding of the problem for gathering the requirements during each assignment will be given (Section. 3.3.3). Then, the problems and opportunity areas discovered from the interview are shared (Section 3.4). Lastly, after realizing that the current situation is closely related to the decision-making process concerning GTO's power dynamics, using the understanding of the power from the literature review in Section 4.5, an analysis will be done to see what kinds of power are exercised in the GTO (Section 3.5).

3.3.1 Interview results: initial findings on the context

This section will first explain the context which was derived from the interviews, to analyze the initial problems within GTO.

In 2018, a new vision for the future of GTO was shared by the head manager. Teams were working distantly from each other and from clients. Even though GTO teams work for the same client, it was difficult to see their collective contribution. The new vision would have teams cooperate better with each other and with the client. By working closer together, one's knowledge and expertise could also increase. For this, a full-stack management system was introduced. Using a metaphor, they had a narrow view of the elephant's separate parts before, but now, they have a complete picture of an elephant with the full-stack management system.

A brainstorming session was held among all GTO members to consider how to make different teams work closely with the same client. During the brainstorming session, a Six Thinking Hat method, which enables looking at the problem from different perspectives, was used, after which the members could vote on the suggestions. Additionally, GTO reorganized its setup based on the foundation of people, processing, and technology.

After the brainstorming session, the GTO head manager hired an external supplier, proposing an optimal scenario for the new organization setup and a toolset that would usher GTO to a full-stack management working style. The toolset was Splunk.

The decision-making process for adopting the new toolset took about seven months. And a critical insight from the interviews was that most solving team engineers were not involved. From the interview, two of the solving team members who are potential users of the tool and two architects as experts joined in a few meetings to validate the tool with all the managers. Despite few members joining in the decision process, some of the solving team members still feel discontent about the process through which the decision was made. It was identified from the interview that three out of four solving teams interviewed said they were informed of the decision but unsure about its reason.

After the decision to adopt the new toolset, the Tooling team pitched the use of Splunk to the solving teams in the building of dashboards. However, not much input was received from the solving teams. After reaching out to each team separately and having the managers encourage them, the solving teams came up with some ideas for the dashboard, which resulted in the interaction between the Tooling team and solving teams.

3.3.2 Interview results: current usage of the dashboards

Five dashboard assignments were identified from the interviews with the Tooling team and solving teams that required significant interaction between the two teams. These dashboards are:

1. Life cycle management
2. Server compliancy
3. VMware capacity
4. Network compliancy check
5. VPN user.

Three assignments were completed with the dashboards; two were unfinished and stopped without a clear outcome. The solving teams' utilization of the completed dashboards was investigated to verify whether they are well-designed and effective.

Table 3. 6 explains how the solving team currently uses the existing dashboards. The results are gathered from interviewing solving team members.

Dashboard Assignment	Life cycle management	Server compliancy [Linux]	VMware capacity
Usability	Not user-friendly, not easy to use	Information overload, Irrelevant info, Mismatch in visual sign and text info	Easy overview, functioning very well
How often it is used	Monthly (Expected: monthly)	Monthly (Expected: daily)	Monthly (Expected: monthly)
How important is it to your job	What the dashboard is displaying is important for the solving team's client.	What the dashboard is displaying is Important, but because of usability issues, the solving team is getting the same information via other tools.	The dashboard is used for patching, so it is an important dashboard.
How many people are using it?	1 out of 6	1 out of 6	2~3 out of 5

Table 3. 6 The use of the completed dashboards

A user of the Life cycle management and Server compliancy dashboards noted that the dashboards are not user-friendly. Especially, the server compliancy dashboard contains too much information, and sometimes the user doesn't understand the information or is confused by mismatching signs. Thus, the two dashboards are almost not used by the intended users. In contrast, the user of the VMware capacity is satisfied with the dashboard, and it is used regularly for their main job.

3.3.3 Interview results: understanding processes and interactions in dashboard making

Another part of the research was to see the quality of the collaboration between the two teams by reviewing each dashboard's building process and problem-solving. The overview of the dashboard and the people involved in building each dashboard is shown in Table 3. 7. The Tooling team had support from a third party consultancy during the implementation of Splunk. This third party also aided in the building of some dashboards, which is demonstrated in Figure 3. 3.

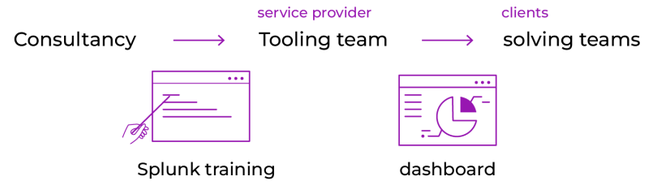


Figure 3. 3 The Tooling team received training to learn Splunk from the third party consultancy

Assignment name	Did it complete with a dashboard?	Who was responsible for the building? (Service provider from the Tooling team)	Who was the client? (From the solving teams)	Who initiated the idea of the dashboard?	Who is the contact person from the solving team?
Life cycle management	Yes	Andi	Unix & Wintel team	One member from the solving team Unix	Rob from the Unix team
Server compliancy	Yes	Third-party started->Andi took over[1]	Unix & Wintel team	Unix team	Rob-> Nate from the Unix team
VMware capacity	Yes	Third-party started-> Andi took over[1]	Capacity& More teams	GTO members	Ryno from the solving team Capacity
Network compliancy check	No	Third-party started-> Ray examined to continue, but no change has been made	Team Network	Marc from the solving team Network	Marc from the solving team Network
VPN User	No	Ray	Team Network	Marc from the solving team Network	Marc from the solving team Network

Table 3. 7 People involved in building the dashboards

1 According to the Tooling team, the third party made the first version of the dashboard, and the Tooling team later changed it. The thrid party's engagement was limited to helping with the technical part, setting up the environment, and retrieving the data from other tools. Thus, the Tooling team actively engaged in the interactions with the solving teams instead of the third party.

Assignment 1: “Life cycle management” dashboard

The narrative is collected and pieced together from two individual Interviews, with Rob from the Unix team (one of the solving team) and Andi from the Tooling team.

Person responsible for building	Andi
User	Unix Team & Wintel Team
Initiated by whom	One member of the Unix team
Contact person	Rob
Function of the dashboard	Monitoring the lifecycle of the OS versions on a server. It shows how many OS-systems are nearing their end-of-life or support date.
Dashboard building process	1. The Unix team thought about an idea during one of the Splunk sessions. *“At first, we had a little resistance, on why do we need to use Splunk. What’s the use? All the negative comments you can think of probably, and after that we had a little talk about what Splunk can offer us.”- Rob.* A couple of dashboard ideas were presented on the table, and two of them were chosen, the Server compliancy and the Life cycle management. 2. Rob and Andi had their first meeting. 3. A 6-month gap between the first and second meeting due to a busy schedule of Rob. After Rob looked at Andi’s result, he had some suggestions for alterations. 4. Multiple meetings followed in quick succession. 5. Rob started using the dashboard.
Key remarks	• The gap between the first and second meeting was quite long.The reason was the busy schedule of Rob. However, it also shows that this dashboard building did not have a high priority. After the second meeting, the following meetings could follow in quick succession, showing an increased priority. • The interaction between Andi and Rob went well. However, interaction between Rob and his Unix team members was lacking. Only during the ideation and final delivery. They were less involved, and their opinions were less reflected in the final product.

Table 3. 8 The process of “Life cycle management” dashboard building

Assignment 2: “Server compliancy” dashboard

The narrative is collected from two individual Interviews, with Rob from the Unix team (one of the solving team) and Andi from the Tooling team.

Person responsible for building	A The third-party started -> Lynn (from the third party) gathered the requirements -> Andi took over[2]
User	Unix Team & Wintel Team
Initiated by whom	Unix team
Contact person	Rob
Function of the dashboard	To check if Linux systems are compliant with other tools and actively communicating, for instance, with CMDB, Zabbix, ACP, etc.
Dashboard building process	1. A Unix team member proposed an idea to build a dashboard for Server compliancy. 2. Rob thought Lynn from the Tooling team gathered the requirement from Rob from the Unix and Wintel teams. Lynn used an Excel intake form to collect information. 3. Rob gathered opinions from the Unix team as a contact person. 4. Andi made several iterations which were shared with Rob. Some of the iterations were shared with the Unix team. Rob asked the Unix team what they wanted from the dashboard. Rob showed the dashboard once during development and when it was finished. 5. The Unix team did not like the final design, although the final version did not differ greatly from the iterations he shared with team members. One member, Nathan, had the most comments. After some conversation, it was decided that Nathan would be the new contact person for the Tooling team. 6. Nathan communicated with Andi to make changes to the dashboard. 7. Andi made multiple iterations which were discussed with Nathan and the Unix team. 8. The final design was agreed upon by the Unix team.
Key remarks	• The interaction between Rob and Andi went well, and no issues were found in their communication and understanding of the requirement. • There was a miscommunication between Andi and the Unix team members, as it seemed that Rob couldn’t fully understand or deliver his teams’ suggestions. This led to Rob giving his role as contact person to Nathan. • Currently, the Server compliancy dashboard is scarcely used by the Unix team. Rob is probably the only user. With the teams’ involvement in the final version, it was expected that they would use it. However, the feeling from Rob is that they only finished the dashboard to please him. • Additionally, the dashboard lacks user-friendliness. This was only discovered after they started using the dashboard.

Table 3. 9 The process of “Server compliancy” dashboard building

2 According to the Tooling team, the third party made the first version of the dashboard, and the Tooling team later changed it. The third party’s engagement was limited to helping with the technical part, setting up the environment, and retrieving the data from other tools. Thus, the Tooling team actively engaged in the interactions with the solving teams instead of the third party.

Assignment 3: “VMware capacity” dashboard

The narrative is collected from two individual Interviews, with Ryno from the Capacity team (one of the solving team) and Andi from the Tooling team.

Person responsible for building	The third-party started ->Andi took over
User	Capacity team & other teams
Initiated by whom	Capacity team manager. Based on a survey targeting all GTO members.
Contact person	Ryno
Function of the dashboard	Giving alarms when the CPU-load and storage are reaching their threshold capacity.
Dashboard building process	1. A survey was conducted, asking what kind of support the solving teams needed to perform better. From this survey, GTO started using Splunk. 2. The Capacity team had issues finding a dashboard assignment that could be made in Splunk. The team manager asked Ryno to be the contact person for the team. His interaction with Andi made it clearer what a dashboard could do for them. 3. Frequent interaction between Ryno and Andi led to a clearer picture of the dashboard. 4. Andi showed iterations of the dashboard to Ryno. 5. Andi & Ryno showed the dashboard to the Capacity team members. However, not much feedback was given. 6. Ryno talked individually with the members of the Capacity team, which resulted in proper feedback that was implemented in the dashboard.
Key remarks	• Ryno doesn’t have a clear answer as to why there was no real start of an assignment before he became the contact person, but he thinks this has to do with the fact that it was very unclear what the project was about. Also, the knowledge of the possibility of the dashboard was very low. • Ryno thinks that the interest in the dashboard was low at first because they can get similar information via existing tools. Yet, it takes more effort than having a centralized dashboard such as Splunk. • When Ryno & Andi asked the opinion of the members from the Capacity team, they were very quiet, so Ryno went to each one of them. In this way, he could get responses.

Table 3.10 The process of “VMware capacity” dashboard building

Assignment 4: “Network compliancy” dashboard

The narrative is collected from two individual Interviews, with Marc from the Network team (one of the solving team) and Ray from the Tooling team.

Person responsible for building	The third-party started -> Ray took over
User	Network team
Initiated by whom	Marc
Contact person	Marc
Function of the dashboard	Analyzing customers’ firmware for vulnerabilities and system compliancy.
Dashboard building process	The interviews provided different descriptions of the collaboration in the dashboard building process. <u>Marc’s perspective</u> 1. Marc proposed a dashboard idea to the Tooling team and the third party consultancy. 2. Ray started developing the dashboard. 3. The third party consultancy joined Ray and showed a prototype to Marc. 4. Marc communicated the progress with the Network team members and asked for feedback. <u>Ray’s perspective</u> 1. Marc proposed a dashboard idea to the Tooling team and the third party consultancy. 2. The third party consultancy started working with the Network team. 3. Ray joined the third party consultancy. At this point there was already a finished dashboard. 4. Ray examined the dashboard and found issues which were made aware to the Network team. 5. Multiple people, including managers, joined in on how to solve this issue. 6. Finally, someone proposed different available commercial tools that could achieve a similar goal, leading to the dashboard being canceled.
Key remarks	• Ray could pinpoint the issues of the dashboard that the third party left off, meaning that he clearly understood the intended functionality and purpose of the dashboard. • Marc convinced other network team members about the needs of the dashboard.

Table 3.11 The process of “Network compliancy” dashboard building

Assignment 5: “VPN user” dashboard

The narrative is collected from two individual Interviews, with Marc from the Network team (one of the solving team) and Ray from the Tooling team.

Person responsible for building	Ray
User	Network team
Initiated by whom	Marc
Contact person	Marc
Function of the dashboard	Monitoring VPN users. Examples of functions could be showing the number of users and whether someone is locked because of many failed login attempts.
Dashboard building process	1. Marc asked the Network team for dashboard ideas. One member proposed the idea of monitoring VPN usage. 2. Ray asked the Network team to fill in the intake form, after which they had a meeting. 3. Ray had difficulty understanding the requirements, so multiple meetings were held. 4. After these meetings, it was decided that the Network team would make a suggestion for the dashboard visualization. 5. However, it turned out too difficult, and the assignment was stopped.
Key remarks	• The current intake form is too technical and tool-focused. *“It’s very technical and Splunk-focused which is not easy for clients to understand because it’s related to how you implement something in Splunk which is not something they know. …we need to go more in detail to know about the metrics that you need and how you possibly want to have these metrics visualized, these level of depth.”. Second is to specify the question to gain a clear answer. “In the form, I think one question should be what metric correlates with the problem or what metrics tells you whether you have a problem or whether the problem is solved. …this very direct question of correlation between a metric and the problem…” -Ray* • Due to Ray’s limited knowledge in the area of networks, Ray couldn’t get a clear understanding of the problem and desired outcome of the dashboard during the intake meeting with Marc while Marc couldn’t understand why Ray didn’t understand. Especially visualizing the solution as a dashboard was one of the difficulties they experienced. *“I think starting visualizing is not that difficult. Just put it on the black and white screen drawing in paint. Maybe I am wrong, but it could be that Ray wants a whole concept...for instance, red button, etc.” -Marc* • Marc missed progress in the dashboard. It took too long for Ray to gather the requirements. *“Ray didn’t want to start with the programming for the dashboard without getting the requirement from us, and we gave him the requirements but somehow Ray needed more requirements- the figures of the dashboard” -Marc* •Ray understood the need for progress. *“If you keep discussing and meeting and without coming to a conclusion, and to a product, people get annoyed. Understandably so at some point, you need to get something done so. Uh, this could be something that would annoy people to coordinate” - Ray*

Table 3.12 The process of “VPN user” dashboard building

3.3.4 Summary of the processes & interactions and analyses of the Mutual understanding

A lack of mutual understanding was observed during the “VPN user” dashboard building between the Tooling team and the contact person. It was caused by both sides of the collaborator. They lacked understanding in the new area of knowledge, were unable to identify/express user needs effectively, and lacked the necessary skills to visualize the dashboard.

Furthermore, a significant lack of mutual understanding was noted between the solving team members and the contact person while building the ‘Life cycle,’ ‘Server compliancy,’ and ‘VMware’ dashboards. It was mainly because the solving team members were dissatisfied with their lack of control in selecting the tool, leading to a sense of detachment from Splunk during the dashboard assignments. Thus, instead of critiques about the dashboards, the main issue was the solving team’s dissatisfaction with their lack of involvement in the tool selection.

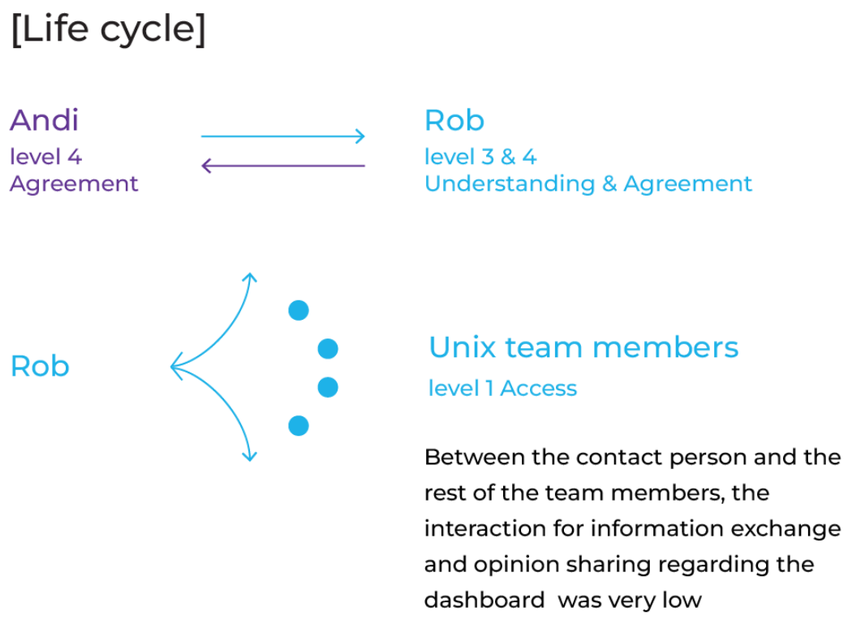


Figure 3. 4 Mutual understanding for the [Life cycle] assignment

Figure 3. 4 gives a summary of the mutual understanding within assignment 1 based on the criteria set in Tables 3. 2, 3. 3, and 3. 4. It shows a proper level between Andi and Rob, but a low level between Rob and the Unix team members, which was also mentioned in the key remarks of Table 3. 8..

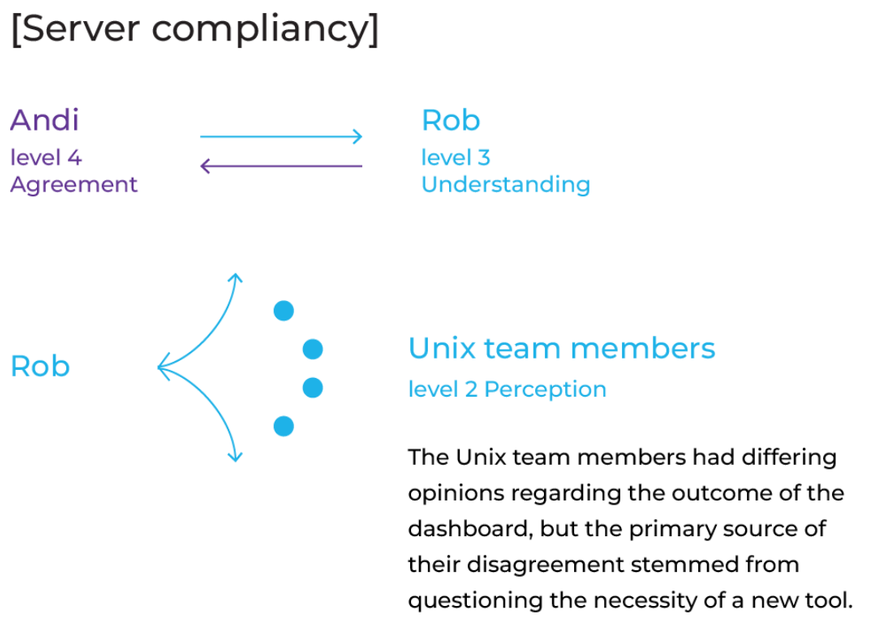


Figure 3. 5 Mutual understanding for the [Server compliancy] assignment

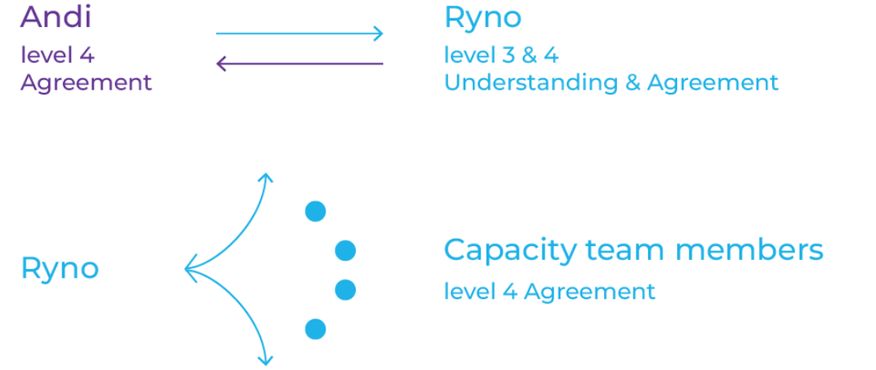


Figure 3. 6 Mutual understanding for the [VMware capacity] assignment

Figure 3. 6 gives a summary of the mutual understanding within assignment 3 based on the criteria set in Tables 3. 2, 3. 3, and 3. 4. It shows a proper level between Andi and Ryno, and between Ryno with the Capacity team members, which was also mentioned in the key remarks of Table 3.10..

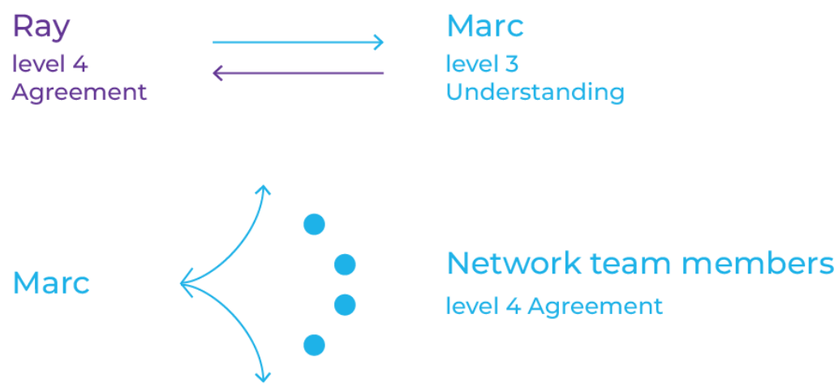


Figure 3. 7 Mutual understanding for the [Network compliancy] assignment

Figure 3. 7 gives a summary of mutual understanding within assignment 4 based on the criteria set in Table 3. 2, 3. 3, and 3. 4. It shows a proper level between Ray and Marc, and between Marc and the Network team members, which was also mentioned in the key remarks of Table 3. 11.

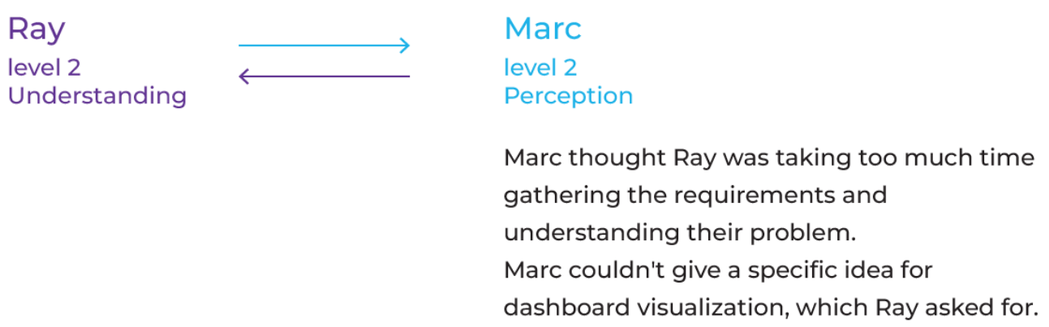


Figure 3. 8 Mutual understanding for the [VPN user] assignment

Figure 3. 8 gives a summary of the mutual understanding within assignment 5 based on the criteria set in Table 3. 2, and 3. 3. It shows low level between Ray and Marc, which was also mentioned in the key remarks of Table 3.12..

3.4 Opportunity Space Found in the Interview

This section summarizes the opportunity spaces which were found based on the identified problems from the interviews.

» **Opportunity 1: Establishing clear objectives and communicating them with members effectively**

» **Problem: Unclear goal**

Opportunity 1 highlights the lack of autonomy the solving team engineers experienced in selecting the new tool. This caused it to be unclear to the solving teams why this decision was made. This lack of clarity is supported by the literature reviewed in Section 2.2.2, which emphasizes the significance of establishing clear strategic objectives and ensuring they are communicated across different levels of the organization. Furthermore, the literature suggests that achieving clear goals can be facilitated by translating higher-level objectives into lower-level objectives for each project (Heidrich et al., 2007).

The solving teams were not content with the new decision, as it did not consider their previous working style.

“But why are we have to use this tool for what? Because we already got a lot of tools. … Actually, I cannot answer what the goal is… Is that copy from the old tool? So why we got the new tool and it’s representing the same information like the old tool? So the new tool has, needs to have more benefits more functionality etc.” - Marc from the solving team.

Furthermore, the desired outcome for using the tool remained abstract for individual members, for example, how it will impact members’ assigned duties. There was a missing connection between the company goal and the individual goal.

“When Splunk was introduced, I was not aware of what the real benefits would be for the team”- Alex, one of the solving team managers.

Thus, clarifying strategic objectives and communicating them to all levels of the organization was considered one of the opportunity spaces for the problem mentioned above.

» **Opportunity 2: Overcoming challenges in adopting a new tool for dashboard building**

» **Problem: Challenges in adapting to change**

This opportunity highlights the challenges the solving teams encountered when adapting to the new tool. These challenges are supported by the literature in Section 2.4, which, for example, mentions individuals’ capacity to adapt to change and the impact it has on one’s attitude towards change.

During the interview, it became apparent that the solving teams were not aware of the potential of Splunk, a tool that could have been helpful. Understandably, the solving team members may find it challenging to invest effort into learning a new tool and adjusting to the change. In addition, everyone has varying capacities to adapt to a new environment, that impact their attitude toward adopting a new tool that requires training and self-motivation to learn the new technology.

“The dashboard we got is somehow, you got a lot more training to get used to it. And I got colleagues they were complaining for, ...But it’s also making it a large bump to use it. And you have to go over it. You have to train more. Be accustomed to it.” - Marc from the solving team

Although there are inherent challenges in adapting to a new tool or embracing any changes, acquiring new skills and increasing the knowledge base can be a breakthrough.

» **Opportunity 3: Improving knowledge transfer to foster problem-seeking and collaboration between teams**

» **Problem: Difficulty in finding the problem**

This opportunity focuses on the challenge in problem-seeking for the Splunk implementation which was faced by the solving teams and Tooling team. Section 2.2.1 of the literature review shows related studies, which mention that a project’s success depends on establishing common knowledge with the collaborators.

Because of the unclear goal of the new tool, the solving teams had difficulty coming up with ideas for new assignments which could be potentially solved with Splunk. From the interview, it shows an attitude of wanting to work with each other and being open to discussion.

“People are willing to help, so the problem is more at the moment of execution. When people say we want to help each other… so coordinating (with the solving team)was not never really an issue.” - Ray from the Tooling team.

However, the problem-seeking was one of the main obstacles for the solving and the Tooling team. Although the Tooling team advertised the tool's capability, few solving teams brought problems. Likewise, no one thought they would need it until someone in the solving team suggested a dashboard. The solving teams couldn't come up with a dashboard idea related to the problem they encountered in their work, and the Tooling team didn't know how to help them envision this. Hence, both teams should transfer knowledge to the other team to seek a problem. The Tooling team knows the tools, and the solving teams have domain knowledge as the problem owner. It shows that proper knowledge exchange didn't occur from one side to another in seeking the problem.

"But there definitely is a difficulty finding needs for a dashboard in the team, because we don't think we need a dashboard for something until somebody shows us a dashboard." - Rob from the solving team.

"We would explain the functionality of Splunk… what kind of data source is possible to connect. And in the end, we didn't get any requests anymore for creating new dashboards. …Then we would go by every team giving uh again, …but it never came (with an assignment) . Yeah, the input was very low. So I actually didn't know anymore how to give some more information about that motivation."- Andi from the Tooling team

Therefore, improving knowledge transfer and effective collaboration between the solving and Tooling teams was considered an opportunity to overcome the challenge of finding problems to solve with the new tool. By sharing domain knowledge and technical expertise, both teams can identify potential uses of Splunk, which is supported by Demsetz (1991).

» **Opportunity 4: Thorough investigation of the problem**

» **Problem: Design fixation & less focus on problem framing**

This opportunity proposes the idea that the solving team may have experienced design fixation, which prevented them from coming up with new problems for implementing Splunk. Further information on design fixation is provided in literature research Section 2.3.2, which mentions that design fixation is a counterproductive phenomenon making one blind by adhering to a limited set of ideas in the design process (Jansson & Smith,1991).

One of the managers believed that framing the assignment as "Splunk" was the problem.

"Yeah, I think what the problem is that we called the project Splunk, so they always referenced to the Splunk. But it's not about Splunk. It could be something else, database or something like that… So they said yeah, why do we need to use something we don't have the knowledge of?" - Alex, one of the solving team manager.

Examples accompanying design problems can restrict one's thinking to certain concepts. Without these examples, a wider range of ideas could have been brought up. This is the principle of "design fixation" by Jansson and Smith (1991). Calling the assignment "Splunk" or "dashboard", caused the solving teams to think from the solution-route perspective instead of focusing on a suitable problem definition.

Therefore, before trying to implement or define the best solution, first, one should take enough time to define a problem. Defining a problem is the beginning of the design process, as can be seen from the study from Luchins, et al. (1970) Thus, the problem solver should examine the problem from various perspectives to prevent solving the wrong problem that leads to the wrong solution.

» **Opportunity 5: Enhancing coordination and communication**

» **Problem: Lack of coordination**

This opportunity underlies the need for systemic coordination to manage both teams' expectations and streamline service production and maintenance. It specifically focuses on the relationship between the Tooling team and the contact person of the solving team, describing difficulties faced in setting deadlines and maintaining services after delivery.

More systemic coordination could have helped manage both teams' expectations when they faced difficulties during the collaboration in service production and service maintenance.

Interactions were found in the following relationships, where coordination and communication can be improved.

1. The management and the employees. (Section 3.5)
2. Contact person and the rest of the solving team members. (Section 3.3.3, 3.3.4)
3. Tooling team and contact person (partly seen in Section 3.3.3, 3.3.4)

The third relationship between the Tooling team and contact person will be further described here.

For instance, they tried setting a deadline when an assignment started, but it was often delayed due to other priorities. Or sometimes, there was an endless discussion as more people joined in, or gathering requirements took longer than expected. During these prolonged discussions, both teams expressed tiredness.

“I think teams need to be aware that there is this balance between finding an agreement between all, ...You cannot endlessly keep discussions going because there is no agreement. You have to give a deadline to the responsible one. ...Even if there is no 100% agreement, otherwise you will never move forward.”- Ray from the Tooling team.

Another example was the difficulty in maintaining the services after the service delivery. Although the dashboards needed maintenance and improvement, the lack of coordination between the two teams discouraged the Tooling team from taking the initiative to improve the service quality. One crucial factor in understanding is that they take a request-based work process, which means that only when the solving team takes the initiative to request, will the Tooling team offer help. In particular, after the dashboards were handed over, despite the dashboards’ errors, the solving team didn’t ask for help, so the dashboards remained unused and left behind.

The suggested opportunity space is to enhance coordination and communication between the Tooling team and the solving team. Through this, both teams can benefit from a better understanding of each other’s expectations and limitations.

» **Opportunity 6: Facilitate knowledge integration between teams**

» **Problem: Misaligned expectation**

This section emphasizes the importance of defining clear roles and responsibilities to avoid misaligned expectations in collaboration. Section 2.2.1 elaborates on a literature review regarding achieving efficient and long-lasting results through successful knowledge integration and collaboration.

Collaborators should agree on their roles and responsibilities to avoid misaligned expectations. For example, when the two teams faced challenges during the requirement gathering, they often placed the responsibility on the other team to find solutions. Specifically, both teams argued that it was the other team’s responsibility to create visualizations of the dashboard.

“The coordination is also difficult when there is no clarity about who is responsible for what… Also, this is under the title of expectations management. It’s also very important to from the beginning to state exactly what is expected from whom?” - Ray from the Tooling team.

“So that was also a hard part because we expect the solving teams to get some requirements. I expect a little bit of them how they want to visualize it. we also expect them that they know where the data come from.” - Andi from the Tooling team

“It was for them to find out the data. That’s what my assumption was, but they apparently didn’t get it. So we searched for the data and found that it wasn’t that easy …” - Rob from the solving team

Long-lasting and efficient results through teams’ collaboration can only be gained when obtaining enough corporate knowledge. Only successful knowledge integration guarantees the project’s success, and this can be done through collaboration.

» **Opportunity 7: Exploring effective methods for collecting detailed information for dashboard building**

» **Problem: Inability to discover the users’ needs**

This opportunity shows a need for a more effective and efficient method of gathering detailed information about the problem, desired solution, and requirements from the solving team to build a dashboard. It elaborates on the literature background in Section 2.3.1 on the four levels of knowledge and how explicit and implicit knowledge could be externalized.

When the Tooling team started assignments with the solving teams, certain questions in the intake form were asked to be filled in by the solving teams. It is to understand the client’s problem, desired solution, and requirements. However, the Tooling team realized in hindsight that the method they used was not bringing them complete information to solve the problem.

The intake form is an Excel sheet in which specific questions are asked to be filled in by the solving teams before the first meeting. Initially, this form was given to them so that they could fill it in by themselves. Still, later they saw that the solving teams found it difficult to answer by themselves, so the Tooling team used it as a verbal questionnaire guideline. During the interview with one of the members of the Tooling team, the member retrospectively recalled the limitation of the intake form.

“If I read now the intake form, what they wrote for the desired solution is too general, and as I explained, we need to go more in detail.” - Ray from the Tooling team

From examining the intake form and analyzing the Tooling team’s interview, four kinds of information are needed for dashboard building.

1. Problem definition
2. What kind of metric is needed?
3. Where does the metric come from?

4. How should the metric be visualized?

The answers to questions 1, 2, and 3 are gained using the intake form during the face-to-face meeting. Yet, from their experience, the solving teams' answer still remains general. Thus, the Tooling team ends up seeking more detailed answers to fill the knowledge gap by taking more time on their own. For instance, they desired that the solving team give them more specific metrics, how they relate to the problem, interrelationships, and combinations of metrics. However, the questions in the intake form failed to gain detailed information from the solving team. When the information is incomplete, the Tooling team asks for another meeting to find the answer.

The fourth point, visualization was the most challenging for both teams. It is not asked in the Excel form, so they ask this question on the spot, but in a short meeting, the solving team couldn't answer this question. Both parties mentioned that it is difficult to think of visuals.

"So, that there would be a gap in the communication if they don't know. But I want to visualize to solve the problem." - Rob solving team

"But the hard part was to…, what do you want? What kind of dashboard do you like? So finally we didn't go on with that because it was very impossible to make a design from OK, how the dashboard will look like." - Marc from solving team

The interview of the solving team also shows that they also find it difficult to fully express what they want verbally. As an opportunity space, drawing on design research methods to discover implicit user needs, such as generative design techniques, could solve the problem, which is elaborated in Section 2.3.1 of the literature research.

3.5 Interview Results: Understanding Power Dynamics

In Section 2.5.2 of the literature research, I examined the different types of power individuals or project owners can possess. In this section, by analyzing the interview responses using the understanding of the types of power, it was found that two forms of power, access power, and goal power, were the most prevalent in shaping the power dynamics of the organization.

This analysis aimed to use the understanding of power dynamics to identify opportunities for improving collaboration, communication, and decision-making processes in GTO. By recognizing the different types of power and how they are exercised, I could identify areas where interventions could be made to facilitate more efficient and effective working relationships.

Access power is the ability to influence who is included and excluded from a design process. Who is involved in the process and the extent to which various stakeholders are granted access to the process can have a significant impact on power dynamics and how the process is shaped (Goodwill et al., 2021).

Goal power refers to the ability of ones to form the project, including how the problems are formulated, goals are chosen, and how the whole project is structured. How problems and the goal is established can support certain individuals' interest, empower or discourage certain individuals from participation, especially marginalized ones, and affect the outcome of the decision-making process (Goodwill et al., 2021).

» **Access power exercised by the manager**

During the interview with the head manager, it was discovered that he possessed the authority to grant certain individuals access to the decision-making process (access power). Understandably, managers with greater responsibilities may be entrusted with making significant decisions. However, despite this understanding, the question remains: how can we empower the remaining team members to participate in the decision-making process, despite practical limitations?

"So people say we need a different tool... So then I ask people, 'go look in the market, go to your colleagues in the metro markets, do desk research on Internet to see which tools there are.' ... They don't have time for it. ... In this case I had some experience in another company where I worked with exactly these problems and I have some contacts with vendors,... So what you would generally see if, as the manager, you would give a suggestion what people could look at, then suddenly without you knowing, you're the one that decided to use Splunk." -by Cedric, Head manager of the GTO.

This quote highlights the importance of ensuring individuals have sufficient spare time and opportunities to participate in decision-making. It could potentially guarantee the use of one's access power in a busy organizational context.

» **The goal power exercised by the manager**

In addition, the limitation of the current communication methods are discovered: there is almost no opportunity for direct communication between the head manager and the remaining employees. The meetings the head manager attends facilitate communication between the head manager and other team managers. While the head manager does hold monthly meetings with all the employees, it can be challenging to establish close communication in such an environment. He prefers to acquire the employees' opinions through their team managers, to respect managers' areas of responsibility. However, the downside is that there is no effective communication and information flow in both top-down and bottom-up directions. In particular, effective communication is crucial for the solving team engineers to comprehend how the problems are formulated, goals are selected, and how the decisions are arrived at. It is equally important for the managers

to understand why the engineers may be opposed to or dissatisfied with the decisions.

“I do the monthly meeting where everybody is there. That is generally not an environment where you could have one-on-one discussions, of course, because there’s over 100 people usually join. one on one meetings I have with my managers, so I do that team based...- by Cedric, Head manager of the GTO.

» **Need for empowering solving team members with the access power and the goal power**

After observing and listening to the complaints, Alex, one of the solving team managers, believes that providing agency to the team members is necessary. It would entail allowing them to create a dashboard by themselves, select their preferred tools, and make decisions without seeking help from the Tooling team. This move implies that the team members would gain access and goal power.

“interviewer: if there’s another plan to use a new tool, can the members choose the tools because they want it?...

Alex: Yeah, of course, but I think we need to start first with the question of (asking)’What do you want to see? what kind of dashboards?’ ...What we should have done or should do is because the knowledge is within the teams, ... (ask to them)’What do you want it to look like?’ They should have tools to create dashboards themselves. Create easier dashboard”.

This quote suggests a potential solution to the problem could be enabling the solving team to address the issue independently.

» **Lack of goal power of the solving team member**

During an interview with one of the solving team members, Joe, I learned that his efforts to solve an issue through his methods were not acknowledged and were overshadowed by the solution suggested by Splunk. Joe had attempted to implement his solutions, presenting them to his manager. Unfortunately, his supervisor did not provide any feedback on his proposals. Instead, the manager returned with a nearly identical dashboard to Joe’s suggestion made by Splunk, but it was not designed according to the teams’ needs, so it is not used currently.

The Tooling team was looking for people like Joe because Joe has a deep understanding of the problem, and he tried actively solving it by himself. In this case, the Tooling team could have helped Joe further the idea through collaboration.

In this case, it is evident that the employee’s initiative was not adequately acknowledged, and there was a lack of proactive efforts to foster collaboration. In addition, Joe lacked goal power in structuring how the problem could be best solved.

“ We had an issue with the customer … and I created this for myself, and I showed it up to supervisor, and later this(dashboard made in Splunk)came along. We were only involved at that time that it was 95% ready, and we did some tweaking and asked, ‘ Can we do something differently?’ And then it was done, but that’s all.

» **Difficulty in balancing inclusivity and efficiency in dashboard creation**

In an interview with Ray from the Tooling team, he discussed the challenge of deciding on the optimal group size for allowing access to the dashboard creation process. He found it ironic that involving more people would lead to increased time and difficulty in converging ideas by selecting among the various suggestions, while involving fewer people would make it harder to consider all relevant viewpoints. Therefore, the key issue is creating a participant group that efficiently captures everyone’s opinions without leaving anyone out while avoiding excessive time consumption.

“you want to say OK. Let’s help as many people as possible with the dashboard, but the risk is that you want to make all the worlds happy and you the dashboard becomes a huge thing. So this is also a risk. So also there is a tradeoff between the scope, the stakeholders in this dashboard and the goal of the dashboard. So this is also not always easy to understand to draw lines limits…we cannot talk to thousands of people. We need one contact point per team. … but this person is responsible to discuss and find agreement within the team about dashboards... Because if we talked to two different people in the same team, we hear different opinions, wishes. “..”-by Ray from one of the Tooling team

04

Redefining the Scope and Posing the Design Direction

Chapter 3 fished by discussing various opportunity spaces. Chapter 4 will explain how the design direction was chosen from those opportunity spaces to address the core problem.

4.1 Journey Map & Root Cause Analysis

Although several opportunity spaces for each problem have been identified, it was necessary to define the core problem to arrive at the design direction because doing so enables solving the right problem and resolves subordinate problems.

Widespread problems are arranged into a table using a journey map technique, which is shown in Figure 4. 1. A journey map is a visual way of representing how the service is perceived and experienced by the customer or user. This technique was used to comprehend the experience of the solving teams, who are the users of the service, according to the timeline of events.

The takeaway gained from the journey map was that because the solving team had questions and doubts about the decision, it continuously impacted the events that took place when the team members directly engaged with the service.

Therefore, I used a root cause analysis technique to find the root cause, which is shown in Figure 4. 2. It is the technique to find the root cause by asking ”why” and repeatedly answering to it.

How did the solving teams experienced collaborating with Tooling team for the dashboard-building asssignment?

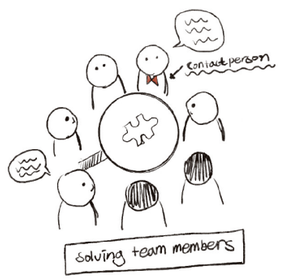
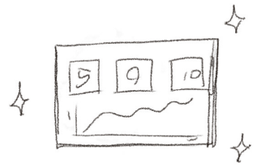
	Indirectly engaged		Directly engaged				
TIMELINE IN THE SERVICE	**2018 GTO's new vision shared to the members**	**A tool called Splunk was selected**	**A solving team discovering/ Awaring the need**	**A solving team planning for the assignment**	**Tooling team gathering requirements**	**Iterative developments**	**delivery & maintenance**
							
ACTIONS	Through GTO members voting, using a tool that provides data analysis and data repository was chosen	At the meeting a Tool called Splunk was selected. In the meeting there was three solving team members, two experts(architects), GTO managers, and supplier of the tools	Find the problems that would presumably be solved by a dashboard Have discussion within the solving team members	Decide and agree with the needs within the team Contact Tooling team to request an assignment Fill in the intake form	A contact person from the solving team sit with Tooling team member Review the intake form Ask questions and get the answers	Tooling team develops a dashboard Check with the contact person Demonstrate the outcome towards the solving team members Check with the solving team members	Deliver the outcome Go on a maintenance when the solving team members request comes
NEEDS			I don't know why we have to use the new tool when there are a lot of tools already used by us What is the tool Splunk for? I cannot find the need for a dashboard I am not sure what the purpose of the assignment is.	How I am not sure what to write in the intake form. Did I do correctly? dashboard?(when there is a discord within the members) I am quite busy with other priorities right now. How should I plan the meeting with Tooling team?	I think Tooling team should look for the information. I don't know how to answer this. I don't know how to find the data. How should I know how to visualize? I thought I gave enough requirements. What more do they want?	I wonder what my team member thinks about the progress. But they are not sharing their opinions. Should I approach them one by one to hear their thoughts?	I thought I really liked the dashboard, but now I see many usability issue
OPPORTUNITIES			**Clarifying strategic objectives and goals** **Overcoming challenges in adopting a new tool for dashboard building** **Improving knowledge transfer to foster problem-seeking and collaboration**	**Exploring effective methods for collecting detailed information for dashboard building**	**Establishing agreement on roles and responsibilities**	**Enhancing coordination and communication**	

Figure 4. 1 The journey map-The overview of the solving teams' experience of the dashboard assignment

Root cause analysiS

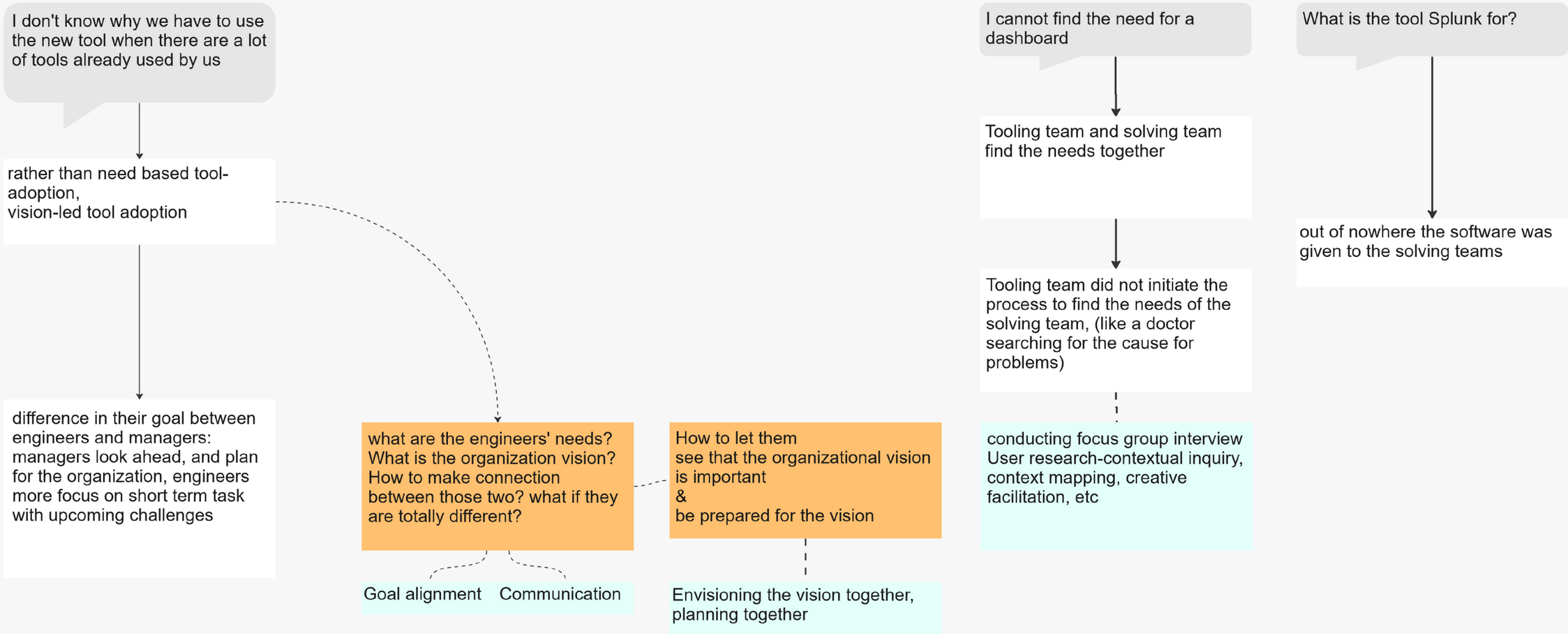


Figure 4. 2 The root cause analysis

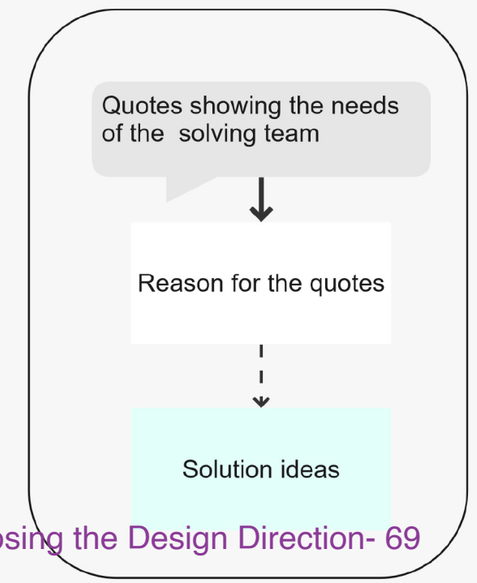
Key takeaways from the Root cause analysis are as follows.

Managers encouraged the solving team to create and use a dashboard to improve their work processes.

Solving teams do not agree with how the tool was chosen

Solving teams think they already have a lot of other tools they've been using

The solving team did not agree about using the tool and assignment execution.



4.2 Design Direction

After reviewing the root cause analysis, and examining the journey map, the core problem was identified. To briefly summarize the findings, the solving team members were dissatisfied with the decision regarding the tool selection. Since they were not directly involved in the process, except for the three engineers, their opinions could not be heard and considered carefully and thoroughly during the decision-making. In the journey map analysis and the root cause analysis, it was noted that the solving teams' doubts about the assignment and the decision kept appearing during the dashboard assignment between the solving team and the Tooling team. Therefore, it was concluded that the core problem was found in the decision-making part when the solving team did not directly participate; in other words, a lack of participatory decision-making.

Kaner et al. (2014, p. 6,7) state that not involving members in decision-making will cause subsequent issues such as an unwilling attitude toward implementation, misunderstanding, and, most likely, failing the plans. Organizational success depends on their ability to bring out, use, and centralize the far-reaching intellectual power -abiding in the members, employees, and stakeholders. It contrasts with the idea that success depends on technology, service, or market share of the business. Thus, a welcoming environment is needed for every member to solve problems, plan, make decisions, solve their conflicts, test, and lead in managing the activities.

While not readily apparent, theoretical research in Section 2.5.3 reveals that what hinders collective decision-making is an imbalanced power relation between members. Yet, power itself is not a problem because it is pervasive in various organizations and systems. For example, the roles and responsibilities in an organization are good examples of power relations.

According to Fast & Schroeder(2020), on the one hand, a social role can play a positive and prosocial effect on the power holder, considering themselves responsible for the community to bring value, welfare, and increased performance. However, power is often exercised to make a shortcut decision by the people with power priority. Because power has an agency-enhancing effect that heightens the sense of control, leading to self-perception as well as agentic and over-assured decision-making. Power holders are sometimes more privileged in having more resources than others. They are given more time, resources, and opportunities to participate in decision-making and carry their point to the end (Fast & Schroeder, 2020).

In contrast, others who are less powerful often do not have an environment ready for them. For instance, they are uninvited to the decision-making process, and if they are invited, partly at best. In addition, they lack sufficient resources, time, and financial support to contribute to decision-making fully.

From this understanding, a design direction was posed.

Create a set up that facilitates participatory decision-making to empower GTO members to possess more agency in organizational decision-making so that their experiences and opinions are heard.

05

Ideation via Creative Workshop

The previous Chapter 4 introduced the design direction. Chapter 5 explains a creative workshop with student designers to generate ideas about the design direction.

5.1 Approach to Designing the Creative Workshop

The first goal of the workshop was to deconstruct the two keywords, “power inequity” and “making decisions together” to answer the following questions :

1. How to dilute power inequity?
2. How to make participatory decisions?

The second goal was to gather a possible direction of solution ideas. The workshop was structured using Integrated Creative Problem Solving (iCPS)(Buijs & Van de Meer, 2013). Specifically, the first two creative diamonds of the iCPS’s Content Finding process: Problem Finding and Idea Finding. Problem Finding is the step for defining the problem, and Idea Finding is the step for generating and selecting options.

In the first diamond, Problem Finding, the participants of the session probe into and reformulate the problem. In the second diamond, Idea Finding, they generate options to address the reformulated problem and select promising options that are original to their perspectives (Heijne & Meer, 2019).

The workshop challenge was shared with the participants in a question form, a so-called problem-as-given(PaG): How can we help GTO recognize and challenge the power inequity by listening & learning from each other to make decisions together?

Before the actual workshop, a pilot workshop was held with one professional service designer.

The workshop was conducted with IDE MSc student designers and took around 1.5 hours. A company engineer from GTO was also present as a problem owner to answer any uncertainties which participants found about the problem during the first part of the session. Before the start of the session, participants had to sign an informed consent.

5.2 Execution of the Creative Workshop

5.1.1 Participants, session process

Participants were IDE student designers who volunteered out of their interest in the topics. Their study backgrounds were as follows.

Participant 1 – DFI, Participant 2 – DFI, Participant 3- DFI, Participant 4 – SPD

The session followed the process shown in Figure 5. 1.

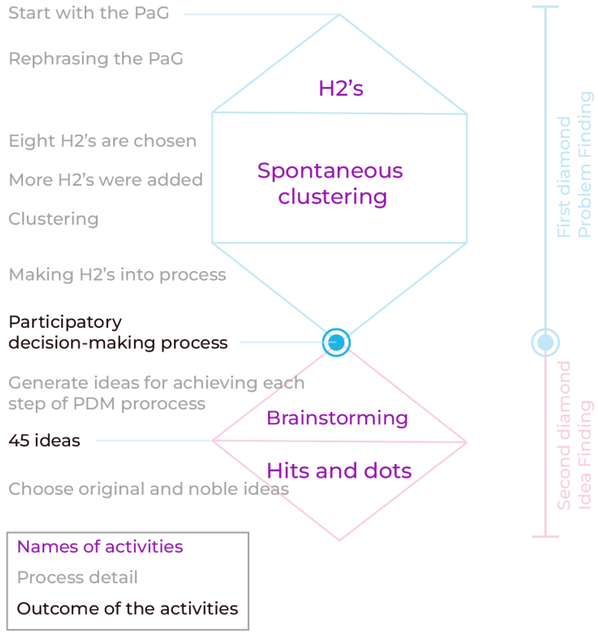


Figure 5. 1 Creative workshop process

» **The facilitator opened the session & sharing the challenge and the goal of the session:**

At the beginning of the workshop, the project’s topic and context were presented. (see Appendix D.)

Lastly, I shared the Problem-as -Given(PaG).:

“How can we help GTO recognize and challenge the power inequity by listening and learning from each other to make decisions together?”

PaG is the first stage of any problem-solving process. The problem as the problem owner describes it to the resource group and/or facilitator(Heijne & Meer, 2019). In the case of this workshop, it is the problem facilitator describes to the participants, the resource group.

Subsequently, participants could ask questions to the facilitator, and the problem owner to clarify any doubts.

» **Problem Finding – The first creative diamond**

➤ *H2's:*

As the first activity, H2's (Prince,1970; Nolan, 1989) was selected to delve into the problem space by generating as many variations of the problem-as-given (PaG) as possible. It is intended to discover different viewpoints of the PaG (Heijne & van der Meer, 2019). In H2's activity, the participants were asked to rephrase the PaG into their words in a Post-it. At the end of the session, the facilitator chose around 8 Post-its(underlined) for the next activity as they contained the essence of thePaG and were considered interesting to discover more. The rest of the H2's options were later examined at the individual ideation time, which helped generate solution ideas.

➤ *Reframing the H2's into a participatory decision-making process:*

Next, the participants were asked to reframe the eight H2's into one H2. Nevertheless, merging the H2's into one sentence was deemed less crucial since each conveyed distinctive perspectives and contributed to the overall understanding of the PaG. Instead, while discussing each H2, new ones were spontaneously suggested and added to the existing options with the facilitator's agreement. Ultimately, the selected eight H2's and the additional ones were clustered and labeled, which was called a participatory decision-making process.

» **Idea Finding-Second creative diamond**

➤ *Brainstorming:*

The purpose of the brainstorming activity (Osborn, 1953) was to generate ideas for achieving each step of the participatory decision-making process, which is the result of the first diamond. The same amount of time was allocated for each step to produce ideas. About 45 ideas were generated in total, which contributed to personal ideation.

➤ *Hits and Dots:*

The fourth activity, Hits and Dots (Buijs & van der Meer, 2013), was to revisit all the generated ideas and choose three ideas for each person deemed original and noble. Everyone was given three stickers to highlight the ideas, and in the end, 11 stickers out of 12 were found on the board.

5.3 Session Results

» **The result of Problem finding – The first creative diamond**

➤ *The result of H2's activity*

H2 let colleagues empathize while listening to their inputs?

H2 evaluate the desirability of the decision?

H2 create an equal (opposed to) hierarchical atmosphere?

H2 make people feel comfortable enough to speak up?

H2 achieve transparency in decision-making amongst many?

H2 let go of assigned roles?

How to provide everyone with the same amount of info to make the decision?

H2 detect power relations?

At the end of the session, the facilitator chose around 8 Post-its(underlined) for the next activity. The rest of the H2's options were later examined at the individual ideation time, which helped generate solution ideas. The complete list of H2's is in Appendix E.

➤ *The result of reframing the H2's : participatory decision-making process*

The identified participatory decision-making process is as follows:

1. Consideration of inclusion
2. Setting the environment for constructive conversation
3. Identifying personal roles and perspectives (introspective)
4. Empathizing & sharing/discussing
5. Evaluation of the decision process

As the first process of participatory decision-making, asking whom to involve and making sure to involve all relevant stakeholders was considered the foremost issue. The second was to set the environment for constructive conversation. The second step reveals that differences in information, language(e.g., expert knowledge), concern, roles, and power hinder constructive conversation. Therefore, efforts should be made to alleviate the information and language differences among the participants. The second step was making a comfortable environment to encourage people to speak up and creating an environment to empathize with others' input. The third step was to identify personal perspectives and interests on the agenda through personal reflection. The fourth step was to empathize during the discussion. As different values and priorities of stakeholders rise to the surface, the negotiation starts. In this stage, communicating honestly

and achieving transparency to know other preferences was the key. The fifth step is evaluating the decision-making process after the decision is made. Evaluating experience is to show an individual's degree of satisfaction with the participatory process.

» **The result of Idea finding-Second creative diamond**

➤ *The result of Brainstorming & Hit and dots*

The ideas suggested for achieving each participatory decision-making process step are presented in Table 5. 1. The yellow highlighted ideas were used for the individual ideation process. The participants choose the ideas with green dots during the Hits and Dots activity. The results of the workshop contributed to ideating on the prototype, PDM method and C&I board(Section 6. 1)

Overview of ideas from the workshop

PDM process	Ideas for each step	Hits&Dots
1. consideration of inclusion	Expert role	
	Informed by the evaluations	
	Envisioning the solution and reflecting who will be influenced	
	Create the map of relevant people	
	Rotation of a spokeperson(not the manager) ,one person from different	
	Importance of exclusion	
	Considering the Roles & expertise of the required decisions	
	To have a big picture (someone with a big picture):involve people who has	
	Will there be one voice per team or multiple?	
2. Setting the environment for a constructive conversation	Round table	
	Speed dates (one to one interaction)	
	Starting with a mediation session, explicit announce no judgement space	
	Morning time with fresh brain and coffee	
	Emphasis the goal of benefit of the company instead of department	
	Practice decision making game	●●
	Collectively formulating the goal of the session	●
	Alignment of the goals.Value map * why	●
	Aligning values of company&department&people	
	Assigning fantasy/having the perspectives of other roles(stepping out from	
	Hat functions exercise	
	Sensitizing towards other stakeholders:let them think in a company	●
	Discovering(other's) value through discussion is important	
	Overview of all the interests of a department(not on a paper)need to	
3. Identifying personal roles and perspective (introspective)	Reflect on what your perfect solution is	
	Identify need, value, priority, concern	
	Not too much pressure on needing to know personal needs	
	Letting people divide between personal and company need	
	Flexible intuitive	
4. Empathizing & sharing/discussing moderated	Storytelling	
	Moderator, neutral expert	
	Identifying and highlighting needs	
	Training for moderation and constructive conversation	
	Role play games	
	Balance between individual(anonymous) acts and collective activities	
	Trust in the moderator believe	
	Training on decision making process	
	Make a shared overlapping list of demands& wishes	●●
	Decide on a shared problem/ boundaries	
5. Evaluation	Preference for physical or digital meeting(not hybrid)	
	Selecting ideal solutions for other roles/ departments	
	Possibility of anonymity	
	Setting common criteria for decision-making to achieve objective outcome	●●
	Checking with the prediscussed list of requriements	
	What level of involvement do you want to have? :let them place	●●
	Define the conflict	

Table 5. 1 Overview of ideas from the workshop

06

Conceptualization

Chapter 6 showcases two studies in which the ideas are conceptualized and evaluated. Furthermore, expert consultation on the concepts will be presented.

The two studies introduced in this Chapter have corresponding design goals, which are more specific and have more focused objectives for the conceptualization activities compared to the design direction (see Table 6. 1). Study 1 demonstrates two concepts, and Study 2 demonstrates one concept that was consequently optimized as the final design shown in Chapter 7.

Design direction	Create a set up that facilitates participatory decision-making to empower GTO members to possess more agency in organizational decision-making so that their experiences and opinions will be heard.	
Study	Study 1	Study 2
Concepts	PDM method, C&I board	Power-full Reflexivity
Design goal	Design a setup that facilitates participatory decision-making among stakeholders holding diverse positions within the organization	Create an exercise that will aid those in a position of authority in identifying the power dynamics in the decision-making process. The ultimate goal is to enable individuals who have experienced the issue and who will be most impacted by the decision to have greater access to the process.

Table 6. 1 Overview of the Studies

6.1 Study 1: PDM method and C&I board

Design goal of Study 1: Design a setup that facilitates participatory decision-making among stakeholders holding diverse positions within the organization

With the design goal as an objective, two design concepts were created, a Participatory Decision-Making method (PDM method) (see Figure 6. 1) and a collective and iterative board (C&I Board) (see Figure 6. 2).

The PDM method aims to increase the engagement of all solving team members and their interaction between the Tooling team. The C&I board was devised to be used in the PDM method. In the C&I board, specific questions are posed to help users clarify the problem, goal, and desired effect of a solution. The questions are developed based on Innocenter's "problem definition process questionnaires" (Spradlin, 2012). Using the C&I board, the solving and Tooling teams can coordinate their understanding regarding their needs. Several features were considered in the C&I board. For example: anonymous posting, rating the priorities on the posting by numbering, and voting features were proposed. These features let the participant's preferences emerge and help narrow the scope of the discussion.

Table 6. 2 gives an overview of the PDM method in which the C&I board is used.

Step	Description
1	Solving team members individually answer the questions on the C&I board
2	Solving team members share their responses with each other and work towards reaching a consensus to arrive at a mutual understanding of the problem definition and the desired outcome
3	The solving team's agreement is shared with the Tooling team. Together, they work towards reaching a consensus using the features of C&I board, such as anonymous posting, rating the priorities on the posting by numbering, and voting features
4	Both teams meet to get buy-in for the remaining open issues.

Table 6. 2 Overview of the PDM method

In sum, the objective behind the two concepts is to engage all relevant stakeholders in the discussion and lead them towards contributing to the decision-making process, where they are actively involved in both diverging and converging ideas.

PDM method

Participatory Decision-Making method

1ST STEP

Discover individual's interest and preference

How

Each solving team member answers the questions on the C&I board individually.

Why

The first step of the PDM process ensures every solving team member takes time to consider the inquiries of the C&I board, such as problem definition and desired effect of the project. The goal is to build shared knowledge among members and increase interest in the project.

Outcome

Individual answers to the C&I board

2ND STEP

Agreement within the team

How

The solving team members share their individual responses with each other and work towards reaching a consensus to arrive at a common understanding of the problem definition and the desired outcomes for a planned solution.

Why

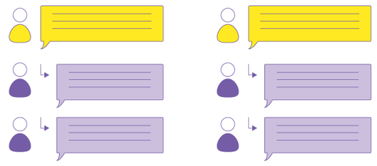
As one team, they can identify gaps in their understanding to arrive at an agreed view on the solution.

Outcome

Agreed answer of the C&I board with clear problem definition & goal & solution direction.

3RD STEP

Written discussion in the C&I board



How

The solving team's agreement is shared with the Tooling team. Together, they work towards reaching a consensus using anonymous discussion, threaded messaging, numbering priorities on the post, and voting.

Why

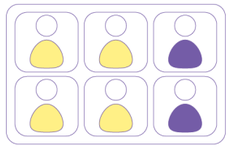
The purpose of the written discussion is to identify issues and information remain uncertain be answered and clarified.

Outcome

There are few open issues that needs to be negotiated in the next step.

4TH STEP

Negotiation



How

Lastly, both teams meet to get buy-in for the remaining open issues at the face-to-face meeting.

Why

Two teams get buy-in for the solution requreiment.

Outcome

The agreed answer between two teams over the solution's requreiment

Figure 6. 1 PDM method

C&I board

Collective and Iterative board

1 What is your initial need? (We will deepen it as we go to the next questions, so it doesn't have to be perfect)

We want ~

2 Justifying the need by articulating the problem statement

A. Define the scope and the scale of your needs.
For example, Is the need driven locally or organizationally ? Does it it the need of specific or bigger group?

B.
- What are being problematic?
- Who is having a problem?
- Who is responsible for solving the issue?
- What kind of issues are incurred by the problems?

C. Is the problem actually many problems?
What are the causes of the problem?
What do you think is the root cause?

3 Contextualize the problem

A. What approaches have we and others tried?(optional)
What were the stumbling blocks to the attempts?
What are the things to learn from previous trials?

B. What is the desired outcome or effect?The questions should be addressed qualitatively and quantitatively whenever possible.

C. Write the problem statement. What information and language should the problem statement include? Be extremely specific avoid jargon.

WE are looking for X in order to achieve Z as measured by W

We think the root cause of the problem is ()

The problem is targeted for ~ (scope) The problem of whom has (issue in () and it cause () problems.

From the previous cases, we think our problem can be solved by (abcd methods)

4. Goal

A. What is the desired outcome? can it be explained qualitatively and quantitatively?

we want ()to be () in the perspective of () so that ()can be ()

5. Exploring Solutions

A. Think of all the solutions and choose the best one by giving an argument

B. What requirements a solution should meet? What are the Must-have and nice-to-have?

C. What are the list of conditions to assess the solution ideas? e.g. money, time, etc

a b c

D. What are the resources need for solution ideas ?
Are time, people, and information reachable/ available to evaluate potential solutions?

Figure 6. 2 The C&I board questionnaire

6.1.1 Consideration of design elements

» **Asynchronous written discussion**

The PDM method can be divided into two sections. The first section is for the alignment within the solving team. The second section is for the alignment between the solving team and the Tooling team. Each section consists of two steps, having a total of four steps. The overall structure can be described as asynchronous-synchronous-asynchronous-synchronous. The structure is inspired by the work of Damian et al. (2006), which proved the efficiency of having asynchronous group discussions before synchronous negotiation meetings. Damian and other scholars have shown the benefits of asynchronous discussion. When engaging in an asynchronous discussion, individuals are granted more time to contemplate their responses compared to a quick-paced synchronous conversation. This enables them to make well-considered decisions.

» **Use of the digital whiteboard**

The C&I board is built on a digital whiteboard. Damian et al. and other scholars advocated using the whiteboard during the asynchronous discussion. They stated that the digital whiteboard supports participants in building coherent, well-thought-out arguments and bringing in heavy topics (Damian et al., 2006; Schwier & Balbar, 2002).

Furthermore, using the C&I board features such as anonymous posting, rating the priorities on the posting by numbering, and voting features enables all the collaborators to grasp the progress of the conversation and to participate without disrupting the previous dialogue. Moreover, as a digital platform, the participants can participate in the conversation at any time and anywhere based on their convenience. Additionally, discussions can be saved for future reference as well.

» **Anonymity**

One of the characteristics of the C&I board is the anonymous postings. Known benefits of anonymous postings are a perceived feeling of safety, the freedom to openly communicate about a sensitive issue without being identified (Van Soest et al., 2000), increased honesty, and a sense of connectedness (Bertera & Littlefield, 2003).

Nevertheless, in companies, most decisions require concrete actions. Therefore knowing the full background of information can be crucial. Thus, a speaker and how the message is delivered can be as important as the content. Anonymity in digital space raises doubts about whether the de-identified message can be perceived as important as regular conversation and be seriously discussed in a physical group setting. Moreover, while anonymous digital spaces are more inclusive in accepting diverse perspectives, inclusivity accomplished in the digital space only partially fulfills the participatory value.

» **Clarification of the problem and desired effect**

The C&I board's questions assist users in clarifying the problem and desired outcomes of a solution. It aims to build a shared goal among the stakeholders regarding the solution. Spradlin underpinned the importance of setting clear goals when tackling innovation projects. "When developing new products, processes, or even businesses, most companies aren't sufficiently rigorous in defining the problems they're attempting to solve and articulating why those issues are essential. Without that rigor, organizations miss opportunities, waste resources, and end up pursuing innovation initiatives that aren't aligned with their strategies." (Spradlin, 2012).

6.2 Evaluation of Study 1

Three evaluations were conducted with varying objectives. The overview of the evaluations are explained in Table 6. 3.

Evaluation	1st pilot test	2nd pilot test	3rd evaluation
Evaluation material	PDM method & C&I board	C&I board question	C&I board features
Objective	What are the client's perceptions about the two concepts	-How are the questions in the C&I board perceived? - Do the questionnaires help respondents articulate the needs that a solution should meet and the problem that it aims to solve? - Are these questions effective for aligning the comprehension of collaborating teams regarding the issue they are solving and the desired effects of their solution?	-Does anonymous and asynchronous discussion promote transparent information exchange among participants? -How do features of the C&I board perceived, which involves anonymous posting, rating the priorities on the posting by numbering, and voting features to validate their effectiveness in aligning collaborators and in narrowing down the decision options?

Table 6. 3 Overview of Study 1 evaluations

6.2.1 First pilot evaluation

The objective of the first pilot evaluation was to know the clients' perceptions of the two concepts. The participants were two primary stakeholders of the project. The concepts were presented to the participants in the form of a presentation for about 30 minutes and another 30 minutes was used for feedback. The feedback was audio recorded to be analyzed.

» **Results and discussion**

Generally, participants expressed a favorable opinion of the PDM method and C&I board. Specifically, they showed interest in the asynchronous aspect of the PDM method, because their previous experiences with methodologies such as Agile or Scrum significantly emphasized synchronous approaches, where all individuals simultaneously engage in collaborative activities. Furthermore, diverse applications of the asynchronous discussion were suggested based on their experience. For instance, while individual use of the C&I board ensured inclusive participation, the formation of small groups consisting of two or more individuals working together was proposed as an opportunity for varied dynamics. Participants noted that expressing contrary viewpoints became challenging when two people engaged in discussions; however, when three individuals worked together, it became easier to articulate divergent viewpoints. Additionally, anonymous discussions were perceived to alleviate the pressure typically associated with individuals holding dominant positions within the discourse.

However, several aspects need to be improved. Although the presented C&I board was primarily designed for dashboard building at this phase, users found it difficult to pinpoint its precise application because its questions did not concentrate on a single problem area. Another point for improvement was that the current idea of the PDM method and C&I board lacks clarity on how colleagues in different positions, such as managers and head managers, fit into the process.

6.2.2 Second pilot evaluation

The objective of the second pilot evaluation was to ascertain the three aspects as follows:

1. How are the questions in the C&I board perceived?
2. Is the questionnaire helpful to respondents in articulating the needs that a solution should meet and the problem that it aims to solve?
3. Are these questions effective in aligning the comprehension of collaborating teams regarding the issue they are solving and the desired effects of their solution?

For the evaluation two participants were recruited, who work for other companies as engineers. The questionnaire on the C&I board (Figure 6. 2) was shared on the digital whiteboard, Miro. They were instructed to reflect on one of their decision-making experiences in their work and answer the questionnaire for 30 minutes. After the test, their experience was interviewed.

» **Result and discussion**

Participants provided feedback indicating that questions on the C&I board were helpful in organizing their thoughts. They commented that the decision-making process within their team would greatly benefit if all members took the time to consider these kinds of questions. From their experience, individuals often struggle to articulate their desired outcomes from a solution.

However, participants also suggested that there were too many questions to finish in 30 minutes. Therefore, reducing the number of questions was a point of improvement.

6.2.3 Third iteration evaluation

» **Objective, participants, procedure**

The objective of the third evaluation was regarding the C&I board's written discussion using its features, and it aimed to ascertain two aspects as follows.

1. Does anonymous and asynchronous discussion promote transparent information exchange among participants?
2. How are features of the C&I board, which involve anonymous discussion, threaded messaging, and numbering the priorities on each posting, perceived?

Three participants were recruited. They are the founders of a startup affiliated with IDE TU Delft. As a small organization, they were deemed appropriate due to their shared discussion topics and decisions to make.

Prior to the evaluation, the participants determined what they wanted to discuss for the evaluation. To align with the participants' needs, the evaluation material was simplified to prioritize the objectives of the Study 1. (see Figure 6. 3)

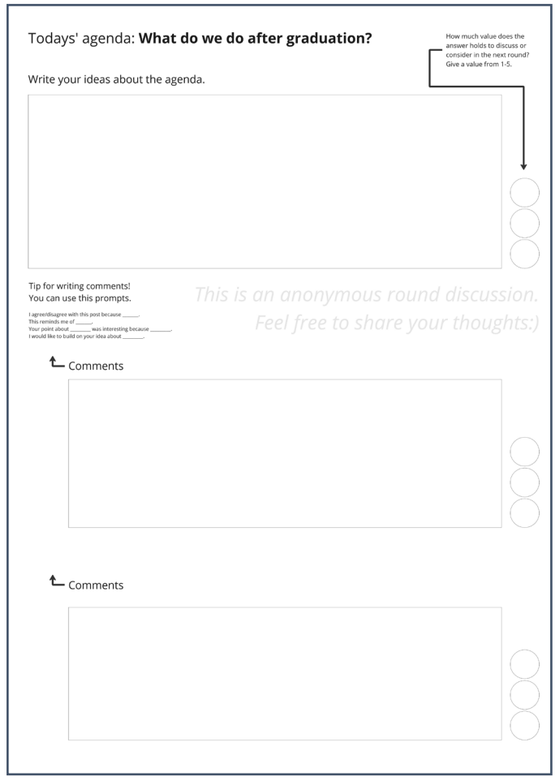


Figure 6. 3 Evaluation material used for the third iteration's evaluation

C&I board has features to support collaborations, such as anonymous discussion, threaded messaging, voting, and numbering priorities on each posting.

Each participant was provided with a paper prototype and a pen. Participants were given the same type of pens to mimic an anonymous written discussion. The objective of the test was explained, and they were instructed to write down their thoughts about their agenda, possible solutions, or points that needed to be clarified before engaging in face-to-face discussions. After 10 minutes of filling out the first box on the paper, the paper was switched to another participant's paper. On the second paper, they wrote their thoughts in the second box in response to the first post. Next, they also rated the priorities of each post by assigning numbers ranging from one to five, with one being the least important to discuss and five being very important to discuss.

» **Results and discussion**

They mentioned that the written discussion was beneficial in aligning their opinions. They acknowledged that it acted as a reminder for certain issues they had forgotten and discovered that each person has varying perspectives on what is considered important to discuss, highlighting individual differences in priorities. The participants found the exercise valuable because the written discussion allowed for a smooth conversation and gave them more time for in-depth thinking.

However, the effectiveness of assigning priorities on the posts to narrow the scope of the discussion was uncertain. It was because participants could not view all the messages on the paper since it was shifted only three times, and new posts were not shared at the end. Moreover, each standard of importance differed, so they remarked that posts that received high priorities might not be equally significant to all the members.

Furthermore, whether the anonymous discussion promoted transparent information exchange and created an atmosphere for open discussion was also uncertain because the test was conducted within a small group where all the members were close to each other. Additionally, the participant's agenda was non-sensitive, so it may not be directly comparable to larger organizations where decision-making involves individuals with varying positions and intertwined interests.

It was advised that the C&I board be digitized, which would allow visualization and interaction of the threaded messaging. Subsequently, it was suggested that the usability of the feature, assigning priorities on posts, could be enhanced visually.

Besides, it was considered crucial to have an agreed agenda between the participants before the written discussion. They remarked that prior to written discussion, everyone should be appropriately communicated to understand which aspects of the agenda they will discuss. For instance, they can decide on which level of detail regarding the agenda or the criteria of priorities.

Lastly, having a moderator was proposed to lead the meeting, prepare the fitting agenda, and sort and narrow the information after the meeting to converge the ideas.

6.2.4 Conclusion

Despite a clear design rationale and continual development of the two concepts, they were not selected as the final design. The first reason was that the effectiveness of the PDM method is highly dependent upon individuals being willing to follow the prescribed steps, which can result in a longer decision-making process. Second, a question was raised on how the proposed feature of the C&I tool can facilitate participatory practice compared to other existing platforms that support collaboration and discussion. Eventually, a design concept used in Study 2(see Section 6.3) was selected and optimized because it was considered more original and better suited to address the problem in shifting individuals' mindsets towards participatory values.

6.3 Study 2: Power-full Reflexivity for Participatory Decision-Making

Design goal of Study 2: Create an exercise that will aid those in a position of authority in identifying the power dynamics in the decision-making process. The ultimate goal is to enable individuals who have experienced the issue and who will be most impacted by the decision to have greater access to the process.

The approach of Study 2 is to reveal power dynamics in an organization, enabling the identification of potential power imbalances. Instead of directly addressing or mentioning the power imbalance, the design aims to make the latent aspects of power more salient, enabling individuals within the teams to self-regulate. By doing so, it challenges the current status quo and demands action to initiate change. This approach can be classified as an adversarial design that operates as an agonistic space, which is explained in Section 2.6.2.

The design target is focused on individuals in a position of authority and specifically targeting the managers of the GTO within the project's context. They are considered primary users and the focus of the design because their view regarding the importance of adopting participatory practice was deemed vital for initiating meaningful change.

Second, the power dynamics are determined by the dynamics of each one's possession of access power in the process. Who is included in the process and to what extent individuals are granted access to the process can significantly affect the process and the stakeholders' power dynamics. Access power is an ability to influence who is included and excluded from a design process, and in the design, it is considered one's ability to influence the process (Goodwill et al., 2021) (See Section 2.5.2).

Lastly, it is crucial to note that the exercise, on its own, cannot lead to better decision-making or evaluate the effectiveness of the decision, which is not the aim of the design goal. Also, the exercise does not aim to decide for the user who is responsible for making the final decision or give specific methods used for participatory practice.

6.3.1 Iterations

» **First iteration**

In the initial stage, a developed prototype(Figure 6. 4) contained questions aimed at prompting respondents to reflect on their decision-making process. These questions assist individuals in recognizing the goal power and the access power(See Section 2.5.2) among the stakeholders involved. The work of Goodwill et al.(2021) was adapted in formulating the questionnaire. The questions from Goodwill et al. were modified to suit the specific design goal.

» **Evaluation**

From a subjective perspective, the limitation of the first iteration appeared to be that it solely used open-ended questions which is difficult for an objective assessment. It was considered not suitable for companies that in general prefer clear and quick methods for assessment to gain insights.

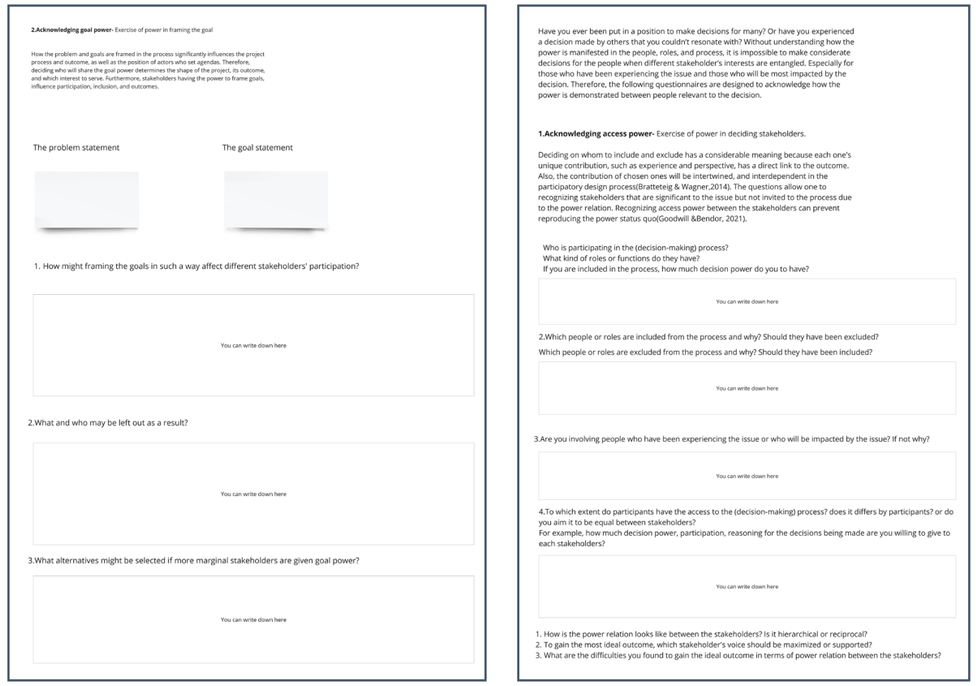


Figure 6. 4 Prototype for acknowledging the goal power and the access power

» **Second iteration**

The second iteration(Figure 6. 5) employed a more intuitive and visual approach than the first iteration. Building upon the limitation of the first iteration, which depended on open-ended questions and subjective assessment, the second iteration sought to use a more straightforward indicator that enables users to recognize the power dynamics. Furthermore, the questions were simplified to primarily focus on identifying access power, as it is more closely associated with the research topic of participatory practice compared to the concept of goal power.

Dicisions on " which tools should be used to support new FSM structure "

Who are the important people in the decision-making, including those who participate and those who do not participate but are related? Write down each participant in the Post-it and move them to the square area.

Those who are participating

Those who are not participating

What are the reason they are not involved?

You can write down here

Do you think all the important people are included in the decision-making?

Yes/No, because

How do you perceive their level of influence on the issue being discussed?(status) Can you place them on the scheme?

Think about the "status" factor in relation to the influence one member has over another, the level of involvement of any particular group member, the chances provided to take action, and ultimately, compliance. Status can be shown in either scenario, whether in a specific situation or task, or widespread, applying to a broad range of situations.

Low influence — High influence

Why did you place them on a certain level in the scheme? Can you match the reason by dragging the word to the Post-its? (Optional)

special knowledge (expert) | special skill(expert) | personality | value or beliefs | unique perspectives | having a big picture of who knows what within a group | type here

...

How much can they participate?(This is not asking whether they participated or not. It is asking how much level of participation they can play in the decision-making.)

The level of participation

They could not participate.	They are trained to understand the benefit of a new direction.	They can participate in a discussion where they will hear and be heard, but no guarantee for a clear conclusion because they lack power to do so.	They can negotiate and engage in trade-offs with the decision making members.	They can obtain the majority of decision-making seats or full managerial power.

How much are they affected by the decisions ?

How much influence does the decision has on them?

No impact at all.	Almost no impacts on work.	Moderate impacts on work. Partial change. Needs to make reasonable adaption to work.	High impacts on everyday performance. Big change, needs to make big adaption to work

Do you think your group offers a comfortable atmosphere where everyone feels safe and confident to express their thoughts and opinions openly?

I think

What alternative measures could be taken to ensure that the concerns and perspectives of individuals with less power are heard and taken into consideration?

For example,
- If their presence is not absolutely necessary, it may be wise to exclude individuals in positions of power.
- It may be beneficial to have a separate discussion specifically for individuals who have less power.

Thank you very much for your contribution!

The respondents are guided to choose and reflect on one of their organizational decision-making experiences for this exercise.

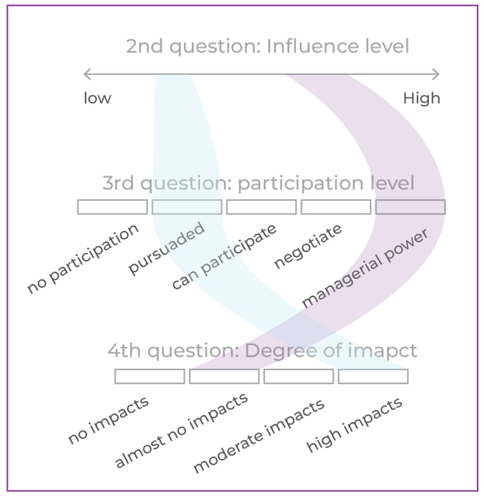
The first question inquires of the stakeholders in the decision-making process, enumerating one by one whether they were considered active participants in the decision-making process or not. This serves to demonstrate who has the access power. Then, they are led to reflect on the reasons behind their granted or denied access.

The second question asks about individuals' influence on the issue being discussed. Subsequently, the following question inquires about the source of their influence.

The third question asks individual's participation level in the decision-making process. The participation level was adopted from the work of Arnstein, a ladder of citizen participation. (Arnstein, 1969)

The fourth question asks how much individuals were affected by the decision.

Lastly, the responses from the participants are compared to identify any pattern. For example, suppose those who are listed as participants(1st question), have a high level of influence over the issue(2nd question), a high participation level(3rd question), and are less impacted by the decision(4th question). In that case, it exhibits an environment where those with less power face challenges in voicing their opinion. In contrast, if more impacted people show a high participation level, it indicates a participatory decision-making environment of the decision-making process.



Example of identifying patterns from the answers

Figure 6. 5 The second prototype for acknowledging the access power

6.4 Evaluation of Study 2

» **Objective, participants, procedure, data collection**

The objective of the evaluation was to know the following aspects:

1. The participant's perception of the concept and areas for improvement
2. The effectiveness of the concept concerned with identifying the power dynamics
3. Participant's perspectives on participatory decision-making in GTO

For the evaluation, two participants were recruited. They are managers of GTO. Each test was individually conducted face-to-face in a test room.

The concept's prototype was uploaded on Miro, a digital whiteboard, and the participants accessed the prototype using their laptops.

The evaluation lasted approximately one hour. It began with an introductory session wherein the participant was provided a brief presentation about the benefits of recognizing the power dynamics and bringing the organization's hierarchical structure to the forefront. Afterward, the participant was guided to use the prototype. During the exercise, the respondents are required to choose one decision-making experience and give answers based on the experience. Following their completion of the questionnaire on the prototype, the answers were reviewed and discussed with them. Afterwards, the participants answered semi-structured questions outlined in Appendix F to obtain answers for the evaluation objectives.

During the test their interaction with the prototype was monitored. The participant's screen was recorded, and the audio was separately recorded. The recording was transcribed, and filtered to examine the insights following the Grounded Theory(Glaser & Strauss, 1967).In addition, the participant's answers to the exercise were visualized to identify power dynamics

» **Result and discussion**

Visualization of the answers from both participants revealed that highly impacted individuals had little to no participation in the process.

In general, the discussions with the participants demonstrated the concept's usefulness in identifying power dynamics and that it served as a means to elicit their perspectives on participatory practices. Furthermore, their insights regarding potential approaches for implementing participatory decision-making were recognized. The subsequent section provides a detailed account of the results.

➤ *Perception of the concept and areas for improvement*

It was suggested that instead of enumerating names of stakeholders, using the roles of stakeholders could be better as many stakeholders shared the same role.

Furthermore, it was observed that participants interpreted questions differently than what was intended. The questions had to be clarified in the process. In addition, difficulty in pinpointing whether one should be classified as a "participant" or "involved" were observed (in exercise question 1). Because participants experienced, different individuals join and leave at different stages during the decision-making process, influencing the categorization of individuals.

➤ *The effectiveness of the concept concerned with identifying the power dynamics & Participant's perspectives on participatory decision-making in GTO:*

Both participants' answers to the exercise and their visual insights revealed that their current practices are far from participatory practice. The results show that those highly impacted by the decision show little to no participation in the process, and the participants agreed that represents the current situation. Nevertheless, one participant stated that while it is impossible to invite all the highly impacted ones, a good level of participation is to involve "leads" of the highly impacted ones.

Additionally, the participants mentioned that instead of directly involving everyone in the decision-making process, providing sound reasons for the decision was more crucial. One participant commented that there was a notable deficiency in the manner in which decisions were conveyed to others. Particularly, there was a lack of supporting reasonings for the chosen decision, strategic information delivery, and clear guidance regarding future steps. Thus, enhancing communication and information delivery was considered a suitable strategy for addressing the identified shortcomings in their particular situation.

➤ *Potential application of the concept*

Participant 1 stated that utilizing the exercise has the potential to bring about how they approach making decisions. Participant 2 stated the use of exercise in assessing the appropriateness of their current practices, seeking areas for improvement in the decision-making process, and promoting agreement among all stakeholders. Subsequently, it could be used in deciding participants before the process has started. In addition, using the exercise for decisions requiring urgent conclusions was not recommended.

6.4.1 Expert's consultation

Mieke van der Bijl-Brouwer, an expert in research in design for social innovation, provided valuable guidance that helped to strengthen the design direction. The evaluation of Study 2 led to the perception that the reasoning presented for using design of Study 2 was weak, which hindered effectively delivering the full value of participatory decision-making. In the evaluation of Study 2 during the introductory session, the goal of the concept was shared with the participants that the design aims to address the deficiency of participatory decision-making resulting from power imbalance within the organization.

However, concerns regarding the terminology were encountered, as power imbalance and differences are naturally seen in organizational roles and authority. Thus, the term ‘power imbalance’ was seen as holding negative connotations that could demotivate client acceptance of the proposed solution.

Mieke van der Bijl-Brouwer provided practical advice on understanding different forms of power demonstrated in Section 2.5.1, which gives an understanding of the three forms of power: power-over, power-with, and power-from-within. This understanding stresses recognizing an individual’s unique power and states that power can be developed collaboratively with others. Next, it was recommended to present participatory decision-making as a means to empower individuals and grant them agency.

6.4.2 Conclusion

The insights gained from Study 2 contributed to strengthening the theoretical foundation of the project, determining the appropriate design format, and refining the questionnaire used in the prototype. These learnings were reflected in the final design.

07

Final Design

In Chapter 7, the final design is showcased with the elaboration of its form, structure, and contents. Subsequently, the client's evaluation of the final design was undertaken. The result and discussions of the evaluation are demonstrated.

The final design presented in this chapter is the optimization of Study 2's concept, which shares the same design goal as Study 2. Appendix G shows the complete final design.

The goal of the final design: Create an exercise that will aid those in a position of authority in identifying the power dynamics in the decision-making process. The ultimate goal is to enable individuals who have experienced the issue and who will be most impacted by the decision to have greater access to the process.

7.1 The Form and the Structure

The final design: Power-full Reflexivity has been made into a website containing two pages: an understanding page and a reflexivity exercise page.

In the understanding page, theoretical knowledge of the three forms of power is illustrated through which the need for participatory decision-making in an organization is supported. The reflexivity exercise page, which is designed in a Google sheet, contains questionnaire. These include four closed-ended and six open-ended questions. Table 7. 1 shows the overview of the questions in the reflexivity exercise. For this exercise, the respondent should choose one decision-making process that they experienced and that involved multiple individuals within the company.

Finally, the result of the close-ended questions is analyzed into two types of objective insights: a Sankey diagram and a dot chart.

7.2 Contents of the Final Design

	Close-ended questions
1	Mapping the stakeholders: who are the people relevant to the decision?
2	Assessing the level of influence: Looking at the people you've named, what do you perceive their level of influence in the organization to be?
3	Level of participation: Looking at the people you've named, what was the level of their participation in the decision-making?
4	Understanding the impact: For the people named, to what extent did the decision impact their day-to-day work?
	Open-ended questions
1	What is the reason for not involving people that are labeled as "not involved" even though they are considered relevant to the decision?
2	Do you think all the relevant people to the discussion were counted in the decision-making process?
3	Acknowledging power-from-within: What are each individual's unique strengths and power specific to the issue?
4	Based on the recognized strengths, how did those who participated and were involved contribute to the decision-making? How could those who were not involved contribute to the decision-making?
5	What are ways to acknowledge, respect, and maximize individuals' strengths in the decision-making process?
6	What alternative measures could be taken to ensure that the concerns and perspectives of individuals who were not involved are heard and considered?

Table 7. 1 Overview of the questions in the reflexivity exercise

7.2.1 Closed-ended questions

» ***Mapping the stakeholders: who are the people relevant to the decision?***

The purpose of this question is to prompt respondents to recall all relevant stakeholders associated with the decision-making process. The basis of the question was the recognition of access power, one of the forms of power stated in the work's of Goodwill et al. (2021), which plays a crucial role in determining power dynamics among the stakeholders. The respondents can categorize the stakeholders into three groups, which ensures comprehensive coverage and recognition of all individuals based on their level of involvement in the decision-making process.

» ***Assessing the level of influence: Looking at the people you've named, what do you perceive their level of influence in the organization to be?***

The term "influence" was deliberately used in the question to deliver a broader understanding of power, which goes beyond the notion that power is solely dependent on hierarchical rankings or social status. Within the context of power bases, the concept of power involves both the use of coercive and soft means. French & Raven developed an inclusive framework of tactics used to exercise power, called power bases. It includes "coercive (e.g., punishment), reward (e.g., support), legitimate (e.g., shared beliefs about obedience), expert (e.g., knowledge), referent (e.g., religious identification), and informational (e.g., persuasion) (French & Raven, 1959)." Recently, the power bases have been reclassified into two groups: social control (harsh bases) and influence (soft bases) (Fiske & Berdahl, 2007). The reclassification acknowledges that soft methods, such as incentives or expertise, are likely to be more successful in informal, medical, and organizational contexts (Guinote, 2017). Thus, the term influence was used to imply that the determinant of power comprises both the harsh and the soft means, moving beyond the simplistic understanding of coercive power and the concept that power is obtained at the expense of others.

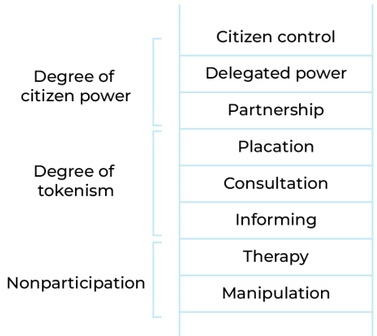


Figure 7. 1 Arnstein(1969)'s "Eight Rungs on a Ladder of Citizen Participation"

» ***Level of participation: Looking at the people you've named, what was the level of their participation in the decision-making?***

The question inquires about the level of participation individuals hold in the decision-making process. The levels are divided into four steps, which is adapted from Arnstein's "eight rungs on a ladder of citizen participation" as shown in Figure 7. 1. (Arnstein, 1969).

» **Understanding the impact: For the people named, to what extent did the decision impact their day-to-day work?**

This question inquires about the degree of impact the decision had on each individual's day-to-day work. The levels of impact are categorized into four groups, following the example of Arnstein in categorizing the level of participation.

7.2.2 Open ended questions

» ***What is the reason for not involving people that are labeled as "not involved" even though they are considered relevant to the decision?***

» ***Do you think all the relevant people to the discussion were counted in the decision-making process?***

These two questions prompt respondents to reflect on why certain people are not selected as participants or to be involved.

» ***"What are each individual's unique strengths and power specific to the issue?"***

» ***"Based on the recognized strengths, how did those who participated and were involved contribute to the decision-making? What are each individual's unique strengths and power specific to the issue? How could those who were not involved contribute to the decision-making?"***

The purpose of these questions is to elicit recognition of individuals' strengths and power. By inquiring about strengths and power, specifically related "to the issue," the intention is to emphasize the potential use of individuals' power-from-within for the decision-making process. Additionally, although not explicitly stated in the question, the purpose is to encompass a wide range of factors as strengths, including one's experience with the issue.

"What are ways to acknowledge, respect, and maximize individuals' strengths in the decision-making process?"

"What alternative measures could be taken to ensure that the concerns and perspectives of individuals who were not involved are heard and considered?"

These two questions prompt respondents to consider strategies to implement participatory practices in current practices. However, it is important to note that the intention behind the questions is not to advocate for drastic changes in the existing system or the immediate involvement of all relevant stakeholders in the decision-making process. Instead, the goal is to explore feasible alternative measures for the organization's specific context and circumstances.

7.2.3 Insights

Based on the answers from the close-ended questions, two kinds of visualizations could be created which give insight into the organizations' decision-making process.

1. A Sankey diagram
2. A dot chart

» **Sankey Diagram**

Sankey diagrams are a type of visual representation that shows how values flow from one set to another. It is a visualization that depicts the relation of one set of values to another.

From the close-ended questions, four categories of nodes can be seen: stakeholders, level of influence, level of participation, and level of impact from the decision. By reading the diagram, one can discover the dispersion of stakeholders into different categories.

Figure 7. 2 and Figure 7. 3 show examples of the Sankey chart. Figure 7. 2 shows a result of an organization that reflects participatory decision-making, while Figure 7. 3 gives a result of an organization that does not reflect participatory practice.The flow of each line from one column to another can indicate the power dynamics among the relevant stakeholders of a decision-making process.

Look at the flow of the stakeholders from one categrory to another. If the people most impacted by the decision were the participants with a high participation level, it shows the decision-making process was participatory. Conversely, suppose the people with high influence in the organization are the participants with full participation level, but their impact from the decision is low, it indicates the need for deliberation on ways to enhance participatory practice.

This can be seen in Figures 7. 2 and 7. 3. Figure 7. 2 shows a result in which those impacted by the decision also have an equal or near equal level of participation. Figure 7. 3 shows many intersections, between participation and degree of impact. This means that the ones most participating are not the ones impacted by the decision.

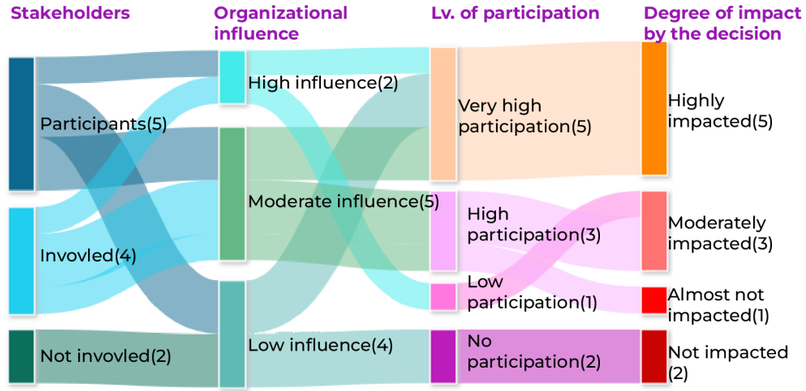


Figure 7. 2 An example of the result that reflects participatory practice

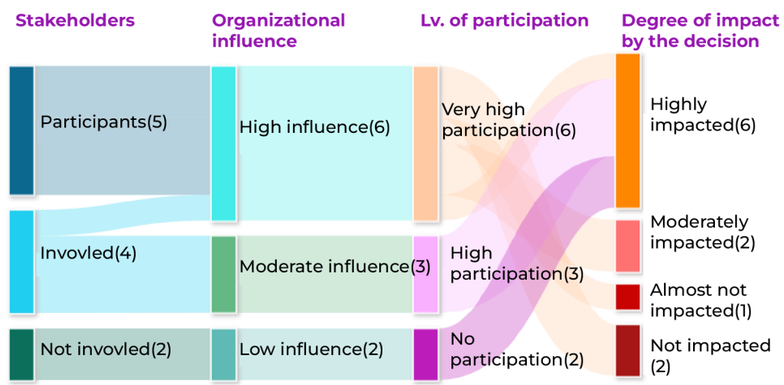


Figure 7. 3 An example of the result that less reflect participatory practice

» **Dot chart**

Equation 1 in Table 7. 2 describes the individual power during the decision-making process in order to gain an overview of the power dynamics among stakeholders. Using equation 1, a dot chart was created.

$$P = (Par - Imp) * Inf \qquad (1)$$

Variable	Description	Range
P	Power of the individual in regard to the other stakeholders	-9 to 9
Par	The level of participation of the individual in the decision-making process	1 to 4
Imp	The degree to which the decision impacts the individual	1 to 4
Inf	Their organizational influence as an individual	1 to 3

Table 7. 2 Explanation of equation 1

The first part of equation 1, *(Par - Imp),* determines the difference between a stakeholders' level of participation and the degree to which they are affected by the decision. This answer can range from -3 to 3. If this value is zero, it indicates that one's participation in the decision-making process was appropriate to the impact of the decision on them.

The value is then multiplied by the stakeholders' level of influence within the organization. If an individual has significant influence in the organization, their decisions will have a greater impact. Furthermore, their influence is able to strengthen their participation in the decision-making process.

Here are the examples of the dot chart. The x-axis shows *P*, the power of the individual in regard to the other stakeholders. The y-axis shows N, the number of stakeholders having *P* as a result of their answers. The Figure 7. 4 shows a result of an organization which has participatory decision-making, while the Figure 7. 5 an example where there is still something to gain.

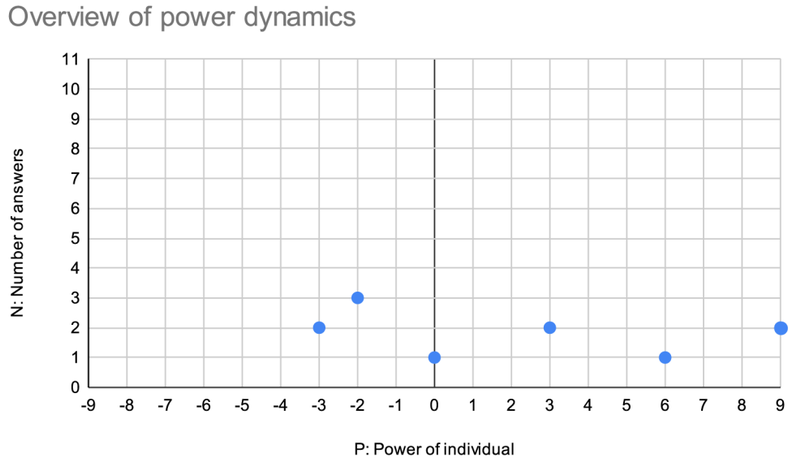


Figure 7. 4 Dot chart that reflects participatory practice

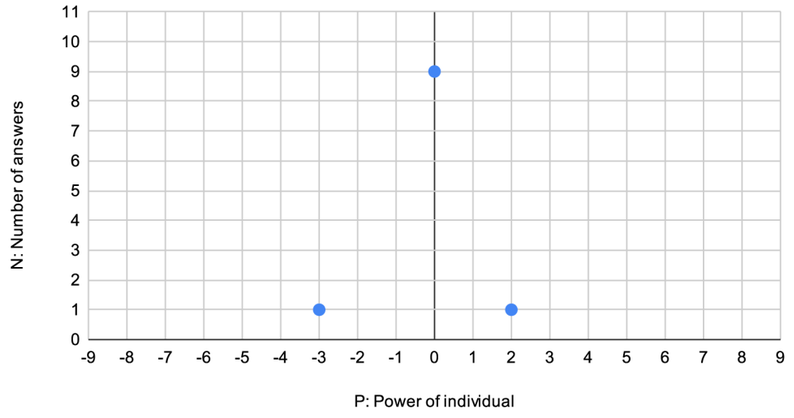


Figure 7. 5 Dot chart that less reflects participatory practice

Figure 7. 4 is a chart that less reflects participatory practice. Figure 7. 4 shows a low count of *P* being 0 and a widespread of **P**-values. This indicates that *Par* and *Imp* are not balanced. In this example, most *P*-values are on the positive side of the chart. This means that *Par* was higher than *Imp.* This means those most impacted by the decision could not participate as much as they maybe should have. It even has a few *P*-values of 9, meaning that there were participants of high organizational influence, having a high participation, while not being impacted by the decision.

Figure 7. 5 shows a high count of *P* being 0 and only a few answers that are close to 0. This indicates that the level or participation *Par* was equal in relation to the degree by which the individual was impacted *Imp*.

Before finalizing the exercise, the points to consider lastly are presented. There may be decisions where the participatory practice is not fitting. Then what are the decisions that can involve more people, and what are decisions that cannot? In both cases, it is worthwhile to examine who should be included, the means and proper time to hear their ideas, and the effects the outcome would have on the people. The objective analysis does not account for the various situational factors that impede participative practice in the respondents' particular decision-making scenarios. Therefore, it is encouraged to reflect on their responses to the open-ended questions to implement participatory decision-making that aligns with the specific needs of their organization. In addition, these open-ended questions could serve as a framework to guide them in designing more inclusive decision-making processes for the future.

7.3 Evaluation

An evaluation was conducted to substantiate four aspects of the final design showcased in Appendix G. The four objectives are as follows: the design's usability, the impact of the design on the target audience, the user's resonance with the design in terms of the relatability to their experience in the organization, and the design's effectiveness in recognizing power dynamics among the stakeholders.

7.3.1 Objective

Each objective aimed to assess the following details as follows:

» **The usability:**

- Whether the understanding page's information grounds the reflexivity exercise.Whether the amount of information is good enough.
- Whether the reflexivity exercise's questions are easy to understand and follow.
- Whether the questions are comprehended as they are intended.
- Whether the final design is used as intended and the interaction with it is smooth.

» **The impact of the design on the target audience:**

- Whether the "reflexivity exercise" helped the respondent to consider how each individual's strengths could be used in the process.
- Whether the exercise helped the respondent to be aware of the power dynamics
- Whether the respondent is motivated to incorporate the participatory value in their work.
- Whether the respondent is more aware of the need for participatory practice in the organizational decision-making process.

» **Users' resonance with the design in terms of the relatability to their experience in the organization:**

- Whether the exercise is relevant to the respondent's work concerning their position or function in the organization
- Whether the respondent thinks that the exercise is relevant to the company.
- Whether the respondents would like to recommend the exercise to other colleagues.

» **The design's effectiveness in recognizing power dynamics among the stakeholders.**

- Whether the insights of the results help respondent objectively determine power dynamics.
- Whether the exercise helped the respondent be aware of the power dynamics among the stakeholders.

7.3.2 Participants, procedure, data collection

» **Participants**

Three participants were recruited under the consideration that they should be GTO managers who haven't previously tried the design.

» **Procedure**

The URL of the design was shared one week before an in-depth interview to research their experience with the design. The estimated duration to go through all design parts, including the "Understanding page" and "Reflexivity exercise," was around one hour. After one week for the individual experience with design, a 40-minute separate interview was undertaken.

» **Data collection**

The data was collected in two types, quantitative and qualitative measures. The qualitative data from the semi-structured interview was audio recorded, transcribed, and filtered to examine the insights following the Grounded Theory(Glaser & Strauss, 1967).The quantitative data was gathered through a survey with 5 points Likert scale. The survey questions are designed to obtain answers to the evaluation objectives and they are adapted from the survey questions of (Maya Goodwill, 2020) The survey questions were designed according to the evaluation objective. The full survey questions are shown in Table 7. 3 with the participants' answers.

1. The usability of the design- Questions 1, 2, 3, 4
2. Impact of the design on the target audience-Questions 5, 8, 9
3. Users' resonance with the design in terms of the relatability to their experience in the organization -Questions 10, 11, 12
4. The design's effectiveness in recognizing power dynamics among the stakeholders – Questions 6,7

7.4 Result

7.4.1 The survey answers

Evaluation questions to GTO NL. To what extent do you agree with the following statement?
1-strongly disagree, 2-disagree, 3-neither agree nor disagree, 4-agree, 5-strongly agree)

Understanding page	P1	P2
1. The "understanding page" was easy to follow.	4	4
2. The "understanding page" contained a good amount of information.	5	3
3. The "understanding page" was a good foundation for knowing the purpose of the "reflexivity exercise."	5	5
Reflexivity exercise		
4. I felt confident in filling in the answers to the "reflexivity exercise".	5	5
5. The "reflexivity exercise" helped me to consider how each individual's strengths could be used in the process.	4	5
6. The exercise helped me to be aware of the power dynamics among the stakeholders.	4	5
7. The insights of the results (charts) helped me objectively determine power dynamics.	_	4
8. I am motivated to incorporate partiwcipatory value in a new project/ process after completing the exercise.	5	4
9. After the exercise, I am more aware of the need for participatory practice in the organizational decision-making process.	4	5
10. The exercise is relevant to my work concerning the position/function I have in the organization.	4	5
11. The exercise is relevant to GTO NL.	5	3
12. I would recommend the exercise to other colleagues.	5	4

Table 7. 3 Overview of the survey answers

The result of the quantitative survey in Table 7. 3 shows that, in general, the participants perceived the design positively by answering agree (4) or strongly agree (5) to most of the questions(11/13), and positive experience, in general, was also noted in the interview of three participants.

P1: "I see it is giving an interesting viewpoint. Feedback on how we decide on things. So they're important enough to get that feedback to spend the time anyway."

The questions that received the lowest points 3 (neither agree nor disagree) are "whether the understanding page was a good foundation for knowing the purpose of the reflexivity exercise", and "whether the reflexivity exercise is relevant to GTO NL."

Now, the assessment for each objective is demonstrated.

7.4.2 Overall insights

» **Objective 1: Usability of the final design**

	P1	P2
1. The "understanding page" was easy to follow.	4	4
2. The "understanding page" contained a good amount of information.	5	3
3. The "understanding page" was a good foundation for knowing the purpose of the "reflexivity exercise."	5	5
4. I felt confident in filling in the answers to the "reflexivity exercise".	5	5

Table 7. 4 Survey questions related to the evaluation objective: usability of the final design.

The quantitative data in Table 7. 4 shows a high score concerned with the final design's usability. From the qualitative data, I was able to uncover deeper insights.

The usability issue concerning the usage of the tool was observed mostly in generating insights using a Google extension. P1 and P2 mentioned that instruction to make a Sankey chart was complicated. P2 made the Sankey chart by himself, but he expressed that instructions should be more readable and visible. The instruction on how to use the extension brought confusion because the reason for following each step was not explained. Moreover, P2 wanted to edit the color of the Sankey chart, which was not explained, so an additional explanation on editing the chart was recommended.

P2 and P3 disagree that two terms, "affected" and "relevant," are used at the same time to define the stakeholders. To illustrate, in question 1, the stakeholders are referred to as those who are relevant to the decision, but in further explanation, the requirement for being the stakeholder is explained as being affected by the decision. P3 noted the inconsistency by giving an example that an

expert who is relevant to the decision can participate in the decision-making, but the decision might not impact the person.

P3 noted that question 2A be better designed to lead respondents to give a detailed answer. For example, the name of the stakeholders could be matched with the individual's strengths, and next to the strengths, there could be enough blank space to elaborate on how each one's strengths were used or could have been used in the process.

» **Objective 2: Impact of the final design on the target audience**

	P1	P2
5. The "reflexivity exercise" helped me to consider how each individual's strengths could be used in the process.	4	5
8. I am motivated to incorporate participatory value in a new project/ process after completing the exercise.	5	4
9. After the exercise, I am more aware of the need for participatory practice in the organizational decision-making process.	4	5

Table 7. 5 Survey questions related to the evaluation objective: Impact of the final design on the target audience

The quantitative data in Table 7. 5 reveals that the design had a significant impact on the target audience, specifically the managers of the GTO. The P2's response from the interview conveys that he acknowledged the need for participatory practice and thought of appropriate ways to implement it in the future.

P2: "I learned that next time I need to involve more engineers in the process."

On the other hand, the qualitative data shows the limitation of question 2A in the reflexivity exercise. The question 2A is for assessing the impact of the final design on the target audience.

Question 2A: Based on the recognized strengths, how did those who participated and were involved contribute to the decision-making? How could those who were not involved contribute to the decision-making?

It was observed when one's perspective on participatory decision-making is confined to the participation through representatives rather than direct participation by the people themselves, the respondent failed to address the central aspect of a question in their response. For instance, P3 answered that the strength of the "participants" are the proactiveness of planting the seed, which means informing stakeholders who are not directly involved in the decision that certain decisions are being made and gathering information from them on how the decision has an impact on them and what are their opinions about the decision In contrast, the strengths of the ones who are appointed as "not involved" lie in their proactiveness in expressing their opinions to the representatives and acquiring information through attendance at various open meetings, primarily focused on staying informed about company news. However, this viewpoint does not genuinely recognize the individuals' strengths, nor does it incorporate their strengths into the decision-making process.

» **Objective 3: Users' resonance with the design in terms of the relatability to their experience in the organization**

	P1	P2
10. The exercise is relevant to my work concerning the position/function I have in the organization.	4	5
11. The exercise is relevant to GTO NL.	5	3
12. I would recommend the exercise to other colleagues.	5	4

Table 7. 6 Survey questions related to the evaluation objective: Users' resonance with the design in terms of the relatability to their experience in the organization.

In addition to the quantitative data shown in Table 7. 6, the qualitative data from both P1 and P2 further supports the resonance of the design with the users. Both P1 and P2 recommend a workshop for managers to utilize the design, indicating their positive reception and recognition of its potential value. This qualitative feedback highlights the users' approval and signifies their appreciation for the design's usefulness in their specific context.

» **Objective 4: Design's effectiveness in recognizing power dynamics among the stakeholders**

	P1	P2
6. The exercise helped me to be aware of the power dynamics among the stakeholders.	4	5
7. The insights of the results(charts) helped me objectively determine power dynamics.	_	4

Table 7. 7 Survey questions related to the evaluation objective: Design's effectiveness in recognizing power dynamics among the stakeholders.

Although P1's answer to survey question 7 is missing in the quantitative data shown in Table 7. 7, the qualitative data provides support for the notion that the insights derived from the exercise results helped P1 and P2 in objectively determining the power dynamic. This is further evidenced by P1 engaging in discussions regarding the appropriate interpretation and application of these insights, as elaborated in Section 7.5 of the Discussion.

7.5 Discussion

» **Is having a high number a risk?**

Regarding the second insight, a dot chart using the equation, a question was raised if having a high number is a risk. It means that someone with high influence but low impact from the decision participated in the process.

As an answer to this question, the insights do not imply that there shouldn't be anyone with a high value. Instead, one can consider whether a person with high value is necessary for the decision. Some decisions are more fitting to be resolved by individuals with more experience with the issue and who would be highly impacted by the decision, while other decisions may require people with high influence because of their unique perspectives. Again, the dot chart is not for the diagnosis but designed to bring deeper questions to the current practice and facilitate reflexivity.

» **Is it a problem that other people feel managers made the decision?**

Another question was raised by a participant regarding whether it is a problem for others to perceive the decision was made solely by managers. The participant defended that although people were given enough time and opportunity to make their own decision, they did not reach a conclusion due to their cautiousness, so the manager had to intervene. Regarding this, the design and the evaluation do not explicitly address the validity of the argument or whether other people agree with it. However, the question emphasizes that participatory practice requires mutual cooperation between both sides. First, there should be a company culture that rewards and encourages individuals to take initiative, bear responsibilities, and accept risks for improvement. Second, the employees should be motivated to take ownership, leverage their "power-from-within", and seize opportunities to exercise the agency. Thus, the success of participatory decision-making depends on the willingness of both sides.

» **Although people believe that I made a decision, the real input of the decision could be from them.**

One viewpoint expressed by a participant was that while it may be perceived that the manager made a final decision, the actual input for the decision could have come from others. While the design exercise does not delineate the actual decision maker, the question arises as to whether specifying an individual's influence in the decision is necessary. The response is twofold. On the one hand, it would contribute to objectively reflecting the process. However, doing so is not the main purpose of the exercise. The exercise does not seek to blame someone or find the accountable person. Instead, the purpose is to enhance decision-making by fostering a greater participatory value. Considering these aspects, it became noticeable that how the user experience the design can differ greatly depending on one's perspective and mindset and openness to the participatory value.

» **Feedback regarding the equation**

One participant raised a question regarding the equation. Currently, the equation value is perceived optimal when the stakeholder's level of participation is equal to the degree of impact the decision has on the individual. However, regarding this view, a participant raised a question regarding appropriateness.

Similarly, a participant rated different degrees of impact on two managers, who were considered "participants" in the decision-making process. Because one of the managers is responsible for employees who are considered to be impacted by the decision, the manager received a higher impact than the other. Then the question was whether their influence should also differ based on their close relationship with the highly impacted individuals.

Both questions imply a perspective that is counter to the direct practice of democracy, which attempts to magnify the power of citizens and society as a whole (G. M. Nelson, 2017). Various alternative measures can be considered to be incorporated into the equation, such as an individual's indirect participation in the decision-making process through representatives. However, adding anything more would weaken the significance of the original meaning of the direct practice of democracy.

In conclusion, the purpose of having two types of questions, the open-ended and close-ended questions, is not to advocate for the instant participation of all stakeholders but rather to raise awareness to participatory practice and guarantee that the views of those who will be most impacted are heard. It is vital to consider various approaches and gestures to address the concerns and viewpoints of these people. Again, the result of the interview showed that the effectiveness of the two types of questions is inclined to the respondents' motivation to engage in critical thinking and their perspective on the potential for enhanced participatory practices.

To sum up, it was recommended to use the tool in a workshop form with other colleagues. By doing this, one could obtain valuable insights that one could not get by using the exercise alone, such as aligning the view on the matter, going beyond their subjective interpretation of the insights, and considering the need for participatory practice in the organization.

08

Discussion & Conclusion

In Chapter 8, the design's implications and limitations are elaborated, and finally, the project concludes with the conclusion where the research work is summarized.

8.1 Contribution of Design(implication)

In large organizations with distributed responsibilities across diverse roles, inviting everyone as key stakeholders in decision-making is considered impractical. However, despite the challenge, it remains crucial to consider the opinions of each stakeholder and provide them with a voice. It is essential because decisions will inevitably impact those related and eventually influence the organization. Thus, the research stresses the necessity of participatory decision-making. The design aims to address this matter from the viewpoint of those with authority, such as managers, by raising awareness of the participatory practice through the reflexivity exercise.

The design can be employed as a useful exercise to give rough guidelines with quantified power dynamics, which becomes comparative standards for assessing their practices. The insights acquired from this exercise need not be confined to individual reflection but can be shared within a group setting. Such practices can effectively raise awareness of the issue and drive organizational change.

Moreover, the design provokes the action of those in a position of authority to listen and consider diverse perspectives actively. Furthermore, it encourages recognition of the unique power held by each individual and advocates involving them throughout the decision-making process to utilize their strengths. However, it is important to note that the exercise was designed to be used with an understanding and respect for the current framework and structure rather than attempting to disrupt it.

8.2 Limitations and Future Research

The study has a number of limitations that need to be considered. First, the final evaluation was held with few participants (N=3), impacting the generalizability of the findings. It was due to the selection of participants who are managers and new to using the prototype and who are available within the given time. Although the sample size poses a limitation in being validated scientifically, it was mitigated by conducting extensive interviews that discovered valuable insights regarding the effectiveness of the final design. These interviews took longer than expected, around 1.5 hours per participant.

Second, due to the elongated interview time and time restrictions, there is missing data in the study. Specifically, during the evaluation process, I unintentionally overlooked rechecking P1's answer to survey question 7, which led to P1 not providing a response to that question. Additionally, I was unable to obtain P3's survey responses because the participant preferred to test the exercise in my presence. This resulted in several meetings with lengthy discussions, ultimately preventing the completion of the survey for P3. However, despite the absence of survey responses, a comprehensive and in-depth interview was conducted, allowing me to thoroughly assess P3's interaction with the final design from various perspectives.

Third, the individual insights obtained from the exercise were not shared with other members, which missed an opportunity for colleagues to be engaged in discussions on the topic. However, this decision was made to prioritize the validation of the design in achieving its intended goals rather than increasing the attention to and facilitating the shared understanding between colleagues about the participatory practice. But if there were additional time, planning a workshop to encourage discussion and sharing of thoughts among participants would be advantageous.

Fourth, the created equation affords a view of power dynamics among the stakeholders, but the equation was not scientifically validated. Currently, the equation implies that the individual's level of participation should be decided according to the degree of impact the decision has on an individual. However, in an organizational setting, involving every affected individual may not be feasible, as was observed during the evaluation. Therefore, while efforts were made to address the limitation by using open-ended questions and explaining the implication of the equation, the equation itself can be redefined to incorporate the specific needs and agreements of the organization.

Lastly, the existing equation fails to consider the wide range of factors that influence each variable, the level of participation, the level of influence, and the degree of impact. Furthermore, due to time constraints, the equation could not incorporate the insights provided by state-of-the-art knowledge about each variable.

8.3 Conclusion

The research proposes participatory decision-making in organizational decisions where multiple individuals are related and impacted. This section elaborates on how the final design aligns with its corresponding research questions and design goals.

The research objective underwent a significant change caused by a shift in the research question. The problem to tackle was concerning the low interest and attention to a dashboard assignment in which two groups of teams are collaborating. The initial objective of the research was to enhance collaboration. Thus, an initial research question was, how to bolster collaboration between teams to co-design a sustainable and effective dashboard? The theoretical and empirical research detailed in Chapters 3 and 4 comprehensively addressed this initial research question. In particular, the desk research explored the theoretical background of collaboration, problem-solving, perspectives of power, design & democracy, and participatory decision-making. The empirical research aimed to prove a more profound contextual understanding through interviews, which focused on researching stakeholders' experience of the tool's adoption, their current usage of the completed dashboard, the mutual level of understanding between teams during collaboration, and analysis of the types of power identified through the interview.

Based on the findings of the desk and empirical research, the research objective shifted from strengthening collaboration between the teams to promoting increased participatory decision-making practices in an organization. This alteration was motivated by recognizing a passive attitude displayed by the primary stakeholder group towards collaborative efforts, which stemmed from their perception of being neglected during the decision-making process. The redefined research questions are as follows.

1. **How can participatory decision-making be integrated into GTO?**
2. **How to move away from hierarchical structures/power imbalance in decision-making to embrace participatory decision-making?**

The two redefined research questions were adequately answered through a creative workshop, design ideation, and finally, through the development of the final design. To illustrate, a creative workshop resulted in a participatory decision-making process, a step-by-step process comprising crucial factors of participatory value. Subsequently, this method enabled the development of design prototypes detailed in Chapter 6. Afterward, the two research questions were addressed by creating the final design and evaluation (See Chapter 7). The final design, which is called Power-full Reflexivity, has the following design goal.

"Create an exercise that will aid those in a position of authority in identifying the power dynamics in the decision-making process. The ultimate goal is to enable individuals who have experienced the issue and who will be most impacted by the decision to have greater access to the decision-making process."

Based on the evaluation of the final design, the design successfully addressed the two redefined research questions and the final design goal. It positively impacted the participants' understanding of the power dynamics and brought motivation toward increased participatory approaches in their organization.

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Appendix

Appendix A: interview questions- Tooling team & solving team

The interview question asked to solving team and the Tooling team members

1. Past dashboard assignment

    - Which dashboards were you engaged in?
    - What was the goal of the assignment?
    - `What were the requirements?

2. Coordination with the Tooling team or the solving team

    - Can you share with me the experience of coordinating with the tooling/ solving team? Probe: such as motivation towards the assignment of both parties?
    - What was it like to share your teams' domain knowledge with the tooling/ solving teams?
    - Can you explain to me how was the attitude of both teams towards the assignment? Probe: such as participation and involvement in the assignment?

3. Knowledge transfer/ Integration

    - How did the problem-seeking process? Probe: how did the idea of the assignment start?
    - Probe: I assume that there should be common knowledge between the Tooling team and solving team to solve the problem together. Can you explain to me to what extent you feel like you had the knowledge of the other team for this assignment?

4. The tool, Splunk

    - What do you think about the tool?
    - Are there different tools your team uses that can substitute the function of Splunk?
    - Are there parts that you or your team members wished to be changed in Splunk? What was it?

Appendix B: interview questins to identify mutual understanding

Mutuality of the knowledge established between the collaborating partners

Interaction between solving team and 3rd party or the Tooling team

A. When the interviewee is from solving team

1. The Tooling team or the 3rd party asked you several questions. What kind of questions did they ask? ->difficult to answer. then yes/no
2. Why do you think they would ask these questions? (=Did you understand the purpose of the questions?)
3. Were their questions that you found difficult to understand? If there were, can you explain?
4. I assume that you know best what you need as a user and as an expert on the metrics you provided the Tooling Network team(You are the expert on capacity compliance. so the Tooling team or 3rd party needed to learn new knowledge from you to build the dashboard.) Was their information they wouldn't know unless you told them?
5. Did you also ask questions to them? What kind of questions did you have?
6. Were there any agreements or disagreements between you and the 3rd party or the Tooling team? If there was, can you tell me about it? (if it was a disagreement, how did they try to solve it?)

B. When the interviewee is from the Tooling team

7. Can you explain to me the relationship between the 3rd party and you? How the 3rd party helped you in this assignment? Did the solving team mostly interact with you or the 3rd party?
8. How was your understanding of their problem?
9. Why did you think the dashboard would solve their problem?
10. Were there any agreements or disagreements from your side or from the solving team.
11. After you delivered the prototype, did you hear any success or feedback? And what did you do with it?
12. When was the last time you checked with them?
13. how is the dashboard used?
14. What is your impression of how they are using it?

Interaction between the contact person and the rest of the members of the solving team

A. When the interviewee was a contact person

1. As a contact person, how was your experience being a middle person between the Tooling team and your team?
2. Can you explain what you shared with your team member?
3. How was your team member's attitude when you shared the progress of the work? Were they open to listening to what was happening? Were they open to sharing their ideas?

B. When the interviewee was not a contact person

1. How did the contact person share the progress with other members?
2. Was there any disagreement from your team over the progress? If other members had a different opinion about the progress, what did the contact person do?

Appendix C: interview questions-managers

- Interview questions asked to managers
- What kind of goals and needs was in adopting a new tool, Splunk?
- How was the decision made (to adopt a new tool Splunk)?
- Did others understand the rationale?
- How do managers work with other managers and engineers?
- Which actions did you take when you knew that the demand for the Splunk assignment was low?
- What do you think is the problem?
- What would you do to solve the problem?

Appendix D: Creative workshop background information

"Many organization tries to bring organizational transformation. However, often the changes are made by few and not involving the most influenced people, which results in confusion. The people who ought to perform the task followed by the decision do not align themselves with what has been decided by others and they are unclear of the reason and the goal of direction given to them, so they have difficulties carrying out the tasks.

Then a specific context of GTO was shared. "In 2018, a new organizational vision of Full Stack Management was shared with all the GTO members by one manager, and through the discussion using the six-head thinking exercise how to achieve the vision was discussed with all the GTO members. Consequently, they voted and several were chosen in which one of the chosen options was to equip a data lake by using a tool.

After the meeting, the tool called Splunk was chosen by a small group of people, including hired consultancy with knowledge of tools, managers, and three technicians representing the solving teams. These technicians were included because they were considered to have a knowledge about the tools.

Consequently, after the tool selection, the managers promoted members to use it, but those who were not involved in choosing the tool expressed dissent as to why they had to use the tool, which led to the following issues such as lack of coordination and collaboration in the assignment associated with the tool."

Appendix E: Creative workshop results

H2 activity result

The generated How to questions from the H2's activity are as follows:

How to encourage free ideation?

How to be satisfied with a communal decision?

How to balance the conversation?

How to encourage people to speak up?

How to encourage people to speak out more freely, openly, and bravely?

How to let different teams understand each other's roles & values?

How to discover everyone's real priority?

How to develop environments? A space to encourage equal contribution?

How to incorporate cultural differences in the places?

How to identify the team's needs to formulate relevant criteria for tool selection?

Switching around roles of individuals (game) Decision-making game mini-game + reflection

H2 let colleagues empathize while listening to their inputs?

H2 evaluate the desirability of the decision?

H2 create an equal (opposed to) hierarchical atmosphere?

H2 make people feel comfortable enough to speak up?

H2 achieve transparency in decision-making amongst many?

H2 let go of assigned roles?

How to provide everyone with the same amount of info to make the decision?

H2 detect power relations?

The result of reframing the H2's : participatory decision-making process

Participatory decision-making process	H2's
1. Consideration of inclusion	How to decide who is relevant? How to decide who is relevant? How to make sure all relevant stakeholders are involved?
2.. Setting the environment for constructive conversation	How to make effort to understand different language, concern? How to let go of assigned roles? How to create an equal (opposed to hierarchical) atmosphere? How to detect(or acknowledge) power relations? How to provide everyone with the same amount of info to make the decision? How to make people feel comfortable(enough) to speak up? How to let colleagues empathize while listening to their input?
3 Identifying personal roles and perspectives (introspective)	
4.Empathizing & sharing/discussing	How to communicate all priorities honestly? How to achieve transparency in decision-making among many? Trained moderator How to negotiate conflicting values and priorities
5. Evaluation of the decision process	How to evaluate the desirability of the decision?

Appendix F: Study 2 evaluation semi-structured questions

Know how the prototype is perceived

1. Can you explain how “hierarchy” is demonstrated in your answer
2. Can you explain to me what you see when two answers are compared?
3. Do you think the answer correctly reflects the situation of GTO? If it is not, where do you think the problem is? Is it in the prototype?
4. What questions or prompts can be added, removed, or improved?
5. From this exercise, what do you think the hurdles are to practicing participatory decision-making?
6. What questions can be added or removed, or improved?

    - What are the ways to involve more people in DM?
    - What do you think of the notion of involving more people in decision-making?
    - I have a few more testing also planned with other managers, And after all the tests, I am planning to find patterns and try to make visualization.
    - How and when do you think this exercise can be used in the organization?
    - How can the data analysis result be used in the organization? Probes: Who would be the audience of the result, and for which purpose?

Appendix G: Final design

Reflexivity exercise URL:
https://docs.google.com/spreadsheets/d/1mGEkCssGL6GwNMhSFsejg4jL2wN1LI19IXlz8nZTbVw/copy

POWER-FULL
REFLEXIVITY

Power-full Reflexivity for Participatory decision-making

UNDERSTANDING

EXERCISE

In your company, you are entrusted with significant responsibilities, and responsibility is usually accompanied by power. Guinote (2017) states that “People in positions of authority are oriented toward causing an impact in the social environment and maintaining appropriate levels of power (Guinote, 2017).”

This tool aims to aid you in acknowledging power dynamics within your organization, with the ultimate goal of encouraging participatory decision-making. This is done by empowering individuals by giving them agency in the decision-making process, which is explained on the “Understanding” page. Afterwards, you are invited to participate in a reflexivity exercise, which takes around 1 hour to complete.

This tool includes two parts.
1. The understanding of power and participatory decision-making
2. Reflexivity exercise

What is Power-full reflexivity?

First, “Power-full” means to fully recognize each individual’s power and consider ways to develop joint power among collaborating colleagues in the organization.

Second, “Reflexivity” refers to the ability to examine one’s feelings, reactions, and motives and comprehend how these influence their thinking and doing. Through the reflexivity exercise, one can reflect on how to manifest “power-full” in organizational decision-making.

GO TO UNDERSTANDING >

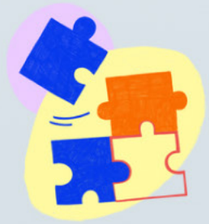
Forms of power

1. Power-over or coercion

It means to exert power over other groups or people and to let another person do something. It is closely related to employing organizational resources, such as a position as project leader, access to resources, a capacity to resolve the unclarity, setting an agenda, or enrolling (Pitkin, 1973). Power-over is opposed to the belief of power-with that power can be a co-possession of multiple stakeholders.

2. Power-with

power-with is a jointly developing power. Instead of a few people controlling a situation, power-with grants power over collaborating partners so that they develop it together. Power-with calls for equal power between individuals and sets the stage for a fair play (Metcalf & Urwick, 2004).



3. Power-from-within or empowerment

Starhawk (2012) continued furthering the notion of power-with to power-from-within. The power-from-within first recognizes the power that resides in oneself, the ability to control resources, make plans, and shape actions. Moreover, in a collaborative group, each individual's power-from-within can be fostered and empowered, developing a collective power or solidarity (Starhawk, 2012).

At the heart of this tool lies the core value of expanding individuals and collective capacity, the increase of power-from-within and power-with. It is closely related to the concept of a direct practice of democracy mentioned by Follet. Direct practice of democracy is to amplify the power of citizens and society as a whole, which involves their ability, willingness, responsibility, and capacity to self-organize, act, and creatively solve complex problems that eventually regenerate society (Nelson, 2017).

POWER-FULL
REFLEXIVITY

Forms of power

UNDERSTANDING

EXERCISE

Furthermore, we know everyone has unique strengths and power. When comparing a hammer and a feather, the hammer's power comes from its ability to press something down with its weight, whereas a feather can defy gravity to float in the air for a while. One isn't better than the other, but they are both powerful.

Likewise, developing a better understanding of each team member's strengths can lead to a greater appreciation of each individual's strengths. Furthermore, it will lead to a discussion on empowering each individual to take agency in their job.

Why participatory decision-making?

Participatory decision-making means using the full range of knowledge and abilities that reside in membership. It entails getting people to speak up, and welcoming diversity rather than avoiding it. It entails a struggle to comprehend one another despite the obstacles and conflicts that put the group at a standstill (Kaner et al., 2014).

You would say that participatory decision-making is not a 'cure-all'. It might take more time and be more expensive, as more people means more opinions. Nevertheless, bringing more people into the discussion will allow members to create co-values by establishing collective knowledge, shared goals, and eventually, an ownership of the decisions they take part in. Moreover, hearing and considering different perspectives from individuals will cause the organization to reach a well thought-out decision that accounts for multiple perspectives. This ushers the company towards a shared goal to create a sense of oneness.

The "Understanding" page covered different forms of power, recognizing each one's strength and encouraging more individuals to be part of decision-making, through which power-with-in is promoted.

GO TO UNDERSTANDING >

Resources

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Starhawk. (2012). The empowerment manual: A guide for collaborative groups. New Society

Illustration by Icons 8 from Ouch!

Rflexivity exercise URL:
https://docs.google.com/spreadsheets/d/1mGEkCssGL6GwNMhSFsejg4jL2wN1LI19IXlz8nZTbVw/copy

1 Mapping the stakeholders:

Who are the people relevant to the decision?

Write down the names of all of the people in your company who are relevant to the decision.

Tip: Choose " ' " in the drop-down menu, incase left column is an empty cell.

Participants	Those who are affected by the decision AND invited to the decision process AND took/take part in the decision process.
Involved	Those who are affected by the decision AND invited to the decision process BUT were not always present (they may be indirectly connected with the participants to contribute to the decision).
Not involved	Those who are affected by the decision BUT not invited to the decision process.

Name	Map the stakeholder
Name1	Participants
Name1	Participants
Name1	Participants
Name1	Participants
Name1	Involved
Name1	Involved
Name1	Not involved
Name1	Not involved
Name1	Not involved
Name1	Not involved
Name1	Not involved

	Participants	Involved	Not involved
Affected	✓	✓	✓
Invited	✓	✓ or pending	X
Participatated	✓	pending	X

2 Acknowledging power-from-within:

What are each individual's unique strengths and power specific to the issue?

Name	Strength
Name1	Technical knowledge or organizational knowledge communication skills, people manager
Name1	regular manager skills are experiences from other companies
Name1	people manager, process knowledge
Name1	organizational knowledge, extensive experience with tools
Name1	expert on changeprocess, detailed knowledge
Name1	expert on security, high presentation skills
Name1	none but members can be subject matter experts and as guest be invovled!
Name1	
Name1	
Name1	
Name1	

2A Based on the recognized strengths, how did those who participated and were involved contribute to the decision-making? How could those who were not involved contribute to the decision-making?

3 Assessing the level of influence:

Looking at the people you've named, what do you perceive their level of influence in the organization to be?

Tip: Choose " ' " in the drop-down menu, incase left column is an empty cell.

One's influence may come from:

· Access to meaningful resources
· Positions of power and authority
· Expertise or experience in the area
· Strong connection with someone with high influence or having social networks that can help them sway others
· Characteristics and personalities

Low influence	They have limited impact in the organization. They may have valid perspectives or ideas, but the impact they have within the organization is limited.
Moderate influence	They have some impact in the organization, but they may not hold as much weight as those with high influence.
High influence	They have a major impact in the organization. Their opinions, actions, and decisions hold weight and can have an impact on a large scale.

Name	Level of influence
Name1	High influence
Name1	High influence
Name1	Moderate influence
Name1	Moderate influence
Name1	Moderate influence
Name1	Moderate influence
Name1	Low influence
Name1	Low influence

Name1
Low influence
Name1

4 Level of participation:

Looking at the people you've named, what was the level of their participation in the decision-making?

Tip: Choose " ' " in the drop-down menu, incase left column is an empty cell.

No participation	They either aren't invited, or even though they were present, their ability to express their opinion was limited as if they were not there. At times, they were persuaded by others regarding the outcome.
Low participation	They can participate(fully/partly/indirectly) in a discussion. They hear other's opinion and shared theirs or give, but there is no guarantee their opinions are used in the decision-making.
High participation	They can negotiate and engage in trade-offs with the decision-making members.
Very high participation	They can obtain positions or roles to decide for a group as representatives.

Name	Level of participation
Name1	Very high participation
Name1	Very high participation
Name1	Very high participation
Name1	Very high participation
Name1	High participation
Name1	High participation
Name1	Low participation
Name1	Low participation
Name1	Low participation
Name1	No participation
Name1	No participation

5 Understanding the impact:

For the people named, to what extent did the decision impact their day-to-day work?

Tip: Choose " ' " in the drop-down menu, incase left column is an empty cell.

Not impacted	No impact at all.
Almost not impacted	Almost no impact on their day-to-day work.
Moderately impacted	Moderate impact on their day-to-day work. There may be changes that require adjustment within manageable or reasona
Highly impacted	High impact on everyday day-to-day work. There may be big changes that require longer adjustments times with perhaps

Name	Degree of impact of the decision on individuals
Name1	Almost not impacted
Name1	Almost not impacted
Name1	Almost not impacted
Name1	Almost not impacted
Name1	Moderately impacted
Name1	Moderately impacted
Name1	Moderately impacted
Name1	Moderately impacted
Name1	Moderately impacted
Name1	Moderately impacted
Name1	Moderately impacted

5A What are ways to acknowledge, respect, and maximize individuals' strengths in the decision-making process?

5B What alternative measures could be taken to ensure that the concerns and perspectives of individuals who were not involved are heard and considered?

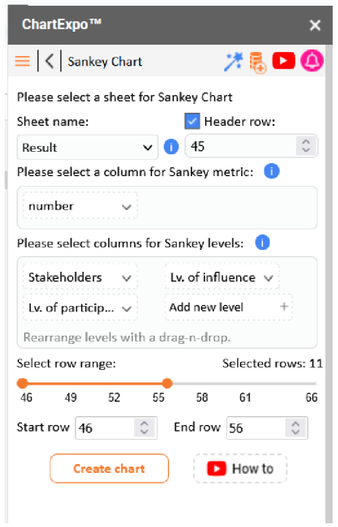
Result

For more objective results, you can go to the second "Result"sheet.

INSIGHT 1

Sankey chart

How to make a visualization? :
- At the top bar of your browser, click on "Extensions".
- Search for "Chart Expo" and download the Google extension.
- Click on the "Chart Expo" extension from the top bar to open it.
- Click on "Add new chart" and choose the Sankey chart option.
- Input the values as shown in the [image: How to make visual].
- Click "Create chart".
- Position the nodes in the chart, with the higher level nodes at the top and lower level nodes at the bottom.



[Image: How to make a chart]

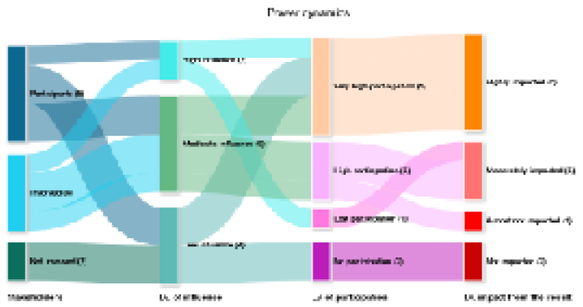
Scroll down and check your data set that starts from Row 121.
Put the same value as the image shows except the value of the "end row".
You need to update the end row number to match the actual number of the last rows of your data.

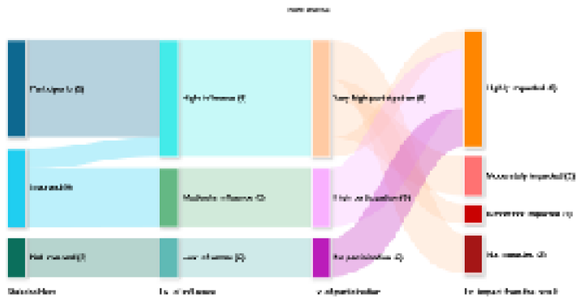
Interpreting the Sankey chart

Looking at the Sankey chart, the flow of each line from one column to another can indicate the power dynamics among the relevant stakeholders of a decision-making process.

How much " degree of influence in the organization" and the "participation level " did the "participants" group hold? How much did the decision have an impact on them? In contrast, what are the "participation level" and the "degree of influence in the organization" of those who are most impacted by the decision?

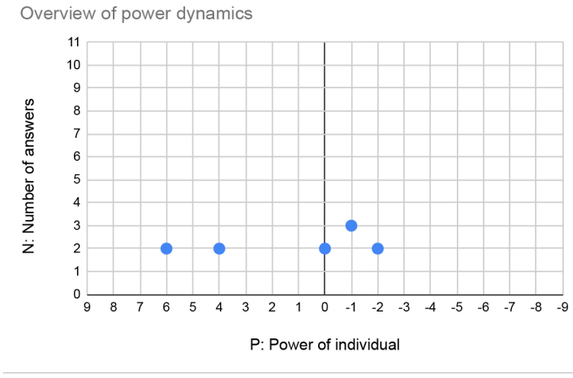
If the people most impacted by the decision were the participants with a high participation level, it shows the decision-making process was participatory. Conversely, suppose the people with high influence in the organization are the participants with full participation level, but their impact from the decision is low. In that case, it indicates the need for deliberation on ways to consider and hear other perspectives of whom the decision might most impact.





INSIGHT 2

OVERVIEW OF POWER DYNAMICS



Power dynamics	COUNT
-2	2
-1	3
0	2
4	2
6	2
총계	**11**

INTERPRETING THE CHART

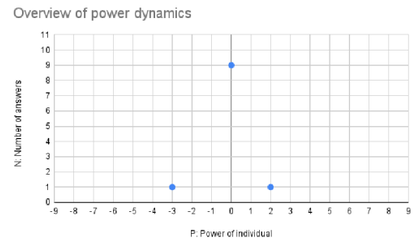
Equation 1 describes the individual power during the decision-making process in order to gain an overview of the power dynamics among stakeholders.

$$P = (Par - Imp) * Inf \qquad (1)$$

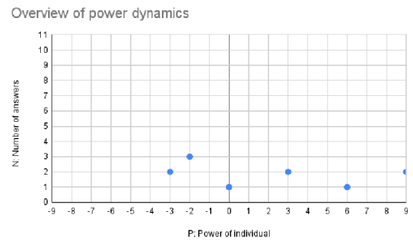
Variable	Description	Range
P	Power of the individual in regard to the other stakeholders	-9 to 9
Par	The level of participation of the individual in the decision-making process	1 to 4
Imp	The degree to which the decision impacts the individual	1 to 4
Inf	Their organizational influence as an individual	1 to 3

The first part of equation 1 determines the difference between a stakeholders' level of participation and the degree to which they are affected by the decision. This answer can range from -3 to 3. If this value is zero, it indicates that one's participation in the decision-making process was appropriate to the impact of the decision on them.

The value is then multiplied by the stakeholders' level of influence within the organisation. If an individual has significant influence in the organisation, their decisions will have a greater impact. Furthermore, their influence is able to strengthen their participation in the decision-making process.



Graph 1:
An example of the result that reflects participatory practice



Graph 2:
An example of the result that does not reflect participatory practice

Graphs 1 and 2 show examples of possible outcomes. Graph 1 has many counts of *P* being zero. This can indicate that there is proper participatory decision-making. Graph 2 shows a widespread of data points. This indicates that the power dynamics of stakeholders is far from participatory. If most data values are positive, the majority of the stakeholders have a higher value of participation than the degree by which they are impacted by the decision. If the values are mostly negative, it shows that stakeholders who are greatly influenced could not participate properly in the decision-making process. It would be crucial to consider how to involve them more.

POINTS TO CONSIDER

There may be decisions where the participatory practice is not fitting. Then what are the decisions that can involve more people, and what are decisions that cannot? In both cases, it is worthwhile to examine who should be included, the means and proper time to hear their ideas and the effects the outcome would have on the people.

The objective analysis does not account for the various situational factors that impede participative practice in your particular decision-making scenario. Therefore, it is encouraged to reflect your responses to the open-ended questions to improve the implementation of participatory decision-making that aligns with the specific needs of your organization. In addition, these open-ended questions could serve as a framework to guide you in designing more inclusive decision-making processes for the future.

THE EXERCISE IS NOW COMPLETE

You have stepped towards being more aware of power dynamics in decision-making, to bring more participatory decision-making culture to your workplace. This exercise can be repeated for past, current, or future decision-making. See you next time!

"Genuine power can only be grown, ...for genuine power is not coercive control, but coactive control. (Follet, 1924)"

future

IDE Master Graduation

Project team, Procedural checks and personal Project brief

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

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

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

STUDENT DATA & MASTER PROGRAMME

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

family name: Kang
initials: H.R. given name: Hyerin
student number: 5419247
street & no.:
zipcode & city:
country: The Netherlands
phone:
email:

Your master programme (only select the options that apply to you):
IDE master(s): ( ) IPD (★) DfI ( ) SPD
2nd non-IDE master:
individual programme: - - (give date of approval)
honours programme: ( ) Honours Programme Master
specialisation / annotation: ( ) Medisign ( ) Tech. in Sustainable Design ( ) Entrepeneurship

SUPERVISORY TEAM **

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

** chair: Senthil Chandrasegaran dept. / section: DOS/MOD
** mentor: Himanshu Verma dept. / section: SDE/KIND
2nd mentor: Rinaldo Bertossa
organisation: CGI
city: Amstelveen country: Netherlands
comments (optional)

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

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

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

Procedural Checks - IDE Master Graduation

APPROVAL PROJECT BRIEF

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

chair Senthil Chandrasegaran date 26 - 10 - 2022 signature Digitally signed by JamfProtect Client 9BC5965F-3B3A-5CBF-AD52-09F80CA0813A Date: 2022.10.26 11:07:16 +02'00'

CHECK STUDY PROGRESS

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

Master electives no. of EC accumulated in total: 29 EC
Of which, taking the conditional requirements into account, can be part of the exam programme 3 EC
List of electives obtained before the third semester without approval of the BoE

(★) YES all 1st year master courses passed
( ) NO missing 1st year master courses are:

name date - - signature

FORMAL APPROVAL GRADUATION PROJECT

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

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

Content: ( ) APPROVED ( ) NOT APPROVED
Procedure: ( ) APPROVED ( ) NOT APPROVED
comments

name date - - signature

A collaborative tool for creating dashboard

project title

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

start date 03 - 10 - 2022

25 - 03 - 2023 end date

INTRODUCTION **

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

Company
Founded in 1976 Canada, CGI is among the largest IT and business consulting services firms in the world. CGI is an insights-driven and outcome-based organization to help accelerate returns on clients' IT and business investments (CGI: About us, n.d). One department of CGI Netherlands, Global Technology Operations (GTO) takes care of internal and external client IT infrastructure by monitoring their assets and solving problems. GTO is composed of eight teams, which can be grouped into two in terms of their functions; Tooling team and solving teams.

The solving teams serve external clients to solve the issue of the specific clients' IT assets. They are technical experts in specific IT areas that they are taking charge of such as Linux/Unix, Windows, Databases, and Networking. Tooling team works internally for the solving teams. In other words, the Tooling team works indirectly for the solving teams' external clients. There are three developers, handling scripting languages (Python, PHP, html, javascript, bash, powershell, etc.) and support the solving teams by making and managing software to monitor clients' IT assets.

Context
A few years ago, a tool Splunk was introduced in GTO to support solving teams to give information about their daily job. The Tooling team lent support by building dashboards in Splunk. In total 14 dashboards were made with different purposes. Each dashboard was made for different teams, and some of them are owned by more than one team. Yet, the solving teams' use of dashboards has dwindled over time, and also feedback meetings to improve the dashboard decreased and eventually stopped.

I identified two problems from the situation. First, the relationship between the two teams is one-sided, from the Tooling team to the solving team, and this results in passive behavior of the solving team and an unsustainable dashboard. Second, when the Tooling team interacts with the users, they fail to help users tangibly demonstrate their needs. It makes the Tooling team think that the requirements are insufficient and that it is hard to guess their wishes.

Prior work on product or service
The work by Kerzner et al. (2019) shows one way to involve stakeholders actively in the project. Here, the applied visualization researchers use creative visualization-opportunities (CVO) workshops to collaborate with domain experts to explore original and useful applications of visualization. Although CVO workshops are used for a research purpose that tends to be more exploratory than the professional setting, looking at how the workshop is structured and what kind of methods lead up to visualization can benefit my thesis.

We see these days that network-based technologies help learners work collaboratively in a learning environment. Jermann et al. (2001) developed a conceptual framework to characterize the capabilities of these systems that support the management of collaborative interaction. The three classified capabilities are mirroring system, meta-cognitive tools, and coaching systems. The mirroring system displays the data without any processing or interpretations. The monitoring tool monitors the state of interaction. It assembles the data into a high-level indicator and displays it in visuals to the collaborators for self-diagnose. Finally, the advising system recommends actions to improve collaboration. In my research, I will consider whether these qualities can be implemented for a solution based on visual analytics to bring collaboration to GTO.

space available for images / figures on next page

introduction (continued): space for images

image / figure 1:

TO PLACE YOUR IMAGE IN THIS AREA:
- **SAVE THIS DOCUMENT TO YOUR COMPUTER AND OPEN IT IN ADOBE READER**
- **CLICK AREA TO PLACE IMAGE / FIGURE**

PLEASE NOTE:
- **IMAGE WILL SCALE TO FIT AUTOMATICALLY**
- **NATIVE IMAGE RATIO IS 16:10**
- **IF YOU EXPERIENCE PROBLEMS IN UPLOADING, COVERT IMAGE TO PDF AND TRY AGAIN**

image / figure 2:

PROBLEM DEFINITION **

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

The scope will consist of two parts. Firstly, I will review the concept of co-creation. The unfruitful results of the Tooling team's assignments may derive from an "engineering and product centricity" (Fuentes & Smyth, 2016) mindset of the organization. The product-centricity is the opposite concept of customer-centric service. Whereas the product-centric mindset focuses on delivering high-quality products, the customer-centric mindset puts customer needs and success first place (Harre & Nielsen, 2020). In a product-centricity mindset, after the service delivery, the service values are shared and assessed by the stakeholders and project users (Vargo & Lusch, 2004), and the service value may either positively or negatively influence them. In contrast, Fluentes (2019) states that when the stakeholders are partners of the project instead of passive actors, the service experience can be improved by the notion transition that they are the co-creator of value. Designing a value proposition with the relevant stakeholder from an early project stage can bring enhanced value-outcome-experience to the client and relevant stakeholders.

Secondly, I will review the data-gathering framework used for solutions based on visual analytics, for instance, a GQM (Goal-Question-Measurement) model. Janes et al. (2013) stated that in the context of dashboard building, it is important to gather the right information from the client, and they need to be well laid out visually in the outcome. The author explained that the GQM model could be used in dashboard development to achieve this. The GQM model allows dashboard builders to set goals first and then questions to make goals quantifiable. Lastly, the dashboard designer looks for measurements, which are data that answer the questions. (Basili et al., 1994)

ASSIGNMENT **

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

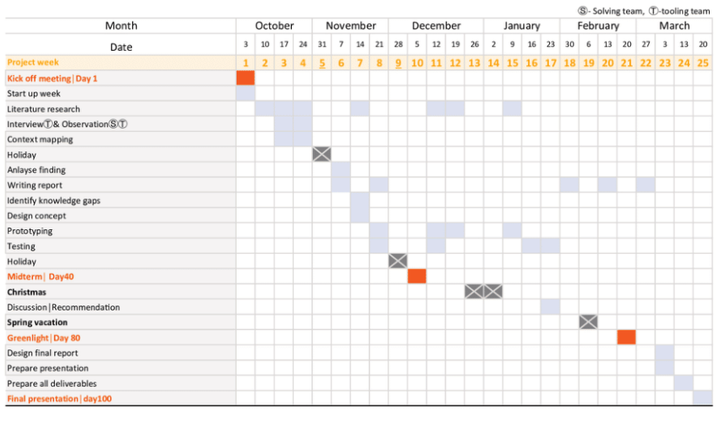
In the context of engineers working for the commissioned dashboard, I will research the information needed for visual analytics and how such information can elicit interaction that will help stakeholders to co-create. Finally, I will design a tool that aids team communication in order to build and maintain dashboards sustainably.

As a possible outcome, I will design a tool that helps the team communicate better and set clear requirements for the dashboard building. The tool can provide the team with methods fitting for the different phases of the dashboard-building process. In addition, it can contain exercises or questions that stimulate users to elaborate and arrange their thoughts individually and corporately. By doing this, the teams can exchange ideas and develop concrete requirements for the dashboard.

PLANNING AND APPROACH **

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

start date 3 - 10 - 2022 25 - 3 - 2023 end date



In the first four weeks of phase 1, the literature review will be the primary task, but next to that, I will engage in an interview and observation with the solving and Tooling team, and context mapping method with the solving team. Reviewing literature and conducting user research activities simultaneously is to link the knowledge learned from the literature to the findings from the activities. Next, I will analyze the data from the literature and the activities, and come up with a design concept. If there is missing knowledge, I will go back to review the literature. Then according to the design concept, I will start prototyping and reporting the progress for the midterm. After the midterm, the prototype will be tested and go under iterations. I assume that there will be at least three iterations and the goal of three consecutive iterations are as follows.

A. Prototyping1/Testing: Explore different forms & Decide on the scope
   a. How to give help in different timelines of the process
   b. What kind of stimulus should the tool give-individually and corporately?
B. Prototype2/Testing: How to trigger collaboration? & What role does the tool has when it is used during the collaboration?
C. Prototype3/Testing: How will it be used during the meeting? & How can it help make sustainable dashboard?

Eventually, I will test the final design for the last time with the solving teams and the Tooling team. Depending on the testing plan, it can take one or two weeks to test and validate the tool by the stakeholders within the context of the dashboard-building process. Next, until the green light, I will focus on writing the thesis. After the green light, I will finalize writing, design the report, and prepare all other deliverables for graduation.

MOTIVATION AND PERSONAL AMBITIONS

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

My interest during my master's was in data and data visualization. Attending the Dataviz IDE workshop, I was fascinated by the versatility and creative space in data visualization. In the C&C course, I wrote a practice conference paper concerning "The framework for business dashboard design: GQM+Strategies Literature review" where I learned that making a dashboard requires an understanding of the needs of the different layers of an organization. Also my internship in CGI, I had a chance to learn the Power BI software. Lastly, I took a "Data processing analytics" elective course to learn the Low code data processing and visualization tool called "Orange." In addition, from many DFI courses, I learn about how designers can enhance the interaction between people and between people and technologies. Plus, from the creative facilitation and service design courses, I saw that designers could help people to see the bigger picture and bring change to a community. Thus, both my interest and skills made me choose this topic. Even though I've taken a "creative facilitation" course, I didn't have more practice outside the course. During the thesis, I will actively engage with the stakeholders, for example, by holding creative facilitation sessions. It can be very challenging to do this with engineers, but at the end of my thesis, I want to proudly say that I am a "designer-facilitator." Data being the main topic of the project, the thesis will be a stepping stone for my career, as a UX designer knowledgeable about data.

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FINAL COMMENTS

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