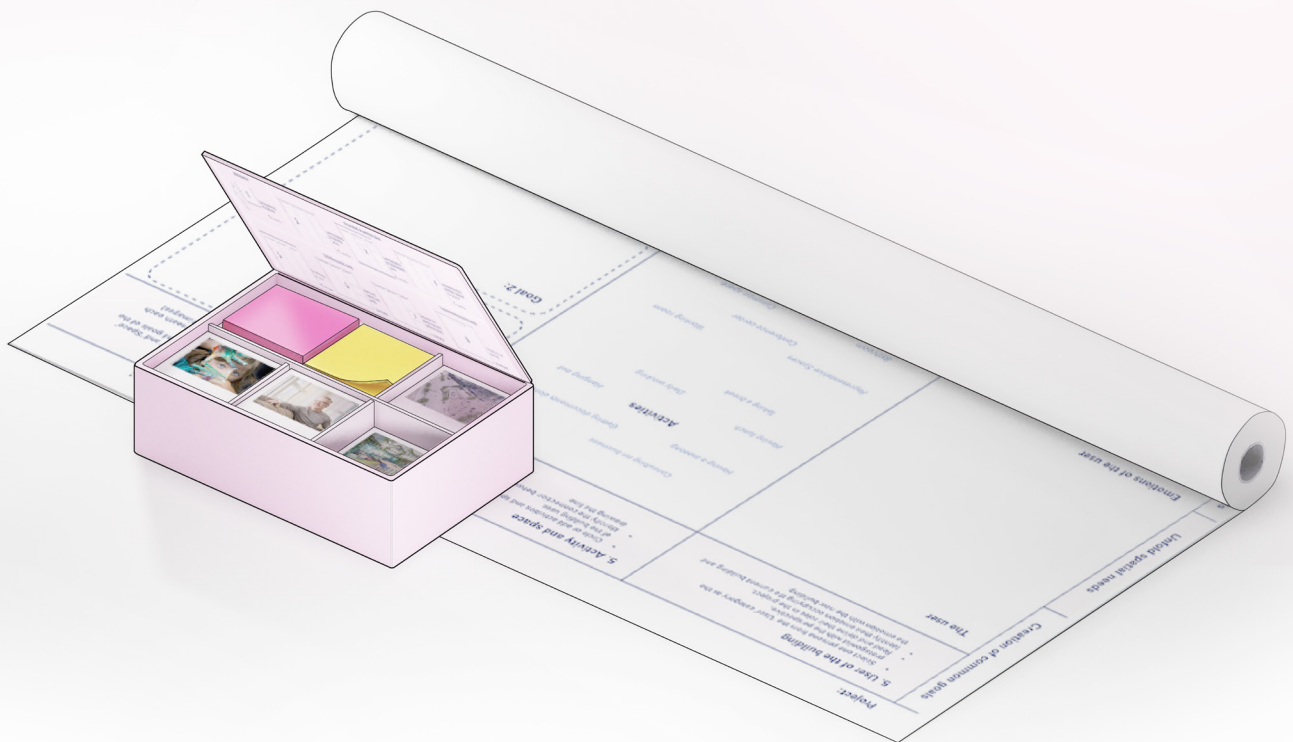# Participatory Design in Architecture:

A toolkit to communicate needs between architects and users

Master Thesis by
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Master Thesis

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Executive summary

This project examined the architectural practice, its design process, and the challenges architects encounter when comprehending and fulfilling the requirements of users and other stakeholders involved in the architectural design process. One solution was participatory design, which involves non-architects in the design process. Despite the challenges that participatory design in architecture can present, it is a developing practice that can lead to greater engagement of non-architects in the architectural design process and create designs that meet the needs and values of all participants.

Kraaijvanger Architects, recognizing the potential benefits of participatory design, incorporated it into their practice. However, the firm faced several challenges as they had been using the process intuitively in their projects. To address these challenges, the firm decided to standardize and systemize a participatory design toolkit to effectively collaborate with stakeholders on architectural projects.

Through analysis of documents, observations, and interviews, several challenges, and limitations in their current participatory design process were identified: 1) architects not clearly communicating their goals for the project to clients or users, 2) difficulty forming relationships or attachments between architects and other stakeholders, 3) insufficient learning and reflection throughout the design process, 4) lack of awareness and consideration of diversity among stakeholders, and 5) unclear structure and purpose of the participatory design toolkit.

To design a suitable solution, the participatory design toolkit for architects and users of the building aimed to communicate and accommodate personal needs and spatial needs in the early phase of architectural design. The toolkit was designed and iterated through workshops in three phases, with an extensive literature review on the communication of knowledge, needs, and values. In the first phase, the discussion with architects on sequences and topics of discussion in the architectural design process with clients and users showed the potential of the toolkit in focusing on facilitating communication between architects and users.

In the second phase, the use of storytelling and 2D-collage were explored as means to communicate needs. The visual tools facilitated communication between architects and non-architects, resulting in a common language to discuss spatial needs. Moreover, the images initiated communication of personal needs and values between participants.

In the third phase, the toolkit explored the integration of personal needs and spatial needs, aimed at ensuring that architects and participants had considered the needs and priorities of all stakeholders in relation to spatial designs. It revealed the importance of understanding and sharing personal values, organizational values, and spatial needs toward the agreement on the project's objectives, followed by discussions on the architectural design using storytelling and collages.

Through design and iteration in workshops, a toolkit for architects and users to communicate and accommodate personal needs and spatial needs in the early phase of architectural design was proposed. The toolkit consists of three sessions supported by visual aids: the creation of common goals, unfolding spatial needs, and accommodating spatial needs. Communication starts with sharing personal and organizational values to formulate common goals, followed by exploring and identifying spatial needs of building users in relation to the common goals, and ends with collective visualization to accommodate needs with the architectural design.

Overall, this project highlighted the importance of participatory design in the architectural design process and the challenges and successes that can be experienced when incorporating it into practice. It suggested that by involving non-architects in the design process, architects and users can communicate their knowledge, need, and value, leading to appropriate architectural designs that are functional, aesthetically pleasing, and meet the needs of all stakeholders.

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Glossary

Facilitation
Facilitation refers to basic design facilitation which is the process of helping people solve a specific problem by providing guidance or support (Eriksson, 2016).

Knowledge
The fact or condition of knowing something with familiarity gained through experience (Merriam-Webster, n.d.).

Need
Needs, dynamic and contextual, trigger an emotional response, whether it be positive when fulfilled or negative when not met. It tends to cause a reaction. It represents the concrete and specific requirements that must be met in order to achieve values (Stappers & Sanders, 2012).

Persona
a persona is a fictional representation of a user group that is used to help designers and developers understand the needs, goals, and behavior of that group. (Pruitt & Grudin, 2003)

Perspective drawing
Perspective is a technique used to depict three-dimensional spaces and their relation in two dimensions. (McNeill et.al., 2009). It aims to create realistic illustrations of structures and buildings, to give an understanding of their appearance inside and outside, and in relation to their surroundings.

Program of requirements
"An organized collection of the specific information about the client's requirements which the architects need in order to design a particular facility." (American Institute of Architects., Palmer 1981).

Sensitization
Sensitizing is a method of activating and stimulating participants to consider, reflect, and investigate various aspects of their circumstances independently and in their settings. (Sleeswijk Visser et al., 2005)

Toolkit
"a collection of tools that are used in combination to serve a specific purpose." (Sanders & Brandt, 2010, p.196)

Value
A value, long-term and core, is a conscious decision to behave in a certain way to meet one's needs. It represents the underlying motivations and goals that drive the design process (Stappers & Sanders, 2012).

Spatial
"Relating to, occupying, or having the character of space" (Merriam-Webster, n.d.)

Chapter 1

Introduction

In this chapter, the reasoning and stages of the project are presented. It consists of the background context, the challenges given by the project stakeholder, initial research questions, and an overview of the methods used.

1.1 Architectural design process and stakeholder participation

Designing complex architectural projects requires engaging multiple stakeholders and users of the building to understand their needs and design functional and aesthetically pleasing buildings for them. The Architect's Council of Europe (ACE) outlines four phases in the architectural design process: concept design, preliminary design, developed design, and detailed design (RIBA, 2020). Architects typically begin by analyzing the project using the brief or program of requirements (POR) provided by clients. However, there are challenges in the design process such as unclear requirements at the beginning of the architectural design process and architects wanting to gather more data in order to design. Those challenges can be tackled through participatory design methods, which involve non-architects in the design process.

Participatory design in architecture can present challenges such as managing the roles of architects and users, ensuring the quality of design solutions, and effectively communicating using architectural terms (Luck, 2003; Hillier, 2014). Despite these challenges, participatory design is a developing practice that can lead to greater engagement of non-architects and more successful projects overall (Drain & Sanders, 2019). In some projects, architects can speak with clients or users of the building to understand their needs and rearrange the methods of working to define and design programs for the building (Robertson & Simonsen, 2012). Participatory design events allow architects and users to exchange feedback based on their experiences and observations to aid in further design development (Robertson & Simonsen, 2013).

The benefits of participatory design in architecture include the development of appropriate solutions for both architects and participants (Drain & Sanders, 2019). However, architects must also cope with challenges such as differences in the types of participants and the settings of participation (Robertson & Simonsen, 2012), difficulties in managing the roles of architects and users (Chun, 2016), and limitations on the quality of design solutions (Luck, 2003; Chun, 2016). Despite these challenges, participatory design in architecture is a developing practice that is becoming more interesting to study.

1.2 Kraaijvanger Architects as a project stakeholder

Design processes, such as participatory design, have been introduced and used intuitively in the field of architecture (Ciep̄ucha, 2018; Indrosaptono et al., 2021). One example is Kraaijvanger Architects, an architectural firm that applies participatory design to gather insights and refine the design process.

The firm engages with stakeholders through workshops, meetings, and other communication channels to gather input, and then the architects analyze these insights to inform the design of the building.

1.2.1 The company

"We are practical idealists. Of course, we enjoy dreaming about beauty and a circular world as much as anyone, but what we really like is to work on it: day after day, together with clients, and always with the users and the environment in mind. The resulting designs inspire the way people live, work, and learn. Our architecture creates space, strengthens the environment, and gives something back to society. We are Kraaijvanger."

(Home | Kraaijvanger, 2022)

Kraaijvanger Architects is an architectural firm located in Rotterdam, consisting of approximately 70 employees working in different teams with different expertise. A project often starts with 3-5 architects and designers in the Tender Team and continues with other teams after the concept design phase. Project timelines vary, but the design phases are fixed as a benchmark for work delivery and negotiation between teams and clients on issues such as design fees, timelines, and deliverables. The projects of interest for the thesis - the City Hall Amersfoort and the Company Office Project - will be explained and analyzed in Chapter 3 as case studies to provide an overview of the work process.

1.2.2 Project brief

Kraaijvanger Architects works on projects with public organizations, municipalities, experts, and private organizations, so the design process was expected to be flexible to involve and guide these diverse stakeholders throughout the project. To achieve this, Kraaijvanger Architects has been experimenting with using participatory design in the architectural design process for large, complex public buildings. The goal of using the approach is to identify the right design questions for the project before providing the right answers through architectural design. Stakeholders, including clients, users, and experts, are involved in participatory design activities such as theme-based workshops with architects. Kraaijvanger Architects aims to standardize these methods to make them usable and adaptable for future projects which can be diverse with different groups of stakeholders.

1.3 Initial project objective

The complexity of architectural projects often arises from the diverse perspectives and needs of stakeholders and building users. The participatory design method, which involves engaging non-architects in the design process, offers a solution by considering these different viewpoints of participants, and the architect's expert knowledge is optimally used.

However, it can be challenging to perfectly involve all participants and achieve the best design for everyone. It is crucial to examine the framework of participatory design and create a design process that minimizes difficulties in collaborating with non-architects, such as language barriers (Luck, 2003; Hiller, 2014) or misunderstandings about the design's future effects (Luck, 2003; Eriksson, 2014; Chun, 2016; Drain & Sanders, 2019).

As aforementioned, Kraaijvanger Architects is testing and developing the participatory design tool to support the collaboration with their stakeholders, therefore, the following research question will be addressed in this project:

Research question:

How can a participatory design toolkit be designed for architects at Kraaijvanger Architects to collaborate with stakeholders on architectural projects?

Sub-questions:

1) What is the current process for collaboration between Kraaijvanger Architects and the building's users?

2) How can participatory design methods and tools better support the collaboration between Kraaijvanger architects and the building's users?

3) What works/does not work in the participatory design toolkit that is being designed?

1.4 Outline of the project

This project consists of two stages: the research stage from Chapter 2 to Chapter 4 and the design stage from Chapter 5 to Chapter 6 (Fig 1).

In the research stage, the objective was to understand the current practices of participatory design at Kraaijvanger Architects. To achieve this objective, a literature review on the principles and challenges of participatory design in relation to architecture was conducted. The findings of this literature review were used to narrow down the initial research question of the project to the context of Kraaijvanger Architects.

Afterward, the field research, which included desk research, observations on two case studies, and interviews, was conducted and analyzed, which resulted in findings on the practices of participatory design at the Kraaijvanger Architects. These findings led to the problem definition of this project, including the design criteria, which served as the starting point of the design stage.

The design stage aimed to create a toolkit that would facilitate effective communication and participation between architects and users during the design process. To achieve this goal, a literature review was conducted on the communication of needs, values, and knowledge.

The focus of the project was to understand the underlying personal needs of architects and how they influence decision-making, while also taking into account the needs of users. To develop the toolkit, five workshops were organized. Through iterative testing and validation, the final design of the toolkit was achieved. The toolkit was then discussed in terms of its implementation and potential future usage scenarios.

The project concluded with recommendations, reflection, and a summary that reflected on the research questions and their significance for design education. Overall, the project aimed to provide a deeper understanding of the research questions and their impact on architecture and design education.
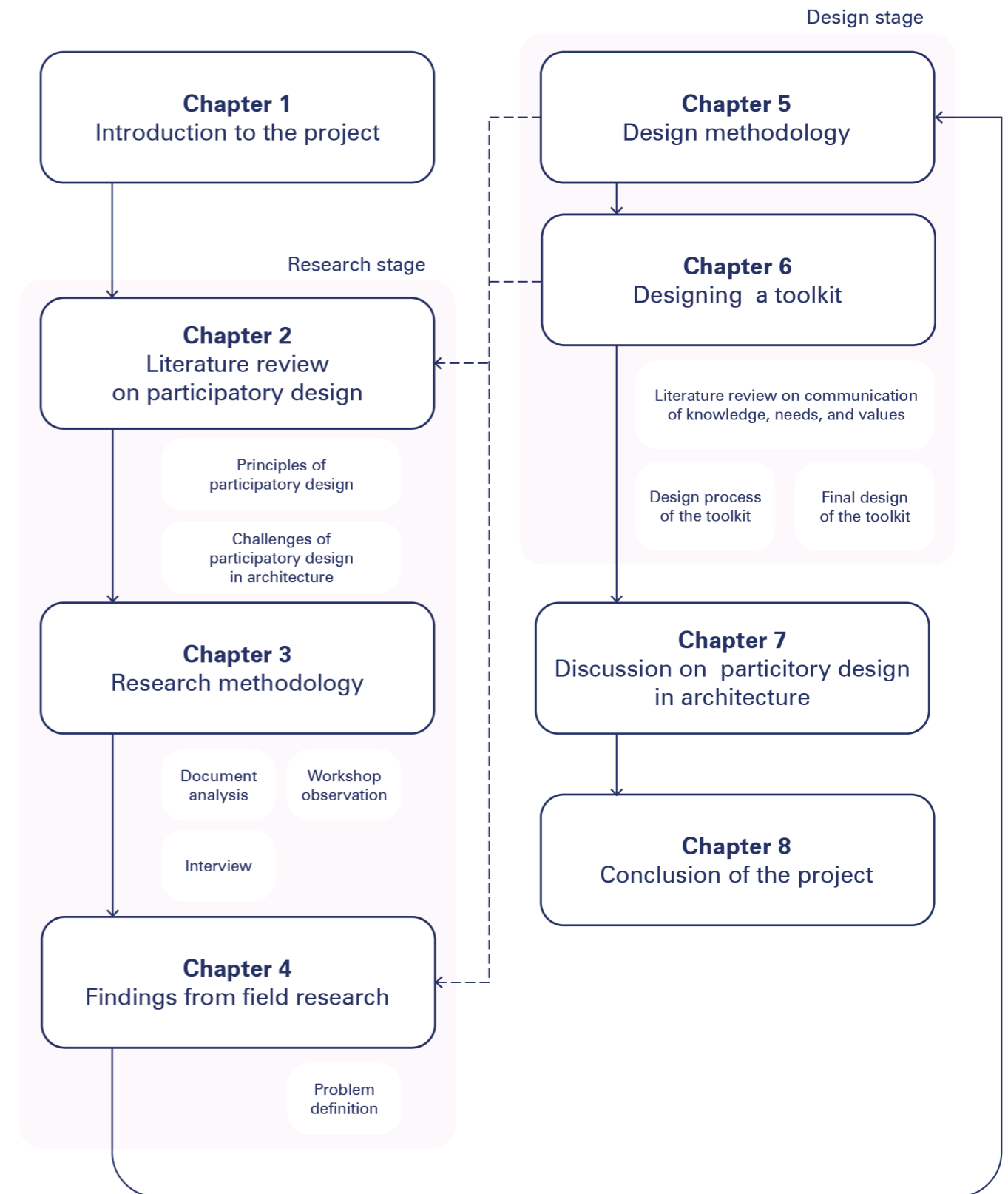
Figure 1. Outline of the project

Chapter 2

Understanding participatory design

This chapter presents an analysis of the literature on participatory design, which was conducted to assemble the development and current process of the method itself, as well as its principles and challenges in relation to architecture. The literature review identifies the challenges and advantages that were used to narrow down the research focus.

The literature review focused on the topics of participatory design in general and participatory design in the architectural field. Those papers were academic papers, guidebooks, and reports which were published from 1993 to 2020. (see Appendix B)

2.1 Principles of participatory design

Participatory design is a design process that directly involves various participants, including those who are not professional designers, in the design process. This approach aims to equalize power among participants, facilitate mutual learning, and envision the future (Gregory, 2003; Wang & Oygur, 2010; Robertson & Simonsen, 2013; Luck, 2018; Drain & Sanders, 2019). It is important to consider the characteristics of each project when adapting and adjusting the participatory design process (Luck, 2018). However, there are common principles and a framework that outline the tools and techniques used to support participatory design activity (Muller & Kuhn, 1993; Sanders & Brandt, 2010; Drain & Sanders, 2019).

An overview of the literature on participatory design (Table 1) lists the papers, the descriptions, and the principles of participatory design regarding the authors. Similar principles were grouped together based on their explanation, resulting in the identification of four main principles (See Appendix B). The principles of participatory design of this project include the involvement of diverse participants, the use of appropriate tools and techniques, the fostering of mutual learning, and the creation of a future vision.

First, it is crucial to consider the backgrounds and relationships of the participants in the design process (Muller & Kuhn, 1993; Wang & Oygur, 2010; Sanders & Brandt, 2010; Robertson & Simonsen, 2013). To facilitate productive interaction, it is important to involve participants with different disciplines, experiences, and backgrounds (Wang & Oygur, 2010). However, it is also important to ensure that power is equalized among participants and that democratic practices are followed (Luck, 2018; Drain & Sanders, 2019). Tools and techniques such as voting can help to ensure that all participants have a voice in the design process and can make decisions.

Second, as aforementioned, tools and techniques can enable participants to learn about the domain of interest, understand their current experience, and discuss the design for the future if it is selected correctly. There are different kinds of tools with purposes that are suitable in each context. For example, a 2D collage is a tool for generating new ideas and it can be done individually and collectively while a diary is a tool for experiencing life and it should be done individually (Sanders & Brandt, 2010).

Third, mutual learning happens in the design process (Wang & Oygur, 2010; Robertson & Simonsen, 2013; Luck, 2018; Drain & Sanders, 2019). Participants and expert designers exchange knowledge which can be divided into three knowledge sets; process knowledge, design knowledge, and basic knowledge (Christiaans, 1992). Not only knowledge but experience and conflict in design can also be a resource for mutual learning (Gregory, 2003).

Finally, future visions are demonstrable outcomes as the result of participatory design activity (Wang & Oygur, 2010; Robertson & Simonsen, 2013; Luck, 2018). As the goal of participatory design is to create suitable design solutions (Drain & Sanders, 2019), the ability to envision the future scenario, communicate the vision between participants and designers, and demonstrate the vision is necessary for the final process.

Table 1. Definition and principles of participatory design

Paper	Author	Definition of participatory design	Principles of participatory design
Participatory design	Muller, M., & Kuhn, S. (1993)	Participatory design involves various theories, practices, evaluations, and actions, aimed at collaborating with users and other stakeholders in the creation of social systems related to human work. (Muller & Kuhn, 1993, p.25)	1. The point in the development process when participatory design is applied 2. The individuals or groups involved 3. The ideal number of participants for a Participatory Design session
Scandinavian Approaches to Participatory Design	Gregory, J. (2003)	Participatory design involves working together and jointly creating understanding and shaping changes in social practices through collaborative partnerships. (Gregory, 2003, p.62)	1. Strong dedication to democracy 2. Discussions of values and future possibilities in design 3. How conflicts and contradictions are considered design resources
A Heuristic Structure for Collaborative Design	Wang, D., & Oygur, I. (2015)	"Collaborative design" (CD) is a term that encompasses various forms of design that involve multiple parties. (Wang & Oygur, 2015, p.356)	1. Groups of individuals, known as Cultural-epistemic-praxis units (CEPs), working together in a productive manner 2. Productive exchanges between different CEPs 3. Facilitation of knowledge sharing 4. Iteration 5. Visible and tangible results
Routledge International Handbook of Participatory Design	Robertson, T., & Simonsen, J. (2013)	Participatory design is a collective 'reflection-in-action' process among multiple individuals, consisting of investigation, understanding, reflecting, designing, improving, and supporting the learning process. Designers work to comprehend the users' circumstances, and the users communicate their goals and gaining knowledge on how to achieve the aims. (Robertson & Simonsen, 2013, p.2)	1. Giving a platform for individuals who will use technology to have input in its design without needing technical expertise. 2. A process of mutual learning for designers and users to design future technology and its uses.
What is it that makes participation in design participatory design?	Luck, R. (2018)	Participation is ubiquitous and participatory design is the vehicle and mechanism for its application (Smith, Bossen, & Kanstrup, 2017).	1. Equalizing power relations 2. Situation-based actions 3. Mutual learning 4. Tools and techniques 5. Vsions about technology 6. Democratic practices
A Collaboration System Model for Planning and Evaluating Participatory Design Projects	Drain, A., & Sanders, E. B.-N. (2019)	Participatory design refers to the collaboration between designers and individuals from affected communities to develop suitable solutions. (Drain & Sanders, 2019, p.39)	1. Equalizing power relations 2. Democratic practices 3. Situation-based actions 4. Mutual learning 5. Appropriate tools & techniques (Kensing & Greenbaum, 2012).

2.2 Challenges in participatory design in architecture

In architecture, participatory events can be more than a meeting where architects take the lead but a place where architects and stakeholders give and take feedback on the design-in-progress based on their experiences, or co-design (Luck,2012). It involves the active participation of various stakeholders, such as architects, experts, and building users, to create appropriate and qualified design solutions (Drain & Sanders, 2019).

However, this process can present several challenges in architecture (Muller & Kuhn, 1993; Robertson & Simonsen, 2012; Eriksson, 2014; Chun, 2016). These challenges can be grouped into four main themes (Table 2): the variety in setting and nature of participants, the solutions themselves, the language used, and the changing roles of experts and architects (Hiller, 2014; Luck, 2003).

Table 2. Challenges of participatory design in architecture

Paper	Author(s)	Challenges of participatory design in architecture
Dialogue in participatory design	Luck, R. (2003)	1. The generalization should be deliberately considered when applying user preferences to a larger group. 2. Tacit knowledge about user experience can be obtained through conversation and be uncovered by descriptive stories and comparisons. 3. Users proposing solutions may constrain design options. 4. In some cases, the use of language may be limited, and a lack of common terminology or architectural language may restrict the conversation to basic ideas.
Challenges and Opportunities in Contemporary Participatory Design	Robertson, T. & Simonsen, J. (2012)	1. Performing the process for a sufficient time to allow for mutual learning, reflection, and evaluation of the process and its results during the development and implementation of new products and situations 2. Finding ways to incorporate Participatory Design in large-scale development projects. 3. Incorporating a range of community contexts. 4. Recognizing and adhering to cultural traditions in specific contexts. 5. Expanding beyond designing physical objects and individual projects. to designing solutions for complex problems and envisioning positive and sustainable future outcomes.
Space is the machine	Hillier, B. (2014)	The lack of a vocabulary for describing arrangements, as there is no means of expressing what is known. This problem is particularly salient in the field of building and architecture.
Challenges in co-designing a building	Chun, M. H. (2016)	1. The roles of participants in co-design are different compared to traditional methods. 2. Selection of the appropriate tools and techniques from participatory architecture for different stages and types of projects. 3. Difficulty in ensuring a high-quality design outcome in co-design approaches.
A Collaboration System Model for Planning and Evaluating Participatory Design Projects	Drain, A., & Sanders, E. B.-N. (2019)	Challenges with participants with low-education level 1. A lack of experience with activities 2. A lack of tenacity 3. A lack of creativity Challenges with expert's ability 1. To equalize power relations 2. To use appropriate tools and techniques 3. To work within the relevant context

One challenge in participatory design in architecture is the variety in setting and nature of participants. Therefore, there is a need to adapt the process to suit the specific objectives and selection of participants for each project (Drain & Sanders, 2019). The decision to develop tools for different stages of the architectural design process (Chun, 2016) or the inclusion of diverse communities with different backgrounds (Robertson & Simonsen, 2012) can be challenging for architects. Additionally, architects may face challenges when working with participants who have low levels of education, a lack of experience, tenacity, or creative ability (Drain & Sanders, 2019).

Another challenge is the difficulty in ensuring the quality of the solutions produced through the participatory design process (Chun, 2016). The objective of participatory design is to create solutions that are appropriate for the needs of the stakeholders involved (Drain & Sanders, 2019). However, it is not always possible to obtain all the necessary information from building users through questioning or context analysis (Eriksson, 2014). Engaging building users in participatory activities and discussing their experiences can help to reveal valuable, implicit knowledge that can enhance the design solutions (Luck, 2003).

Language can also be a barrier to participatory design in architecture (Hiller, 2014). There are two main issues with language in architecture. Firstly, architectural terminology is not always familiar to non-architects and can limit the discussion even within the field of architecture itself. This can make it difficult for architects and non-architects to describe or discuss certain topics (Luck, 2003). Secondly, design solutions can be ideas that we think of and can easily describe in words, or ideas that we think with, which have their interpretation or definition. The latter type of ideas can be difficult to put into words because they occur below the level of conscious thought (Hiller, 2014).

Finally, the roles of experts, architects, and designers are changing in participatory design (Eriksson, 2014; Chun, 2016). Architects are expected to incorporate building users, share their expertise, and gain a deeper understanding of user needs. This can lead to less control over the outcome of the design process (Eriksson, 2014). As a result, architects must work together and assist building users in the participatory design process, considering that they also have the ability to make decisions on the design. Architects can select or design suitable tools and techniques, such as facilitating the making of a 2D collage or 3D model of the building, for participatory activities, and navigating the diversity of participants to succeed in participatory design projects (Drain & Sanders, 2019).

In conclusion, participatory design in architecture presents challenges for architects and stakeholders due to the variety of settings and participants, the solutions being developed, language barriers, and the changing roles of architects. However, by recognizing these challenges and adapting the process to suit the specific objectives of each project, architects can effectively collaborate with non-architects to co-create appropriate design solutions. Through the use of tailored tools and techniques, mutual learning and understanding can be enhanced, and the ability to make a decision or discuss design aspects between architects and non-architects can be equalized, leading to a more successful participatory design process in architecture.

2.4 Problem frame

Participatory design in architecture has posed challenges for architects who use the design process with users. The literature review revealed its principles and the difficulties that architects and users have faced. Participatory design involves tailor-made tools and techniques to facilitate mutual learning and achieve a shared design vision with participants. Alongside architectural design itself, the participatory design process emphasizes collaboration in which participants work towards a common goal, in this case, architectural design. Therefore, architects have used new tools and techniques in the design process to uncover the needs of users and generate design ideas from non-architects. As a result, the problem frame has been defined to focus on the current ways of participation in the architectural design of the problem owner, Kraaijvanger Architects (Fig.2):

What is the current way of participatory design at Kraaijvanger Architects?

This problem frame is based on the first sub-question in Chapter 1.3 which is exploring the current process for participation between architects and building users. Knowledge from the literature review will be taken into account which will then synthesize with the context of Kraaijvanger Architects. Therefore, three sub-questions are defined.

Sub-questions:

1) In the current participatory design practice, how do participants interact with architects and other participants in the participatory design activities?

2) How is mutual learning being fostered between architects and participants?

3) Do participants arrive at the future vision in the design outcome?

These sub-questions aim to determine the potential of the current tools and techniques used at Kraaijvanger as participatory design tools. Firstly, the approach is to understand the interaction of the users of the building in the participatory design process of Kraaijvanger Architects. Secondly, to explore the fostering of mutual learning about architectural design with non-architects. Lastly, to examine the results of the sessions at Kraaijvanger Architects, as it should be the collective outcome that stimulates the future vision. Based on the problem frame and sub-questions, the field research proceeded.
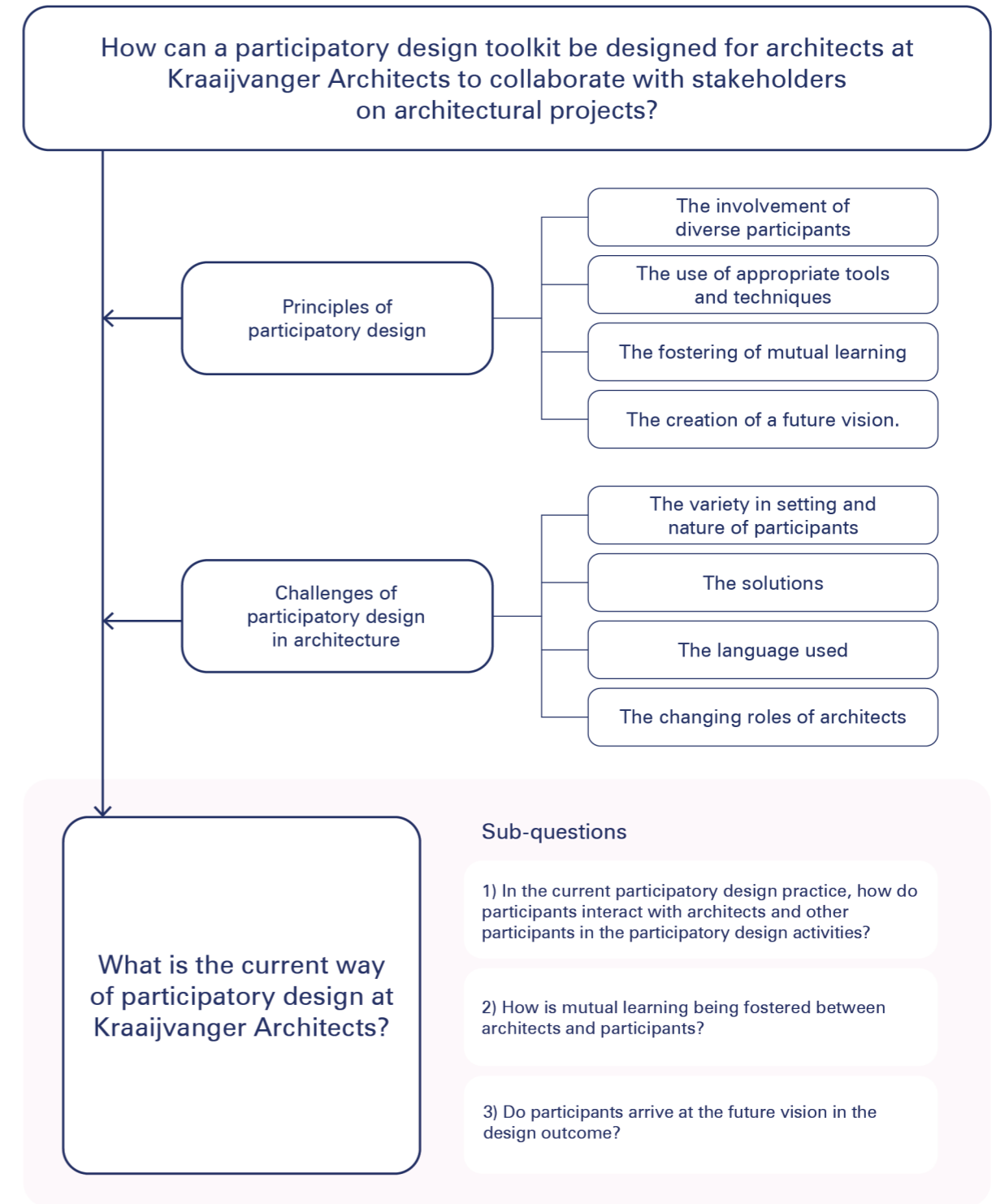

Figure 2. Problem frame

Chapter 3

Research Methodology

This chapter explains the field research methodology. The objective and setting of the research are first described, followed by the process of data collection and data analysis, gathering from documents, observations, and interviews, conducted with Kraaijvanger Architects.

3.1 Aim of the field research

To achieve my research, field research activities were conducted to collect and analyze the data, resulting in insights in the context of Kraaijvanger Architects. The method involved engaging with architects, building users, and other stakeholders through participatory design workshops and additional collective design activities. Existing research and practices in the field of participatory design were also drawn upon to support the development of the toolkit. Consequently, after data analysis, the problem of this project was defined.

3.2 Setting of the field research

To understand the current ways in which participatory design toolkits were being used at Kraaijvanger Architects, the research began with the selection of two projects as case studies that utilized participatory design processes with users of the building. The first case study was a project undertaken by a public city hall that involved a larger number of stakeholders, while the second case study was a project conducted by a company with approximately 50 employees.

Figure 3. City hall Amersfoort. (Plotvis, 2021).

Figure 4. Battolyser. (Kraaijvanger, 2022).

3.2.1 City hall Amersfoort

The City Hall Amersfoort (Fig. 3) is a city hall project that was designed by Kraaijvanger Architects in 2020. While the design is still being developed today, it was a good case study to analyze the process and results that emerged through the design process. There were four reasons for choosing this project as the case study. First, the client had clear ambitions, but there was no program of requirements (POR). Architects, in collaboration with the municipality of Amersfoort, were able to define the programs of the building. Second, the project involved a diverse group of people, including the municipality, experts, and citizens, making it an interesting case to analyze the participation process. Third, Kraaijvanger Architects designed a new design process and was able to communicate with the participants. Finally, this project is currently under construction, allowing the design process to be studied until the detailed design phase, providing an overview of a project, including participatory design moments.

3.2.2 The Company Office Project

The Company Office Project (Fig. 4) is a new initiative at Kraaijvanger Architects, beginning in 2021, and the clients were interested in participating in workshops for users of the building provided by the architects. While these workshops did not always involve employees as the users of the building, sometimes the architect set up meetings with a small group of clients responsible for managing the project. This project was useful as a case study for three reasons. First, the clients had strong intentions to involve their employees in the design process. Second, the variety of setups and participant selections created different ways of interaction and discussion. Finally, the design process was still in the early phase, and despite the clients' tight schedule, there would be the opportunity to test and observe the usage of tools in the early phase of design.

3.2.3 Stakeholders of case studies

In architectural design projects, there are typically multiple stakeholders involved, including clients, experts, and users of the building. It is important to differentiate between these stakeholders as some, such as experts, may not use the building once it is finished, while others, such as clients and users, will use the building for an extended period.

Experts

At Kraaijvanger Architects, experts such as co-creation and innovation managers, landscape architects, sustainability advisors, installation advisors, construction advisors, and building physics consultants are often involved in the design process of projects like the City Hall Amersfoort or the Company Office Project. These experts are typically organized into a team with architects and interior designers from Kraaijvanger Architects before the project begins. Usually, architects collaborate with other experts throughout the entire process to complete the architectural design, as knowledge from different experts is needed. Consequently, the collaboration stops when the project is completed, and the experts are less likely to use the building afterward.

Building users

In this context, users or building users refer to everyone who will use the building. This can include employees working in the Amersfoort House for the City or the Company Office Project, citizens with appointments, and visitors. These individuals will have direct contact with the building. However, it was uncommon for architects to receive input directly from users. In the design process for the City Hall Amersfoort and the Company Office Project, users are included in workshops where architects and clients intentionally involve their employees and citizens in order to let them share ideas and provide feedback directly to architects.

3.3 Data collection

Data for this project was collected in the field research through Kraaijvanger Architects' work and research on their previous participatory design projects, as well as observations on workshops and interviews with architects and non-architects involved (Fig. 5). The purpose of analyzing this diverse and comprehensive data was to gain insight into the approaches used by the firm and the outcomes achieved through their use of participatory design.

Data collection

1. Document
2. Observation
3. Interview

Data analysis

Figure 5. Overview of data collection and data analysis in research methodology

3.3.1 Document

This research began by examining the projects completed by Kraaijvanger Architects using a participatory design process, with guidance from partner architects with experience in participation. The focus of the research was two case studies – the City Hall Amersfoort or the Company Office Project, as well as the company's mission, areas of expertise, and working processes. The benchmarks of the design process, including its goals and deliverables, were also explored.

In addition to an overview of the company, the design process, and the various projects, the two case studies were analyzed in detail. Project reports, design documentation, and other relevant materials for the case studies were studied and analyzed during different phases of the design process.

The City Hall Amersfoort had documents from the firm and experts that Kraaijvanger Architects collaborated with, which provided information about the process and individuals involved in the project. Only the design brief and proposal were available for the Company Office Project, which was in the early phase. However, the architects responsible for the project suggested other materials, such as documents and photos of participatory design activity for similar building types that they used as references.

3.3.2 Observation

Three workshop sessions for the City Hall Amersfoort or the Company Office Project were observed and analyzed. The objectives of the observations were to understand the session setup, explore the participants' reactions to the activities, and observe the interactions between different people.

In the City Hall Amersfoort, an evening workshop with 30 citizens and architects was held. The municipality and Kraaijvanger were interested in exploring potential activities that could take place in the various meeting rooms in the building. Therefore, the 3-hour brainstorming session with participants was organized. My role in this observation was to quietly observe, take notes, and take photos of the setup, participants' behavior, and interaction. Lastly, three people who participated in the session were invited for an interview.

For the Company Office Project, two workshops were observed. The first workshop, with 40 employees and architects, aimed to generate new ideas for activities in different areas of the building. The session was 3 hours, and I was part of the facilitator team. My role in this workshop was to assist participants with the activity, take photos, and keep track of time. After the session was finished, I made notes (see Appendix C.) of the setup, participants' interaction, and the final result. Lastly, two people who participated in the session were invited for an interview.

The second workshop, with the clients, aimed to develop the design of a building. The architect presented design directions and options, and later the clients were asked to provide structured feedback through a series of questions. The workshop was 3 hours in which I quietly observed and made notes on the discussion between architects and clients.

3.3.3 Interview

A series of semi-structured interviews were conducted with a total of 11 participants (Table 3.): five architects from Kraaijvanger Architects responsible for the case studies, four users of the building from the Company Office Project, citizens of Amersfoort, one interviewee from the municipality of Amersfoort, and one interviewee from the project management team responsible for the City Hall Amersfoort. Interview guides and prompts were used (see Appendix D).

Each interview, either on-site or online via Team meeting, lasted 45-60 minutes and was recorded, and notes were taken. The audio recordings were later transcribed into text using Descript and checked by the interviewer. The interviews aimed to understand the perspective of each interviewee towards participatory design activities as well as their experiences being part of the process.
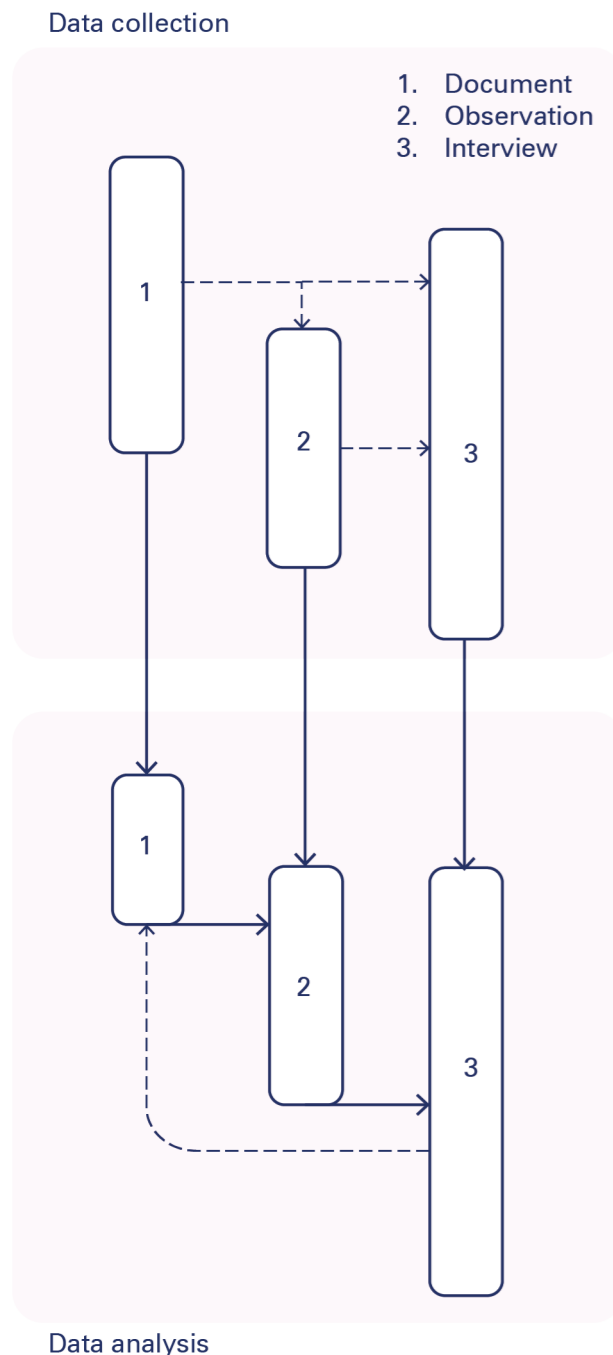
Table 3. Interview participants

Interviewee	Role	Project
Architect 1	Architect	The City Hall
Architect 2	Partner architect	The City Hall
Architect 3	Project architect	The City Hall
Architect 4	Partner architect	The Office
Architect 5	Project architect	The City Hall
User 1	Citizen	The City Hall
User 2	Citizen	The City Hall
User 3	Employee	The Office
User 4	Employee	The Office
Expert 1	Project manager	The City Hall
Client 1	Communication	The City Hall

3.4 Data analysis

To understand the working methods of participatory design at Kraaijvanger Architects, data was collected and analyzed through documents from case studies and their processes, workshop observations, and interviews with architects and participants. These insights, gathered from desk research, observations, and interviews, were interconnected and analyzed simultaneously throughout the data analysis process (Fig. 5).

3.4.1 Document

The documents were analyzed using four steps: translation from Dutch to English, a summary of the process and results, a comparison of two case studies, and concluding with insights on participatory design in the architectural design process at Kraaijvanger Architects.

As the documents for the House for the City Amersfoort project were in Dutch, I translated them using Google Translate with assistance from the architects of the project. Next, I summarized the documents, starting with the company's portfolio to understand its vision and mission, followed by an overview of the design process of two case studies. This process provided an understanding of the two projects. Additionally, I analyzed documents related to participatory design activities, including the report of a workshop session with experts and a worksheet with images, and an analysis of a workshop session with employees of the Company Office project. The documents were compared to identify the tools, setups, and results. Lastly, I concluded the document analysis, highlighting insights on tools and techniques, participant selection, and the timing of workshops in the architectural design process.

Overall, the desk research provided sufficient information to understand the design process and informed the observations and interviews conducted later.

3.4.2 Obervation

The observation analysis was conducted in three steps: summarizing the session, analyzing images, and drawing conclusions with insights from each workshop (see Appendix C).

The architects typically had scheduled the workshops, which I received the planning prior to the sessions, but the plans did not always follow as expected. After the workshop was completed, I took notes on what actually occurred during each workshop, focusing on four main topics: purpose, participants, tools, and setup. Later, I created a folder of images from the workshop that I used as a reference to recall the events and interpret what happened. Subsequently, I made bullet points with the insights I had noticed. Besides analyzing each workshop individually, I also compared the three workshops, evaluating the strengths and weaknesses of the sessions.

3.4.3 Interview

The transcripts from the interview were analyzed multiple times using a combination of direct quotes and a literature review (see Appendix D). First, first-order codes were identified from quotes and literature on participatory design in chapter 2. Next, these codes were organized and grouped into sub-themes and themes. The themes revealed insights and connections between each other, leading to the answer of the research frame to what the current participatory design process is at Kraaijvanger Architects and its outcomes, as well as identifying areas for improvement in the project.

To identify the first-order codes, quotes from the transcripts were highlighted and selected. Initially, quotes on similar topics such as the objectives of participatory design, key elements of participatory design, tools, techniques, and roles of architects and participants were grouped, resulting in 54 codes. Later, these codes were clustered into sub-themes, taking into account the literature review analysis. This resulted in 22 sub-themes. The sub-themes were then organized into themes, including Architect's needs, learning and reflecting process, relationship and attachment, participants, and tools. The table illustrates the clustering of quotes, codes, sub-themes, and themes (see Appendix D). The final themes are explained in Chapter 4.

To give an example of the interview analysis (Fig. 6, Appendix D), architects mentioned that they had a preferred design for the projects, but they did not openly share it. Instead, they had to guide or steer the decision-making process. Quotes such as *"You have this idea about where you would like to go with the design. So it's not that you give them limitless freedom in the direction that you want to go... So there's a little bit of manipulation in it..." (Architect 3)* or *"Instead of someone giving you something you really don't want that you can't design with. And I think the most dangerous part is to be given an option, which you don't like..." (Architect 1)* were grouped into a code called "manipulation by the architect." This code was organized with other codes such as "architects as experts" and "ambition of clients" resulting in a sub-theme called "secret control and manipulation in decision-making." This sub-theme was then grouped with other sub-themes such as "architect's ambition is hidden compared to the client's ambition" and "shared goal for the future." As a result, the theme "Architect's needs" emerged.

Quotes	Codes	Sub-themes	Themes
" So there are different types of conversations and different needs during those conversations and within all those workshops, we try to get more information. And we also try to challenge them to not think about what they have now, but what they need in the future." (Expert 01)	Envisioning future	Common or shared goal between architects and clients for the future	The architect has their goals for the project but doesn't communicate to the client or users
"What I misuse participation for is, … So you have these flows of water, air biodiversity, and all these energy soil materials, it's supposed to be the footprint of the building. And instead of making it very technical, try to link it to what people want working and, seeing the pigeons, breed their eggs outside your window …" (Architect 04)	Architect's ambition	Ambitions of architect is hidden compared to client's ambitious	
" You have this idea about where you would like to go with the design. So it's not that you give them unlimitless freedom, it's in the direction that you wanna go… So there's a little bit of manipulation in it but you try not to show it of course. And it's in a good way. I mean, we are the experts. So you wanna bring that layer into the design, You do want the architect to design it … So it's a mixture always of what you want and, and what the participation process brings you." (Architect 03)	Manipulation	Secret control and manipulate in the decision making toward the goal	
"It was really enjoyable. I think Kraaijvanger could have come and showed us the place and said, Okay, this is how it looks. It's amazing. … but I think this was a better way to do it. Because here everyone's just got involved in the entire process. And if Kraaijvanger uses some of those ideas, people could be like, oh my god, my team!" (User 03)	Participant as designer?	Positive feelings toward the project	No relationships or attachments formed
"My experience is that most of the time when you organize something like this, And you ask for their opinion or that of their ideas, there are not really ideas which we didn't have to think about ourselves. It's also because sometimes you think, okay, but for 90%, we think about that. Of course. But that's why we organize evenings like this. They get the feeling they have participated and they can participate." (Client 01)	Feel-like participation	The feeling of co-designing/co-ownership	
" I'm still involved in this project. And most importantly, I think because we(Kraaijvanger Architects) still have the process of participation and I started it in the beginning, after the competition, so I will be doing it till we're finished with that part, with participation." (Architect 05)	Involve in the whole process	Sufficient time involvement in the process	
"It's just not possible to manage the whole project, just with the workshops you need … So they know the organization and we don't know the organization as well as they do." (Expert 01)	Learning through discussion	Learning happens in the discussion	Insufficient learning and reflection
"There is always conflict. I don't have a general approach to how to deal with conflict, but the nice thing about participatory design when they're all at the table is that the conflicts also become their conflicts. And not only my conflicts." (Architect 04)	Conflicts	Sharing experience and conflict as resources in design	
"I felt this was a very good way to take the collective feedback of a lot of people in a very short pile of time, and clearly with those smiley and those red dots, people could really relate to a lot of things that someone said or had written down" (User 03)	Feedback	Reflect by voting and giving feedback on positive/negative points	
"There were some people that were not from Amersfoort who joined this group as well and they had quite an impression on the group which I didn't really like. It made me not feel heard that much." (User 01)	Intention to join/ Negative feelings	Complexity in participants participation	Lack of diversity awareness
"In the beginning they were big workshops with bigger groups and now they are more one-on-one small meetings. And it's more scattered." (Architect 03)	Number of participants	Size of the group and time involvement matters	
"Most of the time, when you look at the AMF, they have more than a thousand people working at the government building.So when you ask all the people, you've got so many different answers. And most of the time they have a certain way to do their work." (Expert 1)	People with expertises	Group of people with different disciplines or experiences	
"I really enjoyed the photo… Got loads of discussions going. And then the third section was, it was fine. And then the fourth section was quite fun again. And we just handed over the two pens and the glue and the photos." (User 04)	Conversation starter using tools	Fun-to-do tools	Unclear tool structure and purpose
"Mind map was a bit tricky to me, and maybe it was the order of things because it could be related to the order of things because at some point I realized that with the mind map." User 03	Difficulty in tools	Structure is needed	
"It was about what role, what function should a space have in the city from your opinion. And well then I can look at some nice VR renderings and presentations, but it has no added value to this creative process at this point." User 02	Tools don't fit	Wrong timing in using tools	

Figure 6. Example of interview analysis (see Appendix D)

Chapter 4

The current practices of participatory design at Kraaijvanger Architects

This chapter explains the findings from observation and interview that resulted from field research conducted at Kraaijvanger Architects. These findings lead to the problem definition and design direction as a conclusion.

4.1 Findings from observation

Kraaijvanger Architects began organizing workshop sessions where architects not only presented architectural concepts and designs but also facilitated activities with non-architects as participants. These sessions aimed to involve the users of the building in the design process, to empathize with and understand their ways of occupying space. By observing and participating in these workshops, which were led by architects of Kraaijvanger Architects and had different participants, tools, and setups, I was able to analyze the situations. I observed three workshops under two selected projects and interviewed participants and architects.

Figure 7. The City hall Amersfoort workshop 1. Photo by Author.

Figure 8. The Company Office Project workshop 2. Photo by Author.

4.1.1 Workshop 1: The City hall Amersfoort

The situation

During the workshop (Fig. 7), participants gathered in a 40 sqm room with a large screen at the front and tables and chairs that were grouped. Before the session began, participants chatted and had a snack with others. The architect gave a brief presentation on the project to bring everyone up to speed. Then, the group activity started, with one facilitator from Kraaijvanger Architects or the municipality in each group. Each table had an A1 worksheet (see Appendix C) and tWools such as pens, post-it notes, and images. Participants spent 40 minutes working on the task with guidance from the facilitators.

Afterward, the group presented their ideas to the others, and they asked questions or shared opinions. The event ended with a drink and snack, as well as an extended discussion optionally. My role in this workshop was to prepare reference images before the session, quietly observe, and take pictures during the session. During the break, I talked to participants and scheduled an interview with three of them.

Interpretation from the situation

When I was assigned to search for reference images, an architect told me what kind of images they wanted to have, mentioning that images of space should be related to the building that Kraaijvanger Architects already designed. *"Can you find a picture of a room with a big window that connects to the garden as the building looks like that?" (Architect).* While, images of activity, architects aimed for something generic that was possible to happen in the room. *"I like this image (elderly people playing chess) because it could happen here" (Architect).* I found it strange with the time of involvement since the design of the building was finished and participants were talking again about spatial design and activity.

Moreover, if users were invited earlier in the process, the variety of images could be more diverse instead of selecting under boundaries. As architects cannot change the planning of the building, they could only prepare the interior of the rooms to support those activities.

During the group activity, I noticed that the discussion varied depending on how the groups were facilitated. Some groups had the facilitator sketch, draw, or write down text while others were able to co-create more independently. The more structured groups had a clear and direct discussion, while the less structured groups came up with more broad ideas. I believe that a facilitator influenced, assisted, or guide participants along with steps in the provided worksheet resulting in the ways of participating. However, the worksheet itself could have been structured in terms of what participants were supposed to do and what was the goal in each session.

Besides the worksheet, I also noticed that some tools, like VR, were not popular and were not used by many groups. Tools were possibly seen as too complex or unnecessary for the activity. As each group had the worksheet and a set of images to work on, shared materials such as the plan and isometric of the building were taped on the wall and it only grabbed attention in the beginning. Participants seemed to have no time to walk around and see those materials as well as they did not need them during the activity.

At the end of the workshop, there was an artist who made a sketch note to conclude the workshop which was sent to participants and architects. I noticed that when she showed the sketch, everyone looked excited and happy. Consequently, having a tangible result, such as visualization, as a takeaway from the workshop motivates participants toward design development. Overall, the presentation from participants and the Q&A session provided a useful summary of the event and the ideas generated, though not all of them were necessarily innovative. Despite this, it seemed that everyone was satisfied with the workshop.

4.1.2 Workshop 2: The Company Office Project

The situation

The workshop (Fig. 8) was set up in a semi-outdoor area with an A1 worksheet (see Appendix C) and other materials, such as pens, post-it notes, and reference images, for the participants to use. The architect gave an introduction and provided examples of the participatory activity to participants. The participants were divided into groups and worked on the worksheet without a facilitator, and the architects were observing, answering questions, and keeping track of the time. The workshop concluded with a feedback session where each group presented their ideas, and participants voted on their favorite. The workshop lasted 2 hours, with 40 minutes spent on the worksheet. My role in this workshop was to observe, answer questions regarding the task, and take pictures. At the end of the workshop, I scheduled the interviews with two participants.

Interpretation from the situation

I was informed that participants in this workshop had previously done activities together since it was a part of the company excursion, so they were comfortable and energetic in this session. Kraaijvanger Architects provided simple examples of how to visualize ideas. However, some participants struggled to visualize their ideas and needed help from the architects.

The provided worksheet has been structured starting from collecting elements related to ways of working of the company, moving toward inspirations using images, and closing with sketching their idea. I believed that as the worksheet was simple, understandable, and related to their company, participants found it easy and fun to complete compared to the complex unrelated one. Moreover, having timeboxing motivated and enthused participants toward the end of the workshop.

The objective of the worksheet was to generate ideas for different spaces in the building, which it achieved as architects stated that they perceived interesting insights to develop the design further. *"It is a good session and we see so many ideas that can be used." (Architect).* Consequently, I believed that the participatory design activity needed the support of well-designed tools considering its objective and the participants' culture of their organization to be accomplished in getting ideas from participants.

Regarding the group setup, Some participants were assigned to the group as the departments they belonged. For example, engineers were responsible for designing logistics and supply chain areas. While other participants were able to select the space, such as a roof garden or cafeteria as it was a common area. The roles of the participants within their groups varied; some groups had experience working together and made decisions through discussion as a group of engineers, while others had a person make decisions based on input from other group members as a group working on the rooftop garden. Despite these differences, all participants were involved in the process. Participants were open to the activity and enthusiastic about the visuals, such as images and sketches. Additionally, participants understand their company's mission and can connect with them in the discussion. Therefore, they were willing to join and work together to give ideas for their building.

The presentation and voting on interesting ideas were also engaging. The worksheets were placed next to each other to provide an overview of ideas, resulting in participants' excitement to see the design development. The architectural elements drawn by participants, such as a slider on the rooftop garden and a flexible wall partition, were visually appealing and interesting to other participants.

4.1.3 Workshop 3: The Company Office Project

The situation

In this workshop, a group of nine people, consisting of clients and experts, gathered in a small meeting room to review design scenarios. The session began with an architect presenting design options to the group, which they spent an hour reviewing. In the second half of the workshop, the group participated in a small discussion activity on their preferred architectural design option for an hour and a half. The room was too small to use the planned tools, such as image cards, so the architect, instead, structured the discussion by asking questions and using post-it notes for individual responses. The group then discussed their responses collectively. My role in this workshop was to quietly observe and take notes.

Interpretation from the situation

It seems to me that this workshop was a combination of a presentation and discussion, instead of interactive participation, with the second half focused on a small activity using post-it notes to facilitate the discussion. During the presentation, I observed that it was familiar with typical architectural presentations where architects talked and clients listened and sometimes asked questions. During Q&A, clients and experts were sharing their preferred design scenarios and one participant was dominating by insisting on the most efficient scenario as their proposal. "I see you like that option huh?" (Client). I see it as an influence in the design as someone was taking the lead in the decision-making. Therefore, the discussion on their reason or other ways to process a reflection session on the architectural design should have happened in order to collect participants' opinions without influencing them.

Later on, the architect structured the discussion by asking questions and guiding the participants through the evaluation process, starting with the criteria and requirements of the design and then moving on to less tangible matters such as the company vision. This process was useful and time efficient compared to the Q&A session. When architects asked clients and experts to write down the answer individually first before discussing it with the group, it showed that everyone was able to speak their ideas independently and later share them with each other. The moment of thinking with oneself also made it comfortable for participants who did not speak much in the discussion to share their thoughts.

The use of post-it notes allowed for individual responses and group discussion, and the session ended with the participants prioritizing the criteria to guide further development of the building. It appears that the workshop was successful in achieving its goals, although the small size of the meeting room limited the use of certain tools.

4.1.4 Observation conclusion

Observations from workshops provided insights into participatory activities in various project contexts, the different nature of participants, useful tools and techniques, and areas for improvement. During the workshops, the participants were mainly engaged in the activities while architects were less involved. Interaction between participants varied depending on their roles and personalities. Overall, it was perceived positively for both participants and architects to have participatory workshops in the architectural design process.

Workshop 1: The City Hall Amersfoort

Participant involvement	Architectural boundary
Having a facilitator	Structured discussion
Complex tools	No advantage
A sketch note as the end result	Excitement and inspiration

Workshop 2: The Company Office Project

Giving examples	Ability to proceed
Worksheets with structure	Ability to proceed
Understanding in company's mission	Discussion in the one direction
Overview of the outcome	Collective feedback session

Workshop 3: The Company Office Project

Influences of participants	Decision-making
Structure the discussion	Time efficient
Individual moment to think	Opportunity to share for everyone

Figure 9. Overview of the observation analysis

4.2 Findings from interview

As a result of the interviews with various groups of people, a range of opinions were gathered on the same activities. When interviewing architects on the design process, they had positive feedback on participatory activities involving clients, experts, and users. Experts had similar opinions, likely because architects and experts had to collaborate on projects. As a result, the involvement of clients or users of the building in the design process has been growing in recent years at Kraaijvanger Architects. However, while users of the building were able to provide opinions and ideas, architects and experts still played a leading role in guiding these participatory activities and internal design developments. Despite this, users of the building had positive feedback about their involvement in the process and the tools and techniques used. However, they did not feel an attachment and connection with the project. This suggests that there may be a disconnect between the intention and outcome of these participatory design activities. Five themes of insight have emerged from the analysis of the interview as listed:

1. The architect has their goals for the project but doesn't communicate to the client or users.
2. No relationships or attachments formed.
3. Insufficient learning and reflection.
4. Lack of diversity awareness.
5. Unclear tool structure and purpose.

4.2.1 The architect has their goals for the project but doesn't communicate to the client or users

In architectural design projects at Kraaijvanger Architects, clients have clear and strong ambitions which they communicate to architects. These ambitions are varied, and some of them may be common goals or shared visions between clients/users, experts, and architects such as well-functioning buildings. The discussion on the ambition or goal of the project usually happens at the beginning of the design process to (re) define the program of requirement or the design brief, and it is most likely to be future-focused.

"So there are different types of conversations and different needs during those conversations and within all those workshops, we try to get more information. And we also try to challenge them to not think about what they have now, but what they need in the future." (Expert 01)

"So I think the combination of making sure that you have all the functions right to keep guiding the bigger perspective. So always be aware of the holistic design and zoom in and zoom out." (Architect 02)

However, architects also have their ambitions or needs toward the projects, in addition to the client's/users' needs. These ambitions or needs are often unintentionally hidden when compared to the client's needs. They are brought up in internal discussions rather than being openly shared with the other parties. While in meetings with others, architects try to persuade their ambition towards what the clients/users prefer. For example, an architect may want a building with a positive footprint, but instead, they will try to convince clients by using simple words that relate to the experience they might have.

"What I misuse participation for is... So you have these flows of water, air biodiversity, and all these energy soil materials, it's supposed to be the footprint of the building. And instead of making it very technical, try to link it to what people want working and, seeing the pigeons, breed their eggs outside your window" (Architect 04)

The consequences of hidden ambitions can manifest as steering or guidance in the design direction or decision-making process for architects. However, as the experts and responsible parties for designing a building, architects can provide suggestions for the design direction.

"You have this idea about where you would like to go with the design. So it's not that you give them unlimited freedom, it's in the direction that you wanna go... So there's a little bit of manipulation in it but you try not to show it of course. And it's in a good way. I mean, we are the experts. So you wanna bring that layer into the design, You do want the architect to design it ... So it's a mixture always of what you want and what the participation process brings you." (Architect 03)

The architect mentioned that there may be good intentions behind their steering during the design process, as they have the responsibility as experts to design an appropriate building not only for the clients or end users but also as a representation of Kraaijvanger Architects. Additionally, an appropriate building also has a positive impact on its surroundings. Through participatory design, architects have the opportunity to openly share their knowledge and ambitions with other participants. This is important because architects not only have their personal needs, but they also represent the company, and clients may not be aware of the reputation of the company. This approach not only allows for the sharing of expertise but also allows architects to learn about the experiences and needs of participants, resulting in a more personalized and transparent design process for the building.

Suggested solution

Opportunities to share needs, ambitions, and knowledge for everyone

Architects, clients, and users need to be able to openly share their needs, ambitions, and knowledge with each other. To facilitate open communication, opportunities for all parties to engage in dialogue and get to know one another should be provided.

4.2.2 No relationships or attachments formed

According to Robertson and Simonsen (2012), participatory design projects involve users as partners in a systematic and ongoing process. The involvement of these participants is expected to be driven by their willingness to be involved and a sense of ownership, as they are invited to participate in the design process by the architects. This intention of inclusion allows for the development and continuation of the participatory design process.

"It's good to involve different people from the organization because they can just speak with other people in their organization as well and be some kind of ambassador about the whole project and be enthusiastic to others as well. That's really important." (Architect 03)

"It was really enjoyable. I think Kraaijvanger could have come and showed us the place and said, Okay, this is how it looks. It's amazing. … but I think this was a better way to do it. Because here everyone's just got involved in the entire process. And if Kraaijvanger uses some of those ideas, people could be like, oh my god, my team!" (User 03)

However, sufficient time involvement in the process can lead to a sense of attachment and strengthen the mutual learning process, resulting in a design solution that reflects the input of all participants (Robertson & Simonsen, 2012).

Ideally, project architects and participants should be involved from the beginning to the end of the process, and an overview of the entire process should be maintained. In practice, it can be difficult to secure a commitment from participants and properly plan all the necessary activities. This can lead to a weak sense of ownership or attachment to the project, potentially affecting the efficiency and quality of the design process (Sanoff, 2006). Sometimes, participants are involved not to elicit innovative ideas, but rather to make them feel included in the design process and to allow them to participate.

"I'm still involved in this project. And most importantly, I think because we(Kraaijvanger Architects) still have the process of participation and I started it in the beginning, after the competition, so I will be doing it till we're finished with that part, with participation." (Architect 05)

"My experience is that most of the time when you organize something like this, And you ask for their opinion or that of their ideas, there are not really ideas which we didn't have to think about ourselves. It's also because sometimes you think, okay, but for 90%, we think about that. Of course. But that's why we organize evenings like this. They get the feeling they have participated and they can participate." (Client 01)

The participatory design aims to involve participants in the design process, and these participants must be willing to participate. The relationship between the participants and the project begins when they contribute to the design. However, the level of attachment to the project can vary depending on the number of times a participant is involved, the extent of their contribution, and their understanding of how their input is incorporated into the design development. It is also important to build and maintain a good relationship between participants, architects, and the project, as this will not only benefit the design outcome through collaboration but also create positive feelings throughout the design process.

Suggested solution

Encourage the willingness to participate and establish rapport between participants.

Having participants and architects get to know each other and work together can foster a positive relationship through collaborative activities. Additionally, incorporating elements that engage and excite participants in the project can further facilitate their involvement.

4.2.3 Insufficient learning and reflection

To design effectively, Kraaijvanger Architects need to gather information from users, especially regarding their needs in the space, which may not be known to the architects due to a lack of user experience. It is also important to consider the needs of different parties or departments, as they may have different needs that may lead to conflicts that can be discussed and resolved in the design process. Architects often share experiences, ideas, and conflicts to create transparency in the design process.

"They are not experts in the sense that they know how the design works ... they give information that helps us design, they would give you the information of other things we wouldn't normally know." (Architect 05)

"It's just not possible to manage the whole project, just with the workshops you need ... So they know the organization and we don't know the organization as well as they do." (Expert 01)

"There is always conflict. I don't have a general approach to how to deal with conflict, but the nice thing about participatory design when they're all at the table is that the conflicts also become their conflicts. And not only my conflicts."
(Architect 04)

It is important to continually engage in the learning and reflecting process during the design

process, as this allows participants to understand the evolution of the design situation (Luck, 2014). However, in current practices, there are various ways of learning from participants that may require flexibility in tools and techniques. For example, citizens may only be involved a few times and have less familiarity with the design of the city hall, while municipalities, who are more involved in the design process and make decisions, may have a deeper understanding of the design. The reflection process is often limited to a one-time activity, such as voting or providing feedback, which may not allow for the development of mutual knowledge as participants are not consistently involved in the process and do not see the design evolve.

"Sometimes we advise the government, maybe you can do this or in other cities they do this, or we can have a look over there to see how they manage the things in their new building. But most of the time it's just advice and it's for the government to decide whether we want to do this or not, we don't want to do it. So, we can only trigger them to think, to think or rethink their decisions" (Expert 01)

"I felt this was a very good way to take the collective feedback of a lot of people in a very short pile of time, and clearly with those smiley and those red dots, people could really relate to a lot of things that someone said or had written down" (User 03)

Although everyone has experience occupying space in a building, it can still be challenging for non-architects to fully understand and discuss architecture (Luck, 2003). Therefore, the learning process is crucial, as it allows architects to present the design and explain the process, while participants can provide feedback based on their experiences and observations, and reflect on the design outcome. These learning processes are less likely to occur during a one-time workshop. However, I believe there is potential for effective communication, both verbal and visual, between architects and participants in participatory design activities, leading to a better understanding of the desires of all parties involved.

Suggested solution

Find a common language to exchange knowledge and learn that the design is being developed.

Miscommunication can occur when architects and non-architects use different languages, making it difficult for them to understand each other during the design process. To overcome this challenge, it is important to find a common language that will help non-architects communicate and understand the design development.

4.2.4 Lack of diversity awareness

The participatory design aims to involve a diverse group of people in the design process to generate better design solutions (Drain & Sander, 2019). The selection of participants is an important criterion in participatory design. Wang & Oygur (2010) suggest that at least two distinct Cultural-Epistemic-Praxis units (CEPs), or groups with different disciplines or experiences, should be included in the collaboration. Drain & Sander (2019) also describe the evolution of partnership and engagement in participatory design, moving from a traditional model where designers, users, and stakeholders directly co-create to a model where participants are trained and prepared before co-creation. The involvement of people with different intentions and backgrounds, such as employees with relevant experience and curious citizens with ideas, can enrich the participatory design process.

"So these are the categories already that you have. And then you can talk with the municipality. Well, who are going to be the people from those groups? Usually there are people who work in that environment already, who have some experience with it. Not a design experience, but user experience." (Architect 05)

"I saw this evening mentioned in one of the digital newsletters. And also mentioned that it will be a quite interactive program to get inspired

and hear the ideas from citizens. So that's really attracted me and that's why I came." (User 02)

While the inclusion of diverse participants can enrich the design process, it can also create difficulties in terms of embracing diversity and determining the appropriate time and sequence for involvement. Working with a large group of people with different backgrounds can add complexity to participatory design projects and impact the design process. Therefore, it is important to carefully select the number of participants and involve them at the right stage of the design process. Additionally, while some people may feel more comfortable sharing in small groups and may be more open with others, the inclusion of a participant who does not fit with the project can create negative feelings among the other participants, even in a small group.

"In the beginning they were big workshops with bigger groups and now they are more one-on-one small meetings. And it's more scattered." (Architect 03)

"And people like to give their opinions in a small group, not like, one group. And you have to get a microphone to tell, that's difficult for some people. So now this evening was like, wow, that's a big, big plus." (Client 01)

"There were some people that were not from Amersfoort who joined this group as well and they had quite an impression on the group which I didn't really like. It made me not feel heard that much." (User 01)

In my opinion, it is important in participatory design to involve a diverse group of people in order to learn about their experiences and what they want in the design. Architects should embrace the diversity of participants, as this allows them to understand the diversity that exists within a building. However, it is important to carefully consider the number and make-up of participants when inviting them to provide opinions, as everyone should be able to share and discuss openly and equally.

Suggested solution

An opportunity to get to know one another prior to working as a team while embracing the diversity of participants.

It is beneficial for both participants and architects to get to know each other on a personal level before starting to work together. This can help them to understand the diversity of the group and to achieve their goals more effectively.

4.2.5 Unclear tool structure and purpose

Tools are materials used in participatory design activities and can be developed or combined into a toolkit (Sanders & Brandt, 2010). Architects choose specific tools to use with participants in order to achieve various goals, such as inspiring, triggering, or challenging ideas.

Visuals and storytelling are often used in participatory design in architecture, as it can be difficult to discuss our relationship with space and this can lead to misunderstandings about what is needed in a building (Chun, 2016). Visualization can be helpful for ease of understanding, imitation of experience, and decision-making, and can also create positive feelings such as enjoyment and inspiration.

"I really enjoyed the photo... Got loads of discussions going. And then the third section was, it was fine. And then the fourth section was quite fun again. And we just handed over the two pens and the glue and the photos." (User 04)

"We were discussing different kinds of client customer journeys. And what do they need on different customer journeys. So that's all these little signs." (Expert 01)

It is important for the purpose and context of the tools and their application to be understood and explained to the participants, and for the tools to be customized accordingly (Sanders & Brandt, 2010). This explanation should include the planning and purpose of participatory design, the structure of activity sessions, the method of using tools, and timing considerations. Without this understanding, participants may have difficulty using the provided tools and techniques.
"Mind map was a bit tricky to me, and maybe it was the order of things because it could be related to the order of things because at some point I realized that with the mind map." User 03

"It was about what role, what function should a space have in the city from your opinion. And well then I can look at some nice VR renderings and presentations, but it has no added value to this creative process at this point." User 02

There are many tools available for participatory design, but architects should still customize them to fit the specific project. I believe it is important to start with tools that are easy to use and engaging, such as using visuals to represent ideas in the beginning and possibly moving on to sketching later. The choice of tools and techniques should depend on the comfort level of the participants and the goals of the participatory design activity. Additionally, the tool should have a clear purpose that is understood by all participants, so that everyone knows what they are working towards.

Suggested solution

Tools that are straightforward and structured with defined objectives.

Tools and techniques used in the participatory design should be easy to understand, well-structured, and clearly defined in terms of their goals. It is important that participants understand how to use the tools in order to effectively achieve their objectives.

4.2.6 Conclusion of interview

Challenges in the participatory design process at Kraaijvanger Architects involve five interconnected themes: communication of needs, the learning process, the development of relationships and project attachment, participants, and tools and techniques. Architects invite participants to join the design process, using tools and activities, and the learning process and development of relationships begin once the session starts. Mutual understanding often emerges when participants understand each other's perspectives and experiences and can discuss the development of the architectural design. These themes are related to the principles of participatory design, as mentioned in Chapter 2. However, as the findings were derived in the context of Kraaijvanger Architects, it is interesting to see that there are goals of the project that personal needs and company needs affect the design process.

While architects may provide guidance to clients regarding their needs or ambitions, this guidance may not always be communicated directly, but rather through the creation of boundaries or the presentation of options or preselected ideas. Therefore, participatory design can be beneficial for designing architecture when used appropriately for each project, as it allows architects to share their expertise, ambitions, or needs and learn from participants, while also providing opportunities for participants to contribute and learn about the design. Additionally, by involving participants and guiding them through the participatory process, relationships are formed, and the resulting learning process leads to an appropriate design solution.

Figure 10. Overview of findings from interviews.

4.3 Problem definition and design direction

Problem definition

Field research at Kraaijvanger Architects, in conjunction with a literature review on participatory design, identified challenges faced by architects and participants. Four findings were identified as challenges in relation to the principles of participatory design. These include a lack of diversity among participants, weak connections between participants and the project resulting in less collaboration towards the goal, a lack of ongoing learning and development in architectural design with participants, and unclear instruction and purpose of the tools and techniques used (Fig. 10).

At Kraaijvanger Architects, not only do clients or building users have goals for the building, but the company also has its own reputation and expertise, and architects have their personal needs for the project. When architects do not openly share their needs or opinions at the beginning, it can lead to guiding users toward the architects' preferred direction during the design process, which can have influenced the participatory design process. This challenge is the focus of this project.

To address these challenges, architects and participants should primarily be able to openly communicate their needs. Additionally, diversity among participants should be embraced and supported with appropriate tools and techniques to facilitate teamwork and new perspectives in the early stages of the architectural design process. It is also important to involve users of the building in the early stages of the architectural design process. Lastly, architects should be able to gain useful insights from participants for architectural design. To be able to tackle these challenges, the problem definition is formulated as (Fig.11):

How to design a participatory design toolkit for architects and users in order to communicate and accommodate personal needs and spatial needs in the early phase of architectural design?

The problem statement consists of three components:

1) Involving users of the building in the early stages of the architectural design process
2) Communication of needs and translation to spatial needs between architects and non-architects
3) Accommodating those needs in architectural design.

The architect has their goals for the project but doesn't communicate to the client or users

- Principles of participatory design
- Challenges of participatory design in architecture
- Other findings

A participatory design toolkit for **architects and users** in order **to communicate** and **accommodate personal needs and spatial needs** in the **early phase** of architectural design

1) Involving users of the building in the early stages

2) Communication and translation of needs between architects and non-architects

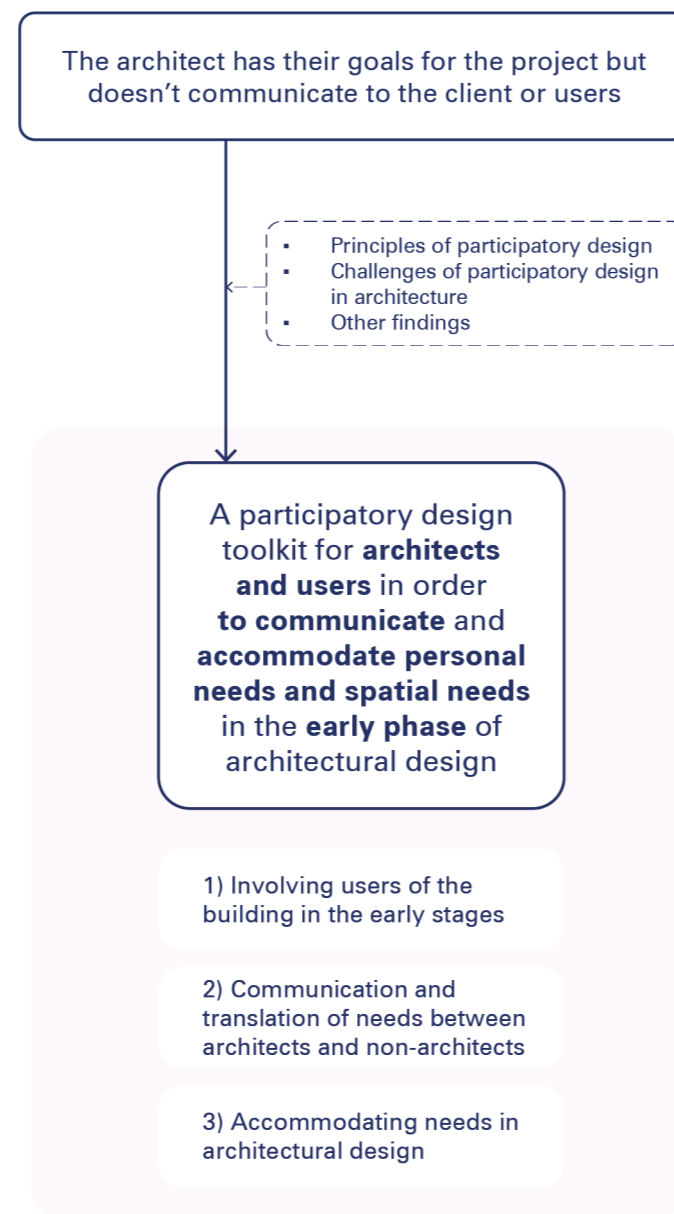3) Accommodating needs in architectural design

Figure 11. Problem definition

Design direction

The design direction for this project is based on the challenges that Kraaijvanger Architects has encountered in participatory design. The focus is to create a toolkit that allows architects and users to openly communicate their needs and incorporate them into the architectural design process from the start.

The design direction takes into account the principles and challenges of participatory design to support the design of a solution for this project. The integration of literature review, observations, and interviews has resulted in the identification of five design criteria for the toolkit. These criteria are used to evaluate the design during the design process.

The toolkit aims to:

1) Provide opportunities for all parties to share their needs, ambitions, and knowledge.
2) Encourage the willingness to participate and establish rapport between participants.
3) Facilitate communication and understanding through the use of a common language.
4) Offer an opportunity to get to know one another prior to working as a team while embracing the diversity of participants.
5) Tools that are straightforward and structured with defined objectives.

The design of the toolkit should prioritize open communication and participation throughout the design process. This is crucial for participatory design, as it allows for the inclusion and engagement of participants from the start, which in turn can lead to building positive relationships between architects and participants and a more dynamic role for all parties involved.

The toolkit should also support diversity by providing opportunities for architects and participants to get to know each other before the collaboration begins. This can help to understand the nature of the participants and how it may influence the participatory design process and architectural design later on.

The toolkit should provide appropriate tools and techniques that are simple, structured, and clear, with a clear purpose for each step. This can help to increase participation and understanding among participants and architects.

The toolkit should also seek to create a common language to facilitate mutual learning and knowledge exchange between architects and users. It should support the understanding of architectural design for non-architects and how their input can influence the design.

Overall, the toolkit should be designed to provide a solution that is appropriate for both architects and users. It should foster opportunities to share, embrace diversity and positive relationships, provide clear and appropriate tools and techniques, support mutual learning and understanding, and ultimately aid in creating a future vision for the project.

Chapter 5

Design methodology

This chapter explains the design methodology. The objective is first described, followed by the aim and setting in the design phases: concept design, preliminary design, design development, and final design.

5.1 Aim of the design methodology

The design process aimed to create a participatory design toolkit for architects and users to facilitate communication and accommodate personal and spatial needs in the early phase of architectural design. To accomplish this, an extensive literature review was conducted on the communication of knowledge, needs, and values to gain an understanding of information exchanges in the process. Additionally, insights from field research were examined, including the principles and challenges of participatory design in the context of Kraaijvanger Architects, to validate the findings. Using this information, along with established design criteria, the toolkit was designed and refined through a series of workshops, feedback sessions, and data analysis. As a result, a participatory design toolkit was successfully created.

5.2 Design phases

The design phases (Fig. 12) for this project included an extensive literature review, which was followed by the design and testing of the toolkit in three phases: concept design, preliminary design, and design development. It resulted in the final design of the toolkit.

Each phase had specific objectives. The concept design phase aimed to identify the sequences and topics of discussion between architects and building users during the architectural design process. The preliminary design phase focused on exploring tools and techniques, such as 2D collages and storytelling, to communicate personal and spatial needs and translate them into useful insights for architects. The design development phase aimed to integrate personal needs and the company's vision into the spatial needs of the project. Finally, the final design phase aimed to create a toolkit that could accommodate the co-created spatial needs of participants and architects for the project.

5.2.1 Literature review

The goal of this project was to create a participatory design toolkit that would provide an opportunity for architects and non-architects to work towards a common goal. The toolkit was intended to facilitate communication, create a common language, and translate discussions into solutions. To design this toolkit, a literature review on communication, the translation of knowledge, needs, and value was conducted. As stated in the problem definition, to address needs and spatial needs in projects, architects and users must be able to express or understand those needs.

5.2.2 Concept design

At the beginning of the design phase, I invited architects and partner architects with experience in participatory design activities, as they were able to provide insights from both the perspective of architects and participants, to participate in a 1-hour interactive session. They were responsible for the two case studies. The objective was to find an approach to utilize the toolkit that included suitable participants at the appropriate architectural design phases. The findings from this session were presented, as well as a collective feedback session on this project, leading to confirmation of the focus by Kraaijvanger Architects as the problem owner of the project.

5.2.3 Preliminary design

In this phase, two workshops occurred with two focuses; 1. exploring ways to communicate needs through 2D collage and storytelling and 2. investigating the differences of needs that were mentioned in the previous workshop. This second workshop was organized with architects, designers, and interns at Kraaijvanger Architects, as they were able to evaluate and provide feedback on the tools, techniques, and results of the sessions. While the third workshop was organized with architects and non-architects, as they could give different perspectives and I could investigate how they talked about needs and spatial needs.

5.2.4 Design development

After the preliminary design phase, the toolkit was further developed to integrate and translate different needs, such as personal needs and company values, into the spatial needs of the architectural project. I organized two workshops with different groups of participants: one for an office building and one for a city hall building. This was done to ensure the toolkit was flexible enough to be implemented with different people and projects. The second workshop included non-architects, architects with experience in the project context, and partner architects who had participated in the concept design phase. They provided deeper and broader feedback, and the architects used the results for an internal brainstorming session for the project. This allowed me to gather insights for the final design and see the impact of the toolkit on the architectural design process.

5.2.5 Final design

The final part of the design phase was to create a toolkit that could capture different kinds of needs and translate them into spatial needs for the project that would benefit both participants and architects. The toolkit with instructions was presented to Kraaijvanger Architects as well as a suggested plan of implementation.
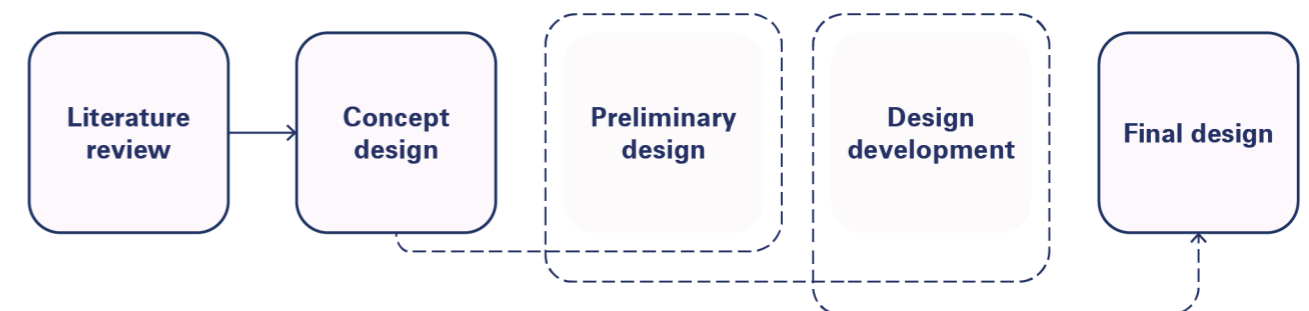

Figure 12. Design phases

5.3 Data collection

In each phase of the design process, data was collected through document analysis, observation, and interviews (Fig. 13).

5.3.1 Document

Prior to the workshop, the objectives and participants were identified as well as the planning, setting, and tools were prepared and documented.
Documents and tools of each workshop were kept in a separate online folder for organization. At the end of the workshop, I collected finished worksheets and took pictures to document the outcome for further analysis and use as materials for the interview with participants. The worksheets and collected results were kept both physically and on Google Drive for easy accessibility.

5.3.2 Observation

As I facilitated or assisted the facilitator, workshops were recorded on video for review after the session. During the workshop, I facilitated and took notes during the activity. However, I could not carefully look at the situation where participants interact with each other and with the tools. Therefore, the videos were re-watched to identify moments and phenomena that occurred. Interesting conversations were quoted for design development.

5.3.3 Interview

After each workshop session, I interviewed each participant. A series of semi-structured interviews were conducted using interview guides. Each interview, either on-site or online via Team Meeting, lasted 15-20 minutes, and notes were taken. The interviews aimed to gather feedback on the tools and techniques used in the workshops from each participant.

5.4 Data analysis

For data analysis, notes from the interview session, documents from the workshop, and quotes from the video were simultaneously analyzed.

Evaluation tables in Fig.13 were created on Google Drive to document general information about the workshop, such as times, tools, participants, the purpose of the workshop, and the design criteria. Later, the notes, worksheets, photos, and videos were probed in order to analyze and record in the evaluation table, as the summary, at the end of the workshop. The analysis served as a guide for developing tools and techniques for the next session.
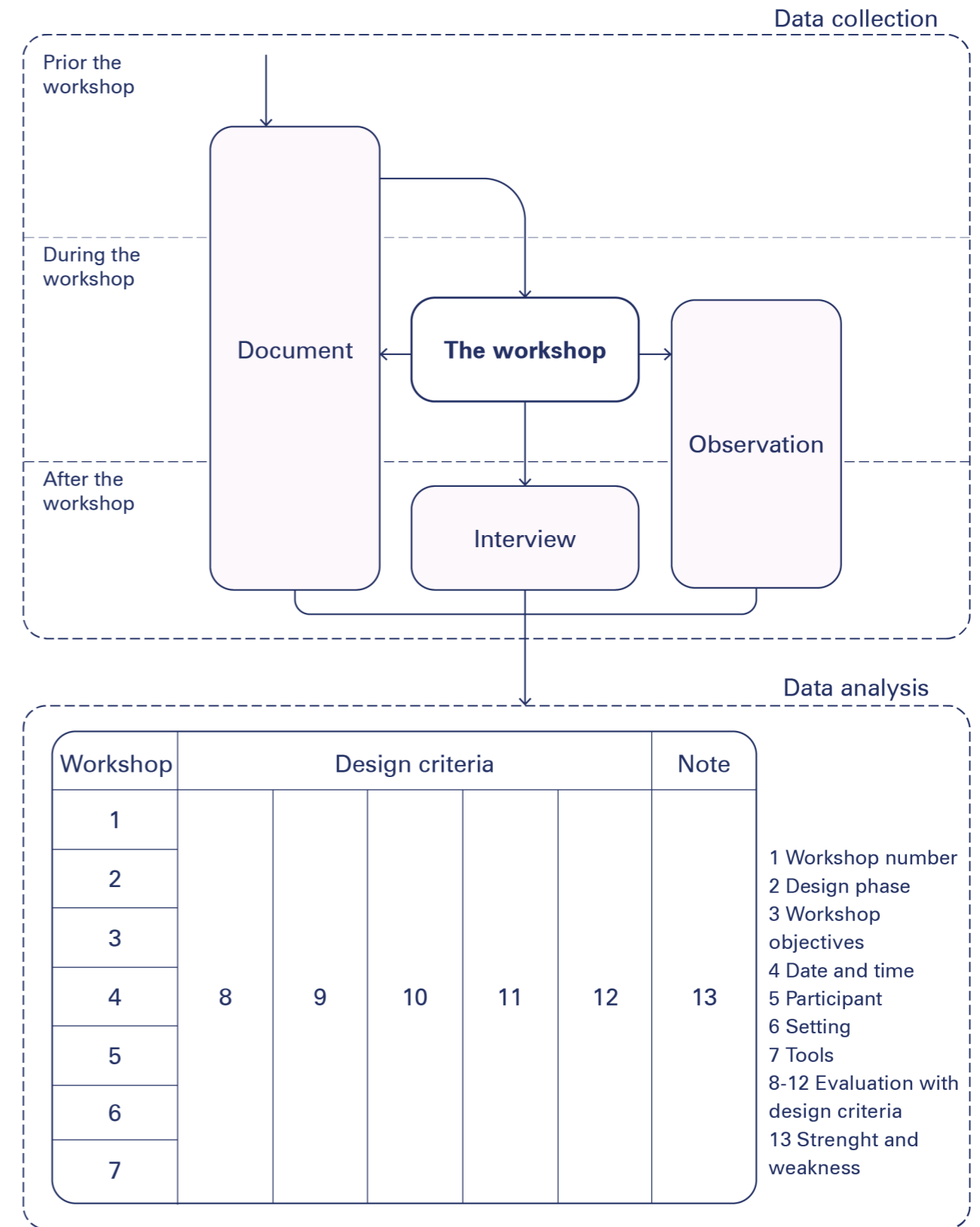
Figure 13. Overview of data collection and data analysis in the design methodology

Chapter 6

Designing a participatory design toolkit

This chapter summarizes the literature review, focused on knowledge, values, and needs, followed by an explanation of the design process. The different workshops in the design process, with their focuses, are demonstrated, and the findings are summarized. Lastly, the chapter elaborates on the final design of the toolkit.

6.1 Communication of knowledge, need, and value

Participatory design involves people with different experiences in different contexts. Each person has their own set of knowledge and having them share their knowledge in a participatory design project is one of the main goals (Jarke & Gerhard, 2018). However, there are different sets of knowledge (Table 4) and difficulty in communicating that knowledge into words.

According to Christiaans (1992), it has three sets of knowledge related to the design. Process knowledge does not depend on its domain. It can be an understanding of the design stage and how to make progress through each phase. Basic knowledge and Design knowledge are specific to the domain. While basic knowledge is a general understanding of a wide range of topics, including social and cultural domains, design knowledge is a deeper understanding of the specific design concept, technique, and solution.

Hillier (2014) highlights two kinds of knowledge separated by principles and events. Social knowledge happens because of personal experience and habit, resulting in social behavior or ideas to think. Analytic knowledge is the knowledge we can learn and use, such as facts or theories.

According to Davies (2015), explicit knowledge can be easily communicated verbally. Implicit knowledge is the knowledge that is opposed to explicit knowledge and it is gained through doing activity consistently without having the awareness, such as knowing how to bike, but it can be expressed with some support. While tacit knowledge, according to Polanyi (1967), is knowledge gained from personal experience and cannot be explained in words without context. It is personal and difficult to communicate but it does not mean sharing tacit knowledge is impossible (Davies, 2015).

Apart from the tacit knowledge mentioned by Davies (2015), needs and values are also considered abstract qualities which people do not often talk about directly (Stappers & Sanders, 2012). Linking values and needs to situations or stories makes it easier for people to think of and talk about. Moreover, Stappers & Sanders (2012) also argue that values represent the underlying motivations and goals that drive the design process, while needs represent the more concrete and specific requirements that must be met in order to achieve those values.

In the context of participatory design, values and needs are often negotiated and co-constructed between designers and users. This process involves a mutual exchange of knowledge and understanding (Robertson & Simonsen, 2013; Luck, 2018; Drain & Sanders, 2019), as designers seek to understand the values and needs of users, and users seek to understand the design process and the choices available to them (Fig. 14). By considering both values and needs in the design process, designers can create solutions that are more closely aligned with the needs and motivations of users, resulting in designs that are more functional, meaningful, and satisfying (Stappers & Sanders, 2012).
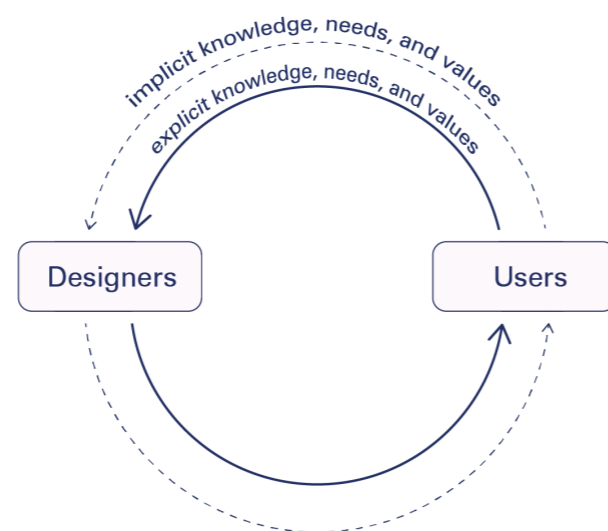
Figure 14. Communication between designers and users

Table 4. Sets of knowledge

Paper	Author(s)	Sets of knowledge
A Collaboration System Model for Planning and Evaluating Participatory Design Projects	Drain, A., & Sanders, E. B. -N. (2019)	Christiaans (1992) 1. Process knowledge 2. Design knowledge 3. Basic knowledge
Space is the machine	Hillier, B. (2014)	1. Social knowledge 2. Analytic knowledge
Knowledge – Explicit, implicit and tacit: Philosophical aspects	Davies, M. (2001)	1. Explicit knowledge 2. Implicit knowledge 3. Tacit knowledge

6.2 Design process

A toolkit was designed through five workshops to determine the design of the toolkit, as well as the criteria. A total of thirteen participants participated in the five workshops. The first phase involved discussing and validating the consequences and topics, resulting in the concept of the toolkit. The second phase focused on exploring tools and techniques to communicate needs and spatial needs, and the final phase aimed to integrate and translate the identified needs into architectural design. Figure 15 illustrates the overview of all the workshops that occurred.
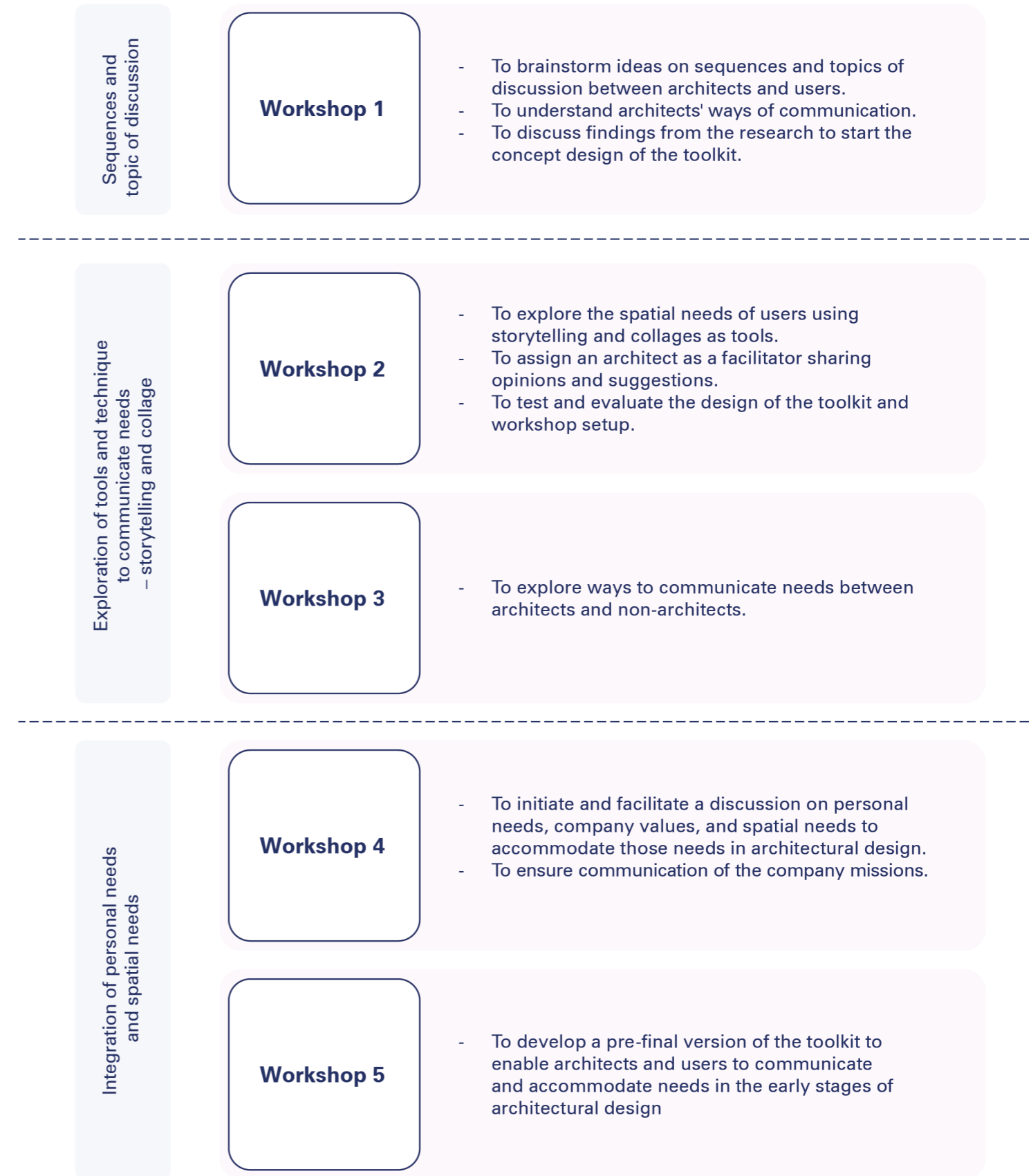
Sequences and topic of discussion

Workshop 1
- To brainstorm ideas on sequences and topics of discussion between architects and users.
- To understand architects' ways of communication.
- To discuss findings from the research to start the concept design of the toolkit.

Exploration of tools and technique to communicate needs – storytelling and collage

Workshop 2
- To explore the spatial needs of users using storytelling and collages as tools.
- To assign an architect as a facilitator sharing opinions and suggestions.
- To test and evaluate the design of the toolkit and workshop setup.

Workshop 3
- To explore ways to communicate needs between architects and non-architects.

Integration of personal needs and spatial needs

Workshop 4
- To initiate and facilitate a discussion on personal needs, company values, and spatial needs to accommodate those needs in architectural design.
- To ensure communication of the company missions.

Workshop 5
- To develop a pre-final version of the toolkit to enable architects and users to communicate and accommodate needs in the early stages of architectural design

Figure 15. Overview of the design process

6.2.1 Workshop 1: Sequences and topic of discussion

Objective

The first workshop (Fig.16) focused on brainstorming ideas on sequences and topics of discussion in relation to the architectural design process between architects and users. The architectural design process typically consists of multiple phases, and clients and end-users often involve at one point.

However, architects have a distinct preference for a specific progression of knowledge and information exchange, which is deemed essential for the successful execution of the design process. Additionally, the topics of discussion can vary based on individual experience and expectations towards the project. Consequently, it was imperative to establish a mutual understanding of the timing and nature of the information required, as well as the individuals responsible for its acquisition.

The goal of this workshop was to gather ideas and discuss findings from the research with Kraaijvanger Architects to develop the concept of the toolkit. Therefore, there was no evaluation with design criteria.

Participants

This workshop was organized with one architect and three partner architects of Kraaijvanger Architects to ensure that the objective of the toolkit aligns with the company's expectations. I invited these participants to the first workshop because they were responsible for case studies and had experience with participatory design activity. Moreover, partner architects can provide information on the organizational level from which the toolkit can benefit. My role in this workshop was to facilitate the discussion, take notes, and present the findings from my research of the current practices in participatory design at Kraaijvanger Architects.

Setting

The workshop, which was scheduled to be structured and practical, was conducted for one hour in a meeting room. A presentation and worksheet were utilized as materials, and participants were assembled and actively engaged in the activities for the entirety of the workshop. This format was chosen to facilitate discussion among multiple partner architects with limited time availability.

Tools

A1 worksheet and post-it notes (see Appendix E)

The worksheet was provided to the participants, which consisted of a table with five questions and a list of architectural design phases. These questions were formulated to explore the exchange of information between architects and users.

During the workshop, architects were expected to reflect on user requirements and assess their alignment with the knowledge and information deemed necessary for architects. Additionally, architects were prompted to share an account of a specific instance in which they had specific needs and sought to communicate with users.

The worksheet was intentionally folded to conceal the design phases. Architects were instructed to write their initial thoughts on post-it notes, without being influenced by the design phases. The cluster of post-it notes revealed the specific design phase in which information exchange had occurred (see Appendix E).

As a result, the workshop served as an initial step in the concept of the toolkit. Its objectives were to establish the appropriate timing for the utilization of the toolkit and to assist in participant selection for this project.

Figure 16. Activity in Workshop 1. Photo by Author.

Key insights from in the workshop

The worksheet showed that the exchange of information between architects and users occurred primarily at the beginning of the design process, during the sketch design phase, and the preliminary design phase.

The architects identified the importance of involving users in the early stages of architectural design. Users of the building, from their perspective, could also be clients or other inhabitants.

The topics of conversation often included the functionality of the building, the areas of the design, design concepts, and the budget. Additionally, they suggested that it is beneficial to engage users in conversations and to consider factors such as the impact on the surrounding environment, the culture of the organization, and potential future developments.

It was found that the ambition of a project and an architect's proposal could be aligned, but there was also the possibility that the client would take the lead in determining the design direction. In such cases, architects needed to communicate their expertise through meetings, presentations, and workshop sessions to ensure that all parties agreed on the design direction for each project.

Feedback session

The architects who participated in the workshop were interested in the objective of the toolkit, which aimed to facilitate communication between architects and users by promoting open dialogue about the needs of architects. As they were asked to validate insights from the research stage during this workshop, the architects offered to participate in the later stages of toolkit design development. Despite their busy schedules, the architects were willing to test and provide feedback on the design, drawing on their professional experience.

6.2.2 Workshop 2: Exploration of tools and technique to communicate needs – storytelling and collage

Objective

The second workshop (Fig. 17) focused on exploring tools and techniques for communicating spatial needs, specifically through the use of storytelling (Stappers & Sanders, 2012) and 2D collages (Brandt, 2015). Architects need to understand and communicate with users about what they want and how they want to design architecture that is appropriate for its context and users.

During the workshop, participants were asked to create 2D collages using words and images to tell their stories as a means of expressing their needs. This can be challenging as abstract needs or values are not always easily discussed, but connecting the needs to specific situations or events in life can make it easier for participants to express them (Stappers & Sanders, 2012).

The workshop also aimed to test the toolkit and the session setup. Sensitization materials were prepared to introduce and immerse participants in the main activity and domain before the start of a workshop, aiming to increase sensitivity and association to share their stories (Stappers & Sanders, 2012). The materials in a toolkit were inspired by storytelling elements (Greenawald, 2021) and were designed to enable participants to describe their needs for the building through the story. Additionally, an architect was assigned as a facilitator (Eriksson, 2014) to share their opinions and suggestions openly with the participants, with a focus on encouraging open communication between architects and users. Finally, the overall setup and results were evaluated with the design criteria for further development.

The architectural context of this workshop was to design an architectural office. Participants were asked to roleplay as employees, such as an architect, an administrative staff, and an intern. An architect from Kraaijvanger Architects was also taking part in the role of an architect/facilitator. The context was selected because, as everyone had experience with architectural offices, they were able to provide input to the design.

Participants

Five participants (P) took part in the workshop, including one architect (A) serving as a facilitator, one designer, and three interns roleplaying as the building's users regarding the objective to have a participation activity between architects and users of the building. Prior to the workshop, I provided a concise briefing and set of instructions to the architect. In addition, I offered support to the architect in the role of moderator and facilitator during the workshop.
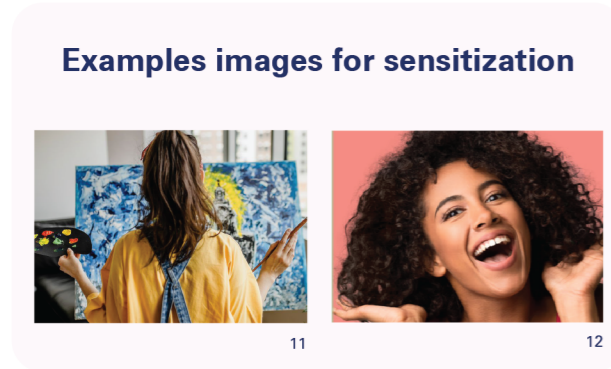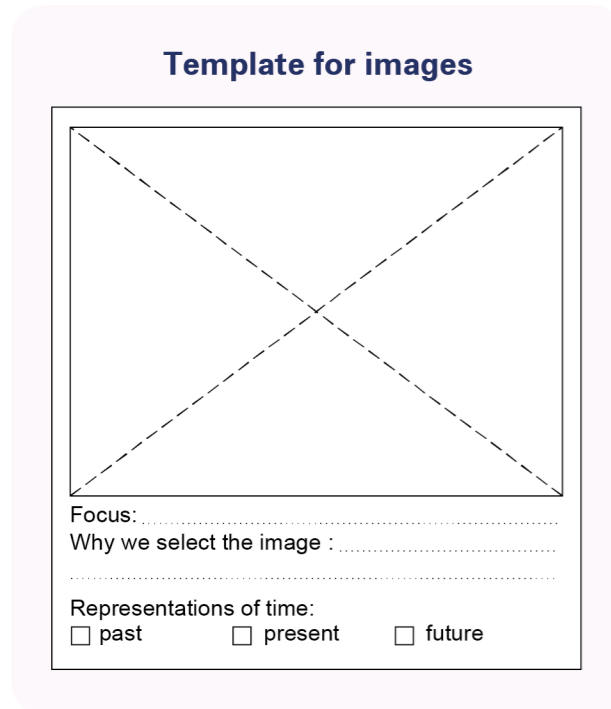
The workshop was designed for a group of five individuals, as this is the standard group size utilized by Kraaijvanger Architects. This group size was deemed optimal as it allows for active participation from all attendees. However, it is not common for an architect to participate alongside other participants in a small group. Therefore, I kept the group size at five and included one architect in the group.

Settings

The workshop was held at Kraaijvanger Architects in a meeting room equipped with a round table, eight chairs, a screen, and a large whiteboard. I reserved this room for two hours for two reasons. First, to encourage collective working, the round table and large whiteboard allowed all five participants to see all the materials at the same time and interact with them and with each other. The table and board also served as the focal point of the activity. Second, Kraaijvanger Architects typically organize workshops that last 2-3 hours, so I chose to try this workshop for 2 hours with a schedule to keep track of time as a starting point.

Figure 17. Activity in Workshop 2. Photo by Author.

Template for images

Focus: ....
Why we select the image : ....

Representations of time:
☐ past   ☐ present   ☐ future

Examples images for sensitization

1. A tabby cat's distinctive stripes. Stephen Hyde (Alamy Stock Photo, n.d.)
2. Firefighter portrait on duty. (Shutterstock, n.d.)
3. Mopping floor. KatarzynaBialasiewicz. (Getty Images, n.d.)
4. Brainstorming. Gstockstudio1. (Dreamstime, n.d.)
5. Workplace. (Jennor UK, 2021)
6. Downtown Crossing Plaza. (Horner, 2016)
7. Skylight. (Moonbeamlighting, n.d.)
8. Weight loss is a numbers game. Oli Kellett/Stone. (Getty Images, n.d)
9. Jeff Koons, Balloon Dog (Orange). (Elad Sarig, n.d.)
10. Plants. (pottaplantta, n.d.)
11. Painting on canvas. Djordje Djurdjevic. (Getty Images, n.d.)
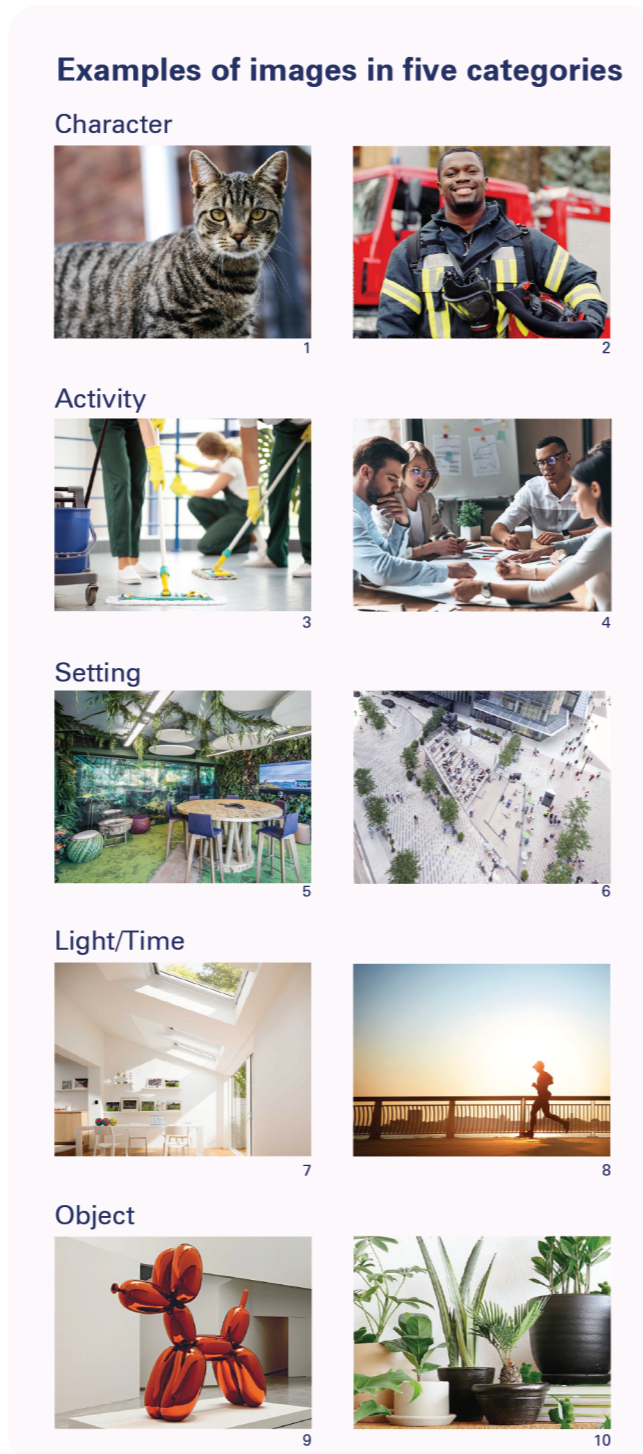12. Different emotions. (Alarmy Stock Photo, n.d.)

Examples of images in five categories

Character

Activity

Setting

Light/Time

Object

Figure 18. Example of images for sensitization, images in five categories, and a template

Tools

1) Two empty A1 papers

Papers were given to the group to cluster and connect selected images to describe their collective story that should represent the spatial needs. Participants were expected to make two storylines that could reveal their learning in the discussion.

2) Images for sensitization (Fig. 18)

These images consisted of generic images that were easy to interpret. They were intended to represent the personalities and interests and to introduce participants to the group. Considering the variety in personality and interests, 45 images were selected to represent daily activities, lifestyles, and emotions. Participants were expected to select three images that showed their personalities or interests and introduce themself to others. It was also aimed to ready participants to communicate their values or needs using photos.

3) Images in five categories (Fig. 18)

The five categories consisted of Character, Activity, Time/Light, Object, and Setting. Each category contained 30 images. Participants were expected to create a storyline using "Character" as a protagonist in a different "Setting" where "Activity" takes place. While "Object" and "Time/Light" enrich the story with details of the surroundings. These images were means to initiate the discussion to identify spatial needs in different scenarios.

The image selections were guided by examples from Stappers & Sanders (2012). It included generic, concrete, and ambiguous stimuli with different factors such as visual styles, diversity of people, etc. For example, "Character" consisted of images of a fireman, a cleaner, a person in a wheelchair, an animal, etc., to facilitate the discussion when participants thought of other users. Or "Activity" consisted of images of a typical person working, people playing sports, a concert, etc., to facilitate the discussion on what act participants wanted to happen.

Each image was placed on an 8 x 8 cm template (Fig. 18) aimed to identify the focus of the picture, the reason for selection, and the time of the happening. Templates allowed participants to document the discussion as well as architects could review the documents after the session was over. Moreover, Kraaijvanger Architects were able to add and organize images in the same system.

4) A5 worksheet for everyone (see Appendix F)

An A5 paper was given for everyone to glue three selected images in the sensitization session. Participants were expected to use this as a tool to introduce themself.

5) A5 worksheet for the architect (see Appendix F)

This worksheet was given to an architect with a table consisting of those five categories and emerging ideas. An architect was expected to note what they found interesting during the session.

6) A schedule (see Appendix F)

A schedule provided the planning and description of the workshop (Appendix F). It was given to the architect as a guideline to keep track of time.

7) An instruction (see Appendix F)

An instruction illustrated each step in the workshop for the participants to have an overview. It was made to guide participants along the workshop.

8) Other materials

Pen, glue, post-it notes, and snacks were provided to support the discussion.

Key insights from in the workshop

The workshop began with a brief overview of the schedule and instructions. Participants completed a sensitization activity and had conversations about it. Images of facial expressions led to the question of whether participants should think of their personality or interests in general or at this moment. It showed that participants were able to differentiate the situations in different periods.

"There are images with emotions, do I select images for how I feel now or life in general?" (P)

The participants, along with architects, then began the first round of creating a story. Each person was expected to be responsible for having one category of images and initiating the discussion. The group collectively selected a maximum of three images in each category to make a storyline that showed the scenario of selected characters. An architect became active in this activity by organizing the images into groups, suggesting ideas, and asking related questions.

In the first round, participants were expected to start selecting images and write on the template (Fig. 18) to document their thoughts. It appeared that participants wrote at the end after finishing the selections as it seemed to distract from the activity since they had to answer many questions.

Participants discussed the realism of the images and how they could be incorporated into the building. An architect then explained that the building was not yet designed, so they could be creative in their approach. Participants also left out images that they felt were obvious and selected others that they thought were more important.

"Here for example, if you want it in this building. This is not possible because it is in nature, right?" (P) ™No no, now we can be a bit creative." (A)

"Every office needs a toilet, we shouldn't select this." (P) "We need a good-looking living room for our clients. We don't have it now." (P)

In the second round, with a better understanding of the process, participants became more creative. One participant suggested involving a fireman as a character, as they were not commonly considered users of architectural office buildings. Other participants suggested creating an educational area for visitors, inspired by an image of a public square on campus. Some participants disagreed, feeling that it would be a waste of money, but they were able to discuss and make a decision.

"I also thought maybe we can return something to society for firefighters, they work for our society. So maybe we have a resting space in our office to have coffee." (P)

"Maybe we can make a campus with our building, to return to society." (P) "I think it is a waste of money." (P) "We can make a lecture room in the office then." (P)

The first round of the workshop took longer than anticipated, due to a lack of clarity in the instructions provided and an excess of questions on the accompanying template. Furthermore, the use of five categories resulted in a sense of repetition and a feeling of tick-boxing. However, the second round saw the emergence of more creative ideas and a faster pace of work. The variety of images used was found to be effective in initiating uncommon discussions. It was determined that the number of images must be carefully selected to prevent overwhelming the participants and time taking in the selection and discussion process.

The interaction between the participants and the architect was productive, with all parties actively listening to and sharing ideas. No individual dominated the discussion and the process was characterized by a sense of group effort. In retrospect, it was acknowledged that all participants were either architects or individuals with a background in architectural design leading to an exploration of the potential outcomes if the participants were non-architects and how their discussions of spatial needs may differ.

Feedback session

The workshop received positive feedback on the tools and setting, with participants noting that a group of five people working together was an ideal size. The images provided were engaging, and the number of images per category was not overwhelming. An architect took the opportunity to share ideas during the workshop and felt that the outcome, in terms of spatial needs, would be useful for the architectural design process. Participants also mentioned that viewing selected images of others in the sensitization session helped them understand the decision-making process in later activities. Additionally, having a second round allowed them to (re)share ideas that were not included in the first round.

However, there were areas for improvement. First, an overview and structure of the worksheet were needed as participants were confused and lost during the activity resulting in reexplanation from the architect and me, which took time and distracted participants from the activity. Second, having five categories of images and creating one story for each worksheet was challenging. Although selecting images and discussing revealed spatial needs, it resulted in a cluster of stories and became repetitive. Thirdly, an architect mentioned that the organizational values, such as the company mission of the client and the architectural firm, were not considered in the workshop. As participants and the architect were asked to share their needs, they were likely discussing from a personal perspective. Lastly, there was no learning process on architectural design in the workshop, as the results appeared to be a cluster of images without connections to architectural design.

6.2.2 Workshop 3: Exploration of tools and technique to communicate needs – storytelling and collage

Objective

The third workshop (Fig. 19) aimed to explore the connection between spatial needs and personal needs or values in people's lives, focusing on the difference between architects and non-architects. The second workshop revealed that architects tend to use more architectural terms while assuming that non-architects may talk more about events or experiences in their lives. Moreover, the toolkit was designed to bridge the gap in familiarity with architectural terms between architects and non-architects (Luck, 2003).

The sensitization session in the second workshop effectively initiated a conversation about values and provided an understanding of decision-making. Building upon this, the third workshop aimed to develop sensitization materials concerning different needs or values. Personal values play a significant role in decision-making for building design and should be explicitly shared among participants to connect them with their spatial needs.

Participants

A total of four participants took part in the workshop individually. Two of them had architectural background (A) participated in the second workshop, roleplaying as users, while the other two were non-architects (P) who were not familiar with the project. My role in this workshop was to facilitate the session and gather feedback.
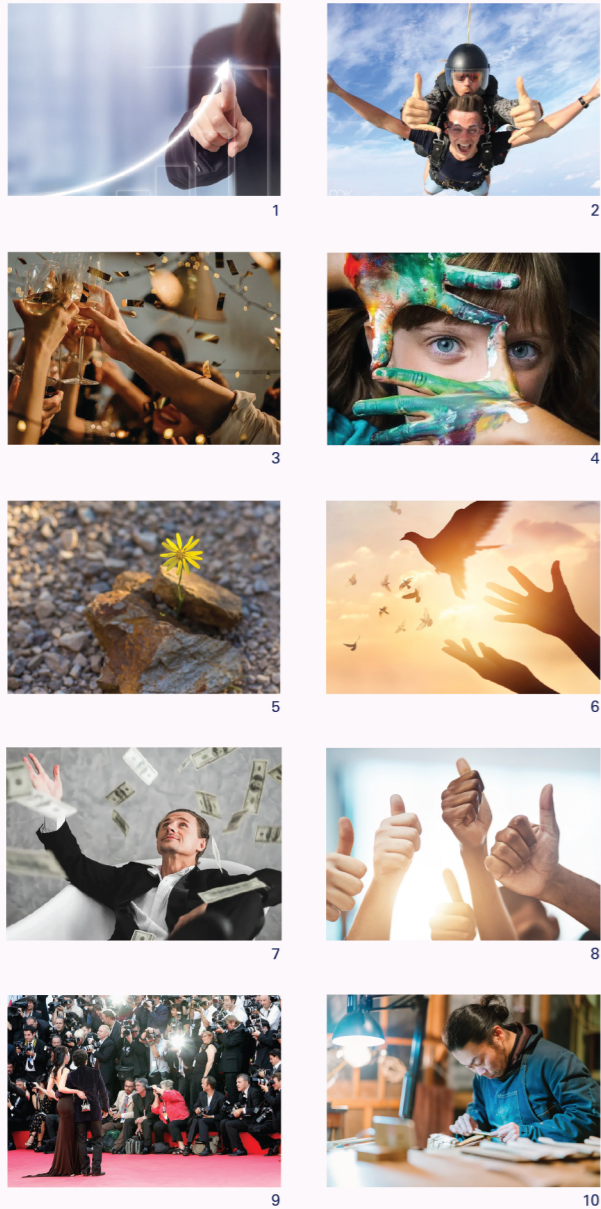
Settings

The workshop was held at Kraaijvanger Architects in a workstation. The online session was conducted via Zoom using a Miro board. Since it was an individual session, the room was not reserved. Each participant was provided with the tools. During the online session, the Zoom and Miro links were shared then the participant joined the board, where I was already present. The worksheet took each participant approximately 20-30 minutes to complete.

Figure 19. Activity in Workshop 3

1. Potential stock (Getty Images, n.d.)
2. Dubai skydiving experience (Klook, n.d.)
3. People Toasting Wine Glasses.
4. Child creativity.
5. Hope. (Hospiscare, n.d.)
6. Woman praying and free bird enjoying nature on sunset background, hope concept. PopTika. (Shutterstock, n.d.)
7. Man throwing dollar bills in a bathtub. (Shutterstock, n.d.)
8. Cropped shot of a team of colleagues showing thumbs up at work. (iStock, n.d.)
9. A film premiere at the Palazzo del Cinema in Venice, Italy. Chris Jackson. (Getty Images, 2005)
10. An Asian man is making craft from wood material at his working place. (Getty Images, n.d.)

Figure 20. Example of added images for sensitization

Tools

1) A4 worksheet (see Appendix G)

An A4 was divided into three parts with three questions. Three questions were asked to explore the communication of needs and spatial needs.

- Briefly share your 3 favorite activities
- Select 3 images for the activity you do and 3 images for the space you like
- Select 3 images that relate to you and say why you pick them

The first question was answered in text form, as the aim was to investigate whether eliciting responses would be more difficult without the use of visual aids and to examine whether the participants' answers would pertain to architecture or not.

The second question was answered using images from the sensitization session of the second workshop, accompanied by a written description. The purpose of this question was to have participants share their personal needs and spatial needs separately, and later look for a connection.

The third question was accompanied by a new set of ambiguous images (Fig. 20). Unlike the first two questions, this question did not provide guidance in terms of activity, space, or feeling.

2) Images for sensitization

Images of activity and space were selected from images for sensitization in Workshop 2 (Fig. 18) as it consisted of general elements in life and was interpreted by participants very straightforwardly.

Extra 30 images were added (Fig. 20). The images were selected for their ambiguous nature, which allows for multiple interpretations to be drawn.

Key insights from in the workshop

With each participant doing the workshop individually, an A4 worksheet was given, and each question and image sets were separate. The questions were presented in order. This was done to prevent any influence on later questions from previous answers.

Participants spent a few minutes before writing down their answers to the first question. They were expected to fill the worksheet horizontally so they could explain in detail one activity. The questions were perceived as easy to answer as it was about participants' lives. Asking about the feeling was interesting as different reasons created similar feelings.

For the second question, as two of the architects had seen the images previously, they selected and wrote their reasons quickly.
Non-architects required additional time to review the images, yet were still able to make selections with ease. Their explanation was related to their feelings and experiences.

For the last question, one participant started questioning right after seeing the images, as it was perceived to be related to psychology. The selection process took longer than the rest as the participant seemed to think about the meaning of the image before selecting.

"Are you using these images to check my mental state?" (A)

However, this part of the exercise proved to be enlightening, as it revealed what the participants considered to be important in their lives, regardless of the architecture. This information could be useful in understanding personal needs before delving deeper and exploring connections with architectural design.

Feedback session

The feedback on this part was useful as the participants enjoyed seeing and selecting images. Participants who had participated in the previous workshop found it easy to select images of activities and spaces compared to the extra set because of its ambiguity. Other participants said it was fun working with the images compared to the first question, which was answered with text. They were thinking of their own story or dreaming about their preferred future. Overall, the participants found this small workshop engaging and fun to do.

When collecting feedback on the communication of needs and values, which were considered important in life and architectural design, the participants agreed that the second question was straightforward and appeared to be the most beneficial for architects. Furthermore, the third question was perceived as noteworthy as it prompted the participants to examine images with various interpretations, representing their needs in life and how they could impact spatial design.

Figure 21. Activity in Workshop 4. Photo by Author.

6.2.4 Workshop 4: Integration of personal needs and spatial needs

Objective

The fourth workshop (Fig. 21) aimed to initiate and facilitate a discussion on personal needs, organizational needs, and spatial needs in order to accommodate those needs in architectural design. The focus of this workshop was to ensure that the mission and goals of Kraaijvanger Architects were clearly communicated to users, while also taking into account the company mission of clients. Through the use of worksheets, templates, and images, the workshop aimed to develop a toolkit that could translate the identified needs into design solutions for architects to implement in projects. Additionally, this workshop aimed to test the outcomes of the participatory design activities to ensure that they effectively represented the desired future vision.

The architectural context of this workshop was the design of an office building. Participants were asked to role-play as employees of an office, and they decided that their imaginary company produced sustainable toys for children. An architect from Kraaijvanger Architects also participated in the role of an architect.

Participants

Five participants took part in the workshop, including one architect (A) who served as a facilitator, one designer, and three interns who acted as the building's users (P). As the role of architects in participatory design was changing, I believed that an architect who had experience with the role of a facilitator would be beneficial for the workshop. Therefore, the same architect who participated in the second workshop was asked to join this workshop as he was familiar with participatory design activities previously. To prepare him for the role of facilitator and discussion moderator, I provided the architect with a brief overview and instructions for the workshop. I also assisted the architect with moderation and facilitation during the workshop, as the two workshops were different. Three participants who had participated in the previous sessions were invited to join the workshop as they were able to evaluate the two workshops. Additionally, a new participant was invited to provide a fresh perspective on the workshop and toolkit.

Settings

Because the meeting room used in the second workshop, which served the workshop nicely, was unavailable, this workshop was held in a smaller model room. The room was equipped with a rectangular table and six chairs. The workshop was planned to last for two hours.
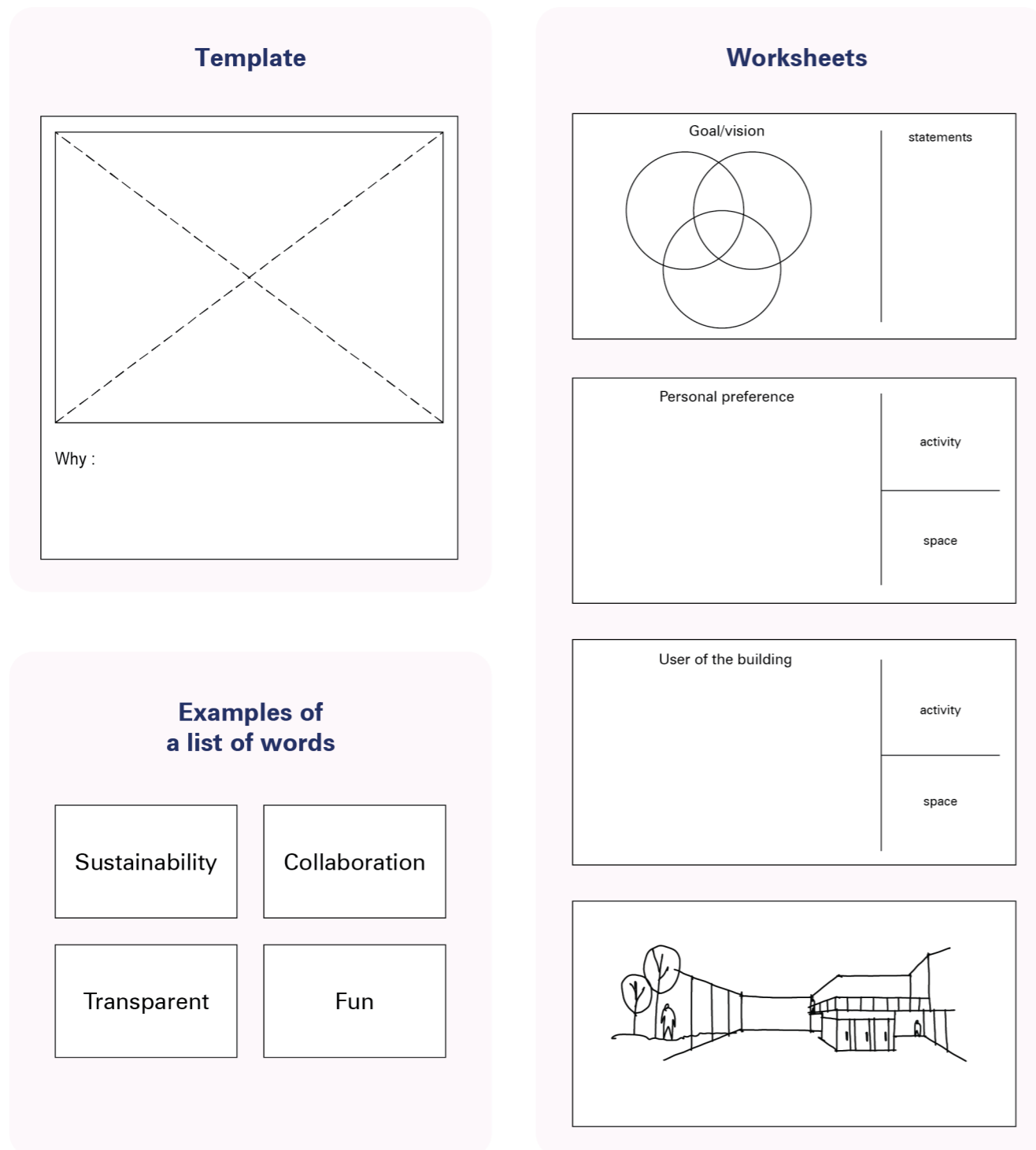
Template

Why :

Examples of a list of words

Sustainability	Collaboration
Transparent	Fun

Worksheets

Goal/vision — statements

Personal preference

activity

space

User of the building

activity

space

Figure 22. Template, simplified worksheets and example of word cards

Tools

1) Four A0 worksheets (Fig. 22, See Appendix H)

Worksheet 1
The first worksheet aimed to integrate personal and organizational values into the statements, which were the project's goals. A Venn diagram was used as a framework, consisting of three circles for personal values, Kraaijvanger Architects' values, and the client's company values. The overlaps showed the relationships among the items added. Participants and the architect were expected to discuss their selections and rearrange them according to the Venn diagram, starting with Personal, Company, and Kraaijvanger Architects, respectively. The purpose was to identify the shared values in the middle and translate them into statements.

Worksheet 2
The second worksheet aimed to identify the spatial needs of each person and create a list of requirements for space and activity for the project. First, participants and an architect were asked to select images of activities and spaces they would like to have in the building. Participants could describe the activities and spaces they preferred using images. Second, participants and an architect were expected to write their ideas and discuss spatial needs with the statements from the beginning of the workshop. This part was designed to summarize the discussion in a way that an architect could easily use for the architectural design.

Worksheet 3
The third worksheet aimed to identify users of the building other than the participants and think about their spatial needs. Similar to the second worksheet, images of building users (Fig. 18) were given to inspire participants to think of other users. Participants were expected to identify possible users, activities, and spaces, and list their spatial needs.

Worksheet 4
The fourth worksheet aimed to visualize and summarize the workshop using the medium of architecture: a perspective drawing. The perspective drawing was created by myself as a mockup for this workshop. The perspective was intended to be a low-fidelity prototype that participants were able to imagine and redesign.

2) Images in four categories

There were images in four categories in the workshop; value, activity, space, and user. The value category had no template, while the other had a template simplified from the second workshop. Images in the value category (Fig. 20) were printed in multiple sets for participants and an architect to see and select individually. The selection and explanation from each participant and architect were intended to show similar or different values, leading to understanding each other and how they associated images with meanings.

Images in the other categories were selected from the second workshop (Fig. 18) to reduce repetition and rearranged them into categories. The template for images in the activity, space, and user categories was simplified (Fig. 22) to keep the reasonings.

3) A list of words

On the first worksheet, word cards were added for the activity. It was selected from lists of core values (White, 2012) as inspiration for the discussion. The words were also added as an experiment to compare to using images or a combination of both.

4) Other materials

Pen, glue, post-it notes, and snacks were provided to support the discussion.

Key insights from in the workshop

The workshop began with a discussion on values, where participants were asked to use images and words to express their personal and organizational values. However, the discussion seemed to mix personal values with the company's mission. *"Wait, are we talking about personal or the company?" (P).* To address this confusion, it was necessary to clarify the distinction between personal values, organizational values, and spatial needs, as they had implicit connections that needed to be explored step by step.

Each participant was given sets of images in the value category to see if there were similarities in their interpretations. This showed that the three participants had selected similar images, but their explanations were slightly different, highlighting the common interests. *"I selected this one because I associate it with sustainability, which I'm interested in." (P) "I also have the same image, but I see it a bit differently. I selected this image because I often go hiking and I think nature is important." (P)* Although it was useful to see the similarities visually, the collective atmosphere did not happen as planned since they were selecting images alone.

During the discussion of organizational values, The architect asked participants to start sharing their company values. The architect perceived themself as service providers, considering what was important to their clients. *"We are providing a service, so if you tell me that fun is important, we will incorporate it into the design." (A)* However, participants also asked for the architect's opinion, considering the mission of Kraaijvanger Architects, about whether it was important to include the selected value. *"We consider being transparent important for our company. Do you also agree? Is it also important to your company?" (P).* It was obvious that the objective of each session should be clear for both architects and participants to effectively benefit from the toolkit. For example, to openly talk about the organizational value together.

The architect saw an architectural term in the description and thought it was easy to understand and translate into design. *"It is easy and clear for me to understand. It's like someone speaking our language, like green space, open space..." (A).* However, the participants were architectural interns and were already familiar with architectural terms. In future sessions with non-architects, it would be compelling to explore using visuals to identify common terminologies between architects and non-architects.

Later, even though the perspective drawing excited participants, it created confusion due to its visualization and representation. Hence, the architect and participants needed to discuss and adjust the drawing to their common understanding before adding images. *"I'm also confused with the drawing. Is it the ceiling? Maybe we should add the light and tile here."(P). "Is this going to be our building?" (P).*

The intention was to visualize and summarize the workshop in an architectural medium, and the perspective drawing together with the collage served this purpose. However, it was necessary to be clear that the drawing represented an imaginary space, and the drawing should be simple as a low-fidelity prototype. In the end, participants and the architect could complete the workshop by collectively gluing and placing images on the worksheet.

Feedback session

The workshop received positive feedback for its integration of organizational values into the discussion, as it was deemed vital in architectural design. One architect noted that the workshop provided an opportunity for open communication between users and the company's mission and expertise. Participants found it useful to understand the architects' perspectives before participating in a participatory design activity related to architecture.

However, there were areas for improvement in the workshop. As the objective was to initiate and facilitate the discussion of needs toward common goals for the project, the goals needed to be prioritized. Despite positive feedback on the communication of needs, participants and architects could not conclude the discussion with specific goals. This resulted in clusters of different ideas that were not well connected. Additionally, in the second worksheet, when participants were identifying their spatial needs, the spatial needs of the architect were not needed as he was not the building user. Instead, the architect could have made use of input from participants, as it was easy for them to pick images and explain the reasoning for their selections.

Lastly, even though the perspective drawing excited participants, it raised questions. For example, participants were confused about whether it was already the design of the building. There were also comments on the perspective drawing itself that it was not clear in terms of visualization and representation.

Figure 23. Activity in Workshop 5. Photo by Author.

6.2.5 Workshop 5 : Integration of personal needs and spatial needs

Objective

The fifth workshop (Fig. 23) aimed to develop a pre-final version of the toolkit by incorporating design criteria, feedback, and the objective of creating a toolkit that would effectively enable architects and users to communicate and accommodate personal, organizational, and spatial needs in the early stages of architectural design. The workshop focused on developing tools and techniques that take into account the design criteria and feedback from previous sessions.

The architectural context for this workshop was based on a new project at Kraaijvanger Architects, specifically a city hall building in the Netherlands. Participants and architects were provided with a project brief outlining the requirements to familiarize them with the context prior to the workshop.

Given the wider scope of the city hall project, involving a larger number and diversity of users, it was assumed that the workshop would reveal the need for adaptability in the use of the tool in a project with more complexity.

Participants

The participants in this workshop were different from those in the second, third, and fourth workshops. The workshop included two teams;

1) The first team (As the architect, A) consisted of a partner architect and two architects who worked on the Tender Team and had experience designing city halls,

2) The second team (Role-playing as employees from the municipality, P) consisted of a partner architect, an architect, and an employee working in public relations who also had experience designing and engaging with the city hall project of Kraaijvanger Architects.

A total of six participants took part, and the workshop was facilitated by me and a partner architect who was the mentor of this thesis. The participants were selected to try the toolkit for the first time and provide feedback to aid in the final design, as they had experience participating in the city hall project in the past.

Settings

The workshop was held at Kraaijvanger Architects in the same meeting room as the second workshop, and it was planned to last for a total of three hours as scheduled (see Appendix I). The session was extended for one more hour with multiple breaks, as it was perceived in the second workshop which participants lost concentration.

Worksheets

1) Creation of commongoal

2a) Unfold spatial needs

2b) Unfold spatial needs

3) Accommodate spatial needs

Figure 24. Three worksheets for Workshop 5

Tools

1) Three A0 worksheets (Fig. 24, see Appendix I)

Each worksheet consisted of instructions and objectives.

Worksheet 1

This worksheet was to simplify and structure the conversation in which participants were following along the sequences. First, Participants and architects were asked to start with personal values by introducing themselves using images. Knowing your teammates and their needs or values in life can benefit the work process as it influences decision-making. Second, the client's company and Kraaijvanger Architects needed to design a building considering organizational values. Words obtained from the company mission were written as a scope of discussion. Participants and architects were expected to represent their company and communicate to others via image selections followed by discussion. Third, as the objectives were needed in participatory design, everyone was expected to collectively think, analyze, and prioritize the previous discussion and come up with the goals of the project. Considering that it was a 3-hour workshop with multiple steps, the goals could be clustered to focus on three goals.

Worksheet 2

The second worksheet was developed from the previous workshops and aimed to unfold the spatial needs of users in a systematic way. Participants and architects were expected to consider their goals from the first worksheet before exploring activity, space, and emotion for the building from their perspective. Personas of other users were added in the second part to trigger thinking from different perspectives. Participants and architects identified new spatial needs using the persona's perspective as it explicitly provided another point of view and requirements for the building.

Worksheet 3

The third worksheet aimed to summarize the workshop in a straightforward way to complete: be understandable for participants, and be usable for architects in their design development. The worksheet consisted of an x-axis and a y-axis, with spatial words such as inside-outside and public-private. The axes and simple architectural terms, such as indoor, outdoor, private, and public, were chosen as the last worksheet, intended to be understandable for non-architects, and architects could get inspiration from the result.

2) Images in five categories
(Fig. 18, see Appendix I)

Five categories consisted of value, activity, space, user, and emotion.

The value category had similar images as the previous workshop. Each image had a number as a template (Fig. 25), and participants were asked to see the images together and write down their selections. Seeing images together could initiate the conversation, which was important as everyone collaborated on the project.

Alike the value category, images in the activity and space categories were similar to the previous workshop. However, the template was redesigned. Participants and architects were expected to write down any thoughts when they selected images. Therefore, to keep it open, a white area was provided.
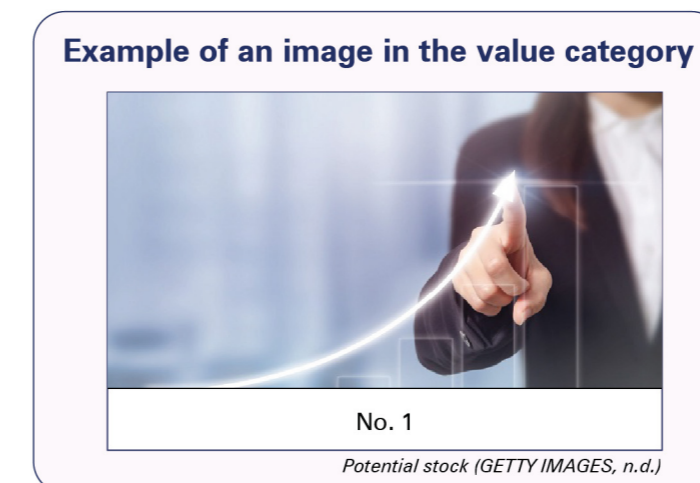
Example of an image in the value category

No. 1

Potential stock (GETTY IMAGES, n.d.)

Figure 25. Example of images in the value category

In the user category, a persona was added (Fig. 26). It described the roles, responsibilities, and needs of each person. This information was obtained through user analysis by Kraaijvanger Architects. Participants and architects were expected to think from the perspective of the users. Therefore, the information of the users should be explicit to both participants and architects.

In the emotion category, images from the PrEmo tool (Desmet, 2019) were used to represent positive and negative emotions as they could be considered when occupying and designing a building.

3) A schedule and an overview (see Appendix I)

A schedule provided the planning and an overview showed the sequences in the workshop. It was given to the architects and participants as a guideline.

4) Other materials

Pen, glue, post-it notes, dot stickers, and snacks were provided to support the discussion.

A persona in the user catagory

HENK

- Citizen   - Busy entrepreneur
- Need to get   - Have a family
a passport

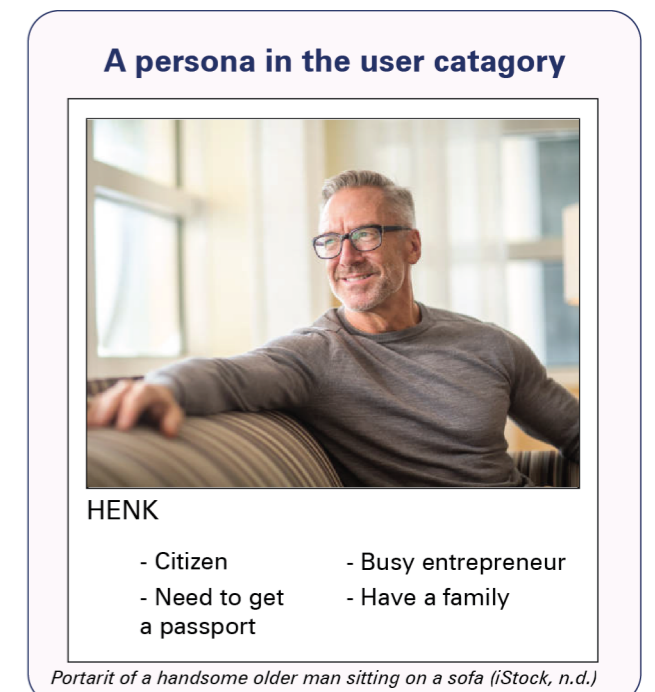*Portarit of a handsome older man sitting on a sofa (iStock, n.d.)*

Figure 26. Example of a persona card in the user category

Key insights from in the workshop

The first worksheet was divided into three parts to focus on different values: personal, organizational, and the common goals of the project, as guidance for the discussion. It became coherent to discuss these needs steadily.

Participants and architects perceived sharing personal values as an ice-breaking activity because they started talking to each other during the selections. It also allowed participants to get to know the architects and each other. *"I think the whole goal of the icebreaker is to create a sense of trust, and you create that by letting people show their personalities but not too much." (A)*

During the focus on organizational values, this session achieved its goal of creating open communication on values and needs between companies. Participants thought of the organization rather than themself. Moreover, they also mentioned weaknesses or issues within their organization to architects as their values were aligned. *"There were issues with reliability within our organization, and we want to solve that issue with your expertise." (P)*

The last part of the worksheet aimed to conclude the previous discussion and brainstorm for the project's goals. It achieved its objective after one of the participants suggested thinking of the goals individually before discussing them with the group since there was no structure to discuss and brainstorm. Later, they started to cluster and define one word/sentence for each group and do dot-voting. As a result, they had three common goals. *"I think we need to ask everybody to make 1 or 2 statements first so then we have materials to discuss." (P) "Shall we do dot-voting? and shall we define it in one word for each cluster?" (A)*

As the first worksheet took longer time than expected due to the internal discussion between architects and participants, the second and third worksheets did not proceed as planned. However, some moments were useful for the development of the toolkit.

The personas were given to encourage participants to think from other perspectives, and a group of architects was responsible for thinking from the perspective of users. They could use the personas to structure the discussion from a clear point of view, and define spatial needs with common goals. However, it worked better to do one persona instead of four personas at once, as they learned in the workshop.

The last worksheet was not inspiring and gave no insights. It provided information that architects already knew, such as room locations, instead of the atmosphere of space that participants wanted. It should be exciting and inspiring for everyone to dream further with the project as well as provide new insights for architects more than the project brief said. *"We already know this (room locations) as the architect, I think the final worksheet could encourage people and architects to continue dreaming" (A)*

Feedback session

Different sessions were held to talk about needs. Participants perceived it as a good starting point for participatory design activity. Sharing meaningful things in life and personal stories introduced the participants to one another and created a collaborative atmosphere. Following this, discussing organizational values helped participants think further beyond themselves, such as their company culture and other employees.

Images selections followed by writing explanations created a common language in an architectural context that was easy to understand. The similarity in image selections or text descriptions demonstrated commonality within the organization, allowing participants to group themselves around common goals at the end of the first session.

Individual and collective moments happened to be needed. Architects and participants agreed that it was necessary to have some activities where everyone could think for themselves before sharing their ideas with others. It was easier and more effective to individually generate ideas and then discuss and collectively select and develop them.

Using a character as the protagonist helped architects to think about the spatial needs of that person, leading to structured discussion and solutions compared to each participant considering their own individual needs, which resulted in fragmented solutions.

Overall, the common feedback for the final result was that it should be a collaborative outcome that everyone feels a part of, making it more interesting for the participants and providing insights for the architects after the session.
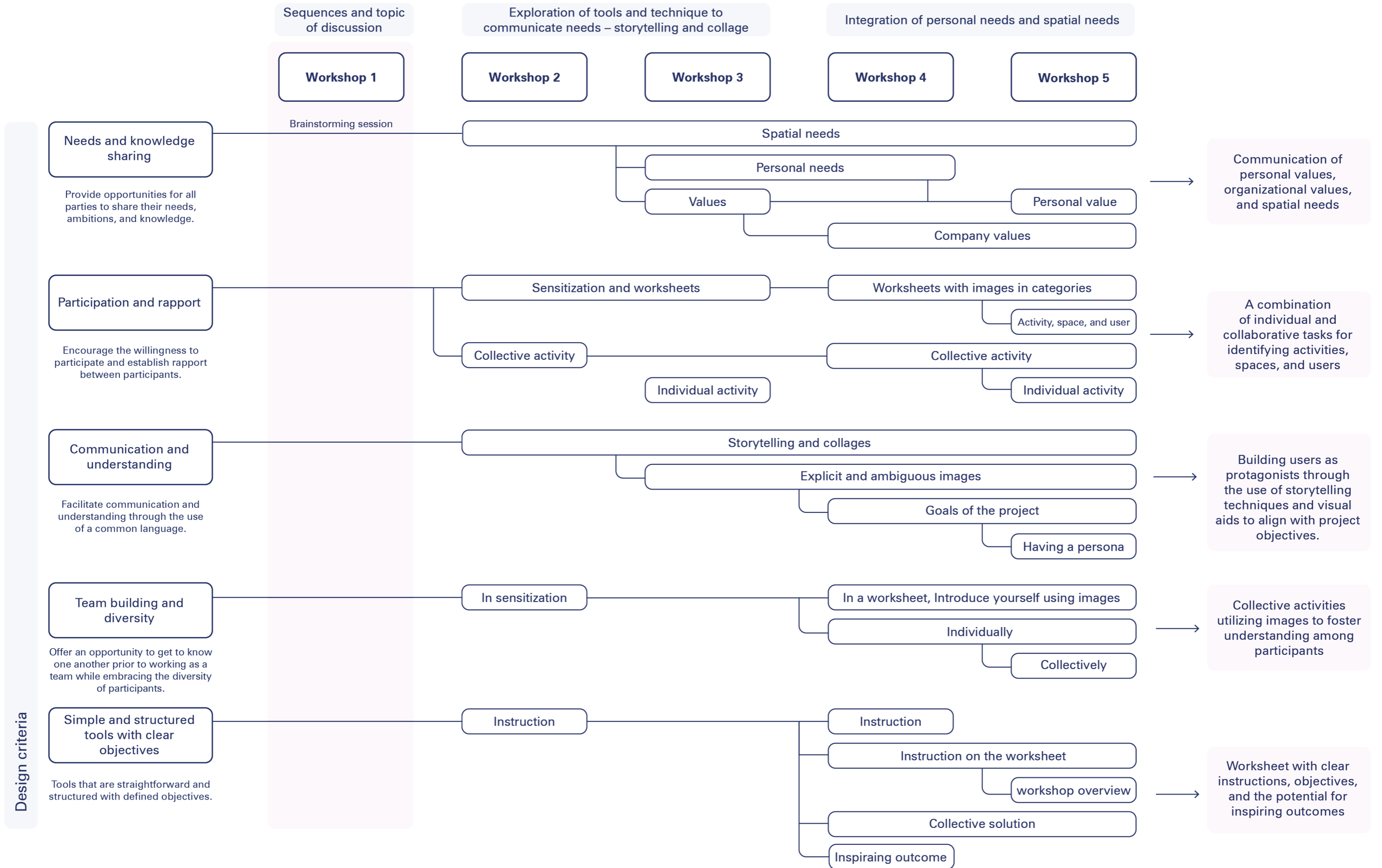
Column headers (top):
- Sequences and topic of discussion
- Exploration of tools and technique to communicate needs – storytelling and collage
- Integration of personal needs and spatial needs

Workshop boxes:
- Workshop 1
- Workshop 2
- Workshop 3
- Workshop 4
- Workshop 5

Left side (Design criteria):

Needs and knowledge sharing
Provide opportunities for all parties to share their needs, ambitions, and knowledge.

- Brainstorming session
- Spatial needs
- Personal needs
- Values
- Personal value
- Company values

→ Communication of personal values, organizational values, and spatial needs

Participation and rapport
Encourage the willingness to participate and establish rapport between participants.

- Sensitization and worksheets
- Worksheets with images in categories
- Activity, space, and user
- Collective activity
- Collective activity
- Individual activity
- Individual activity

→ A combination of individual and collaborative tasks for identifying activities, spaces, and users

Communication and understanding
Facilitate communication and understanding through the use of a common language.

- Storytelling and collages
- Explicit and ambiguous images
- Goals of the project
- Having a persona

→ Building users as protagonists through the use of storytelling techniques and visual aids to align with project objectives.

Team building and diversity
Offer an opportunity to get to know one another prior to working as a team while embracing the diversity of participants.

- In sensitization
- In a worksheet, Introduce yourself using images
- Individually
- Collectively

→ Collective activities utilizing images to foster understanding among participants

Simple and structured tools with clear objectives
Tools that are straightforward and structured with defined objectives.

- Instruction
- Instruction
- Instruction on the worksheet
- workshop overview
- Collective solution
- Inspiraing outcome

→ Worksheet with clear instructions, objectives, and the potential for inspiring outcomes

Figure 27. An overview of the design development of the toolkit

6.3 Final design of the toolkit

6.3.1 Overview of the participatory design toolkit

The participatory design toolkit for Kraaijvanger Architects (Fig. 28) was designed to facilitate effective communication and participation between architects and users in the early stages of the design process. The toolkit takes into account the personal needs of architects in addition to the company's mission of Kraaijvanger Architects and encourages open communication between all parties involved.

The toolkit is designed with the consideration of principles and challenges of participatory design, adapted to the context of Kraaijvanger Architects. The final toolkit was designed by summarizing design criteria and insights gathered through workshops in the design process.

The toolkit aims to:

1) encourage communication between architects and users to understand and share personal values, organizational values, and spatial needs

2) Encourage participation and rapport between participants with a combination of individual and collaborative tasks.

3) Facilitate communication and understanding through the use of a common language by including storytelling techniques and visual aids to help align project objectives with the needs and preferences of users.

4) Offer opportunities for team building by using collective activities that utilize images to foster understanding among participants.

5) Use simple and structured tools with purposes, including worksheets with instructions, objectives, and the potential for inspiring outcomes.
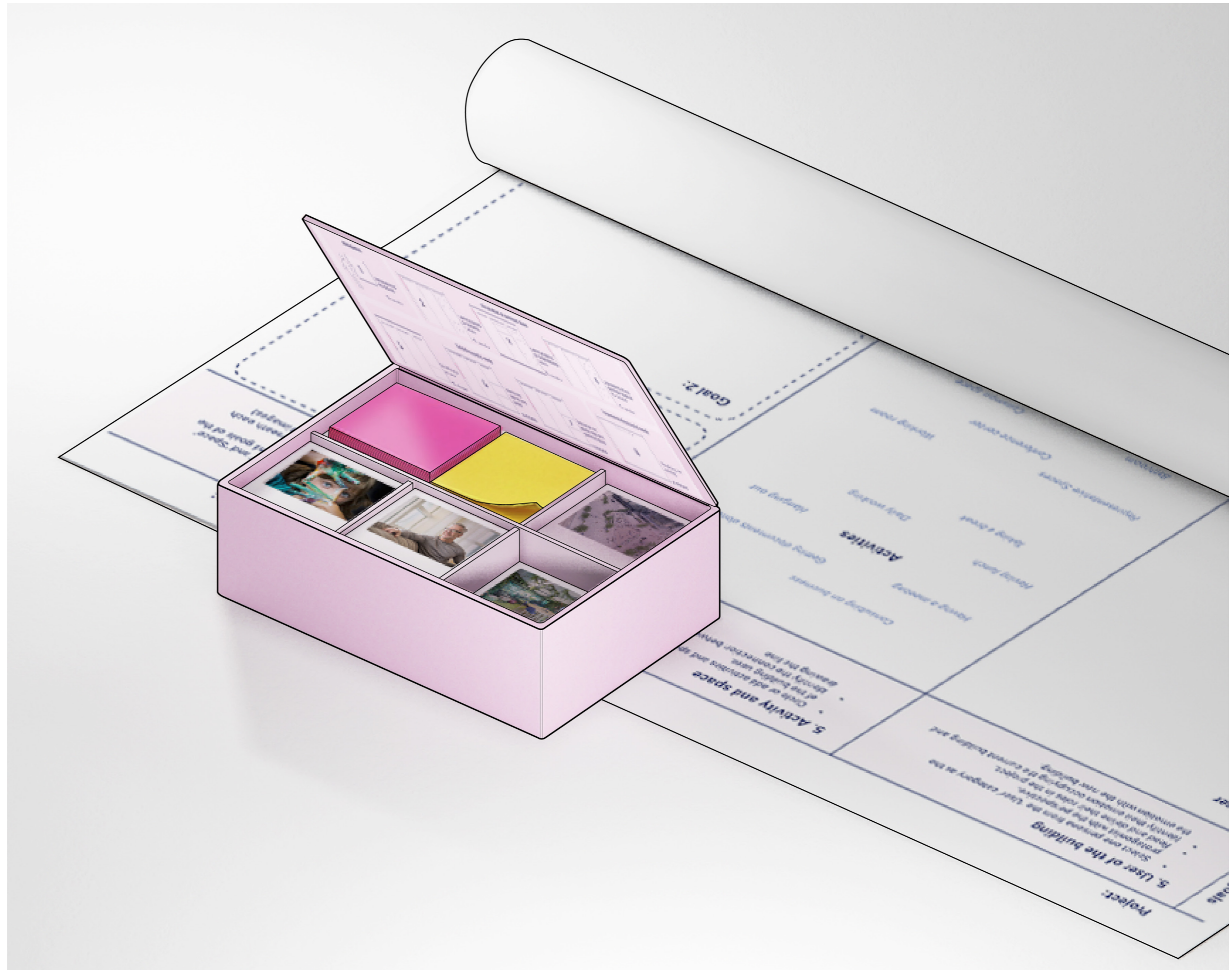
Figure 28. The participatory design toolkit

6.3.2 Explanation of the participatory design toolkit

The participatory design toolkit includes mixed materials that are used to facilitate interactive and open communication between architects and building users during the participatory design process. The toolkit is intended to be used by a group of participants and a facilitator architect in a 3-hour workshop consisting of three sessions (Fig. 29).

The first session focuses on the communication of values and needs and establishing common goals. The second session aims to identify and understand the spatial needs of building users using personas. The third session is dedicated to aligning these needs: personal, organizational, and spatial needs, with architectural design. The worksheets and image cards provided in the toolkit guide the participants and facilitator through different exercises and activities that are tailored to each session.

The toolkit is practical, with simple, structured, and clear instructions that are straightforward to understand. The physical setup and schedule of the workshop are also customized to optimize the usage of the toolkit. Each session takes 30-45 minutes and 10 minutes break after the session.

6.3.3 The physical setup for the workshop

When organizing a session with participants in a participatory design context, it is crucial to consider the physical setting in which the activity will take place. The environment can greatly impact the success of the workshop and the level of participation and engagement from the participants. For a group of five participants, it is recommended to have a room with sufficient space for a table in the middle, five chairs, and a board to display the worksheets. The room should be sized appropriately to allow for movement and interaction among participants while avoiding distractions. Additionally, providing snacks and beverages during breaks between sessions can enhance the overall experience and promote a comfortable atmosphere. It is also necessary to incorporate breaks between sessions to allow for rest and reflection. In the case of larger groups, a presentation screen and ample space should be considered, particularly for the final session, which involves collective activities for the entire group.
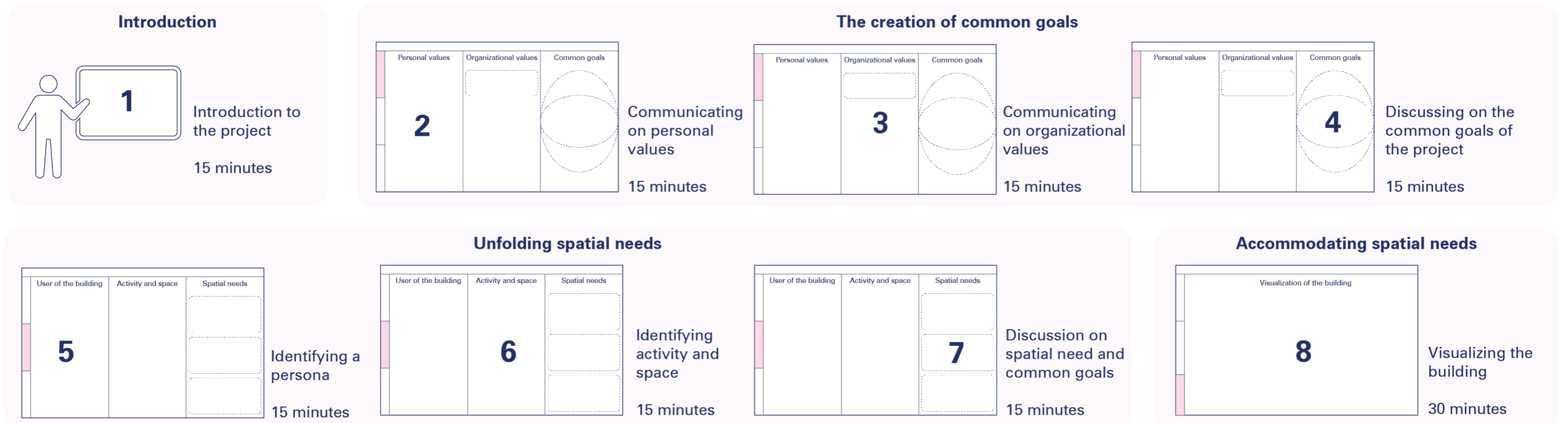

Figure 29. Schedule of the workshop
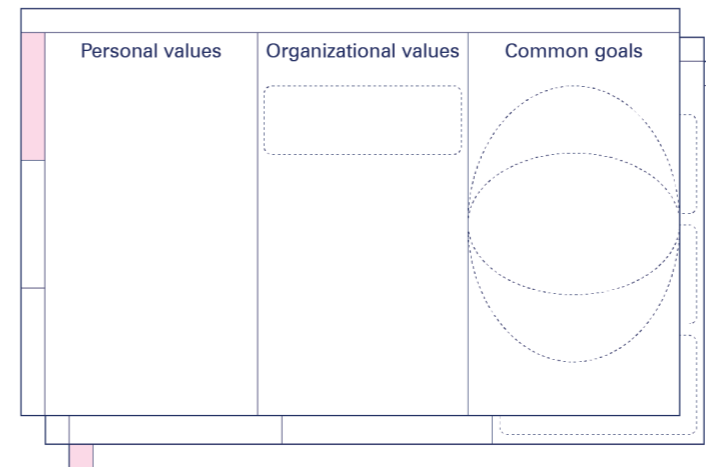
6.3.4 Utilize the toolkit

The toolkit includes a variety of materials such as worksheets, image cards, post-it notes, pens, and dot stickers (Fig. 30). During the first session, the architect facilitates the use of the first worksheet (Fig. 31), supported by image cards in value categories. The session is designed to introduce the participants to each other, help them share the values of their respective organizations, and establish common goals for the project. The session uses a tool that allows participants to communicate by associating images with words. It is a mix of individual and collective activities to communicate and make decisions with each other.

The second session focuses on exploring the spatial needs of different users. The participants were asked to consider these needs from the perspective of others or their representative persona by using a second worksheet (Fig. 32), an image card of user categories, and the common goals established in the first session as a guide. The participants, along with the architect, can identify activities and spaces for different users and generate ideas for the atmosphere and design of the building. Two sets of images in the activity and the space categories are provided to inspire participants with different activities and architectural designs. The participants are encouraged to write down the reasons for their selections.

The third session brings together the work of the previous sessions and provides a foundation for the next phase of the architectural design process. A generic architectural perspective drawing of an imaginary office building is presented to all participants (Fig. 33). The perspective drawing intends to excite participants by providing an image that visualizes the architecture they are designing. Architects prepare the perspective drawing from the design brief as a low-fidelity (lo-fi) prototyping. Participants collectively add their designs and ideas to the drawing through collaging, sketching, writing, and other means.

The final toolkit meets the design criteria and optimizes the communication between architects and users while creating and maintaining good relationships. The tools and techniques, supported by a suitable setup, are straightforward and structured, easy for participants to follow, and understand the nature of users and architectural design. Lastly, together with individual and collective thinking and decision-making, the results from the workshop inspire both architects and participants toward architectural design.
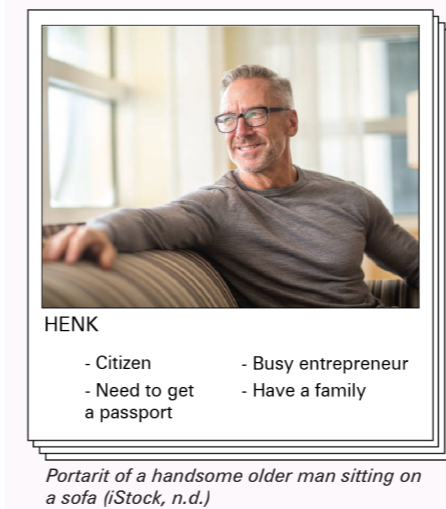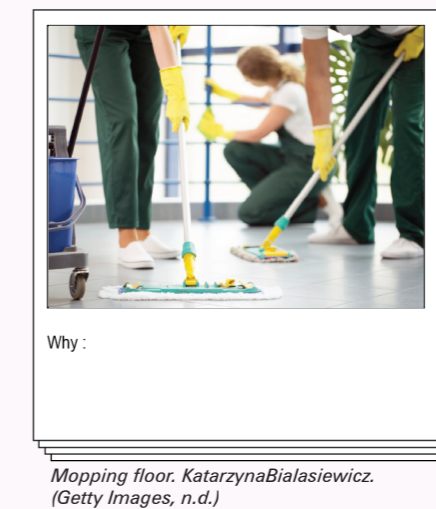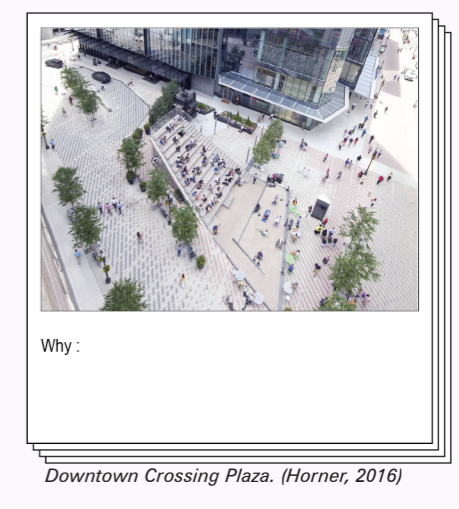
1) Worksheets

Personal values	Organizational values	Common goals

2) Images in the value category

No. 1

Potential stock (GETTY IMAGES, n.d.)

3) Images in the user category

HENK

- Citizen
- Need to get a passport
- Busy entrepreneur
- Have a family

Portarit of a handsome older man sitting on a sofa (iStock, n.d.)

4) Images in the activity category

Why :

Mopping floor. KatarzynaBialasiewicz. (Getty Images, n.d.)

5) Images in the space category

Why :

Downtown Crossing Plaza. (Horner, 2016)

6) Illustration of instruction
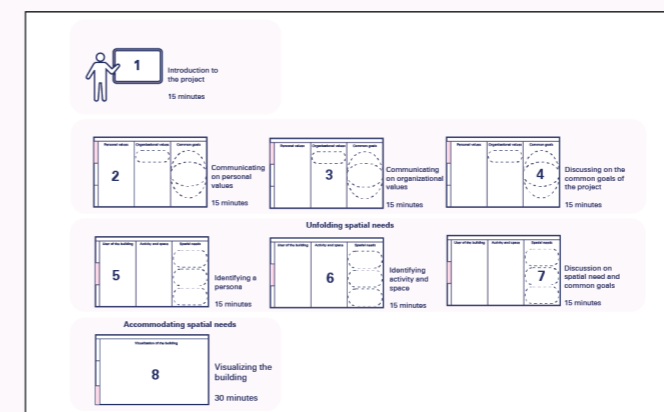
7) Post-it notes, dot stickers, pens
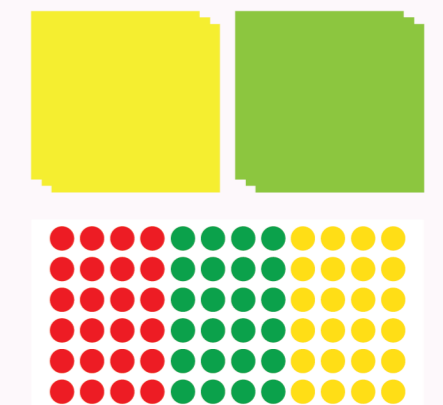
Figure 30. Materials in the toolkit

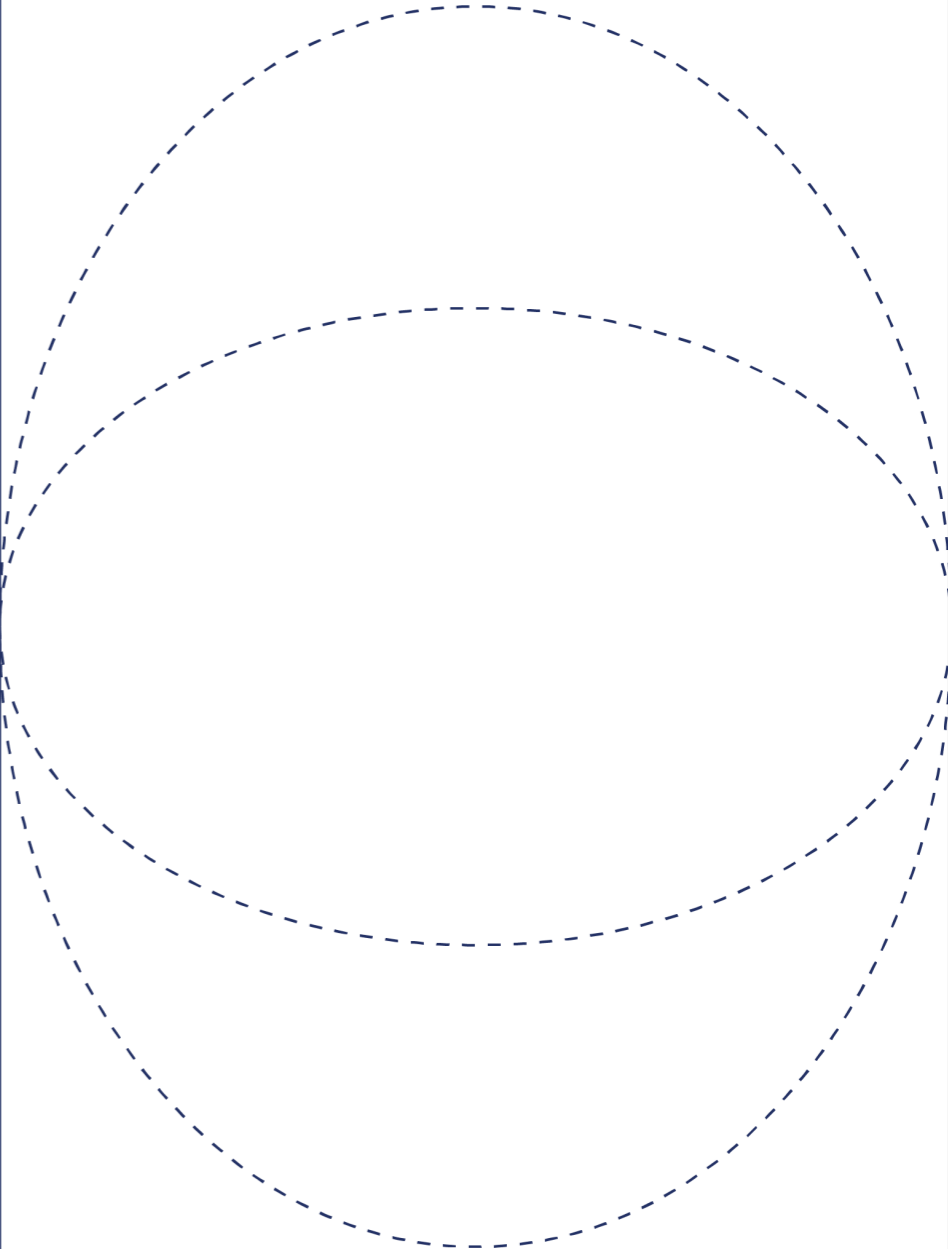|	**Project:**		**Date:**
Creation of common goals	**1. Personal values** ▪ Select 3 images in the 'value' category that you find important in your life. ▪ Write down its number and the reason the post-it notes (use different post-it notes for each image) ▪ Introduce yourself with the selection to the group	**2. Organizational values** ▪ As a group, write down keywords from the company mission and select 3 images in the 'value' category that represents the company's value ▪ Write down its number and reason on the post-it notes (use different post-it notes for each image)	**3. Common goals of the project** ▪ As a group, review the personal values and company values in relation to the goal of the project. ▪ Individually write down three statements on post-it notes and discuss them with other people. ▪ Vote for the top three wanted goals.
Unfold spatial needs		**Company mission**	
Accommodate spatial needs			

Figure 31. Worksheet 1

Project:		Date:

Creation of common goals

5. User of the building

- Select one persona from the 'User' category as the protagonist with the perspective.
- Read and define their roles in the project.
- Identify their emotion occupying the current building and the emotion with the new building.

5. Activity and space

- Circle or add activities and spaces that relate to the persona of the building user.
- Identify the connection between activities and spaces by drawing the line

6. Spatial needs

- As a group, select 3images from the 'Activity' and 'Space' categories that are suitable for the persona and goals of the building.
- Describe the reason for the selections underneath each image. Do the same for all the goals. (Total 9 images)

The user

Emotions of the user

Consulting on business

Getting documents done

Having a meeting

Activities

Hanging out

Having lunch

Daily working

Taking a break

Working room

Representative Spaces

Conference center

Bathroom

Common space

Spaces

Administrative Center

Canteen

Service area

Meeting room

*   as example

Goal 1:

Goal 2:

Goal 3:

Unfold spatial needs

Accommodate spatial needs

Figure 32. Worksheet 2

87   88

Project: **Date:**

Creation of common goals

7. Visualization of the building

- Each participant picks 1-2 images from 6. spatial needs and glues them on the perspective below.
- Share ideas for the building by drawing, sketching, or writing on the image.

Team:

Unfold spatial needs

Accommodate spatial needs

* *as example*

Figure 33. Worksheet 3

Chapter 7

Discussion

This chapter describes the plan for implementation, project adaptability, and future use of the toolkit. It suggests a plan to implement the toolkit in the company strategy, followed by a discussion on different factors that result in opportunities to use the toolkit.

7.1 Implementation plan

The toolkits developed in the context of Kraaijvanger Architects provide a set of tools that can be used to facilitate communication and collaboration between architects and non-architects during the early phases of the design process. These toolkits can be used within the firm, with clients or other external participants, or as part of an internal workshop for architects. To effectively implement these toolkits, Kraaijvanger Architects should follow a few key strategies (Fig. 34):

Share the toolkits with architects within the firm, providing training and guidance on how to use the tools effectively. This can be done through an internal workshop, where architects can get firsthand experience with the toolkits, and through the distribution of a leaflet (Fig. 38) explaining the toolkits and providing examples for further use.

Utilize the toolkits on a new project, working with clients or other external participants in the early phases of design. It is suggested that the process be started with the first worksheet, followed by the second and third worksheets in order, though individual activities or worksheets can be selected as needed.

Standardize and systemize the process internally, and share the design process with the public as a way of marketing the firm's portfolio and approach. This can involve customizing the templates provided in the toolkits to suit the needs of different projects, and sharing information about the design process through the firm's website, portfolio, keynotes, and social media channels.

Utilize the toolkit on other different projects, incorporating the insights and perspectives of non-architects to enrich the design process and create functional, aesthetically pleasing buildings that meet the needs of all stakeholders.

By following these strategies, Kraaijvanger Architects can effectively use the toolkits to facilitate communication and to design appropriate projects that are based on valuable insights from a diverse range of participants.
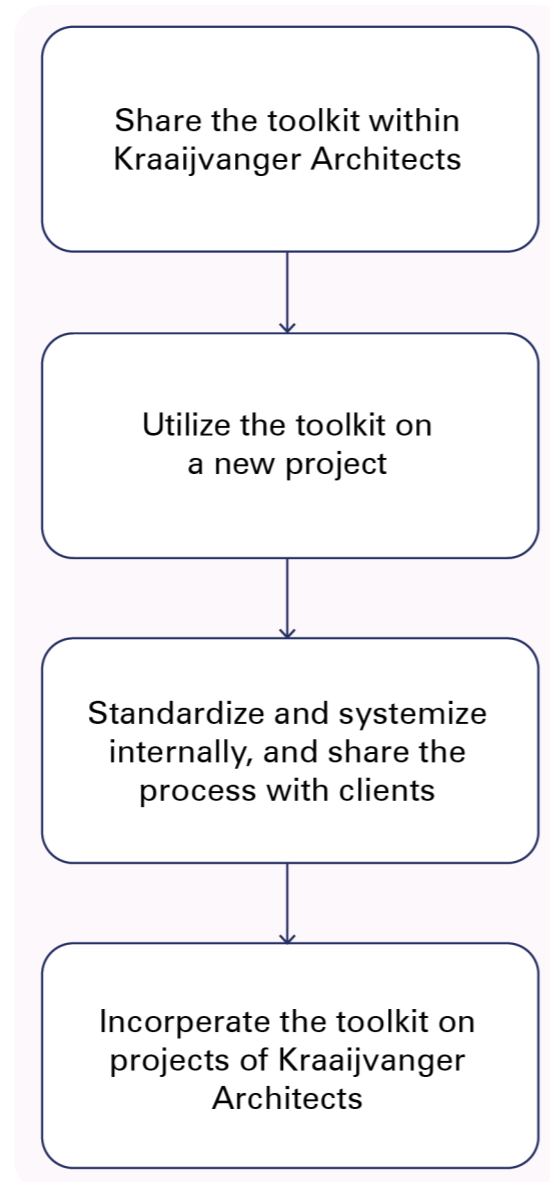
Share the toolkit within Kraaijvanger Architects

↓

Utilize the toolkit on a new project

↓

Standardize and systemize internally, and share the process with clients

↓

Incorperate the toolkit on projects of Kraaijvanger Architects

Figure 34. Key strategies

7.2 Adaptability of a toolkit

To architects

Apart from utilizing the toolkit with the building users, it can be used internally in the firm to generate design concepts, think from the perspective of users, and roughly visualize architectural designs during the early design phase. By roleplaying as clients or users, architects can better understand their needs and values, which can serve as the initial concept ideas for a project. The toolkit also includes a persona feature, which helps architects analyze spaces and activities for different users and relate those findings to the initial concepts. Additionally, the toolkit allows for visualization of the building.

In addition, the results generated from the toolkit can be used to develop further. For example, Kraaijvanger Architects set up a continued session (Fig. 35) after the fifth workshop explained in Chapter 6 where the toolkit was used. The session included six architects in the Tender Team, with another architect as a facilitator who also prepared materials for the session. My role was to quietly observe and take pictures. The three common goals from the first worksheet were formulated into three design questions and given to architects to sketch their ideas for the building. For example, one of the goals was to make the building attractive and connect citizens. The design question was formulated as: how might we attract citizens that want to be in the town hall and make them proud, instead of the need to be there? Then, architects started quick sketching and rotated papers for others to continue. This continued session shows how the toolkit can be adapted to internal use, supporting brainstorming sessions, and generating new ideas for the building.

Figure 35. A continued internal workshop session. Photo by Author.

7.3 Future use

To new contexts

Architectural designs are diverse, covering different types of buildings and surroundings. The materials in the toolkit, which include images in four categories: values, personas, spaces, activity, and perspective in the final worksheet, are adaptable to new contexts. Architects can select, add, or remove sets of images or categories according to their focus and building types. In particular, the persona and perspective materials should be customized, with architects responsible for obtaining information on users and regulations from the project brief of the building in order to prepare the materials. As a result, the toolkit supports participatory design activities in various contexts, as the materials can be adapted to fit the specific needs of the project.

To numbers of participants

Workshop sessions can consist of a small or large group of participants, and the toolkit and instructions can be adapted to accommodate different numbers of participants. In a small group setting, the first worksheet can be completed and discussed, resulting in the goals of the project. Participants can also conduct multiple rounds of personas in the second worksheet to imagine different perspectives from various users. Lastly, the group can conclude the session together. When the toolkit is used in a small group setting, it allows for a more detailed examination of user perspectives. In a larger group setting, voting can be added to achieve agreement in the process.

For example, when the group is divided into smaller groups, each with its own three goals, voting can be used to select the best three goals for all participants. Additionally, the group can be divided based on roles in order to complete the second worksheet, where a persona is selected based on job or vice versa, where a group of people with different roles discuss a user who is not present at the session. Finally, all participants can collaboratively work on the final worksheet as they have the same goals and have finished the discussion on the personas and needs of users in relation to the goals.

For Kraaijvanger Architects

Kraaijvanger Architects can adapt and utilize the toolkits at various stages of the architectural design process, not just during the programming phase. The tool consists of three objectives: creating common goals, unfolding spatial needs, and accommodating those needs.

Even if the architectural design process has already begun, the toolkits can provide architects with new insights. For example, during the preliminary design phase, the goal is to create a basic design for the shape, size, and function of the building. Architects can use the first worksheet (creating a common goal) to revisit the design goals and concept for the proposed architectural planning layout, while also inviting input and empathy from participants. The second objective (unfolding spatial needs) involves understanding how the users will use each space, considering its size and the connections between rooms. Architects can use personas and scenarios to explore this aspect. The third objective (accommodating spatial needs) concludes the process by placing the ideas into the architecture in a way that will allow the design to be developed. This could involve creating a collective drawing or 3D model with the connection between spaces.

In later stages of the architectural design process, when it delves further into details, the main three steps of the toolkits can be similar, with new focuses and materials provided. For example, there may be added categories of images related to the topic of discussion, or the results may be based on architectural materials that the architects have produced and 3D model making. Participants and architects can start with common goals that are carried through the process. Even if there are new participants, they can refer back to previous discussions and continue to the next phases.

For other architecture firms

The toolkit was developed with the context of Kraaijvanger Architects, but other architectural firms can also utilize the toolkit as its principles are based on communication of needs between architects and users. It is important for architectural firms to maintain their reputation and communicate their expertise to clients and users. The toolkit provides opportunities for architects to share these values with clients and users at the beginning of the design process, leading to better understanding of the architectural firm by clients or users. However, other companies should identify the company mission and adapt the materials, such as categories, images, and perspective, to fit their specific context while still maintaining the same objectives: creating common goals, understanding spatial needs, and accommodating spatial needs. As a result, the companies can present themselves to clients or users before continuing with collaboration on the architectural design.

Chapter 8

Conclusion

The project is concluded with a summary, limitations, and reflection. This chapter concludes the project by discussing the answer to the research question, limitations, and suggestions for this project. The chapter concludes with reflections from the author.

8.1 Conclusion

The objective of this thesis was to develop a participatory design toolkit for architects at Kraaijvanger Architects to effectively collaborate with stakeholders on architectural projects. Kraaijvanger Architects implemented the participatory design method intuitively and unsystematically, leading to the analysis and evaluation of the theory and principles of participatory design and challenges in relation to architecture.

The principles of participatory design regarding this thesis project consist of involving diverse participants (Muller & Kuhn, 1993; Wang & Oygur, 2010; Sanders & Brandt, 2010; Robertson & Simonsen, 2013), using appropriate tools and techniques (Muller & Kuhn, 1993; Sanders & Brandt, 2010; Drain & Sanders, 2019), fostering mutual learning Wang & Oygur, 2010; Robertson & Simonsen, 2013; Luck, 2018; Drain & Sanders, 2019), and creating a future vision in their design process (Gregory, 2003; Wang & Oygur, 2010; Robertson & Simonsen, 2013; Luck, 2018; Drain & Sanders, 2019). Besides, participation in architecture reveals challenges such as a lack of communication with clients and users, insufficient learning and reflection, and a lack of diversity awareness (Muller & Kuhn, 1993; Robertson & Simonsen, 2012; Eriksson, 2014;

Hiller, 2014; Chun, 2016). As a result, Kraaijvanger Architects faced challenges and limitations in its participatory design process.

- The architect has their goals for the project but doesn't communicate them to the client or users.
- No relationships or attachments formed.
- Insufficient learning and reflection.
- Lack of diversity awareness.
- Unclear tool structure and purpose.

Consequently, to design an appropriate solution for Kraaijvanger Architects, the participatory design toolkit for architects and users to communicate and accommodate personal needs and spatial needs in the early phase of architectural design has been proposed.

The participatory design toolkit proposed in this thesis focuses on five key elements to address the challenges faced by Kraaijvanger Architects in their participatory design process.

The first element is needs and knowledge sharing, which aims to encourage communication between architects and users in order to understand and share personal values, organizational values, and spatial needs. This will help to ensure that the design process considers the needs and priorities of all stakeholders.

The second element is participation and rapport building, which includes a combination of individual and collaborative tasks that are designed to identify the activities, spaces, and users involved in the project. This will help to build relationships and establish participation between architects and users toward appropriate outcomes.

The third element is effective communication and understanding, which emphasizes the importance of identifying building users as the main protagonists in the design process. To achieve this, the toolkit includes storytelling techniques and visual aids to help align project objectives with the needs and preferences of users.

The fourth element is team building and diversity, which focuses on using collective activities that utilize images to foster understanding among participants. It will help to create a sense of partnership among stakeholders, which is essential for effective collaboration.

The last element is simple and structured tools with clear purposes, which include worksheets with instructions, objectives, and the potential for inspiring outcomes. It will help to ensure that the design process is structured and easy to follow, which will help to improve the effectiveness of the participatory design process.

Additionally, the thesis project contributes to the awareness of the roles of architects and designers. As architects' roles continue to evolve with the rise of participatory design, this toolkit provides opportunities for empathy with a wide range of users, and potentially beyond humans. Future research could further explore different aspects of architecture and participatory design. Overall, this toolkit aims to empower architects to collaborate effectively with stakeholders and create designs that meet the needs and values of all participants.

8.2 Limitation and suggestions

8.2.1 Limitations

Limitations in data collection from decision-makers

During the field research for this thesis, the perspectives of architects, experts, and building users such as citizens or employees were obtained. Although there was a person from the municipality who considered providing a client's perspective, the perspectives of the chair of two case studies, such as the CEO of the company or municipal decision-makers, were not included. As the objective of participatory design is to ensure democratic decision-making and the final toolkit has achieved that goal with architects and users, the exclusion of decision-makers should be considered when interpreting the results. The ways of working of the decision makers may not align with the objective of the toolkit, and there was no opportunity to validate the toolkit with them.

Language barrier in the documents, observation, and workshop session

During the field research for this thesis, the perspectives of architects, experts, and building users such as citizens or employees were obtained. Although there was a person from the municipality who considered providing a client's perspective, the perspectives of the chair of two case studies, such as the CEO of the company or municipal decision-makers, were not included. As the objective of participatory design is to ensure democratic decision-making and the final toolkit has achieved that goal with architects and users, the exclusion of decision-makers should be considered when interpreting the results. The ways of working of the decision makers may not align with the objective of the toolkit, and there was no opportunity to validate the toolkit with them.

The case study consisted of one building type

The case studies were limited to a single building type: office buildings. The toolkit was developed based on this one context, resulting in the selection of tools such as consideration of organizational value, image selections, and perspective drawing. To use the toolkit in different building types, the tools and techniques of the toolkit need to be adjusted accordingly through user research and the project brief of the new context.

The validation session of the final toolkit in real context was missing

Due to the time limitation for personal reasons, as I had expected to finish this thesis in January, the validation session with Battolyser: the Company Office project cannot be conducted using the toolkit. The company has planned a workshop with Kraaijvanger Architects in February, which could have provided an opportunity to validate the final design.

8.2.2 Suggestions

On research

In research on participatory design in architectural projects, it is crucial to involve multiple stakeholders in the participatory design process to gather a broad range of perspectives in the beginning. To overcome limitations in data collection and language barriers, I recommend conducting collective discussions with multiple interviewees within the company and across the organizations, such as an internal session with more than one architect or a session with architects and stakeholders. Additionally, after collecting data from documents, it is recommended that a continued session of document analysis be incorporated to validate the researcher's understanding and findings. Last, when selecting participants for the research, it is necessary to consider their willingness to use English as the communication language and to make this clear to all participants.

On architectural practice

For an architectural firm, it is important to thoroughly analyze stakeholders in order to design effective participatory design activities. This includes not only the building's users but also other individuals and the surrounding environment. The company mission and organizational values should be clearly understood by architects in the office, and architects should be willing to communicate openly and clearly with other parties. If this is not the case, the toolkit and participatory design may not be necessary. When selecting tools, architects should put aside personal preferences and clearly communicate the boundaries of the architectural design project to users. Participation in the architectural design process is complex and this thesis focuses on the aspect of communication between architects and users in the early phase of architectural design. Future research should explore different groups of participants, phases of architectural design, and the objectives of participation in the architectural context.

8.3 Reflection

Reflect on the field of architecture

The thesis project presented the opportunity to explore design processes used by Kraaijvanger Architects, who have incorporated participatory design in their architectural projects. The company's portfolio demonstrates the diversity of buildings it has created with the involvement of multiple stakeholders. Involving different people, such as clients, users, and experts, in the design process, allows for a better understanding of the complexity of the spatial needs of different users. The research led to the development of a toolkit for the participatory design that the firm can use in its future projects.

Participatory design reveals the complexity of spatial needs and its impact on architectural design is intriguing. The insights and knowledge gained throughout the project, along with information provided by architects at the firm, led to the development of a toolkit. I believe that incorporating user analysis and context analysis in the design process can enhance the overall design outcome. Additionally, the incorporation of participatory design in architecture can bring benefits to the design field in the future.

Reflect on process of the thesis project

During the thesis project, support, guidance, suggestions, and recommendations were received from individuals with diverse perspectives. Supervisors provided an academic research approach and a systemic thinking approach to the project. Partner architects shared practical and interesting information on a higher level, taking into account the firm's goals and strategies. Architects and designers participated in workshops, providing valuable insights and feedback on the toolkit. It was found that the combination of literature review and field research was the most effective way to gain knowledge and understanding of participatory design. The field research and workshops also provided valuable insights into real-life design situations and how participants react to the usage of the toolkit. As a result, the chosen approach of alternating between research and design was deemed suitable for understanding participatory design.

Reflect on result of the thesis project

The final design of the toolkit has been satisfactory and can be used by Kraaijvanger Architects in their architectural design process. However, there were missed opportunities that could have been considered. The concept of the toolkit could have been more explored, rather than fixation with storytelling and collage. The decision to use storytelling and collage as a means to communicate needs was made quickly due to personal enthusiasm for setting up the first workshop. This choice was then carried out throughout the design process, while other design options could have been explored in the concept design phase. Additionally, I feel unfortunate not to have the opportunity to validate the final toolkit with a project from Kraaijvanger Architects, which would have provided the chance to evaluate the toolkit.

Reflect on the personal ambition and motivation

It is important to consider personal interests and motivations regarding this thesis project. Before studying at TU Delft, I worked as an interior designer, thus architecture has always been my field of interest. This project presented the ideal opportunity to combine my interest with knowledge gained from my master's studies. Furthermore, it opened up the possibility to explore other design approaches that can be incorporated into architectural design resulting in more innovative processes. It is worth noting that throughout this project, I remained motivated and engaged and never felt unmotivated, disappointed, or bored. The project encouraged me to continue exploring the potential of strategic design and how it can be executed effectively. Overall, I am satisfied with this thesis project.

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