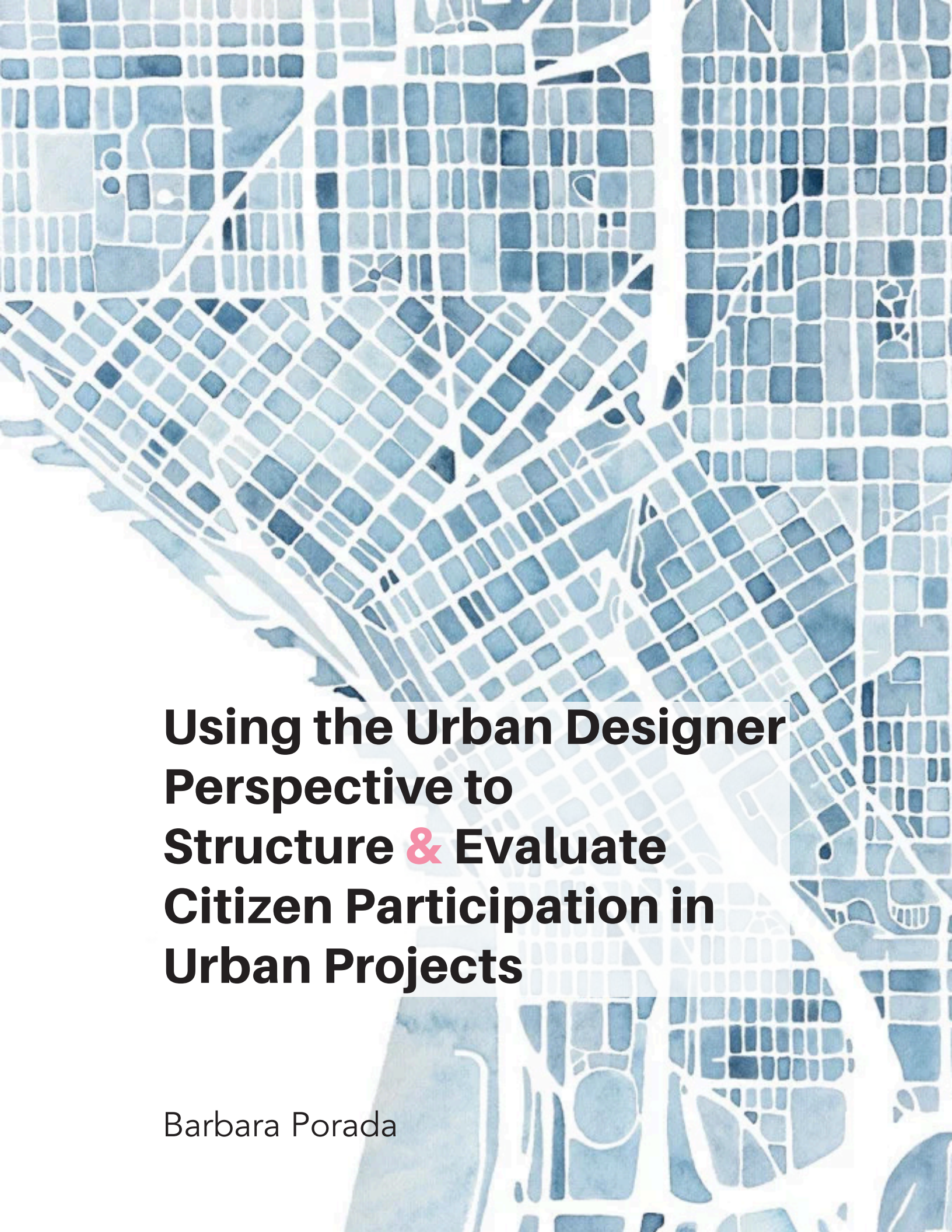

Using the Urban Designer Perspective to Structure & Evaluate Citizen Participation in Urban Projects

Barbara Porada

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Using the Urban Designer Perspective to Structure & Evaluate Citizen Participation in Urban Projects

Master Thesis by Barbara Porada

Master Thesis for MSc Design for Interaction

Using the Urban Designer Perspective to Structure & Evaluate Citizen Participation in Urban Projects

23 August 2018

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Abstract

Thanks to an increasingly digitized and connected world, citizen participation in urban projects is transforming from a privilege to an expectation. As cities grow and urban developments impact more and more people, it is vital that these projects reach out to as many individuals as possible and that the voice of these people is heard and taken into serious consideration by Urban Designers. In partnership with U_CODE, an EU Horizon 2020 project, this research and design thesis explores the Urban Designer's perspective on public participation, what information Urban Designer's want from citizens and when, as well as how to present this plethora of citizen data to the Urban Designer and his / her team. Most participatory process results end up in a report that no one reads, but this project aims to change that by proposing a digital interface designed with and for Urban Designers specifically to be able to better review, digest and incorporate citizen input into their professional designs. This design was based on multiple forms of research and case studies, including interviews, creative sessions, workshops and user tests. Not only was the end result a digital interface but also a redefined participatory process that starts with asking the right questions and understanding the 'why?' behind citizens' designs.

Acknowledgements

I would like to of course thank my graduation project committee, who all motivated and inspired me in different ways. Dirk, thank you for always questioning me and pushing me to look at my research and design through different lenses. Thanks to Marina for your highly analytical and academic approach and to Katrina for being my thoughtful guide through the world of U_CODE. I couldn't have done this without your dedicated and thought-provoking guidance. Truly the best team of mentors I could have asked for.

Thank you to Han for your eternally upbeat and optimistic attitude - your and Katrina's passion for Creative Facilitation is infectious. Thanks to the entire U_CODE team for welcoming me in London and supporting me throughout my process, especially Fabrice, Barnabe, Alena and Aleksandra. Having a solid foundation and support system for this project only made it stronger - thank you so much!

Thank you to all the Urban Professionals who took time out of their busy schedules to participate in my interviews and gave such valuable insights into their work. Equal thanks to the TU Delft Urbanism students who were so open and inspirational in their feedback for the U_CODE tools and both students and professionals who participated in my user tests. Thank you! This project was driven by and designed for you.

And last but not least, thank you to family and friends for the never-ending support during these challenging months. You inspire me every day!

Contents

01
The Project

This chapter provides an overview of the research by setting the objective, relevance and research approach. It also introduces the EU Horizon 2020 project, U_CODE, within which this thesis is situated.

1.1 Introduction

With the world becoming more digitally connected and trust in political processes weakening, average citizens are increasingly informed, demanding of government transparency and eager to have more control over their lives and communities. One field which is expected to experience a major transformation thanks to digital advancements and political mistrust is that of Urban Design, which to this day remains a largely bureaucratic and top-down discipline in most parts of the world. I witnessed this first-hand in my previous experience as an Architect, where the public's opinion on our project was never discussed and citizen involvement was nonexistant.

This does not mean, however, that Urban Designers and Architects are opposed to participation - they just do not have the right tools or company culture for it yet.

In partnership with U_CODE, an EU Horizon 2020 project focused on digital citizen participation in urban projects, I set out to find out why participatory design is not so widespread and to fill a gap in the team's research - the Urban Designer perspective. What is their take on participation and how do they think that citizens can best contribute to their projects? How is citizen data processed and reviewed by Urban Designers as they carry out their professional designs?

These questions and more drove this research and design thesis project for the Masters program in Design for Interaction at the Delft University of Technology.

The report is built up of five chapters:

This first chapter provides an overview of the research by setting the objective, relevance and research approach and describes the U_CODE Project associated with my work.

Chapter 2 describes the context surrounding this work so that the reader has a clear and holistic understanding of Urban Design and urban projects, of Public Participation and current methods of Participatory Planning.

Building on this knowledge and its gaps, Chapter 3 details the empirical studies conducted by myself, describing the goals, methods and insights gained from each study in order to communicate learnings and justify next steps in the research and design process.

Chapter 4 is my reaction to the results of this research - it presents the design brief as well as the goal, procedure and results of a user test using a low-fidelity interface prototype.

Finally, Chapter 5 provides an evaluation of the interface by a professional Urban Designer. It reflects on how the research has addressed the original research questions and outlines contributions made towards Urban Design practice and education as well as new knowledge. Last but not least, limitations and implications of the research are discussed and future recommendations suggested.

1.2 Research Plan

1.2 Gap and Significance

"We [Urban Designers] are at a turning point where we have a lot to analyze, but we don't know how to bring it into design."
- Professor Birgit Hausleitner, TU Delft Urbanism Faculty

Currently, there is no immersive way for Urban Designers to experience data generated by citizens in participatory processes (Hausleitner 2018; Janssen 2018). Typically results from such creative sessions are 'canned' into a report that may or may not be read or by professionals because "people don't read reports" (Stappers 2016). This inability to effectively process and present citizen data prevents much of its richness from being communicated to those responsible for its translation and implementation. This can also be seen in the participatory design work of the U_CODE project, where the perspective of the Urban Designer has not received much attention yet.

For this reason, the Urban Designer was chosen as the focus of this graduation project's research. Urban Designers are the end users of the information and ideas produced by citizen and as Pieter Jan Stappers said, "online participatory tools only work when the results are being inspected by people experienced in how to use the results of such processes" (2016). Therefore, it is essential to validate U_CODE's tools with them and, more importantly, to understand their needs and point of view in this process. Only in this way does citizen input have a chance at making it to reality.

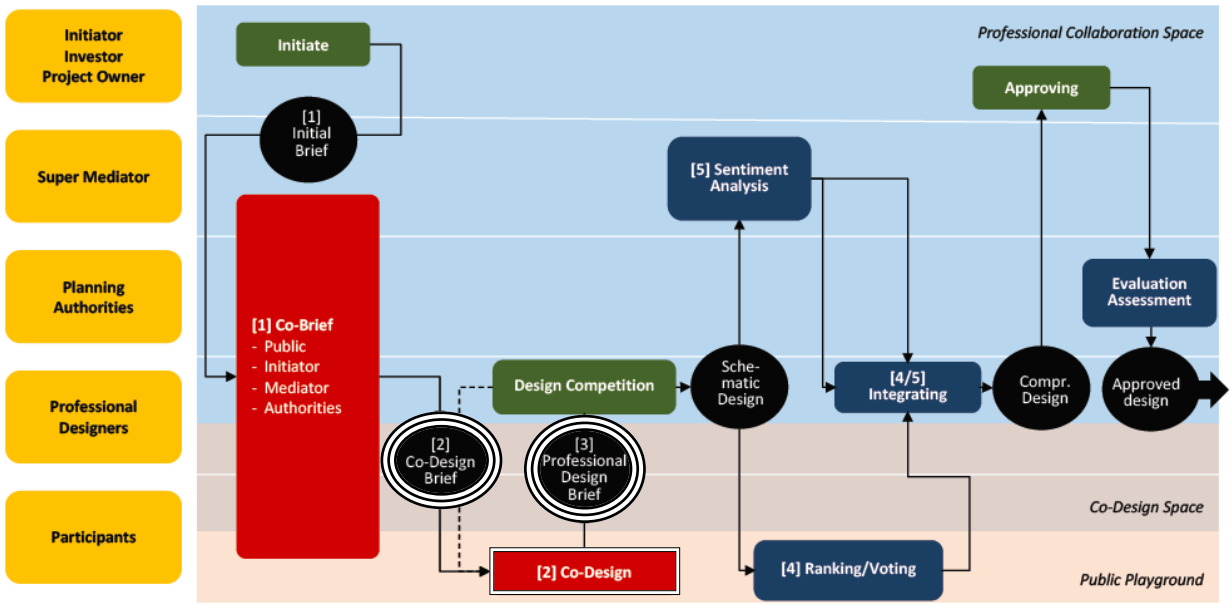


Figure 1: The Minimum Viable Process proposed in the U_CODE project and where my research and design fits.

Where my work fits can be visualized in the Minimum Viable Process (MVP) U_CODE developed for digital participation in urban projects (Figure 1). My work covers the area of the Co-Design Brief to the Professional Design Brief, initially focusing more on the aftermath of Co-Design but discovering through research that suggestions needed to be made for the Co-Design Brief as well.

1.3 Research Aim and Objective

The aim of this research was to gain a deep understanding of the Urban Designer in order to make it easier for Urban Designers to review and incorporate citizen data into their professional work. Although my focus shifted several times, the following questions guided my research throughout:

Research Questions

What is the perspective of the Urban Designer towards citizen participation?

What kind of information do Urban Designers want from citizens and where does this fit into their design process?

What is the most effective way to present participatory data to Urban Designers?

1.4 Research Approach

Various research methods were used, starting with a literature review in which the foundation of the project was laid. It is important to note that an extremely thorough and holistic overview of urban projects and citizen participation was created by a former SPD student, Kaspar Kazil, who graduated with U_CODE in 2017. His work is referenced multiple times in this report, with the most relevant pieces elaborated upon with due credit.

Because of this strong foundation already laid by Kaspar and U_CODE, I was able to jump early on into interviews with professional Urban Designers who had experience conducting participatory design. I chose to conduct these personal interviews because literature only went so far in this area. I was able to find descriptions of participatory tools and methods but very little first-hand experience written from the Designer's perspective. Interviews were the best way to learn about this practical experience and gain access to the Urban Designer's mind. These interviews were qualitatively analyzed and the information condensed into the most important aspects for U_CODE to understand and keep in mind as they move forward.

Part of my research also included attending a U_CODE team meeting in London. There I was able to see for myself the research and design of various tools by the project's members, listen in on meetings and speak to those members most relevant to my research. After this meeting I was able to compare the tools and choose which made the most sense for my project.

I organized two sessions with students, one to generate new ideas for capturing the essence of citizen's designs and one for giving feedback on U_CODE's current tools. The first had participants from various backgrounds of the TU Delft to encourage creativity and the second was comprised of only Urbanism students to give the most relevant feedback. The results of both sessions validated many of my own thoughts and ideas, driving the design of my first interactive prototype.

It was important for me as a Design for Interaction (DFI) student to test my design and I did so again with students from the Urbanism faculty. The results of these tests were processed and next steps were identified for the design of a second and final prototype, which will be presented at my defense.

Finally, feedback on the design was received from one Urban Design professional, validating even more strongly certain elements and suggesting new ones. This back and forth between research and design built off of one another and it is my hope that the recommendations made by this project are taken forward by U_CODE.

1.3 The U_CODE Project

1.3.1 Introduction

The name U_CODE stands for Urban Collective Design Environment and it is the formal client and main reading audience of this graduation project. While I had room to explore and experiment in my research and design, U_CODE's ongoing work and diverse, knowledgeable members played a key role throughout my entire process. In the end, the main beneficiary of this work is U_CODE and its stakeholders.

1.3.2 Goal

According to its website, U_CODE aims to "create an environment for urban co-design."

"Seizing the opportunity offered by emerging technologies to produce new forms of content and user engagement, U_CODE will design and develop a new kind of participatory platform that enables urban designers, architects, and developers to co-design and communicate their projects with the larger public."
(U_CODE, June 2018)

1.3.3 Stakeholders and Relevant Work

The U_CODE project team is made up of the following stakeholders (Figure 2):

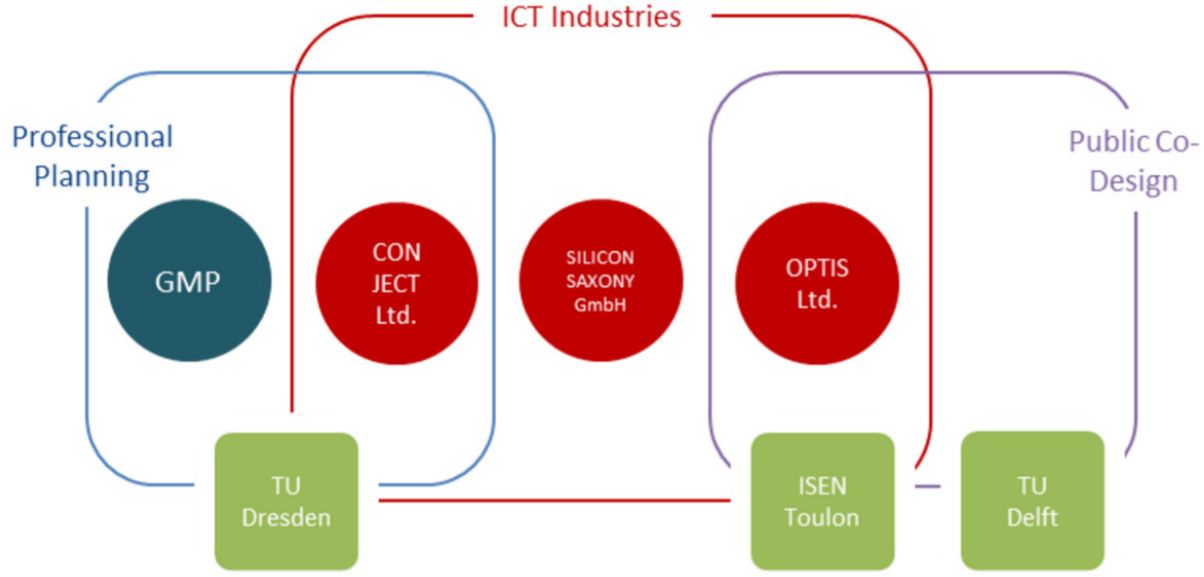


Figure 2: Stakeholders of the U_CODE project.

The following are the stakeholders who have played an important role in my research:

GMP

GMP (Architekten von Gerkan, Marg und Partner) is a Hamburg-based Architecture and Urban Planning firm. The practice was founded by Meinhard von Gerkan and Volkwin Marg in 1965. Since its inception it has grown to include four additional partners and one partner for China, eleven associate partners and more than 500 employees in thirteen cities in Germany and abroad. GMP is one of the few practices with a generalist position, which takes responsibility for a project from the design idea and its realization right through to the interior design. (GMP 2018)

This firm was responsible for translating the results of the DTB (Dummy Test Bed, detailed below) into a professional urban design. Aleksandra Blazhevska, an architect at GMP and member of U_CODE, was also one of my interviewees to better understand the urban designer / architect perspective.

TU Dresden

TU Dresden is one of the largest public research universities in Germany. Out of their many varied departments, the ones that participated in the U_CODE project were Knowledge Architecture, Digital Linguistics and the Media Center. (U_CODE 2018).

With their many resources and researchers, they are responsible for the management and coordination of the U_CODE project but also contribute much of its research and development. Their Dummy Test Bed (or DTB) was one tool that was of utmost interest to my project.

The Dummy Testbed

The Dummy Test Bed was a multi-step process sent out internally by email to U_CODE members to test and evaluate up-to-then developed participation methods. It was a very useful test that revealed strengths but also opportunities for improvement, especially in the processing and presentation of citizen data. See Section 3.2 for a more detailed evaluation of this process.

OPTIS Ltd.

OPTIS is a French company that provides knowledge in the field of virtual reality, ergonomics and physically correct rendering engines. They have successively developed visual perception models that can be experienced on a screen or in virtual reality centers. (U_CODE 2018).

OPTIS is responsible for a Virtual Reality tool for co-creation that I had the chance to test out during the U_CODE meeting in London (more on that in Section 3.3).

ISEN (Institut Supérieur de l'Électronique et du Numérique), Toulon

ISEN-Toulon is an engineering high school and a research and development institute established in Toulon in 1991. Its ICI-Lab (Interface for Creativity and Innovation Lab) conducts research and teaching activities in the area of collective creativity & innovation. A specific focus in made on the impact of sociotechnical environment (physical space configuration, digital artifacts, social constructs) on these processes. (U_CODE 2018)

Phd student Barnabe Faliu and his mentor Alena Siarheyeva are responsible for the development of a multi-touch screen table meant to be used in co-creation workshops (my analysis of the tool can be found in Section 3.3). I interviewed Ms. Siarheyeva over Skype as part of my initial research, the results of which are explained in Section 3.1. The full transcript of the interview can be found in Appendix C.

TU Delft

The Industrial Design Engineering Faculty (IDE) at TU Delft is one of the oldest and largest multidisciplinary product and service design oriented research and education institutions in the world. IDE has a strong tradition in human factors and user-centered design from the perspective of user mapping, co-creation and user-experience with regard to emotion and motivation in design. The creative power needed to translate abstract models into validated design prototypes is one of the hallmarks of this faculty. (U_CODE 2018)

As mentioned before, this graduation project was carried out as part of the Design for Interaction Masters program at the TU Delft, with Katrina Heijne and Han van der Meer acting as clients.

There are two contributions TU Delft has made in relation to U_CODE that have been very influential to this work, and they are the Graduation Project of Kaspar Kazil (2017) and the Creative Facilitation Process.

"Localab," the Graduation Project of Kaspar Kazil (2017)

Mr. Kazil's graduation project explored nearly every corner of Urban Planning and Citizen Participation, giving much needed overview and inspiration for still existing gaps I could fill. The "Expert Dashboard" of his digital tool was perhaps most inspiring and most influential in my own design (Figure 3). To see how Urban Designers responded to Mr. Kazil's design, see Appendix I.

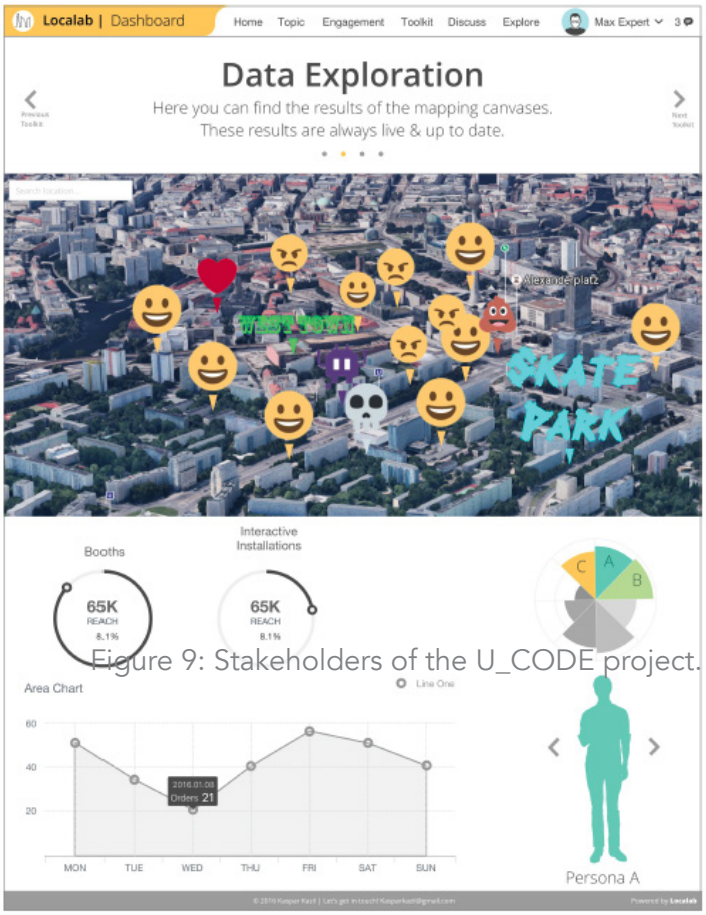


Figure 9: Stakeholders of the U_CODE project.

Figure 3: The Expert Dashboard of Mr. Kazil's graduation project (2016).

The Creative Facilitation Process

One process that is integral to this research and cannot go unmentioned is that of Creative Facilitation. Right before starting this graduation project I participated in a two week intensive course on the subject, led by Katrina Heijne and Han van der Meer, my Graduation Project team.

Creative Facilitation is the facilitation of creative problem solving (CPS) and has been taught at TU Delft for many years. An expert facilitator leads a group of diverse members through the steps of generating novel ideas to a given problem, formulated into a 'sparkling' problem statement. This group is ideally made up of people with a variety of backgrounds, perhaps from different departments of the host organization or even outsiders, as well as the Problem Owner. This individual is the one who will use these novel ideas to solve their problem but is not allowed to guide the session because if their inherent bias (Buijs 2016).

This CPS process can be visualized in the so-called 'creative diamond' (Figure 4), which shows an expanding divergence of ideas phase, followed by a straightened out revergence of ideas phase (introduced by Delft's Tassoul and Buijs) and finally a narrowing diamond representing convergence. Because quality breeds quantity, divergence is necessary to generate wild and out of the box ideas, which then are grouped by similarity and finally narrowed down to usually 2-3 concepts that bring the session back to reality and to solving the problem at hand.

For the purpose of this research, one can imagine that the Problem Owner is the Urban Designer, looking for fresh perspectives and ideas from the citizens that their project will serve. Citizens work together to first generate wild ideas, conversing and working together, but gradually become more structured and attentive to the problem again. Urban Designers are not allowed to influence the citizens' input but they are responsible for translating this input back into their professional design. How should this be done?

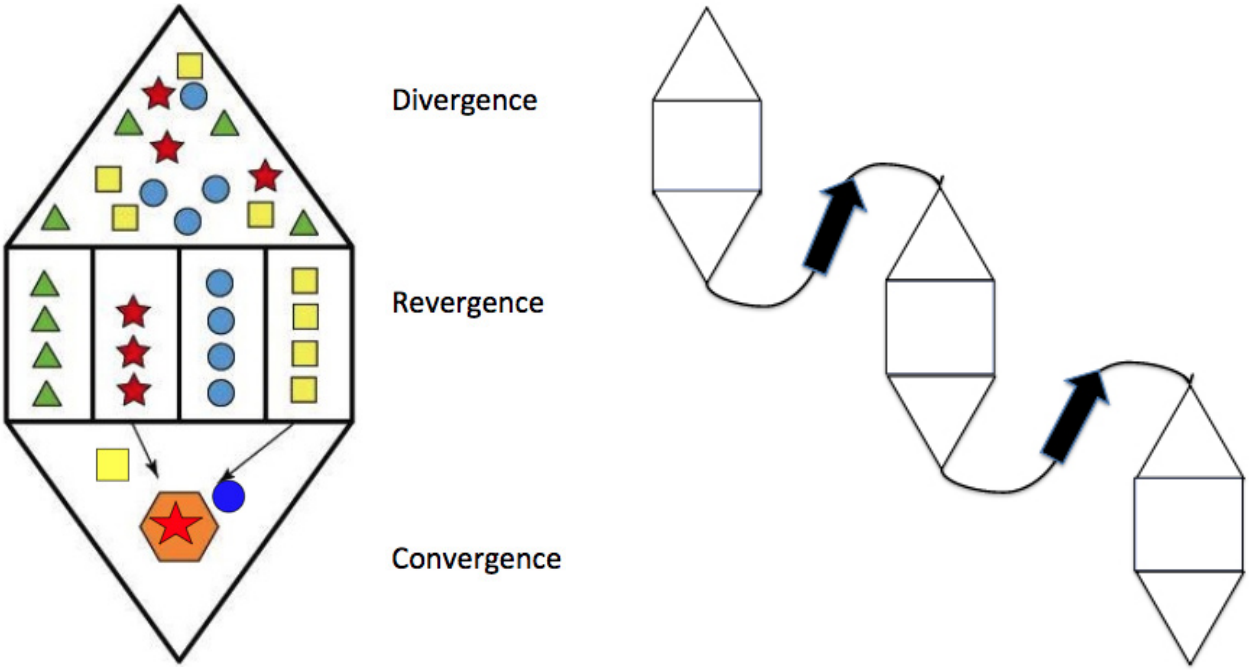


Figure 4: The 'creative diamonds' of the CPS Process.

02
Literature Review

This chapter introduces Urban Design as a discipline and explains the stages of a typical urban project, which will be referenced throughout this thesis. It also explains public participation, its levels and specific benefits and challenges to participation in Urban Design. Finally, it benchmarks current offline and online methods for participation to set the stage for the empirical research that follows.

2.1 The Urban Design Process

What exactly is Urban Design?

The Berkeley Planning Journal defines it as:

"the process of designing and shaping the physical features of cities, towns and villages. In contrast to architecture, which focuses on the design of individual buildings, urban design deals with the larger scale of groups of buildings, streets and public spaces, whole neighborhoods and districts, and entire cities, with the goal of making urban areas functional, attractive and sustainable." (Boeing 2014)

2.1.1 Scale, Time and Stakeholders

Urban Design projects can vary greatly in physical and financial scale as well as in time duration. Chitkara (1998) distinguishes four categories for each:

Scale
Small (less than 10 million Euro's)
Medium (10-100 million Euro's)
Large (100-1000 million Euro's)
Mega (1000+ Million Euro's)

Time Duration
Special short-term projects (less than 1 year)
Short duration projects (few months to 3 years)
Medium duration projects (3-10 years)
Long term projects (over 10 years)

The number of stakeholders involved in an urban project depends heavily on the above factors but can include any combination of investors and developers, municipalities and governments, housing corporations, urban planners, designers and architects as well as academics, media, businesses, interest groups, experts in topics such as environmental issues, engineering, etc. and - finally - citizens.

This overwhelming collection of entities and organization can be organized into the following groups, based on Mathur et al. (2007):

Project-Delivering role
These stakeholders hold power, and interest in the outcome of an urban planning project.

Context-Setting role
These stakeholders hold power, but have no direct interest in the outcome of an urban planning project.

Directly / Indirectly Affected role
These stakeholders have no power, but do have an interest in the outcome of an urban planning project.

Other Interested role
These stakeholders hold no power, but also do not have an interest in the outcome of an urban planning project.

It is the aim of public participation in urban projects to place citizens in a Project-Delivering role rather than the Directly / Indirectly Affected role they have traditionally played.

2.1.2 Stages of Urban Design

Each urban project is unique but it can be generalized into a series of stages. Kazil (2016) identified the stages of Identification, Exploration, Design, Realization and Use of an urban project, while U_CODE uses the following three, more simplified, stages:

Pre-Design
In Pre-Design, professionals gather information about the project site to prepare a design brief. This can include environmental, historical and demographic information.

Design Creation
In Design Creation, professionals ideate on potential design solutions for the space by sketching, modelling and using other design tools.

Post-Design
Post-Design is for presenting, reviewing and judging designs. This is done with other project stakeholders and, ideally, citizens.

Selecting a Stage for this Project

To better define the scope of this project, it is necessary to choose which stage(s) of the Urban Design process the design is intended for.

Several sources including BVBW (2014) and Weinstock (2013) write that the earlier citizens are involved in urban projects, the better. Citizens unsurprisingly have the greatest power to influence a project's outcome before a design brief has been finalized and serious resources invested. Therefore, it makes sense that participation will have the greatest impact and the greatest chance of success in the first two stages of urban projects - Pre-Design and Design Creation.

If participation succeeds in Pre-Design, citizens have the power to inform Urban Designers of issues and opportunities concerning a space that they have first-hand experience with. They can share local knowledge and perspectives with Designers that they otherwise wouldn't know.
They can also make clear what is important to them and what kind of vision they may have for the design space.

In Design Creation, citizens can help Designers come up with alternative forms or functions of required design elements that suit their lives and communities. They can vote on options generated by the Designers or use their fresh perspectives to come up with something entirely new.

Citizens can still influence the outcome of a project in the Post-Design stage, but to a lesser extent. In this stage citizens can give feedback and make small alterations to designs in terms of form or aesthetics.

Thus, all three stages of Pre-Design, Design Creation and, to a lesser extent, Post-Design are chosen for this project.

2.2 Public Participation in Urban Design

2.2.1 What It Is

Public participation can be defined as "the process by which public concerns, needs, and values are incorporated into governmental and corporate decision making" (Creighton 2006).

The IAP2 (2007) defines the following seven principles of public participation:

1. Public participation is based on the belief that those who are affected by a decision have a right to be involved in the decision-making process.

2. Public participation includes the promise that the public's contribution will influence the decision.

3. Public participation promotes sustainable decisions by recognizing and communicating the needs and interests of all participants, including decision makers.

4. Public participation seeks out and facilitates the involvement of those potentially affected by or interested in a decision.

5. Public participation seeks input from participants in designing how they participate.

6. Public participation provides participants with the information they need to participate in a meaningful way.

7. Public participation communicates to participants how their input affected the decision.

Public participation in urban projects specifically is often referred to as Participatory Urban Planning, which is the involvement of an entire community in the strategic and management processes of urban planning and design (European Commission 2015).

2.2.2 Levels of Participation

Public participation and Participatory Urban Planning can both be divided into four levels, from least to most participatory. They are

Informing
Consulting
Collaborating and finally
Empowering (Figure X, next page).

Each level can be distinguished by the role the participants play (active vs. passive), how much power participants have over final decision-making and the kind of communication that occurs between them and experts, or Urban Designers and other project stakeholders (1-way or 2-way) (U_CODE 2018; Kazil 2016).

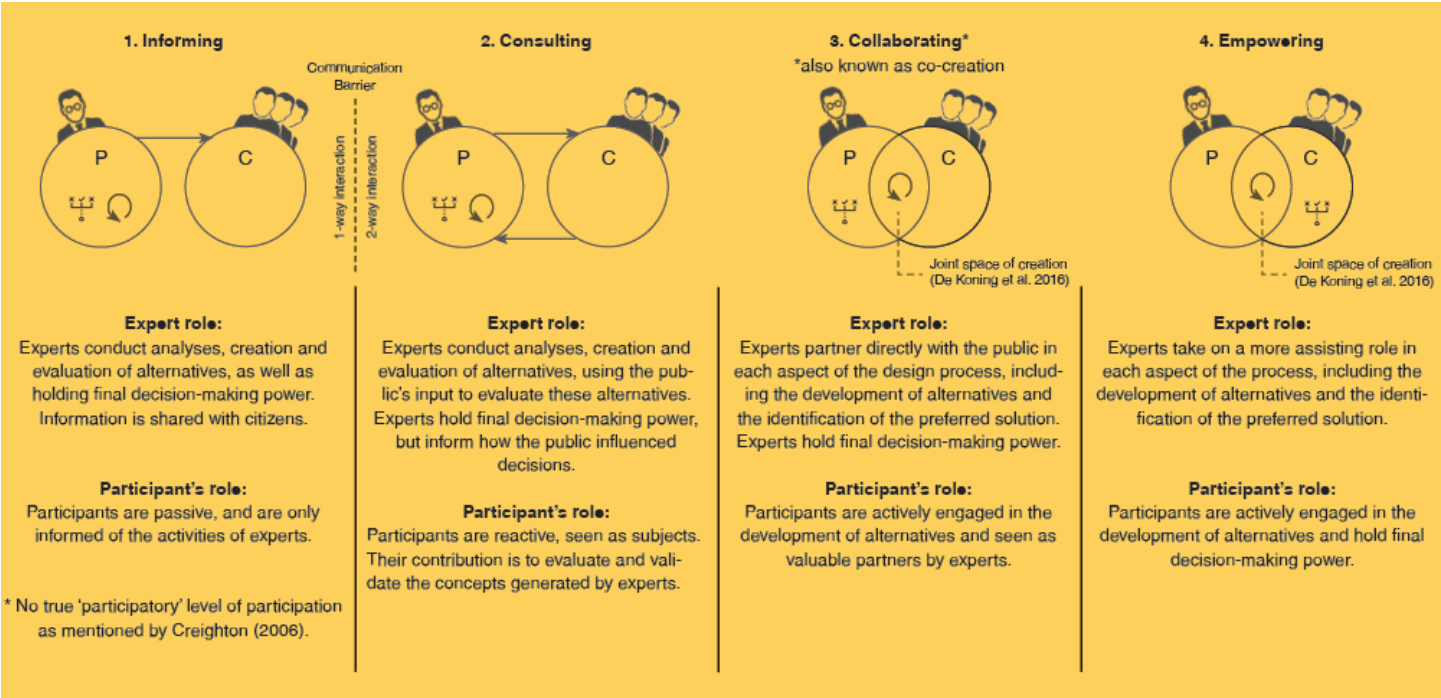


Figure 5: Levels of citizen participation used by U_CODE and visualized by Kazil, 2016.

The first level of **Informing** is not really participatory at all. Participants play a passive role while experts 'run the show' and merely communicate their activities to the public.

Consulting still carries with it an 'expert mindset,' or that the experts are ultimately in control, but citizens are now engaged in 2-way communication where their feedback is sought after and taken into consideration.

Collaborating is the first level to have a 'participatory mindset,' where participants are treated as equals and seen as valuable partners by experts. This is the level where co-creation happens, defined as a "joint space of creation where creation can take place between two entities." (De Koning et al. 2016) This is the level at which U_CODE operates; therefore, all research and design that follows will be used at the Collaborating level of participation.

Empowering is the highest level of participation and puts most of the power in the hands of the public. This is the only level where the public has the last word in decision making and experts merely assist them. This level is rarely achieved in participatory processes and many believe that it shouldn't go so far because being too user-centered can stifle innovation. As Verganti argues in *Design-Driven Innovation*:

"[...] the closer companies get to users, the more they get stuck in the way people currently give meaning to things. In contrast, design-driven innovations are proposals about radical new meanings. They are visions of a possible future. Yet these proposals, these visions, are not dreams without a foundation. These proposals eventually emerge as the products users were actually looking for. [...] They envision how people could give meaning to things." (p. 116)

The Urban Designers interviewed in the next chapter supported this sentiment, expressing the need to 'translate' and 'bring to a higher level' the thoughts and ideas of citizen participants (Werner 2018; Janssen 2018; Blazhevska 2018). And because

U_CODE sees participation as an equal partnernship, Empowering is not a goal of this research and design project.

2.2.3 Benefits of Public Participation

Incorporation of Local Knowledge

Many who practice and promote public participation in urban projects believe that good results cannot be achieved in urban planning through only top-down, expert-knowledge based planning processes (Ludlow and Khan 2012). Brabham (2009) mentions that "non-expert knowledge adds the perspective of the future user of a designed space and the insights about environment and place that the planning discipline might never have approached or might have already forgotten."

This 'non-expert' knowledge that citizens possess is also referred to as 'local knowledge.' Shotter (1993) defines local knowledge as a "knowing from within through which only those intensely involved in the situation can really grasp what the situation is about." This kind of knowledge about existing conditions or how decisions should be implemented can make the difference between a successful or an unsuccessful program (Creighton 2005).

Reduced Risk

As mentioned before, it is a widely-held misconception that public participation is not worth the time and cost it requires (Involve 2005). Creighton (2005) argues that costs are high in initial stages but significantly decrease the risk of political controversy and legal action during later phases, often resulting in overall savings in time and expenses (Figure X). U_CODE (2015) suggests that if a project can be stopped or altered already in its early stages as a result of public participation, 90% or more of design and construction costs might be saved or better invested that might otherwise go to waste as a result of public resistance.

Improved Relations, Trust and Support

Participation can greatly ease growing dissatisfaction and distrust of political processes (EIPP 2009). Creighton (2005) mentions that the keys to creating and maintaining legitimacy are transparency,

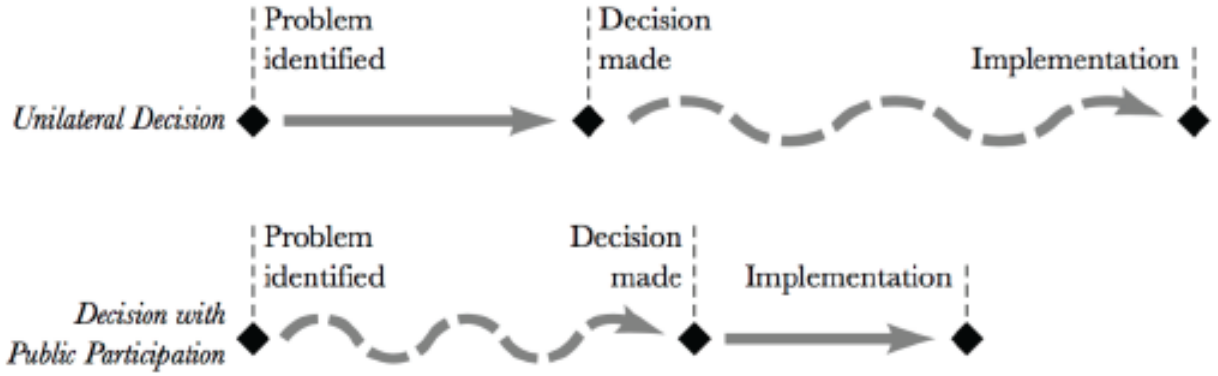


Figure 6: Time to implementation of projects without and with public participation (Creighton 2005).

good informing and public involvement. By not only being informed and consulted but collaborated with, citizens feel that they are valuable members of their community and their voices will be listened to. By simply giving people the opportunity to be heard, these highly-political processes automatically appear to be more approachable and genuinely concerned with those affected by their decisions (Merry 2013). The continued success of these institutions and processes ultimately depend on public support.

2.2.4 Challenges of Public Participation

Despite the many benefits of public participation outlined in the next section, the fact remains that participation comes with its own unique challenges.

Low Demand Early On

Often public interest in a project is lowest in its earliest stages, even though this is when the public can have the most influence on its outcome. This phenomena is described in U_CODE (2015) and supported by interviewees Werner (2018), van Ling (2018) and Urbanism students who participated in this research. Werner and students explain that this is a problem because opposition from the public often rises only when citizens become more aware of the impact the project will have on their lives. Many times it is too late in the project's development, with large resources already invested and commitments made, to accommodate these concerns. A prime example of participation gone wrong is the train station project Stuttgart 21, where public protests broke out against its construction when it was already beyond alteration (Baumgarten & Rucht 2013).

Budget and Time Constraints

One major reason that many urban projects choose not to engage in participatory design is because of the belief that it will cost too much money and take up too much time (Janssen 2018; Van Ling 2018). It is very typical for Urban Designers to simply replace 'time-consuming' participation with a quick online demographic research, making assumptions of what people think or want that are often based on stereotypes and group behavior (Gonzalez 2018; U_CODE Tool Feedback Session). Because this is a widely-accepted practice that seems to work in the short-term, many firms and clients see no need for participation at all.

Lack of Trust in Results

Although the Netherlands has the advantage of being a very low-hierarchy society open to the ideas and contributions of all, the same cannot be said for many - if not most - other nations. Many societies struggle with a very strong top-down hierarchy, such as in France (Gardesse 2015; Nez 2011), or a strong 'expert mindset,' such as in Germany (BVBW 2015; Council of Europe 2015), the other countries involved in the U_CODE project. In these types of societies, citizens are seen more as subjects than partners, a mindset that makes participation very difficult to implement at a larger, institutional level.

2.3 Benchmarking Current Methods of Participatory Design

U_CODE has identified over 70 tools and methods, offline and online, for involving citizens in urban projects, which can be found in the Method Bank of their website. A few of the most relevant ones for this research and for U_CODE are explored in more detail below, with pro's and con's of each explained.

Offline Methods of Participatory Urban Design

Though the world is increasingly becoming more digitized, there are some things that truly benefit from face-to-face interaction.

On-Site Interviews and Observation

One of the most basic and common methods used by Urban Designers to involve citizens in their work is to simply talk to people in the area surrounding the project site. Every Urban Designer I interviewed mentioned on-site interviewing at least once, citing it as a go-to participatory method taught to them during their education. Professor Hausleitner admitted to regularly sending her students to a project site with a paper map and markers to interview and draw with people on the street (2018). Observation was also mentioned as a useful method, especially to see how people use the space as a part of their daily routine (Van Ling 2018).

Pro's
Interviews are a 'quick and dirty' way for Urban Designers to get in the field and get their questions answered. Although it depends on the site, it is more than likely that the passerby live nearby or have some relationship with the place as visitors. With a few interviews and observation, the Urban Designer will surely have a better idea of the space and its current use.

Con's
Sometimes it is not enough to stop someone on the street for their opinion. The best results come out when the Designer has put some thought into their questions before interacting with citizens (Van Ling 2018). It is also difficult to predict and control who will participate, since it depends entirely on who happens to walk by. These interviews and observations are also heavily influenced by the day and time (weekday or weekend, morning or evening, etc.) and therefore may not represent all users or functions of the space. Care must be taken to go to the site more than once and repeat these activities at various times with various people, but this can be very time-consuming for the Designer.

Workshops

Workshops ideally involve 8-16 people (Involve 2005) and can utilize a range of generative research methods, charrettes

and visioning (Janssen 2018; van Ling 2018; Creighton 2005). Expert facilitators lead a discussion between stakeholders who normally do not collaborate all together, such as planning experts, citizens and even politicians, with the aim of collective decision- and sense-making (Siarheyeva 2018).

Pro's
Workshops are an incredibly interactive way for a variety of people to converse and work together towards a common goal. They allow designers and other stakeholders to have a look into the citizen's daily life, needs and wishes and allow the citizen to have their voice heard and to better understand the thought that goes into designing urban space (Van Ling 2018; Janssen 2018; Involve 2005). Although workshops only involve a small percentage of people affected by the design, effort can still be made to select groups representing different interests. The work that comes out of workshops, if well facilitated, can also be of high quality and depth, ensuring that this method will continue to be a popular participatory method despite technological advances (Kazil 2016).

Con's
The biggest limitation of workshops is that they require physical presence from all stakeholders, with specific locations and times that may not be convenient or accessible for everyone. This means that several identically-run workshops may have to be spread out through a week to accommodate all stakeholders (Janssen, 2018). Workshops can also create unrealistic expectations from participants that all their desires and ideas will be realized, requiring that facilitators and designers make it very clear what they are / are not committing to (Janssen 2018; Involve 2005). If expectations are not managed, citizens especially will lose trust in the participation process and likely won't return. Workshops can also be quite expensive if designers and other experts charge for their time (Involve 2005).

Online Methods of Participatory Urban Design

Participation, like most things, is becoming more and more digitized. By harnessing new technologies, a larger number and variety of people may be reached and participation may become more convenient than ever.

Surveys
Surveys can range from simple questionnaires that are sent out to gage interest in other participatory activities (Werner 2018) to the so-called Delphi survey, a series of detailed and interactive questionnaires that, with the help of a facilitator, build on citizen's contributions towards consensus (Involve 20015).

Pro's
Surveys are easy to distribute digitally and can reach a very large number of citizens. They require no set date or location and can be filled out in the citizen's free time (Involve 2005). As Frank Werner of KCAP Architects explained, surveys are a fantastic way to inform a community of a new project and filter out those citizens who are eager to co-create, those who wish to be occasionally consulted and those who are happy to be simply informed (2018).

Con's
Of course, not everyone who receives a survey will fill it out, and sending reminders to do so may be cumbersome and still ineffective (Involve 2005). Surveys are also filled out individually, so there will be no communication or collaboration between citizens unless there is a facilitator to process and communicate back results as with the aforementioned Delphi survey (Involve 2005). In conclusion, surveys are better used for simple feedback and a stepping stone to more interactive participation (Werner 2018).

Social Media
Social media platforms such as Facebook, Twitter and even Second Life are increasing

in popularity as tools for public participation (Foth et al. 2009).

Pro's
Frank Werner of KCAP used Facebook for the redesign of his neighborhood in Rotterdam, saying that it was quite easy and efficient to post project updates, request survey responses and advertise for workshops or other participatory events. With the increase of registered social media users, it's no surprise that this is a good tool for keeping in constant touch with citizens.

Con's
Werner admitted that social media was useful but not a strong enough tool to create space for co-creation. He also explained that citizens 'liking' things on the Facebook page did not necessarily mean they agreed or supported what was written there, as many participants who had clicked 'like' later expressed confusion or disagreement about those same topics. This was a message that I took with me when evaluating the data processing of U_CODE's Dummy Test Bed (DTB).

Apps and Websites

Pro's
Apps and websites, like social media, are easily accessed through computers, tablets and smartphones, and offer more robustness than Facebook, for example. This makes these online outlets very popular for future participatory planning developments. Because citizens these days are almost constantly connected to the Internet, there is no date or location constraint for participation. Apps and websites can also serve a variety of functions in the participation process and even complement it, such as through Augmented Reality (example: augment.com and Earthquake VR).

Con's
Digital platforms often allow for anonymity and the avoidance of face-to-face interaction, in this way making it easier for participants to be hostile with one another and seek conflict rather than consensus (Holmer 2018). Participation processes such as online co-creation workshops may also be difficult to coordinate unless there is a set date for the event and a virtual room participants can meet and work in. If there is no set date and virtual meeting location, the communication and collaboration that defines these workshops could be lost.

2.4 Conclusion of Chapter 2

2.1 The Urban Design Process

This chapter gave an overview of the Urban Design process and clarified many terms that will be used throughout this report. The three stages of Urban Design, as used by U_CODE, were presented and all three stages - Pre-Design, Design Creation and, to a lesser extent, Post-Design - were chosen as the work space for this thesis.

2.2 Public Participation in Urban Design

Public Participation was discussed and its four levels explained, with the Collaboration level chosen as the participatory level to aim for in this project. The reason for not pursuing the Empowering level was also mentioned and benefits and challenges of Public Participation were then addressed.

2.3 Benchmarking Current Methods

The most pertinent current methods of offline and online participation were benchmarked to give the reader a more holistic and thorough understanding of current participatory practices and their pro's and con's.

Next Steps

The next chapter will cover my own research activities, which build on the knowledge presented here. My Empirical Research aims to fill many gaps still left after the Literature Review, most importantly the Urban Designer's perspective, which was not well represented. Therefore, the first move in my research was to get in contact with as many Urban Design professionals as I could here in the Netherlands and get a first-hand account of their views and methods for public participation.

03
Empirical Studies

This chapter details the goal, method and key findings of several research activities aimed at answering the 3 Research Questions of this thesis. First the results of interviews with Urban Design professionals are presented, condensed into 11 aspects that will later inform my design. Next is my evaluation of the Dummy Test Bed, a multi-step participatory process tested internally by U_CODE. This is followed by my learnings from the U_CODE team meeting in London and afterwards the results of a creative session with design students about how to capture the meaning behind citizens' designs. The chapter concludes with important findings from a feedback session with TU Delft Urbanism students on U_CODE's existing participatory tools.

3.1 Interviews with Urban Design Professionals

3.1.1 Goal

The goal of these interviews was to understand the Urban Designer's perspective and experience with citizen participation and to fill many gaps still left after the Literature Review.

3.1.2 Method

Participants

A total of six interviews were conducted, each lasting between thirty minutes and an hour. Two Urban Designers were chosen from two different design firms known for their participatory practices (BVR and De Zwarte Hond of Rotterdam), one Urban Designer was chosen from a larger, more corporate firm (KCAP of Rotterdam) and one interviewee was of the TU Delft Urbanism faculty. Additionally, two members of the U_CODE team were interviewed because one is an architect who dealt with translating the results of the Dummy Test Bed (Aleksandra Blazhevska of GMP, Hamburg) and the other has first-hand experience testing and designing for co-creation workshops with citizens (Alena Siarheyeva of ISEN-Toulon).

Bernadette Janssen of BVR, Rotterdam
Bernadette Janssen is a Director and Partner at BVR, a design bureau based in Rotterdam that specializes in spatial development. BVR was recommended to me as an urban design agency known for leading interactive co-creation workshops with citizens and taking their ideas seriously into professional design. Because of this, I was very curious to hear about their practices and approach to citizen participation. This interview took place in the BVR office in Rotterdam and the full transcript can be found in Appendix A.

Johan van Ling of De Zwarte Hond, Rotterdam
Johan van Ling is an Assistant Urban Designer at De Zwarte Hond, an architecture and urban design agency in Rotterdam. This firm, like BVR, was recommended to me as a company which takes participatory planning seriously and regularly involves citizens in its design process. For this reason, I wanted to interview one of its members to hear about the participatory practices of the firm and their outlook on citizen involvement. This interview was over the phone and the most relevant quotes were transcribed by hand.

Frank Werner of KCAP Architects & Planners, Rotterdam
Mr. Werner is an Associate at KCAP, an architecture, landscape design and urban planning firm based in Rotterdam. He is co-responsible for the acquisition, organisation, planning and contracting of KCAP's urban projects. I was interested in interviewing Frank to see if and how a larger planning firm involved citizens in their projects. This interview took place in the KCAP office in Rotterdam and the full transcript can be found in Appendix B.

Birgit Hausleitner of the TU Delft Urbanism Faculty, Delft
Professor Hausleitner is a Docent and Researcher at the Urbanism Faculty of TU Delft with experience in practicing and

also teaching citizen involvement in urban design. I was referred to her because of her knowledge concerning citizen data and its translation to professional design. This interview took place in the Urbanism Faculty of TU Delft and the full transcript can be found in Appendix D.

Aleksandra Blazhevska of GMP Architects, Hamburg, U_CODE
Ms. Blazhevska is an Architect at GMP with experience working on a variety of projects in Europe as well as Asia. She and her GMP team were in charge of translating the results of the DTB (Dummy Test Bed) into professional designs. For this reason, I was interested in getting her feedback on this process and to hear more about her perspective as an Architect with Urban experience. This interview took place during the U_CODE meeting in London and only the most relevant quotes were transcribed by hand.

Alena Siarheyeva of ISEN-Toulon, U_ CODE
Ms. Siarheyeva is an Associate Researcher in the ICI (Interface for Creativity and Innovation) Lab at ISEN-Toulon, France. She and her PhD student Barnabe Faliu are in the process of developing a multi-touch screen table to be used by citizens and facilitators during co-creation workshops. I was interested in interviewing her about this tool and to hear about her experiences with leading such workshops. This interview took place over Skype and the full transcript can be found in Appendix C.

Procedure

Semi-structured interviews were conducted with the aforementioned Urban Design professionals which were recorded and later transcribed. I used a set of questions to guide the interview (see Appendix E) but each interview was unique and the discussions naturally varied. Each interview, however, did cover these topics: their experience with citizen participation, the methods and tools they use, the level of openness during participation, the data they generate, processing and presentation of this data and how they later design with this information.

3.1.3 Key Findings

A qualitative analysis of the interviews was conducted where the most relevant quotes from each interview were highlighted and clustered by similarity (to see all the quotes in each cluster, see Appendix F). Based on this analysis, the following eleven aspects were identified as the most vital to this project and for U_CODE as they move forward with their research and design:

1.

You have to ask citizens the right questions to get useful answers.

"We get the most useful information when we put some work into the session in advance." - Johan van Ling, Zwarte Hond + 6 / 6 Urban Designers interviewed)

2.

Diversion in ideation should happen based on a clear starting point or problem statement, not a blank space.

"Citizen ideas should build off of restrictions within the brief." - Aleksandra Blazhevska, GMP + 6 / 6 Urban Designers interviewed)

3.

Making is better than just talking.

"They say it's really different when they engage with materials. It was really interesting because one of our session participants had also participated in a session which was run by public authorities in this city and she said they were just talking. And she said 'it's so great to engage with this material. We create something really concrete together and we begin talking about real things.'" - Alena Siarheyeva, U_CODE + 3 / 6 Urban Designers interviewed

4.

Citizens are not always comfortable designing - or even drawing.

"It's not a goal to make everything more complicated with computers - only if it makes the process easier. And more fun. We think about how to make the drawings more accessible or beautiful or more inviting so people take the pen and draw themselves. It needs to be easy for them." - Bernadette Janssen, BVR + 3 / 6 Urban Designers interviewed

5.

Citizens need to design together, not individually.

"When our citizen group was creating this model, it was meaningful to them because they created meaning together. The most important is they negotiate and make sense together." - Alena Siarheyeva, U_ CODE + 3 / 6 Urban Designers interviewed

6.

Not every citizen idea will be incorporated into the professional design, and that's ok.

"We don't put all the ideas together - we make a selection of those things that combine very well, and that means that you have 2-3 concepts that are different. It's the smart combination of things that make the concept strong." - Bernadette Janssen, BVR + 4 / 6 Urban Designers interviewed

7.

Citizens should be given options to choose from.

"If you talk about abstract things [with citizens], everyone will say they want green, everybody likes that, but you can ask people 'ok, do you want green OR parking, because they both cost a lot and you can't have both. In the end, what do you find more important?'" - Frank Werner, KCAP +
4 / 6 Urban Designers interviewed

8.

The "why?" behind the form, function or location of a citizen's input is more important than the input itself.

"It's important to understand that when you ask people questions, you get an uninformed answer. I led workshops in Vienna before I came here and they said 'I want this exact iron bench' but in the end it's not about the bench, it's so they can sit. You have to always find out what is the need, not how it should look like." - Birgit Hausleitner, TU Delft +
4 / 6 Urban Designers interviewed

9.

Experts should be present during the co-creation process.

"When there is a conflict, if somebody says 'it should be water!' or 'it should be green!', then you can draw it and make people understand what it would look like and that not everything is possible. It really helps when you draw it immediately on the table [...] so you can see 'ok, if you get your way, it's this - and if you get your way, it's that.'" - Bernadette Janssen, BVR + 5 / 6 Urban Designers interviewed)

10.

Data generated by citizens needs to be processed into "designerly" language.

"Citizen input needs to be translated into urban design language - 'we want greenery' into a specific % of greenery which we understand. You can't just give us a list of ideas or facts or even individual models. Everything needs to be processed." - Aleksandra Blazhevska, GMP + 4 / 6 Urban Designers interviewed

11.

Every office and designer designs differently and this cannot be generalized or automated.

"I don't think that our aim is to automate this process and replace professionals. They are still professionals. I think the idea is to provide professionals with data, some information which can inspire and be useful for the creative process."
- Alena Siarheyeva, U_CODE +
4 / 6 Urban Designers interviewed

3.1.4 Discussion

These interviews proved to be extremely useful, giving insight into the Urban Designer's mind and revealing their professional approach to public participation. I heard many of the same phrases concerning co-creation repeated over and over again, such as 'local knowledge,' 'experts of their daily lives,' 'finding out citizens' needs,' 'working together,' 'giving choices,' 'building off limitations,' 'finding consensus' and 'creating community.' In terms of data translation and presentation, I heard 'designerly language,' 'processed,' 'strong combinations' and 'inspiration.' This and the resulting aspects nicely summarize the perspective of the Urban Designer, their work process and their desires for digesting the citizens' data.

These aspects will appear again and again throughout this report as the images representing them, linking research and design decisions back to these original principles for added clarity.

In the next section, I dive into my evaluation of the aforementioned U_CODE Dummy Test Bed (DTB), an important study that laid even more firmly the foundation for my project.

Brief

Just have a look. Let it inspire you!

Design Area:
Moldauhafen

100 000m²
residential development between the two waterfronts

Kleiner Grasbr

- 500 000m² wi
- **new Skyline**
- **windy and fl**
- greenery spo
- former harbo
- emissions fro
- good traffic c

Too much information

Brief at the end

3.2 Evaluation of the Dummy Test Bed (DTB)

3.2.1 Goal

The goal of this evaluation was to orient myself with the most recent developments of the U_CODE project and to understand how their participatory process was designed and how it actually performed in this internally-distributed pilot study. This was my first step to finding out what worked, what needed improvement, and to find a gap where I could contribute with my research and design.

3.2.2 Method

Participants

Fabrice Naumann
Mr. Naumann is part of the TU Dresden team of U_CODE and is responsible for research activities within the project. He was one of the main people responsible for testing the DTB and then processing its results.

Procedure

I participated in the Dummy Test Bed when it was sent out to the members of U_CODE and had a Skype call with Mr. Naumann after the results had been processed. We discussed his approach in handling this data and any challenges he faced.

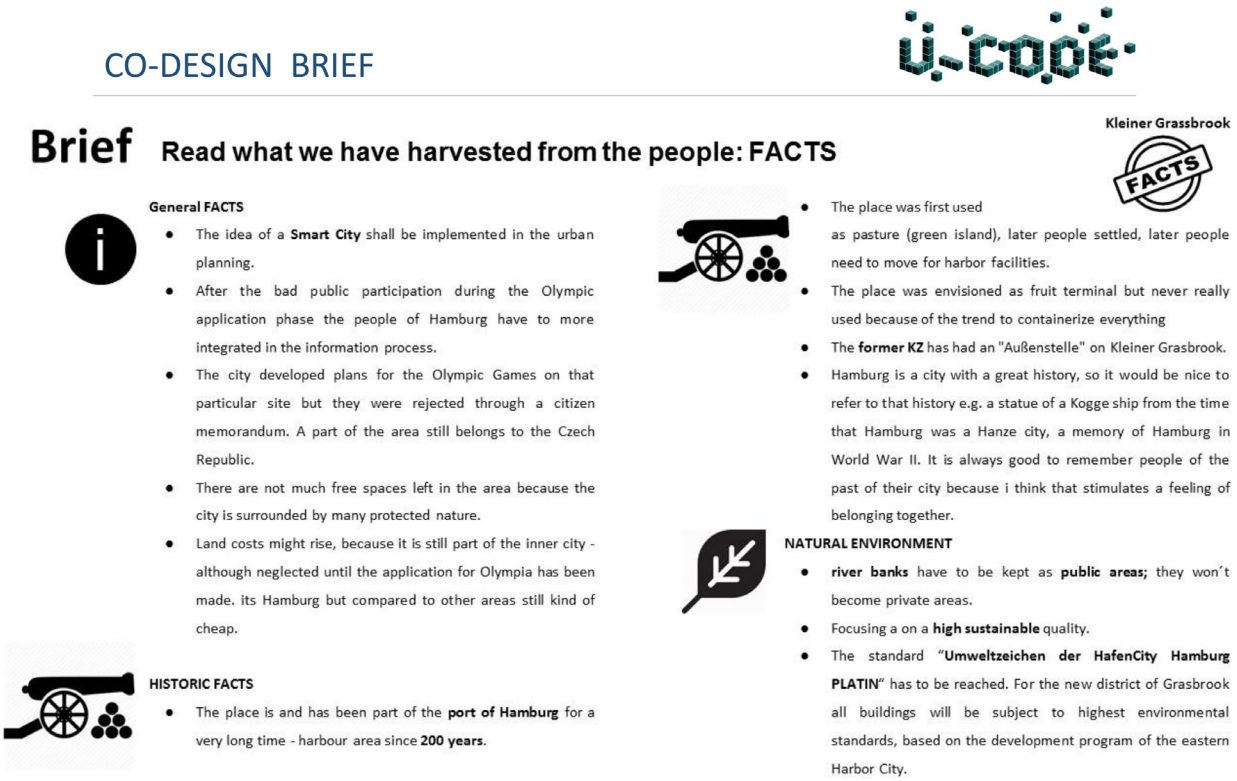


Figure 7: The list of most interesting facts collected from citizens.

Description of DTB Process

The DTB introduced the project site, an industrial area of Hamburg, and started out by asking participants to write facts they already knew about the area followed by ideas for the area. This was all done verbally with an online form and later analyzed by hand by Mr. Naumann and his team into a list of most interesting facts / ideas (Figure 7). Software was used to perform a sentiment analysis on all the verbal contributions, creating a semantic cloud of words that were green for positive and red for negative, appearing bigger the more number of times they were used by participants (Figure 8).

Next participants were given the opportunity to design their vision for this industrial area. They were given a one page brief which summarized the project requirements and environmental conditions (Figure 9). This was followed by some instructions on how to create their design and also how to like and comment on other peoples' designs (Figures 10-12 next page).

Figure 8: The sentiment analysis done on all verbal contributions for "FACTS."

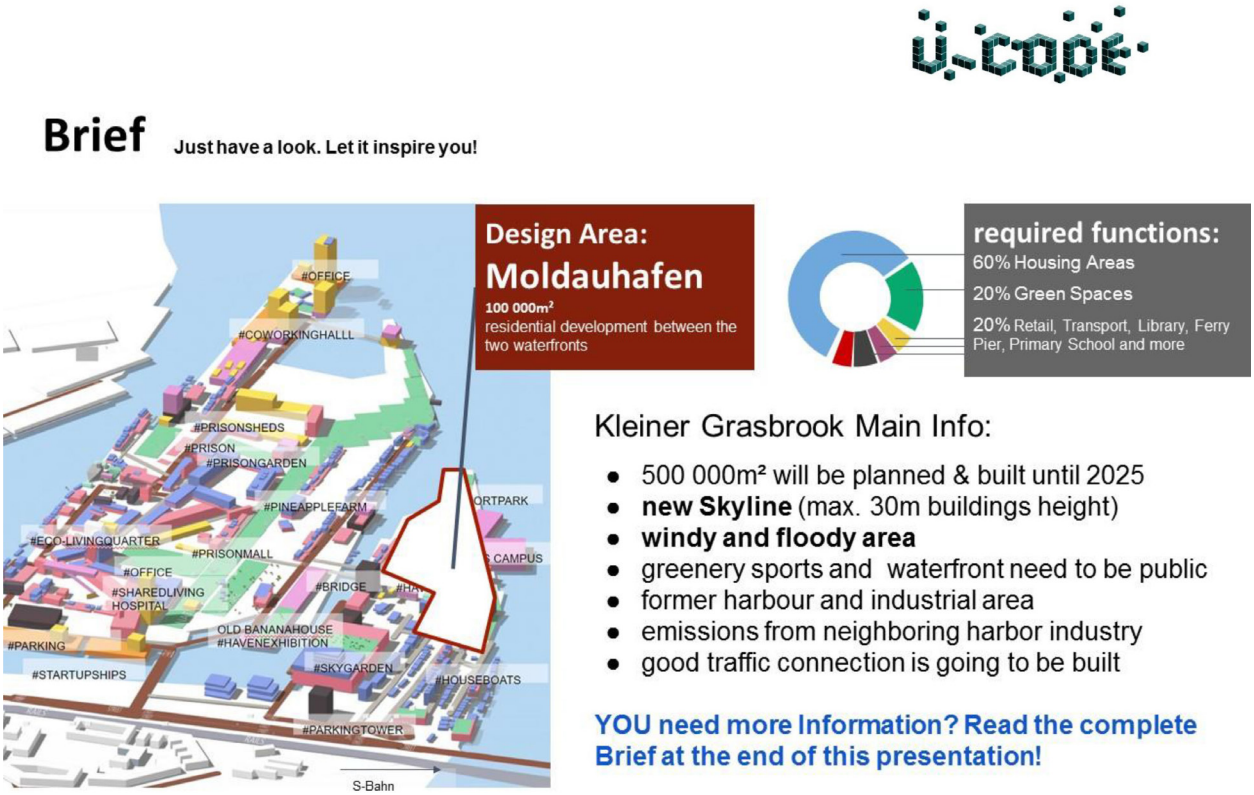


Figure 9: The design brief given to citizens.

Figure 10: The instructions given to citizens when they design.

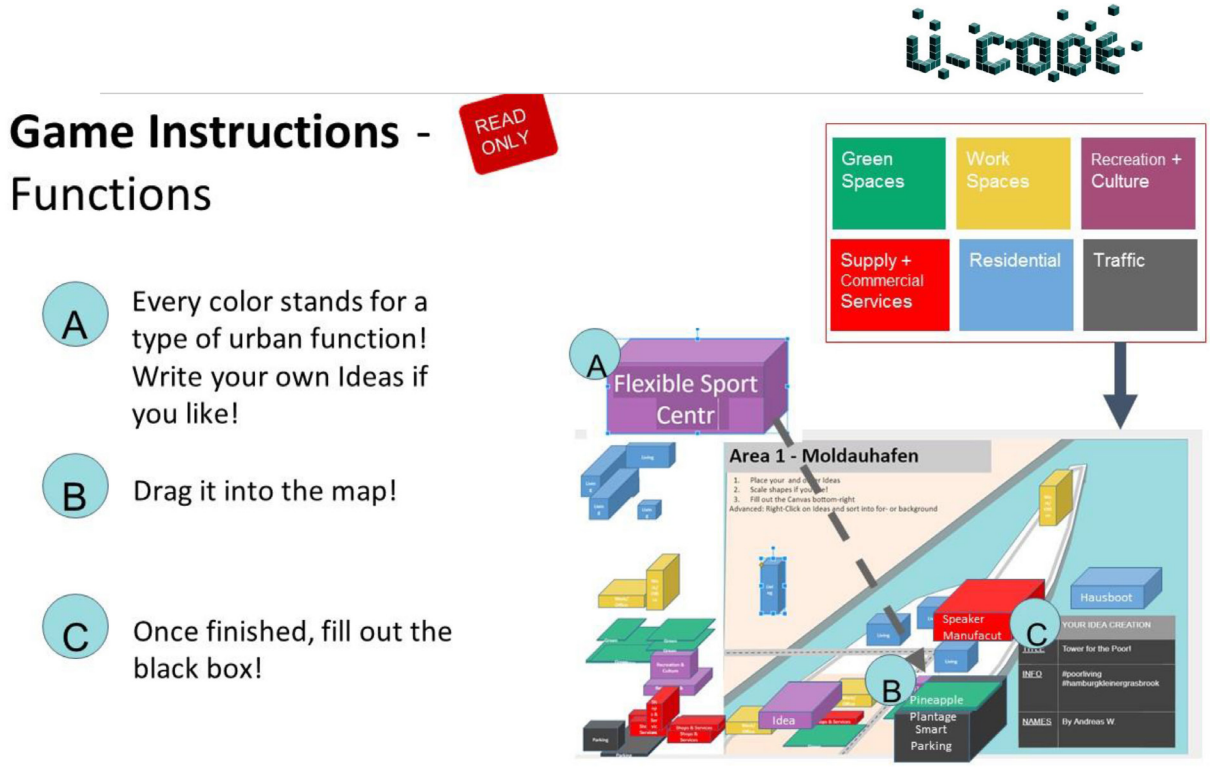


Figure 11: The instructions given to citizens when they design.

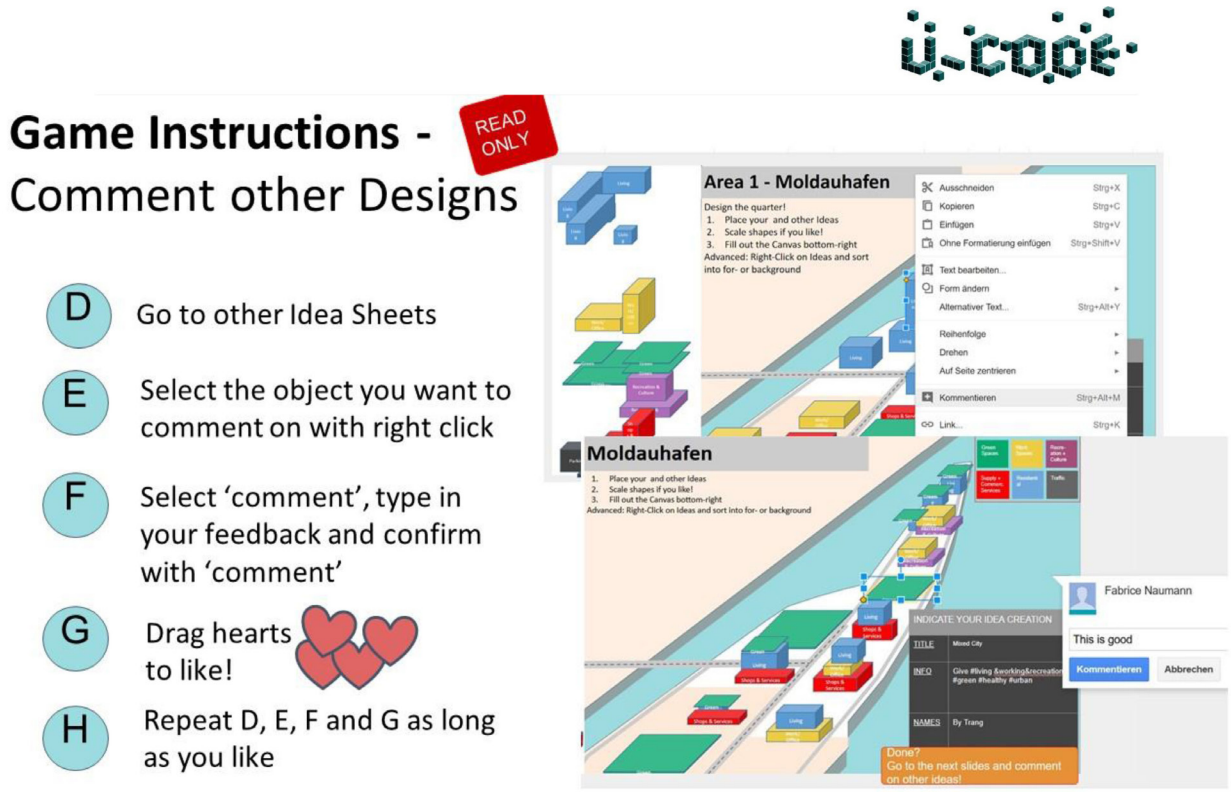


Figure 12: The instructions given to citizens when they wish to like or comment on other participants' designs.

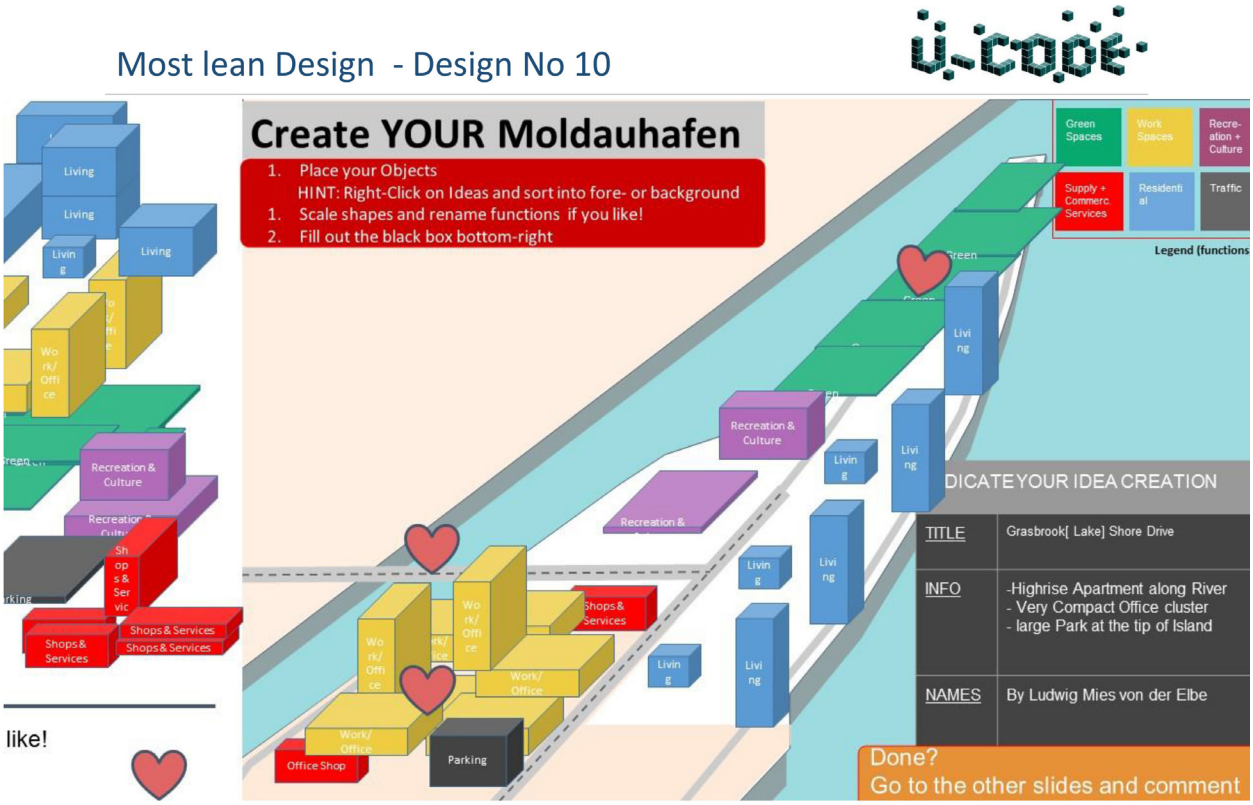


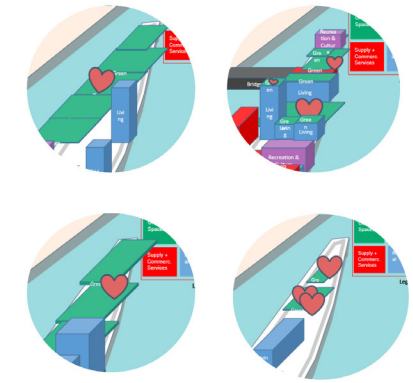
Figure 13: An example of one participant's design, with their own explanations in the corner and likes from others.

The participants used colored blocks of varying shapes and sizes to create their desired vision for the space (Figure 13). There was an area in the bottom right corner where they could give their design a title and briefly explain it. Then they could move on to look at the designs of others which were previously submitted.

Figure 14 (next page) shows how Mr. Naumann and his team analyzed which ideas had the most likes from the group and Figure 15 (next page) shows the ranking of individual designs based on votes from all participants, split into "public" and "professional."

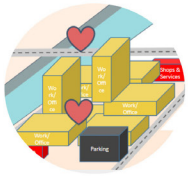
Most liked features

The most liked features in the Grasbrook design proposals
This was loved extremely (6 hearts)

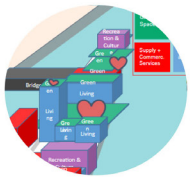


A green park area at the upper tip of Grasbrook island

The most liked features in the Grasbrook design proposals
This was liked a lot (2 hearts)



Hyperdense work and office area



Dense compounds of residences grouped around green space

Figure 14: The manual analysis of which design ideas were most liked by the group.

First Vote on the collected Ideas

Explanation: each one had to list the 3 proposal he/she/it liked most
Rank 1 = 3 point out of 3points,
Rank 2 = 2 point out of 3 points
Rank 3 = 1 point out of 3 points

		Vote by Public Community		Vote by Professionals	
No	Titel	Given Points	Ranking	Given Points	Ranking
No 01	urban housing on a green island	0	16	0	12
No 02	Work left, live right!	4 °°°°	8	0	12
No 03	WELTBAU AUSSTELLUNG	5 °°°°°	4	0	12
No 04	island vibes	5 °°°°°	4	3 °°°	5
No 05	GREEN CITY-ROOFTOP	13 °°°°°°°°°°°°°	1	6 °°°°°°	2
No 06	Utopia	5 °°°°°°°°°°°°°	4	5 °°°°°	3
No 07	FLOAT	10 °°°°°°°°°°	2	10 °°°°°°°°°°	1
No 08		5 °°°°°	4	5 °°°°°	3
No 09		2 °°	13	0	12
No 10	Grasbrook[Lake] Shore Drive	4 °°°°	8	1	10
No 11	Green Moldauhafen	3 °°°	10	3 °°°	5
No 12	Theater Tower	3 °°°	10	3 °°°	5
No 13	Mixed City	2 °°	13	2 °°	9
No 14	Zoos in the City	0	16	0	12
No 15	Sport to go	1 °	15	0	12
No 16		3 °°°	10	3 °°°	5
No 17	Permaculture city	7 °°°°°°°	3	1 °	10

Figure 15: The ranking of ideas based on votes from "public" and "professional" participants.

3.2.3 Key Findings

I performed a comparison of the pro's and con's of the DTB based on my own opinions and what I had already learned from the professionals I had spoken to. These pro's and con's are summarized in the table below:

What I appreciated most about the DTB process was that it was very easy to use for the average citizen. Writing comments and dragging-and-dropping the blocks to design was a quick and fun way for participants to express themselves. The invitation to like and comment on others' designs was also a good start at interactivity and creating a discussion between participants.

PRO's	**CON's**
Citizens contribute textual facts + ideas as well as visual models.	Citizens create individual designs.
Citizens are given basic tools to start visualizing their vision, making it more tangible.	Citizens have no contact with experts.
Citizens are invited to rate and comment others' designs with text and hearts, making the process more communal.	Data processing goes little beyond what designs have the most likes by other citizens.
The most "lean" concept was highlighted - which concept stuck most closely to the initial brief.	Distinction between who is a citizen and who is an expert participant is not clear.
	Similarities and differences between individual designs are not clear. This makes it very hard for experts to combine ideas.
	Citizens don't have any real constraints in their design space. There is nothing stopping them from creating something totally unrealistic and not much guiding their sense of scale.

Figure 16: Table showing my comparison of Pro's and Con's for the Dummy Test Bed.

3.2.4 Discussion

Nevertheless, the qualities of the DTB that stuck out to me most were the ones already identified by professionals as important to them yet lacking in this process:

Citizens work individually rather than together

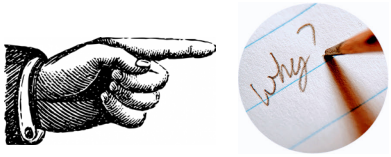
Designing together as a group was not only expressed as important by Urban Designers but also by U_CODE. Liking and commenting on each other's designs was a nice feature but at this level of ideation citizens should have benefited from discussion and exchange of views and ideas.

Experts are not present

Experts create their own designs and only review citizens' ideas after they are finished. Unfortunately there is no exchange of knowledge between the two groups. This results in citizens who may not fully understand the initial brief and what is feasible as they design, as well as experts who may not fully understand the models generated by citizens.

Data needs more processing

As mentioned in the table, the processing of the participants' data went little beyond semantic analysis and comparing likes. Verbal contributions from the first step of facts and ideas were analyzed manually and simply listed. Figuring out a way to summarize all this verbal and design data was clearly not an easy task and highlighted to me the importance of working more on this step in my design.



The 'why?' is not well understood

Although the interface allows writing general comments, many citizens did not explain well why they designed how they did, only describing the model. As my Urban Design professionals told me, often the 'why?' behind citizens' designs is the most important information they want to uncover. This also grabbed my attention as something that needs to be addressed in my work.

The next section will elaborate upon U_CODE's tools and methods with a description of my trip to London for one of their team meetings.


Industry
Living Quarters
Primitives
Public Parks
Public Services
Industry
Living Quarters
Primitives
Public Parks
Public Services

3.3 U_CODE Project Meeting in London

3.3.1 Goal

The goal of attending this project meeting in London was to meet U_CODE's members and to gain a better understanding of the many dimensions of the project. It was also a chance to get some hands on experience with the interactive tools they have been developing and talk

3.3.2 Method

Attending Presentations and Meetings

I attended meetings where project updates were presented and future steps were discussed by all members. I sat in on a particularly heated discussion of the DTB (Dummy Test Bed) where concerns were voiced about its procedure, the collection of citizen data and its presentation to urban designers. I also witnessed discussions between engineers about the technicalities of the tools and their vision of how these tools would be used in a co-creation session. I was able to engage in these discussions and contribute my own designerly opinion on the topics.

Experiencing the U_CODE Tools

I had the opportunity to physically interact with tools that I had only heard about until then, most notably the virtual reality tool being developed by French company OPTIS and the multi-touch screen table of Barnabe Faliu and Alena Siarheyeva of ISEN-Toulon. I was able to get a feel for these interfaces and their capabilities and quickly evaluate them in terms of usability and user friendliness in a co-creation context. I also got to see for the first time the work of Andreas Wilde, a mobile gaming application for citizen urban co-design called "Playground."

One-on-One Talks

I had the opportunity to meet and talk with individual members of the U_CODE team who were of utmost interest to my research topic. I spoke with Fabrice Naumann of the DTB (Dummy Test Bed), Barnabe Faliu of the multi-touch screen table and Aleksandra Blazhevska of GMP Architects. These informal discussions in London brought clarity to my understanding of the tools and informed my research and design direction.

3.3.3 Key Findings

Dummy Test Bed Discussion

I was very interested in this specific discussion concerning the DTB because the team's architect, Aleksandra Blazhevska, revealed what, in her opinion, were its main shortcomings. She strongly expressed that the information generated by the DTB was difficult for designers to work with because citizens were uninformed, working on their own and not in discussion with experts. She stressed that from the beginning, citizens need to be more guided and used to

answer specific questions urban designers have. She argued that in the end, the data they generate needs to be digested into "designerly language" urban designers can work with, not just a list of ideas / facts and individual 3D models.

Evaluation and Selection of a Tool

The following is a table showing my personal comparison across several important attributes of the three U_CODE tools I was exposed to during the London meeting as well as the Dummy Test Bed (DTB):

The table reveals some important strengths and weaknesses for each tool and how it relates to the others. We can see, for example, that all tools are used in a group setting except for the DTB, which was one of its main shortcomings; however, the DTB was perhaps one of the easiest tools to use thanks to its drag and drop function.

The "Playground" app was the only tool that I felt communicated a sense of scale to the citizen with its use of trees, people and cars (a sentiment supported by Urbanism students in the U_CODE Tool Feedback Session, Section 3.5). Scale was something that came up in many of my interviews as important to communicate to citizens, as many have trouble understanding the size of

	VR Tool (OPTIS Ltd)	**Multi-Touchscreen Table (ISEN-Toulon)**	**"Playground" App (TU Dresden)**	**DTB (TU Dresden)**
Used together or individually	Together	Together	Together	Individually
*Designing with volumes or voids **	Volumes	Volumes	Volumes and some voids	Volumes and some voids
Interface for Urban Designers	No	Yes	No	No
Immersive experience	Very	Not really with touch screen, yes with VR	Not really	Not really
Gives a good sense of scale	No in bird's eye view, yes when walking	OK with touch screen, yes with VR	Very good	OK
Easy to use	Complicated	Somewhat easy	Somewhat easy	Easy

Figure 17: Table showing comparison of U_CODE's participatory design tools.

* This means whether the tool allows the user to create using only 3D blocks (volumes) or also with 2D surfaces (indicating voids or spaces between volumes, such as green area, bike lane, etc.).

their own or others' designs

The VR tool and the VR option associated with the multi-touch screen were naturally the most immersive tools but I personally found the OPTIS tool to have a steep learning curve that could be difficult for an average citizen to master, especially an elderly citizen.

Based on all this, the multi-touch screen tool seemed like the most natural complement for my design and what I would propose citizens use to co-create together in an offline or even online session. I also chose this tool because it is the only one actively developing an interface for Urban Designers to review the results of these workshops and ISEN-Toulon seems eager to incorporate my research and design into their product. Thus, the following research and design will be taking into account and building on this tool.

3.3.4 Discussion

I learned a great deal from attending this meeting in London and enjoyed learning about and even experiencing some of the tools being developed within the team. I was better able to understand how all the diverse research and design was interconnected and to see the future direction of the project. I did have the impression that the U_CODE team was focusing quite a lot on the technicalities of their tools (code, capabilities, etc) but not enough on usability of the tools by citizens nor translation of the generated data for urban designers. Here I had confirmation that my research was going to help fill a gap still missing in the developments of the U_CODE project.

Nonetheless, after an intense few days of full immersion into the world of U_CODE, I felt that it would be good to take a step back and look for some outsider's opinions on public participation in Urban Design. Was the direction being taken by myself and by U_CODE the very best one, or were there other options? What would someone who had no previous experience in the area propose for best communicating citizen's ideas to Urban Designers? I decided to organize a Creative Session led by a classmate of mine in the Creative Facilitation Course I took before starting this thesis. The details of this session can be found in the next section.


PERSONAL PHOTO

3.4 Creative Session with Design Students

3.4.1 Goal

The goal of this Creative Session was to get out of my box and generate some new inspiration with the help of fresh eyes and minds. By ideating with a group of creative but completely unaffiliated students, the session was a way to see what solutions existed to the problem of capturing the "why?" behind citizens' designs - a very imporant aspect identified in 3.1.

3.4.2 Method

Participants

The session was facilitated by an SPD (Strategic Product Design) Masters student. I participated as Problem Owner along with three other Masters students - one DFI (Design for Interaction) student, one Urbanism student and one Chemical Engineering / Management student. All participants were from the TU Delft.

Procedure

After an ice breaker and an introduction to the topic from the researcher, the group discussed and agreed upon a problem statement to ideate on. This statement was *"How can we visualize the reasons behind citizens' designs?"*.

The group ideated individually by writing down one idea per post-it and sticking it to a personal sheet of paper while the facilitator provided visual stimuli and vocal inspiration such as "What if budget was not a problem?" and "What if we lived in 2100?". The papers were rotated three times between group members, building off of each others' ideas to make them more rich.

The post-it filled papers were then placed on the wall and similar ideas were clustered together. After that each participant placed a colored sticky dot on two of their favorite ideas. The participants made teams of two and took one dotted idea each, combining to make two final concepts in poster form.

3.4.3 Key Findings

In response to the problem statement of *"How can we visualize the reasons behind citizens' designs?"*, the group created the following seven clusters:

Co-Creation
Social Media
AI + VR
Vocal / Video Recording
Photos / Moodboard
Statistics
Demographics

To see the ideas belonging to each cluster, see Appendix G.

The work done in pairs resulted in two

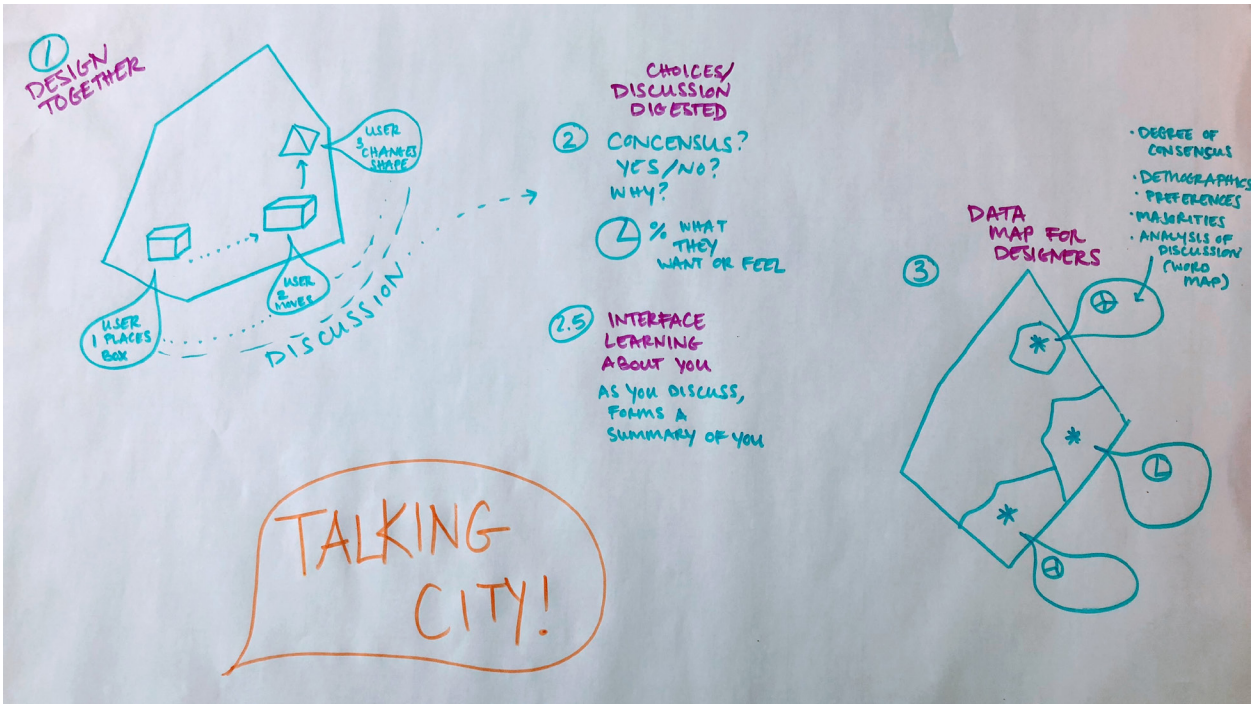


Figure 18: Poster of "Talking City" created by session participants.

concepts, one titled "Talking City" and the second "VR Ur Citi."

Talking City

"Talking City" (Figure 18) combined dotted ideas from the "Statistics" and "Co-Creation" clusters. The concept is highly collaborative and encourages discussion and consensus-finding. Each move or alteration by a citizen is recorded and can be commented on by others. The program learns about each user through their comments and design decisions, developing a summary for each person that grows over time (ex. Jack: added 3 green roofs, often comments about sustainability and environment). When the design phase is over, a statistical summary is made of whether consensus was reached on each area and, if not, what is the majority / minority and what does each group believe? This is presented in an interactive map format for designers where different areas can be clicked on and summative information displayed (ex. degree of consensus, demographics of citizens, analysis of discussion in word cloud form).

VR Ur Citi

VR Ur Citi (Figure 19) very clearly combines dotted ideas from the "AI + VR" and "Vocal Recording" clusters. The citizen is able to download a special app to his / her phone and immerse themselves in an area that is open for citizen input through VR glasses. They are able to walk around and leave vocally recorded comments about specific buildings / locations (in this example, "I really like the canal view," followed by someone else's comment "But it is a quite crowded place"). The comments are then digested into a 3D "heat map" for designers that shows the most commented objects. The analysis and presentation of these recordings could be developed further to be as conclusive and informative as possible for designers.

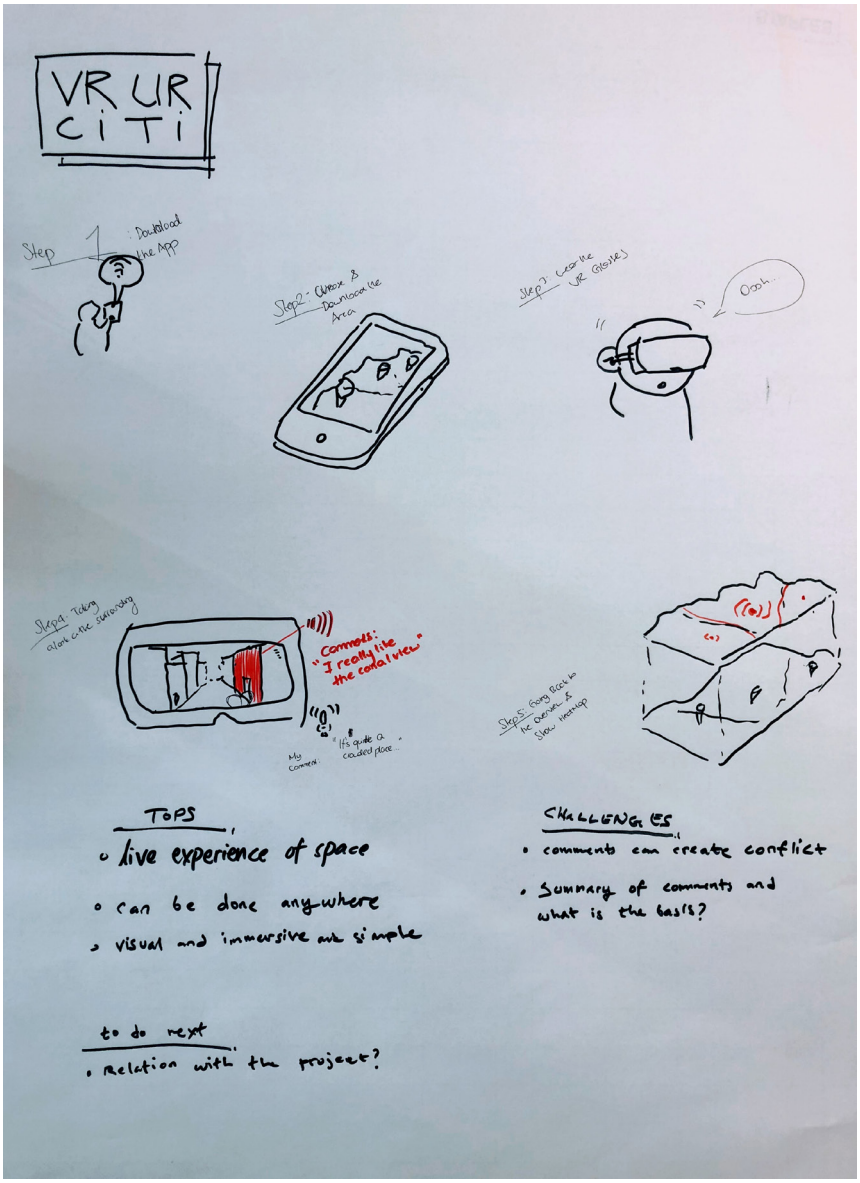


Figure 19: Poster of "VR Ur Citi" created by session participants.

3.4.4 Discussion

Interestingly, the concepts the group came up with were very close to what U_CODE has proposed so far - without them seeing any of the tools besides the Dummy Test Bed. Each concept went a little further than the interactive 3D modeling and Virtual Reality that U_CODE members have developed so far. The concepts integrate aspects that have been discussed before such as consensus-finding between citizens and vocal recording, but they still did not really touch on data processing and presentation for urban designers, which was my hope. The results of the session were, however, a nice confirmation that the project was going in the right direction.

With that in mind, it was important for me to receive feedback from Urban Designers on the tools I experienced at the U_CODE meeting in London. The next section will present my process and findings for these tools.


WHAT PLACES RESIDENTS LIKE /DISLIKE
local experience
EXPECTATIONS OF A PROJECT
"WHY"?
Brief
Just have a look. Let it inspire you!
U-CODE
Design Area:
Moldauhafen
residential development between the two waterfronts
required functions:
60% Housing Areas
20% Green Spaces
20% Retail, Transport, Library, Ferry Pier, Primary School and more
Kleiner Grasbrook Main Info:
500 000m² will be planned & built until 2025
new Skyline (max. 30m buildings height)
windy and floody area
greenery sports and waterfront need to be public
former harbour and industrial area
emissions from neighboring harbor industry
good traffic connection is going to be built
YOU need more Information? Read the complete Brief at the end of this presentation!
grouped around green space
Data Exploration
BIKEFRIENDLY
KARSTADT
FOOTBALL
PARK
WOHNEN
STREET
ST NICOLAS CHURCH

3.5 Evaluation of U_CODE Tools with Urban Designers

3.5.1 Goal

The goal of this workshop was to receive feedback from urban designers on the variety of tools produced thus far by U_CODE.

3.5.2 Method

Participants

The participants were three Urbanism students from the TU Delft faculty - two Masters students and one Post Doctoral student. I chose students because the professionals I had interviewed before were

Procedure

I began by asking these students if they had experience with citizen participation in their design work and what they would consult citizens for if they did do participatory design. I then presented them the different tools and interfaces of U_CODE and invited them to write and discuss what they found useful or not useful for them as designers. This turned into a fruitful discussion.

3.5.3 Key Findings

The group came up with the following reasons to consult citizens in Urban Design:

To find out their concerns

To find out the "why" behind their ideas

To come up with specific ideas and also big visions

To brainstorm alternative uses for a project requirement

To define the expectations of a project

To better understand daily routine

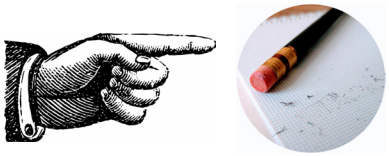
To learn about local experience

To define the current or desired identity of a neighborhood

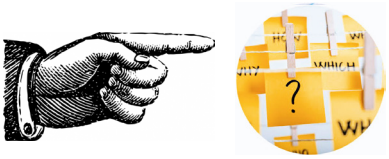
To find out what areas residents like or don't like around the project

The following were key findings from the group discussion:

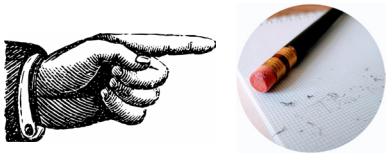
They agreed that letting the citizens create is better than just talking. They felt it would help citizens compromise and be more understanding with architects because they would see first-hand that designing is not that easy.



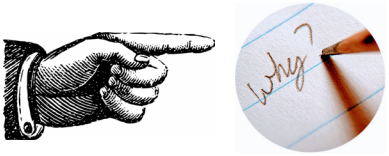
They liked the idea of pictures or mood boards to help citizens express what they want in a space, but were aware it may be already too specific.



They agreed that urban designers have to decide what they want to know from the citizens at the beginning. They all commented that the project brief from the U_CODE Dummy Test Bed looked like a first year Urbanism assignment and that it was not the citizens' job to meet all these requirements - it is the job of the urban designers. Simplifying the tasks and asking citizens for specific input would make it more manageable for the citizens and the outputs more useful for the urban designers.



They liked the abstraction of the shapes users design with but stressed the importance of scale. Rather than windows or other distracting design features, they suggested trees, cars and people in the model for scale, much like in the "Playground" app.



They thought comments and explanations (verbal or audio) were good ways of capturing the 'why' behind citizens' designs. They wanted a quick snapshot but they also wanted to be able to dig deeper and read individual comments, filter opinions by gender, age, etc. and in general have a layered presentation of information accompanying the models. They all really liked Kaspar's dashboard for urban designers - they just wanted to be able to click deeper into it. They said it would be really helpful if every design decision was justified with comments.

They thought the multi-touch screen tool needs an option for sketching or coloring, not just placing 3D volumes. They liked that the shapes can be manipulated into unique forms but thought that the tool also needs a pencil and/or paint bucket function for even more freedom.



They thought the tool(s) should be used differently by citizens depending on the phase of the project. In the first phase, citizens can have total freedom to express themselves; however, as the project progresses, the workshops also need to become more specific. The next phases can introduce the known rules / restrictions and ask for more targeted ideation from citizens.


They believed that VR is most useful for understanding height and scale at the beginning of a project and for experiencing the space much later in the project. All the designers agreed that VR should not be used as a design tool but only as a walk-through tool for these purposes. They even believed that the VR could be "repulsive" to citizens if used before the model is realistic-looking.

For specific comments on each U_CODE tool, see Appendix X.

3.5.4 Discussion

This was an extremely useful workshop for me and, I hope, for U_CODE. The feedback received was both big picture and specific enough for me to get a clear idea in my mind of what Urban Designers would like to see in my interface. Bringing up points that I could not have predicted myself made the session feel like a truly fruitful endeavor.

3.6 Conclusion of Chapter 3

3.1 Interviews with Professionals

This chapter started out with detailing the process and findings of my interviews with Urban Design professionals. These insights were boiled down to 11 aspects that represent the perspective and values of Urban Designers in participatory processes and are important for my project and U_CODE to take into consideration moving forward. Therefore, these aspects will continue to be referenced throughout the rest of this report.

3.2 Evaluation of DTB

This section explained my evaluation of U_CODE's Dummy Test Bed (DTB) and pinpointed the pro's and con's of this particular participatory process. The DTB helped me become more acquainted with the tools and methods of U_CODE as well as identify gaps and opportunities that my design could fill.

3.3 U_CODE Project Meeting

Here my experience at the U_CODE Project Meeting in London was explained, specifically my experience with the different tools being developed by the team. A comparison of tools was provided and one was chosen as a basis for my design - the multi-touch screen table.

3.4 Creative Session

In this section are the details of my process and results of the Creative Session I conducted with design students. This session was carried out to see what others unfamiliar with the project might propose for Urban Designers to review citizen data in an interactive way that captures the meaning or 'why?' behind their designs. The session validated many of my and U_CODE's ideas for digital participatory design.

3.5 Evaluation of U_CODE Tools

This section explained a very important workshop I had with Urbanism students of the TU Delft faculty discussing U_CODE's tools and what worked and didn't work for them as Urban Designers. This workshop gave a great deal of valuable feedback that I analyzed and applied in the next section of this report.

Next Steps

The next chapter will demonstrate how all the research from Chapters 2 and 3 culminates into a series of recommendations for the U_CODE project and an interface designed specifically for Urban Designers.

04
Application

This chapter describes the application of all knowledge gained from 02. Literature Review and 03. Empirical Studies. It starts by outlining a Design Brief that is based on previous research activities and goes into detail how citizen data is generated and how it should be organized in an Urban Designer's interface. The chapter then describes a prototype that was developed and tested with Urbanism students from the TU Delft. Finally, key findings are outlined and conclusions drawn from the testing experience.

4.1 Design Brief

Figure 20: Visualization of the Interaction Vision: doctor looking at X-ray.

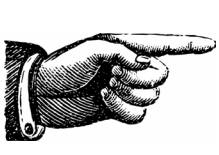
4.1.1 Problem Definition

One of the challenges the U_CODE team identified was how to generate useful data with the U_CODE tools that urban designers could start working with. Thanks to my background in architecture and urban design, I felt confident taking on this challenge and believe that the way citizen data is collected, processed and presented to the urban designer can be improved.

4.1.2 Design Goal

The goal is to design a more structured participation process and a digital interface where urban designers can review citizen generated data to start bringing it into the professional design.

4.1.3 Interaction Vision



The interaction between the Urban Designer and the digital interface should feel like a doctor looking at a patient's X-ray (Figure 20). The underlying problems or opportunities should be clear to the Designer when they look at the data presented and they should be able to draw an informed diagnosis. The Designer should not just see the skin and bones of a fact or idea - they should understand what lies beneath.

4.1.4 Desired Qualities of the Design

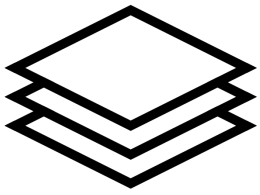
Based on insights from the research, the following are four qualities that the data presentation in the final design should have:

The data should be *focused*.

The data citizens create should be focused enough to answer urban designers' questions (ex. "What is your desired atmosphere for this space?" or "What local history here is important for us to respect?") or to give inspiration on specific design problems (ex. alternative uses for necessary infrastructure). It should not be so open that designers struggle to apply the ideas.

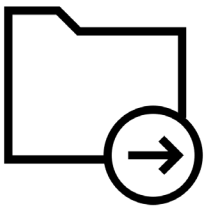
The data should be *conclusive*.

The data should be presented in a digested way rather than a list of words or collection of models. This gives the designer a good overview and insight into what is most important and where ideas overlap or differ. If applicable, they should be able to see what kind of consensus there is on a given area or design.



The data should be *layered*.

The data presentation should be layered, going from a high level to a more and more detailed level. It should be clear what the outcomes were with a quick look but designers should also be able to click deeper on each conclusion to see outcomes from each workshop, individual ideas, discussion threads, etc. if they so desire.



The data must be *applicable*.

The data, most importantly, needs to be useful. It should be clear to the designers how the data can be incorporated into the design and they should not struggle to understand and apply it. Not everything the citizens create will be used, but there should be something to inspire the designers.

4.2 Adjusting the Minimum Viable Process (MVP)

4.2.1 Before Citizens Participate

Identify the Project's Stage

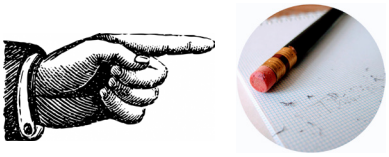
First and foremost, stakeholders need to be able to identify in which stage their project is - Pre-Design, Design Creation or Post-Design. With Urban Designers playing an active role, the stakeholders must decide what kind of question(s) are appropriate for this stage, whether they should be answered individually or in a group, and what limits citizens should be given. It is strongly suggested by myself and supported by Urban Designers Janssen, Van Ling, Hausleitner and all Urbanism students interviewed to initially give citizens the freedom to express themselves but gradually give more and more structure as the project progresses over time. This allows citizens an outlet to get out whatever 'wild' ideas they have initially - that often come back into the design - but also allows the Designer to specify tasks more and more as new issues or opportunities arise in the project.

Ask the Right Questions

Before any participation or co-creation takes place, it is vital for citizens to be given more specific tasks related to the initial brief so they ideate based on predefined topics or functions. These specific tasks are determined by the urban designers before any participation occurs.

This is extremely important to the success of U_CODE's participatory tools because it helps to give citizens a clear - but not too complex - direction and increases the likelihood of Urban Designers receiving information and ideas they can actually use. This point is supported by all professional Urban Designers and Urbanism students. Asking the right question can be the most powerful tool of all.

4.2.2 During Participation & Co-Creation



Make Tools Easy-to-Use

It is extremely important that the digital tools that U_CODE designs should not inhibit citizens' creativity or self-expression. The ultimate goal of these participatory tools is for citizens to be able to visualize their needs and desires, so each tool needs to be thoroughly tested with a variety of citizens (young to old) for usability and user experience problems. Struggling with complicated technology will result in workshops that focus on tech problems rather than on the ideas of the citizens. As Bernadette Janssen of BVR explained, "It's not a goal to make everything more complicated with computers - only if it makes the process easier. And more fun." This was supported by all Urban Designers and Urbanism students.

Have an Expert Present

While the co-creation process should be facilitated by a neutral person, an Urban Designer should be present to answer citizens' questions and to give more information. The Designer could be from the firm which will be applying the citizens' input, therefore acting as what is known as the Problem Owner in Creative Facilitation (see Section 1.3.3). Having a Designer present at the co-creation session enriches citizens' understanding of the Urban Design process and exposes the Designer to the entirety of the conversation and ideation of the session, something that my interface design will aim to capture but may still fall short of. All Urban Designers and Urbanism students agreed that being present and part of the conversation helps retain more information to bring back to the design.

Apply the Creative Facilitation Process

The co-creation workshops should allow each citizen to express him / herself easily but, in the end, be about collective "sense-making and consensus-finding" (Siarheyeva 2018). To achieve this, the Creative Facilitation method should be applied to each group session that calls for ideation. Because "quantity breeds quality," citizens should be pushed to diverge at the beginning with as many ideas as possible, reverge by clustering and combining similar ideas, and finally converge into one to three design proposals that can be shown to the Urban Designer. Although most were not familiar with the concept of Creative Facilitation, all Urban Designers and Urbanism students interviewed were in favor of citizens first having freedom to express wild ideas then narrowing down more and more to concrete solutions.

4.3 Creating the Urban Designer's Interface

4.3.1 Why an Interface?

This design builds on U_CODE's multi-touch screen tool because the touch screen is being developed by a PhD student - Barnabe Faliu - who is very open to my research and has the time to actually implement these recommendations. In this way, the research and design proposed here have the greatest likelihood of coming to fruition and actually being used in the future.

Because U_CODE is working on digital participation and co-creation tools, a digital interface where Urban Designers can explore the generated data simply makes sense. Not all Urban Designers work digitally, but most - especially the younger generation - use a variety of design software and should be comfortable engaging with data in a digital form. As most disciplines, Urban Design is in general becoming more and more dependent on software programs, so a digital interface that can help them review, share and learn from citizens would be highly beneficial.

4.3.2 Generated Data

Before jumping into the interface design, It is necessary to first break down what kind of data could be generated by citizens with Barnabe's co-creation tool so that it can be organized properly for urban designers to review.

First, it is recommended that the tool be used differently depending on the phase of the project. Urban Designers will have different questions and desire different kinds of information depending on how early or late it is in the timeline of their project. For this, we can use the stages of Urban Design described in the Literature Review of this report - Pre-Design, Design Creation and Post-Design. As explained before, the most likely and most successful stages for citizen participation are Pre-Design, Design Creation and, to a lesser extent, Post-Design.

Pre-Design Stage

In this stage, Urban Designers will want to know about the past or current condition of the design space and the citizens' (daily) experience with it. These kinds of questions can be answered individually, ideally using a mobile phone for speed and convenience.

Figure 21 (next page) is a visualization of the process, including examples of questions Urban Designers could ask citizens. Photos generated by these questions will most likely be personal photos taken by the citizens themselves and uploaded to the interface via mobile phone. The comments associated with these photos and/or locations will express personal day-to-day experiences or local knowledge of the citizens.

Pre-Design Stage

Questions asking citizens about  local knowledge **and**  daily routine

to be answered  individually **via**  mobile

How do you *currently use or experience* this space?
Individual response:

 expressing "I usually eat my lunch under this tree"

What are the *current qualities* of this space?
Individual response:

 expressing "This corner is very sunny in the afternoon"

What is the *history* of this space?
Individual response:

 expressing "This used to be a shoe factory"

What is *special* about this space?
Individual response:

 expressing "This tree is a favorite of local children"

Are there any *problems* in this space that we should address?
Individual response:

 expressing "This alley is dark and I usually avoid it"

Figure 21: Visualization of how a Pre-Design stage question might be answered by citizens.

Design Creation Stage

In this phase, Urban Designers can ask citizens everything from big picture ideas for the space to more specific questions which build off of requirements or limitations in their project brief. It is up to the facilitator and Urban Designer to decide whether the question should be answered individually or in a group. Although some can be done individually, on principle ideation questions should be answered in group co-creation sessions to encourage discussion and hitch-hiking off of each other's ideas - see the "designing together" aspect.

The difference in these responses from those of the Pre-Design stage is that the photos will most likely be stock photos from the Internet representing a feeling, idea or concept that the citizen wishes to communicate. 3D models will be basic and probably representing function rather than form. Comments will ideally express the "why?" behind the photo or design.

At this stage, there can be even more specific questions from Urban Designers giving citizens options to choose from - something that was also identified as an important aspect. Although it is more constraining, options can be given after citizens have had the opportunity to express their 'wildest' ideas in order to give more guidance and so Urban Designers can weigh what is more important to the public (ex. green vs. parking).

Figure 22 (next page) gives examples of Design Creation stage questions and visualizes how citizens might answer them.

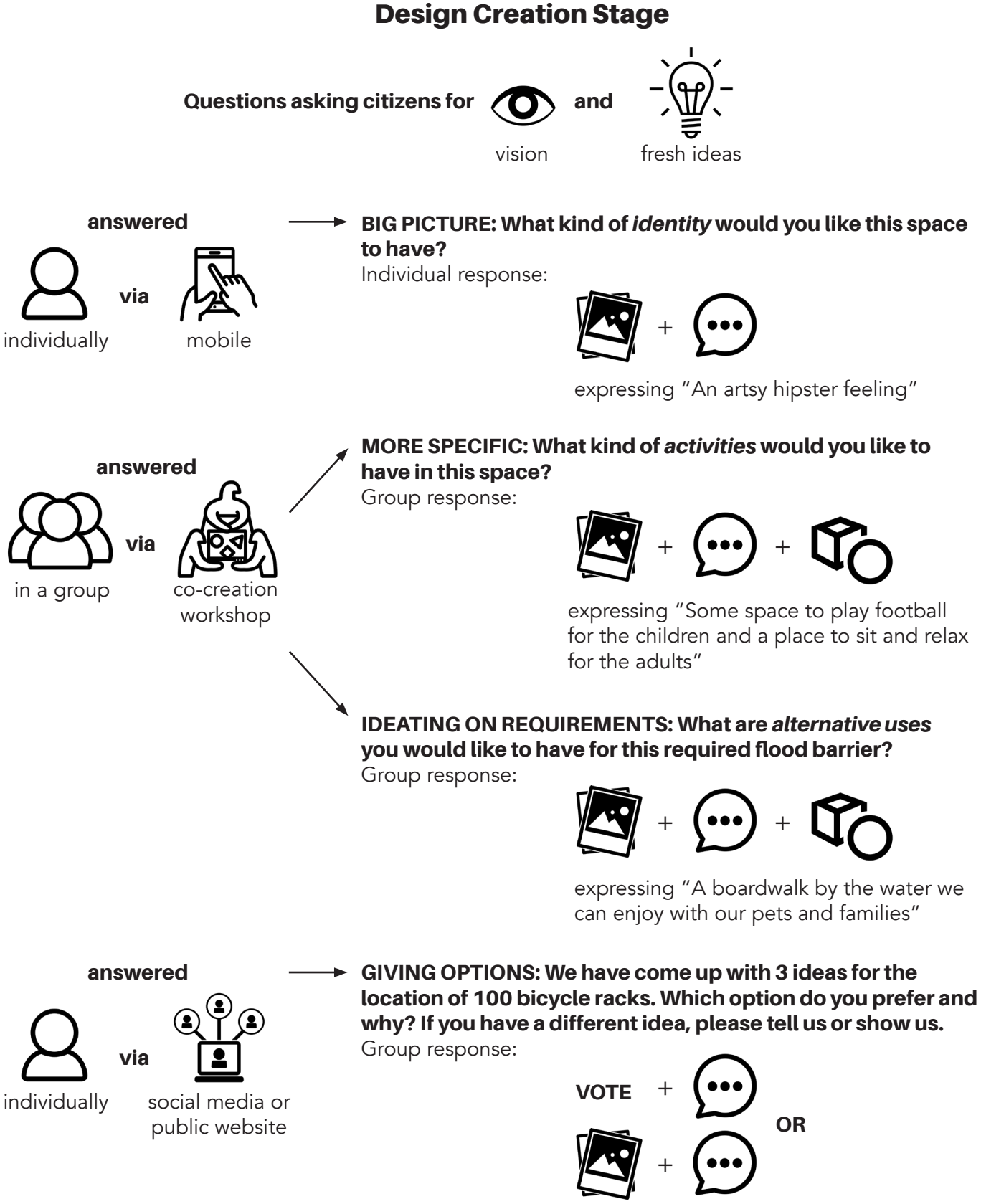


Figure 22: Visualization of how a Design Creation stage question might be answered by

Post-Design Stage

In this stage of the Urban Design process, citizens can still have some impact by providing feedback on designs (that they hopefully helped create). Citizens can be asked to reflect on specific qualities or elements such as building height and materials and can still create change within the design based on these inputs.

To reach a larger audience of citizens that is not limited to just those designing, it is proposed to use a social media outlet or a public website for the project where all those interested can give feedback. Here U_CODE's VR Tool can make a big impact by walking citizens through a life-like design. If the VR tool could be adapted to be used online (or at least that users can look around the design in a street view on their mobile or computer), citizens may even be able to make edits to the model itself.

Figure 23 below shows the process for answering Post-Design stage questions:

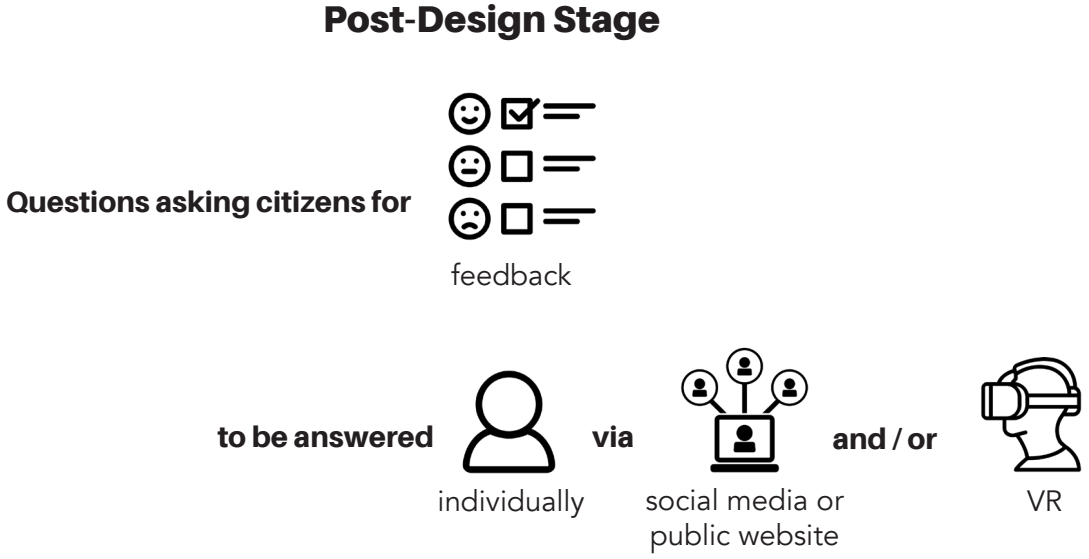


Figure 23: Visualization of how a Post-Design stage question might be answered by citizens.

4.3.3 Organizing the Data

All of these questions generate quite a variety of data. So how to organize all this? The following are 3 features that drove the organization of data in my design:

Filtering and Demographics

One suggestion from the U_CODE Tool Feedback session was to be able to filter responses by different demographic data, such as age, gender, race and profession. The Urbanism students wanted to be able to quickly and easily apply filters to review data and look for trends in what different demographic groups proposed, for example elderly vs. youth, students vs. residents. One student said that they look for "tensions" between groups when designing and that these conflicts of opinion fuel her work.

Semantic and Sentiment Analysis

As mentioned in U_CODE (2015) and practiced in the Dummy Test Bed, semantic and sentiment analysis could be used to automatically generate most common themes / topics and analyze satisfaction or dissatisfaction. This kind of analysis received a positive reaction from all Urban Designers and Urbanism students who saw it as a nice feature that quickly summarizes people's attitudes or ideas for a space.

The assumption is made that the interface software has the ability to take a large number of words from comments, photos or even designs, group those that repeat, and present those words as larger in a cumulative word cloud (ex. the word "bike parking" being used 5 times and therefore appearing larger). It is also assumed that the software can distinguish if words are being used positively or negatively depending on the context of the comment and will display them in red (negative), green (positive) or black (neutral). Some facilitation, however, may be required here if the software is unable to correctly place more ambiguously-used words.

Big Picture to Small Details

The overarching approach to the design of this interface was to create a structure that was as layered as possible, going from concise, clear data summaries all the way down to individual words and user details. This is based on hearing from some Designers and students a desire for easy-to-use, processed information and from others the option to dig deeper to find the source of an opinion or idea. The only way to accommodate both was to create a layered interface where the information can be understood both at a glance and also at a deeper level.

4.4 User Testing

4.4.1 Goal

The goal of this user test was to receive feedback on the layout and organization of data in the interface prototype.

4.4.2 Method

Participants

Five TU Delft Urbanism Masters students participated in this test, two of them being repeat participants from the U_CODE tool feedback session and three newcomers. It was important that the participants again come from the Urbanism faculty because they are the end users of this interface and have specific needs that need to be addressed by the design. For this reason IO students, though more easily accessible, would be unable to give sufficient feedback.

Prototype

The prototype used in the tests was a semi-interactive web interface designed in Axure. The location shown in the interface is a large, recently demolished block right next to the Jumbo Supermarket in Delft and it was chosen because it is a space all users would have experienced before, making it easier to talk about and imagine. It was also selected because it was quick and convenient for me to gather 'fake' citizen data in order to simulate the interface structure. All photographs and comments were created by myself but of course would be generated by citizens in real use.

Two different versions of the interface were presented to the participants. The interfaces had a common style and layout but the first displayed data generated by an example Identification Stage question (What do you like and / or dislike about this area as it currently is?) and the second displayed data generated by an example Exploration Stage question (What activities would you like to see in this space?).

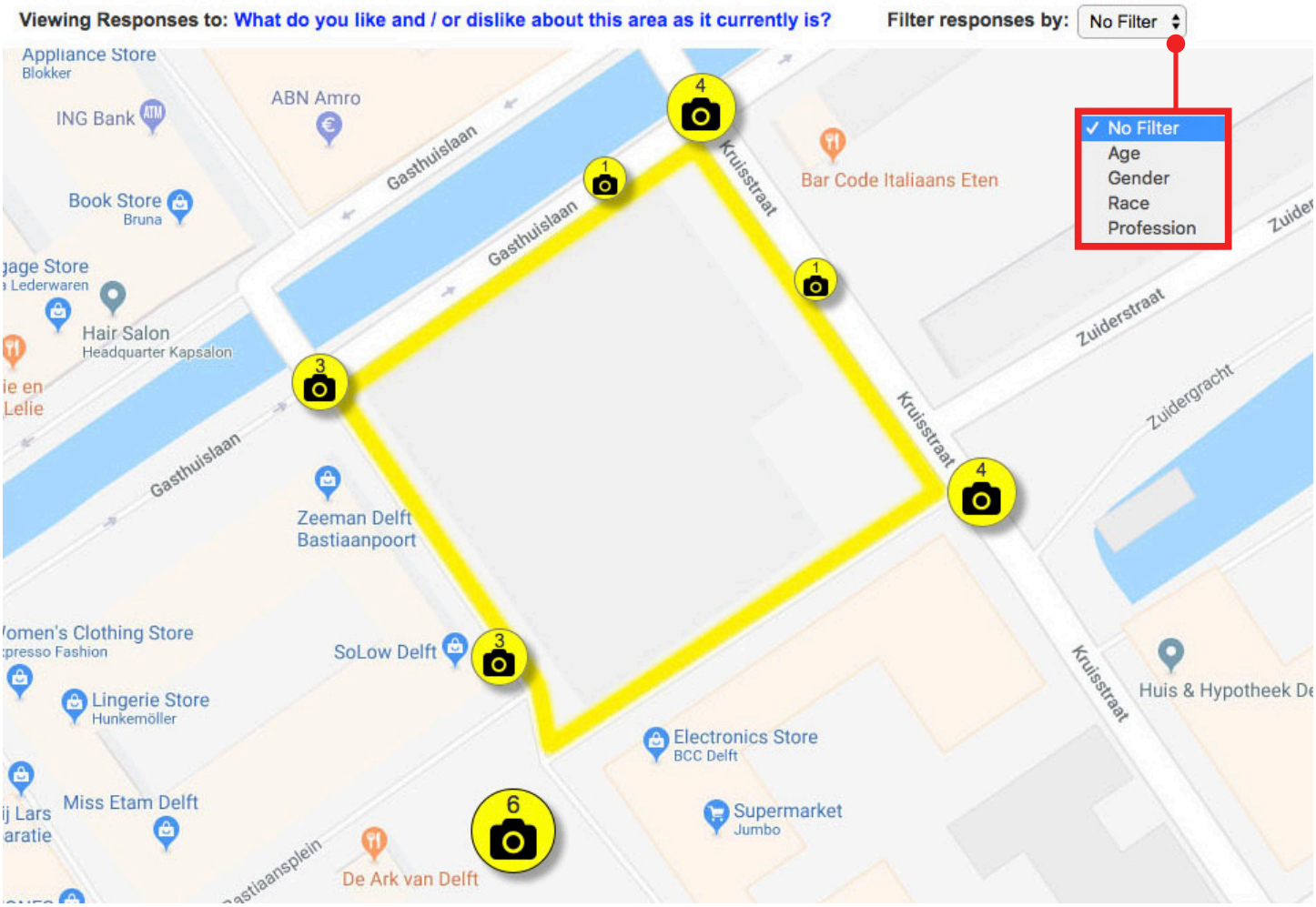


Figure 24: First screen the Urban Designer sees.

Interface 1 - Pre-Design Question

This is the first screen the Urban Designer would see when reviewing individual citizen responses to the question "What do you like and / or dislike about this area as it currently is?" (displayed at the top in blue). In the top right corner there is a Filter option where the Designer can filter responses by age, gender, race and profession (Figure 24), a feature that was suggested in the U_CODE Tool Evaluation Workshop with Urbanism students.

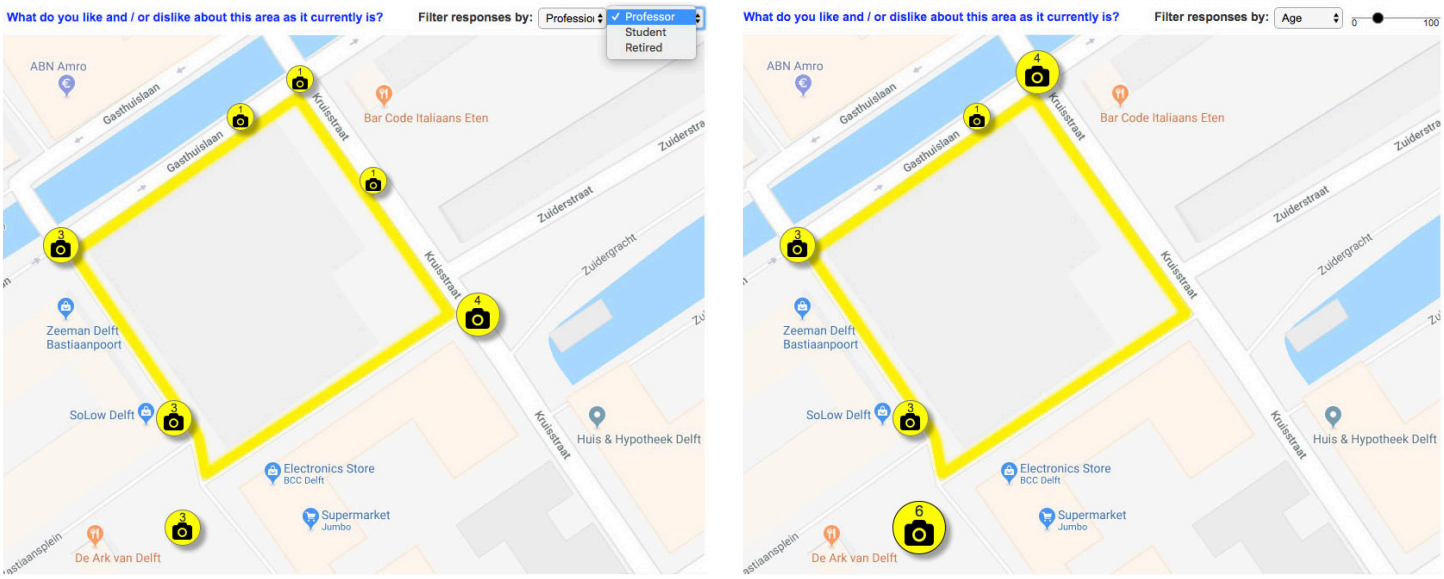


Figure 25: Responses displayed change depending on the filter applied (profession on the left, age on the right).

Each time a filter is applied, the responses displayed change (Figure 25) so that the Designer can easily review the ones from that specific group.

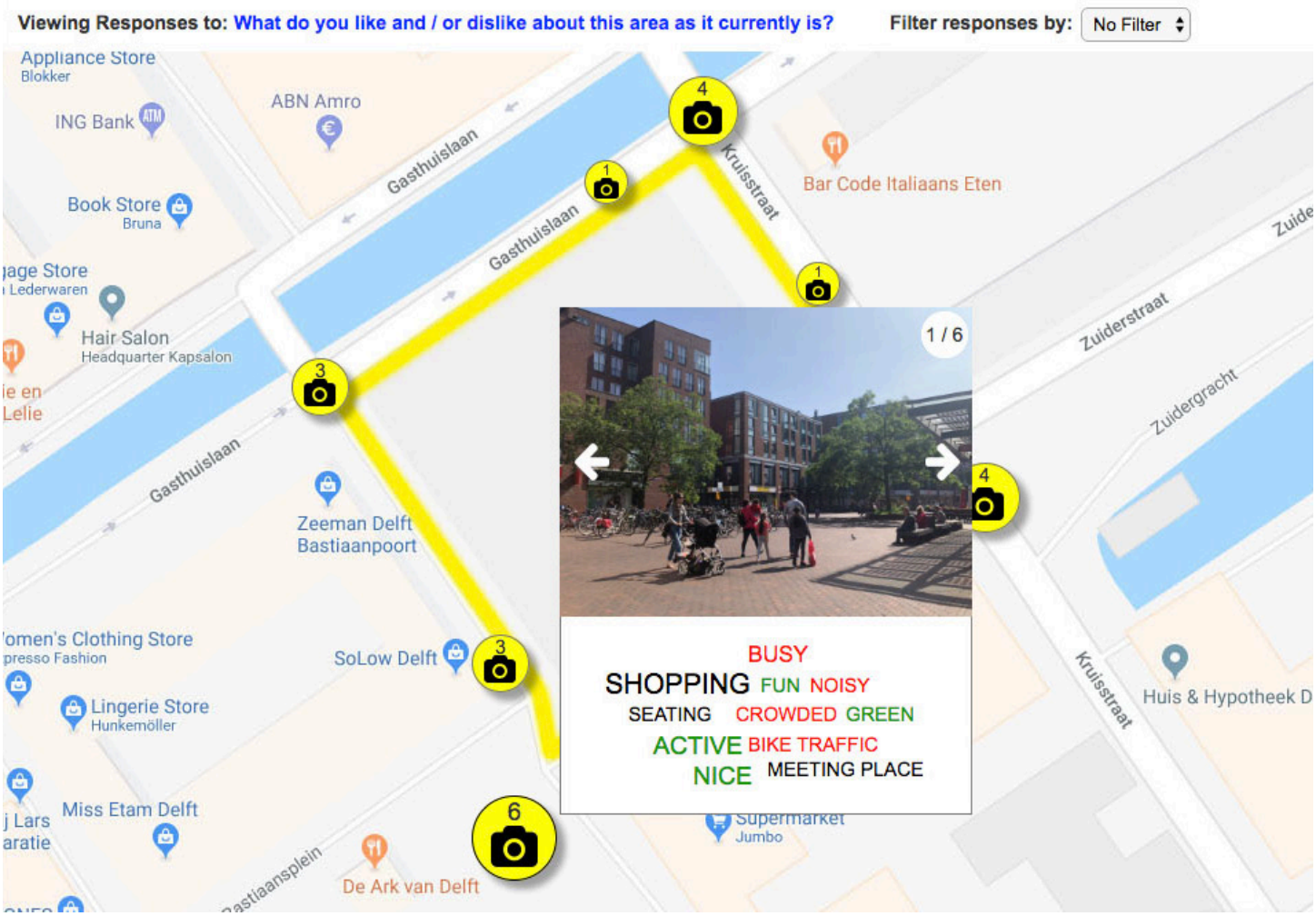


Figure 26: Information displayed when the Designer hovers over the yellow "6 photos" icon.

When the Urban Designer hovers over a yellow photo icon, the above data is presented (Figure 26). The Designer can click through images uploaded by citizens in that particular location and see a cloud of words that have been semantically processed: red for negative, green for positive and black for neutral. These words have been pulled from the individual comments of citizens (see Figure 27) and are processed depending on the context of each sentence. Words appear larger the more number of times they have been used.

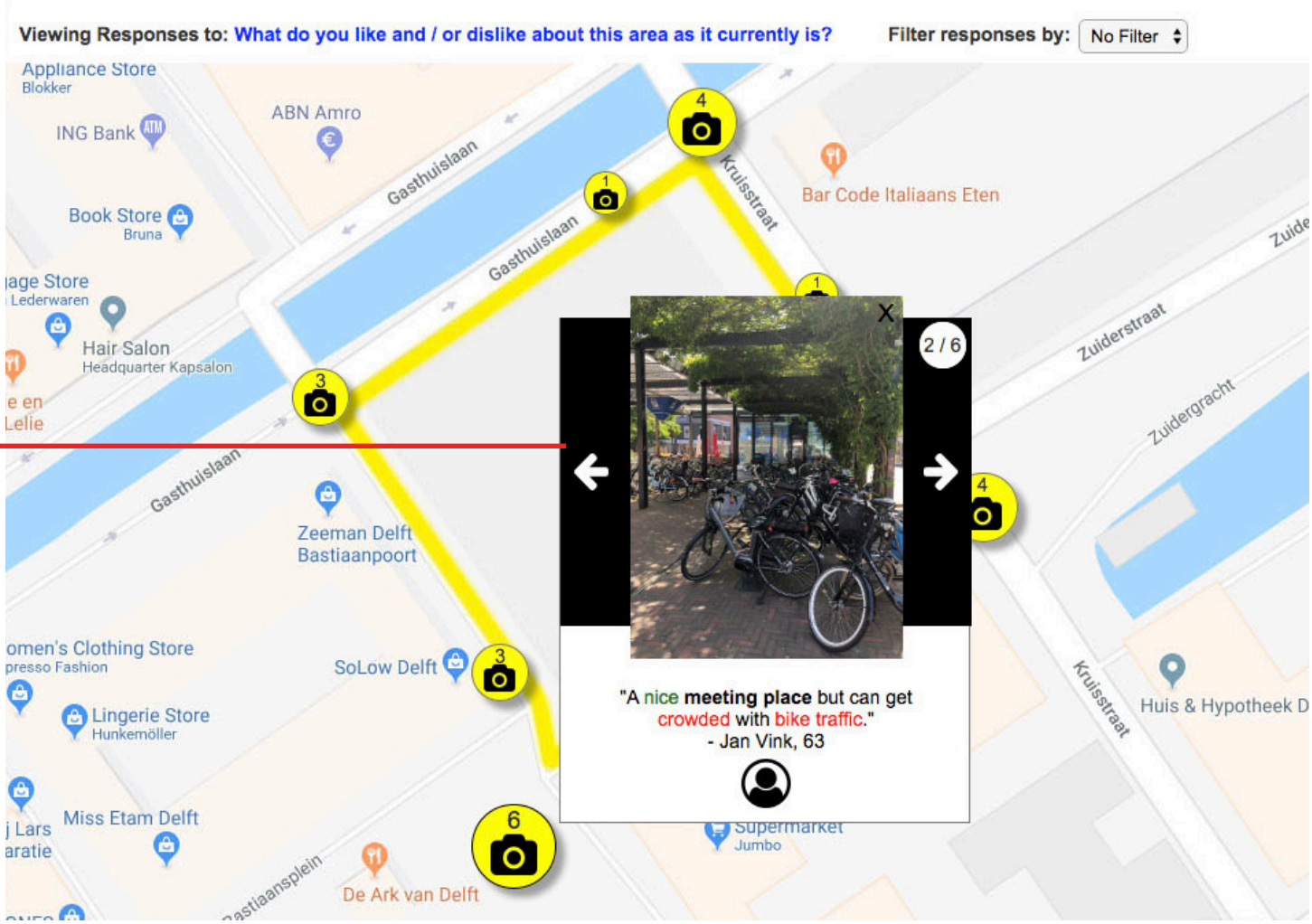


Figure 27: Information displayed when an individual photo is selected.

When an individual photo is selected, the associated comment is displayed with the citizen responsible for it (Figure 27). Colored or bolded words indicate that the words make up part of the semantic word cloud for that location.

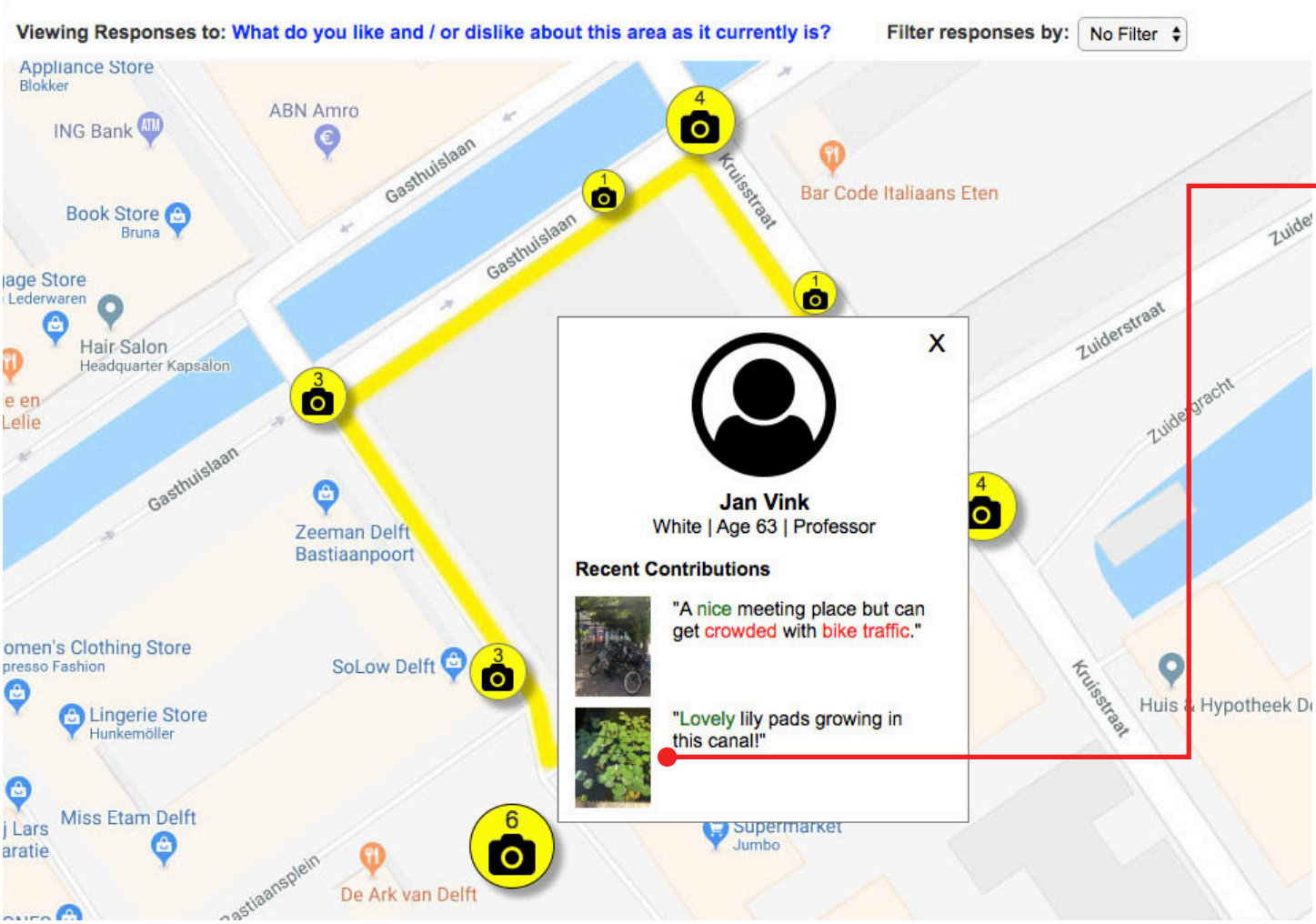


Figure 28: Information displayed when the citizen's profile is selected.

The Urban Designer can click to see the individual profile of any citizen who contributed something (Figure 28). This profile includes demographic information (which allows the data to be filtered) and any other contributions made by the same user. When the Designer hovers over the contribution, the location of that photo + comment changes color in the background interface (Figure 29).

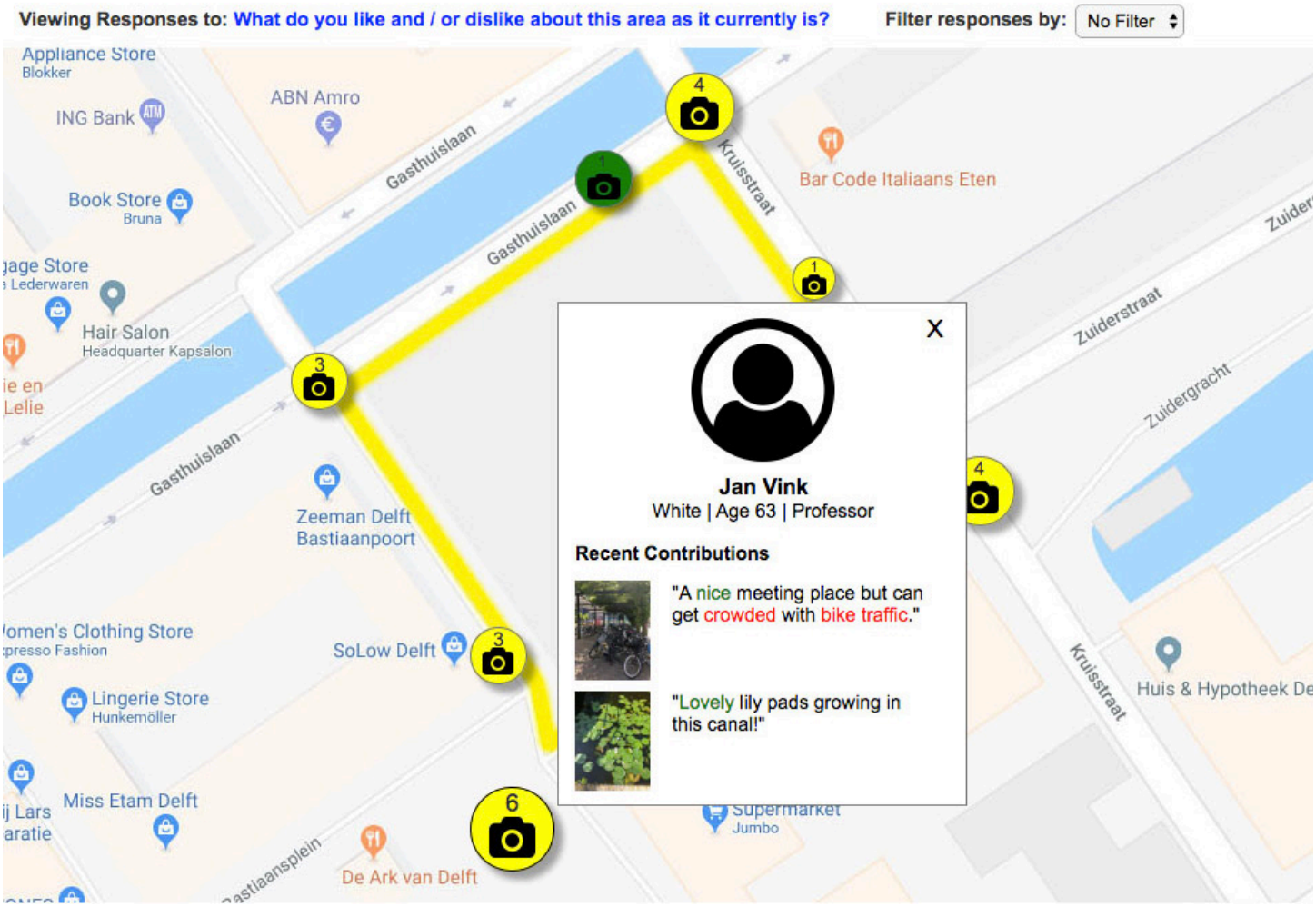


Figure 29: The location of the photo + comment turns green when the Designer hovers over “Lovely lily pads growing in this canal!”.

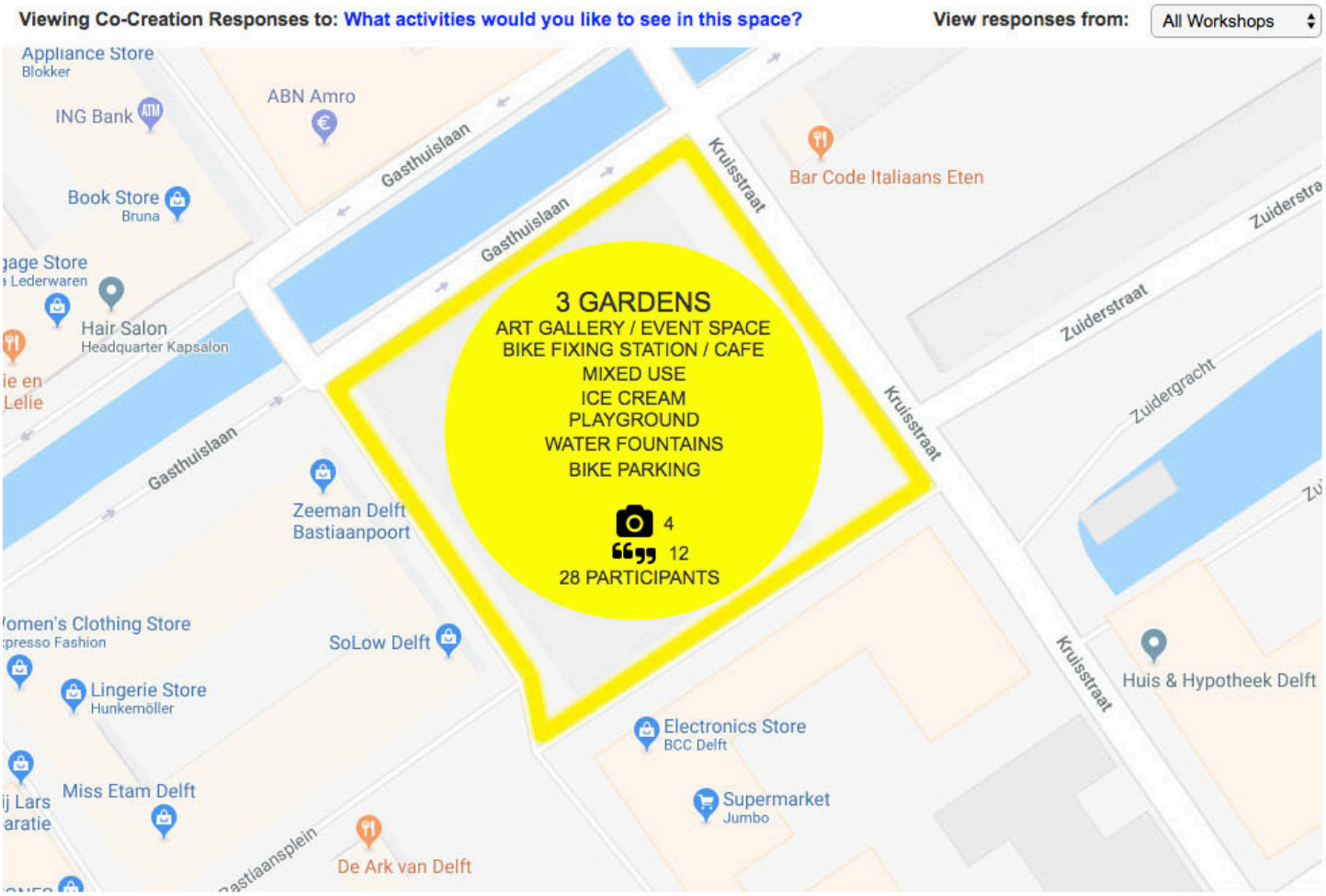


Figure 30: First screen the Urban Designer sees.

Interface 2 - Design Creation Question

Figure 30 is the first screen the Urban Designer would see when reviewing citizen co-creation responses to the question "What activities would you like to see in this space?" (displayed at the top in blue). It shows a summary of ideas generated from all workshops, with the first one "3 GARDENS" indicating that gardens were suggested in all three workshops. The ideas below are ordered by surface area, so the ones at the top are the largest, most prominent designs created by citizens. The number of photos, comments and participants from all workshops are also mentioned.

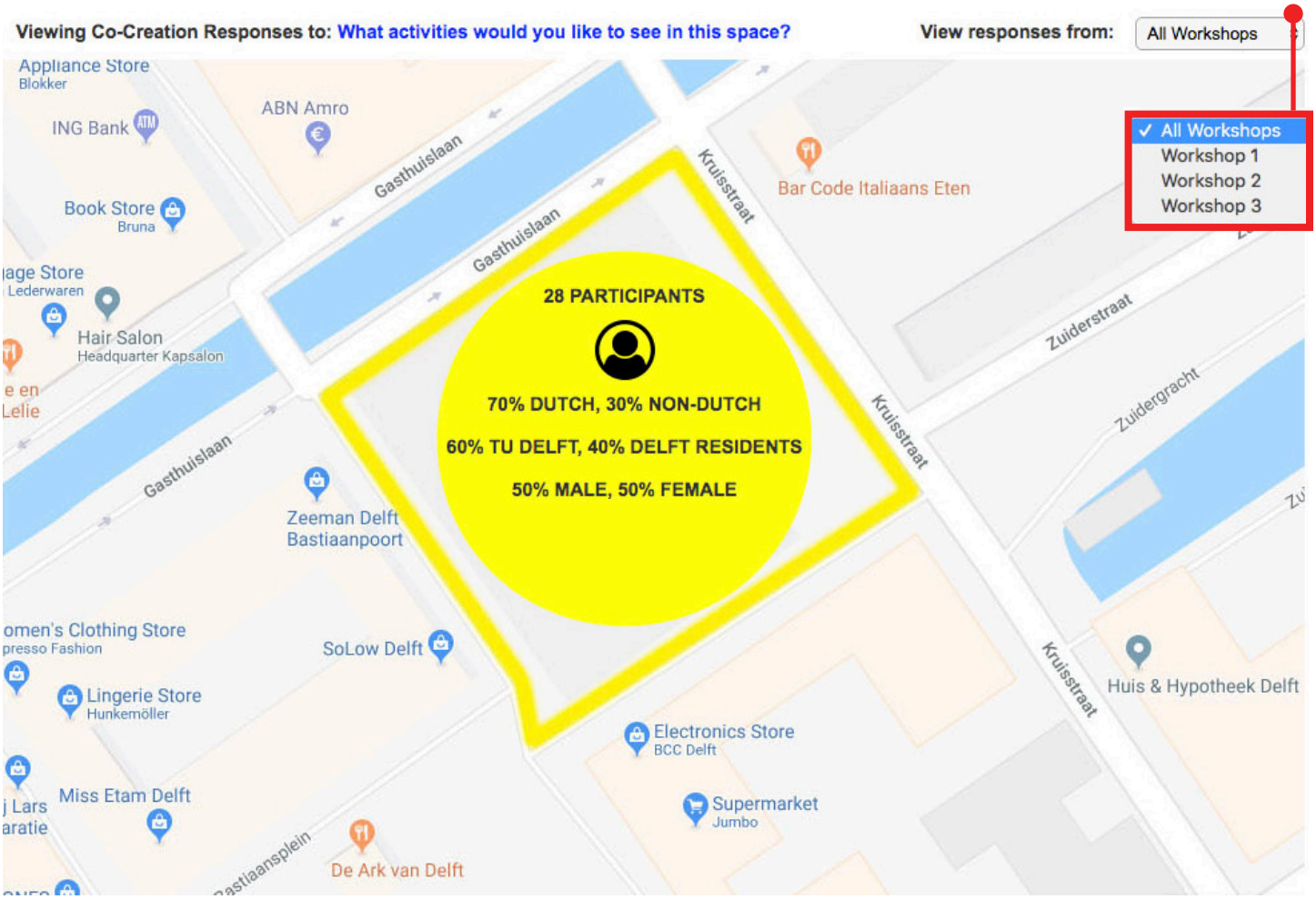


Figure 31: Information displayed when the Designer clicks on "28 Participants."

The Designer can see more about the participants of all three (or however many) workshops by clicking on "28 participants" in Figure 30. Figure 31 displays demographic information such as nationality, gender and whether they are town residents or affiliated with TU Delft.

In the top right corner is where the Urban Designer can choose to review responses from all workshops or from each individual workshop.

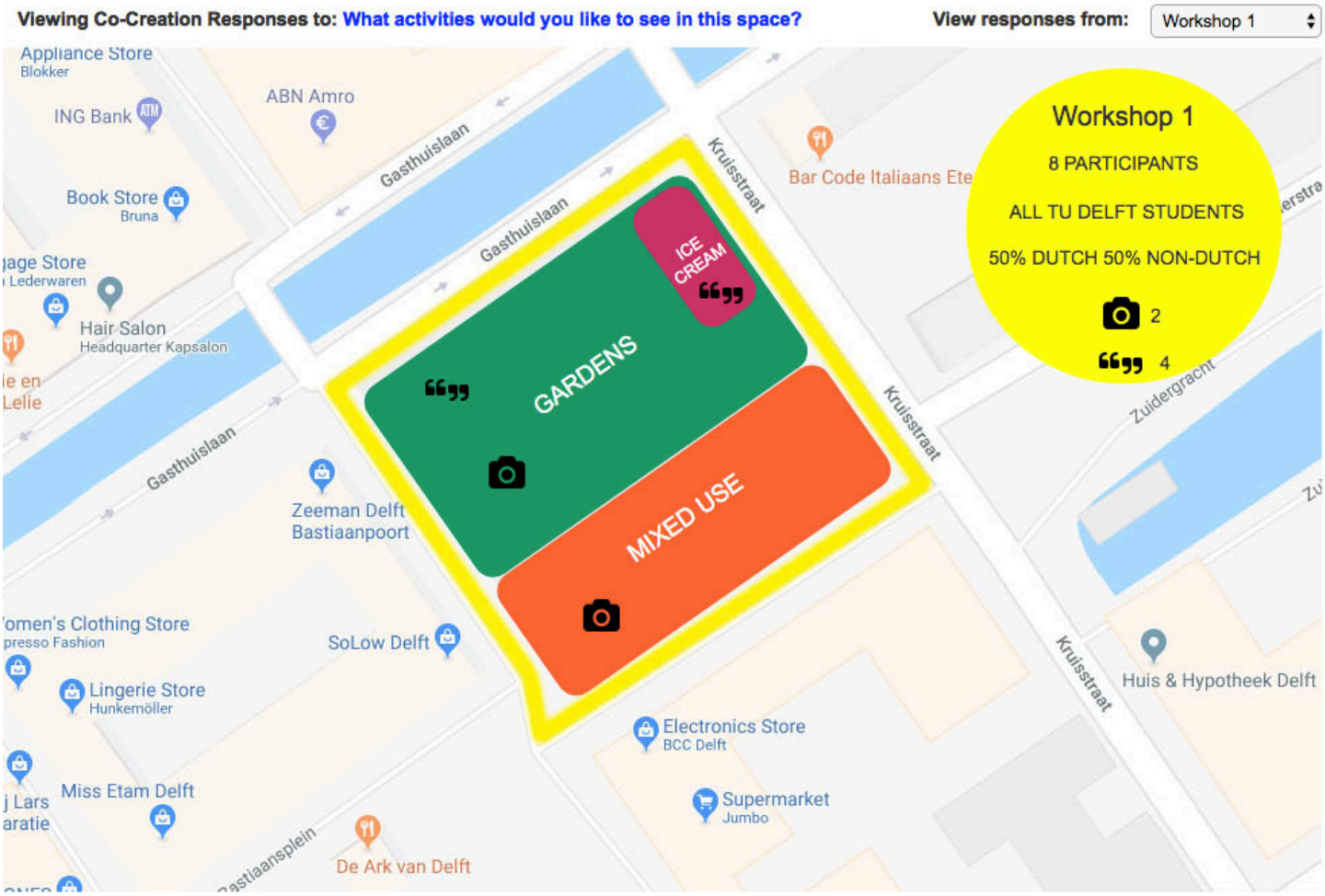


Figure 32: Results from Workshop 1.

When the Designer selects "Workshop 1" from the dropdown menu, the results from that individual workshop are displayed (Figure 32). In the upper right corner is a demographic summary of this particular workshop's participants, including the number of participants, their background and nationalities. It also includes the total number of photos uploaded and the number of comments written, both of which participants do during the workshop.

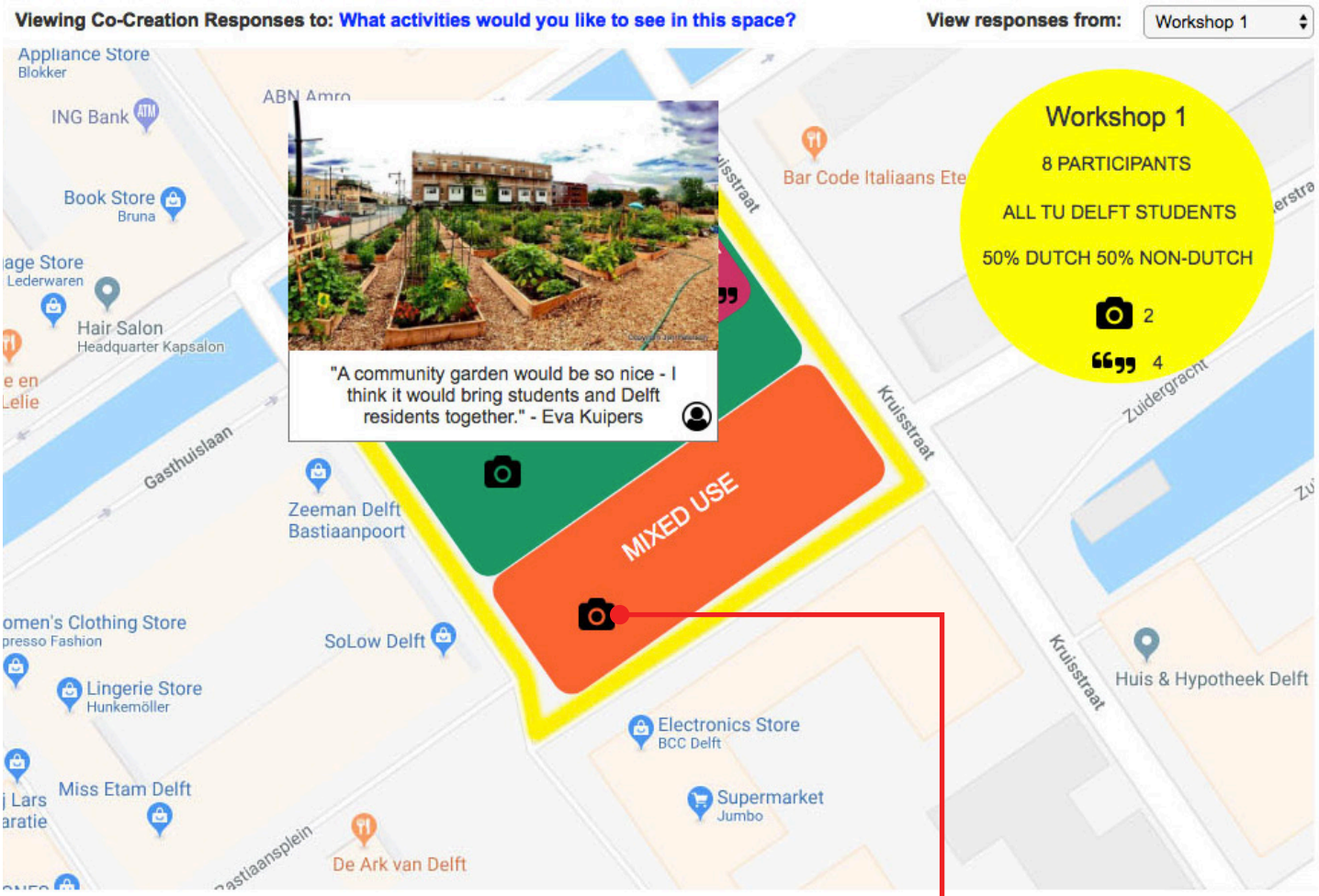


Figure 33: Information displayed when the Designer hovers over a photo icon.

Figures 33 (above) and 34 (right) show what happens when an Urban Designer hovers over one of the photo icons in the citizens' design. The photo the citizen uploaded will pop up and the associated comment displayed, along with the name of the citizen who uploaded it. The photo will most likely be a stock image from the internet meant to inspire the Designer and the comment should explain why the citizen chose that image. It is the responsibility of the workshop facilitator to encourage citizens to write clear, detailed comments that express their need or desire behind that image - otherwise, citizens may write comments that are not very helpful for Urban Designers. The profile of the citizen is also clickable, as before with the previous interface.

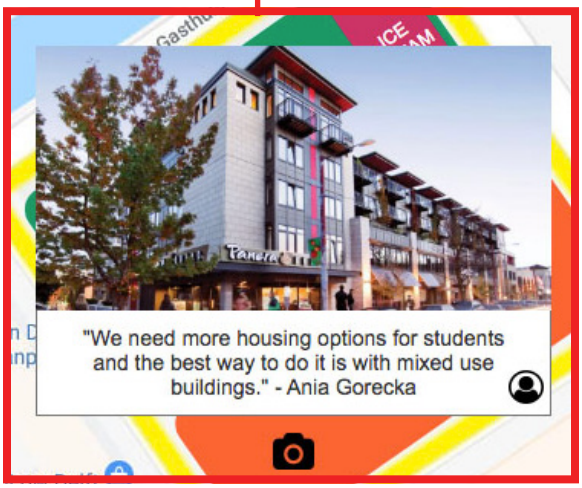


Figure 34: Information displayed when the Designer hovers over another photo icon.

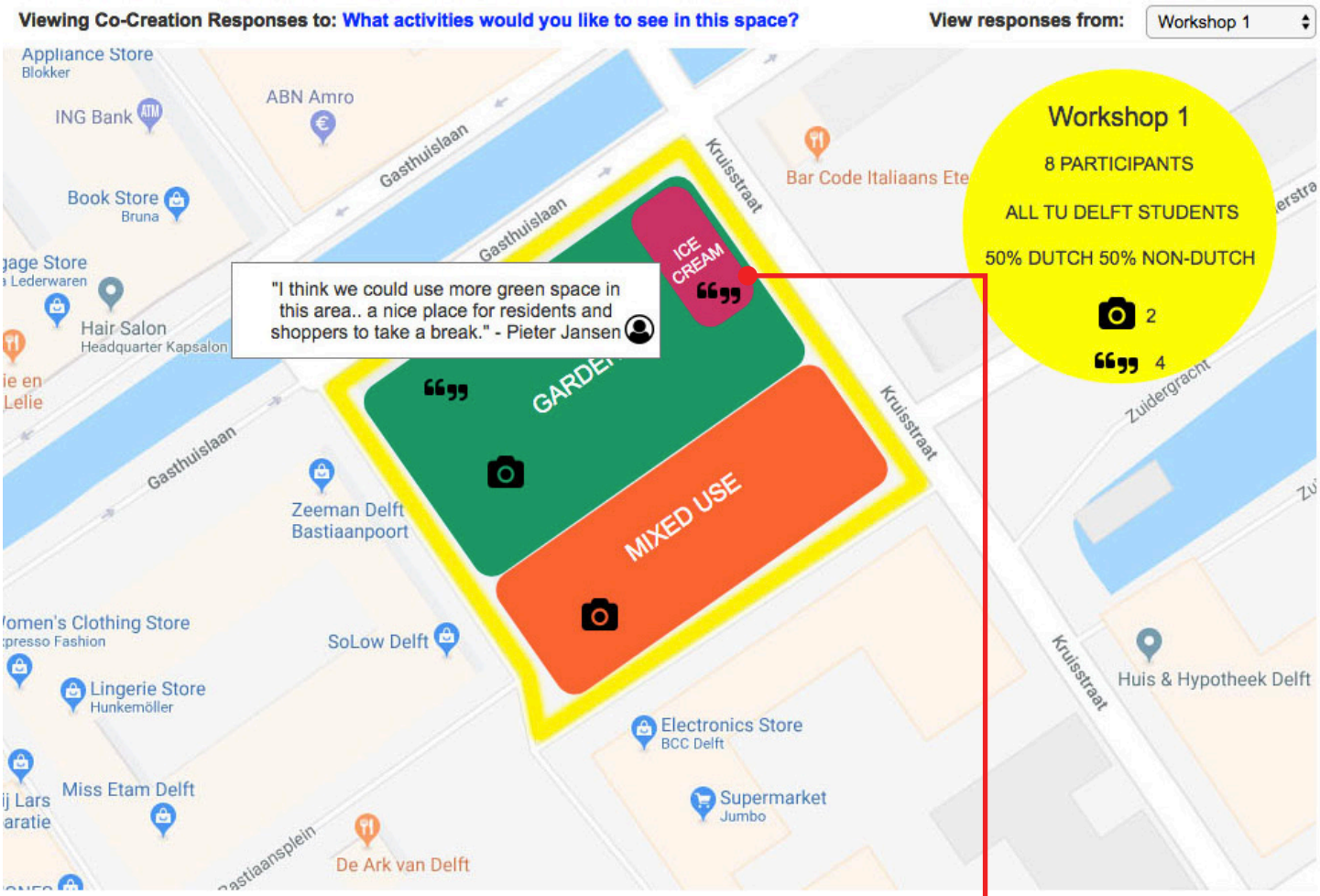


Figure 35: Information displayed when the Designer hovers over a comment icon.

Citizens may not always feel like uploading a photo and may write only a comment for the Urban Designer. Figures 35 (above) and 36 (right) show what the interface would look like if the Designer hovered over a comment icon.

Despite the workshop facilitator's best efforts, citizens will still probably upload some comments like the one in Figure 8. Nonetheless, it lets the Urban Designer know that an ice cream shop would make this citizen very happy.

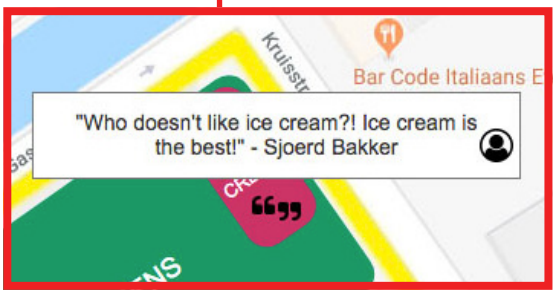


Figure 36: Information displayed when the Designer hovers over another comment icon.

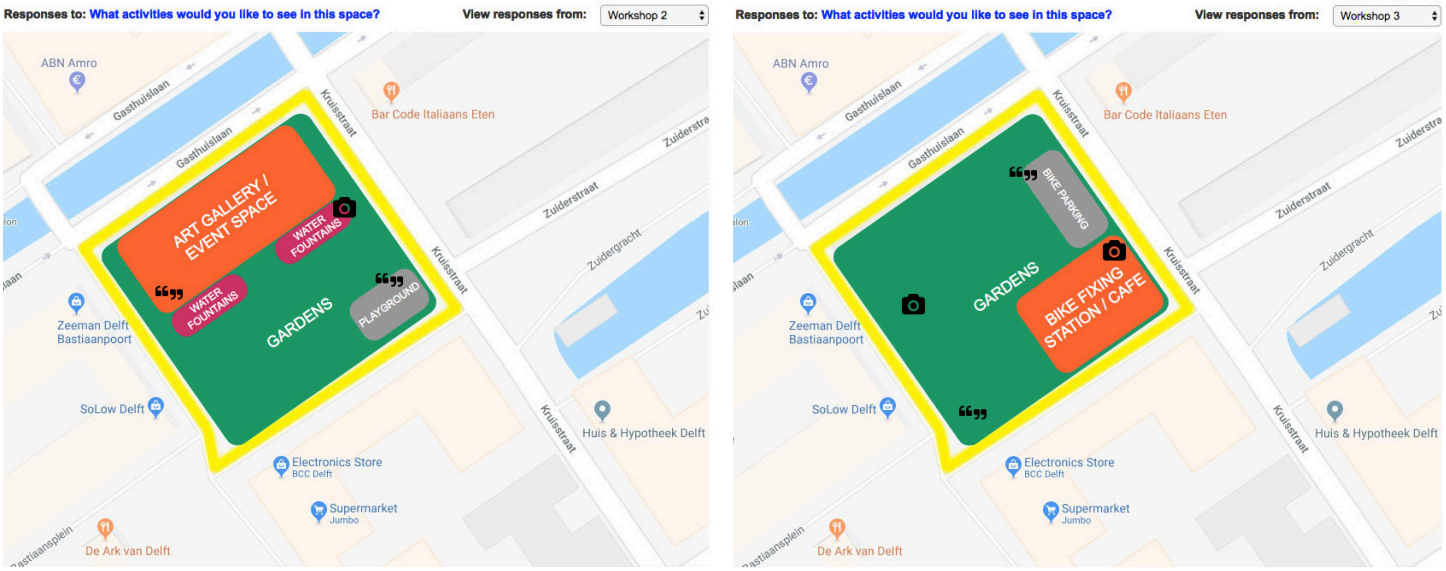


Figure 37: Results from Workshop 2 (left) and Workshop 3 (right).

Figures 37 show the results of Workshops 2 and 3, which would also display demographic data and function in the same manner as Workshop 1.

Procedure

Each of the five user tests took about thirty minutes, although one went all the way to an hour because the participant's feedback was so rich and detailed. Each test took place in the main hall of the IO Faculty of the TU Delft at a table separated from other students and noise. I used my laptop to show the participants the prototype and recorded the screen and the audio of our conversation with my phone camera.

Because the prototype was not fully interactive and only I knew which specific areas were clickable, the participants watched me give a sort of 'tour' of the interface and its organization. I demonstrated to them what kind of data could be uploaded by the citizens, how it would be presented and how they as professionals could look through all of this information.

I asked them to comment and ask questions freely about whatever caught their attention but I also structured the test by gathering some quantitative data from each participant. For each of the two interfaces I asked users to rate 1 to 5 the following qualities, taken from my Design Brief:

How focused is the data?

How conclusive is the data?

How layered is the data?

How applicable is the data?

I also asked them if the questions were well structured and something they would realistically ask citizens (yes / no) and if the photo and comment combinations in the second interface help them understand the citizen's reasoning or 'why' behind their design (yes / no). I chose not to ask this question for the first interface because the citizens are not yet designing in the Identification Stage and are only offering opinions and personal experiences.

Quantitative Results

Below are the quantitative results gathered from the tests:

Interface 1

Question	U1	U2	U3	U4	U5	Average
How focused?	3.5	4	4	5	4	4.1
How conclusive?	4.5	3	4	3	4	3.7
How layered?	4	5	5	4	4.5	4.5
How applicable?	4	5	3	3	4	3.8
Good question?	Yes	Yes	Yes	Yes	Yes	Yes

Figure 38: Table showing quantitative results of Interface 1.

Interface 2

Question	U1	U2	U3	U4	U5	Average
How focused?	5	4	5	5	4	4.6
How conclusive?	2.5	3	4	5	3	3.5
How layered?	4	5	5	4	4.5	4.5
How applicable?	4	5	3	3	4	3.8
Good question?	Yes	Yes	Yes	Yes	Yes	Yes
Understand why?	Yes	Maybe	Maybe	Yes	Yes	More Yes

Figure 39: Table showing quantitative results of Interface 2.

Both interfaces scored well in the data being focused, meaning that the participants felt that the data was specific enough to answer the overarching question given to citizens.

Both interfaces scored lowest in how conclusive the data was, which indicates that participants want to see even more concise summaries and conclusions drawn from the details. This is supported by comments about demographics that are linked to specific screens in the following section.

Both interfaces scored well on how layered the data was, with Interface 2 scoring lower to indicate that more layering can occur here due to the richness of the data as compared to Interface 1.

Interface 2 scored high on applicability while Interface 1 had mixed reviews due to some Designers seeing the data as a very basic analysis they could do themselves. Those who rated applicability higher valued the added perspective of the citizens.

Both interfaces scored all Yes's on whether or not the question was appropriate.

Interface 2 had More Yes for whether the data helps the Designer understand the citizen's reasoning behind their design. The ones who responded Maybe believe that the citizen's comments could dig a bit deeper.

The accompanying comments, critiques and sentiments for these ratings are detailed below.

4.4.3 Discussion

Both Interfaces

Both interfaces received surprisingly positive reactions and ratings from all participants of the user test. Repeat participants and newcomers were equally enthusiastic about the data presentation, with one newcomer claiming he learned a lot from the interface and our discussion and a repeating participant saying, "It's really interesting to see how this is based on our previous comments. It really looks like that!". A third participant said, "I like this a lot because it offers data in a way that we can work with it." Bingo!

All participants approved of the questions being asked in both interfaces but expressed interest in also asking citizens more specific

questions and giving them options to choose from (as mentioned several times in this report). This leads me to believe that the final prototype should have a third interface simulating this kind of question-data presentation.

All participants would also like to be able to filter responses by whether the user is a resident of the area or a visitor. This information is important to them to better understand how residents see this space and what they want versus the opinions and needs of those visiting. This feature will be added in the final prototype.

Interface 1 - General Comments

All participants agreed that the question being asked was appropriate for the early stage of the project given, one describing it as part of 'discovering the area's soul'. All participants expressed interest in wanting to use this interface to get answers to other kinds of questions as well. One participant said that this would be very useful for her if she could not visit the site herself and all agreed that even if they were able to visit, this data provides access to perspectives that otherwise would not be known to them. One user commented that, "It's a very good way to translate statistics into something integral that can be used in the analysis."

Interface 1 - Screen-Specific Comments

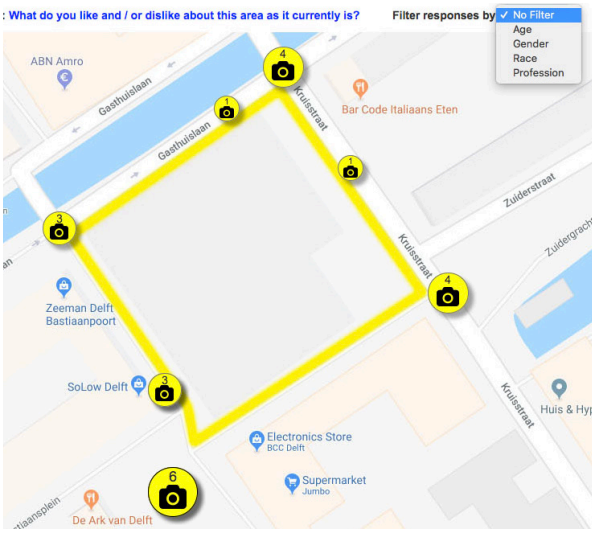


Figure 40: First screen the Urban Designer sees.

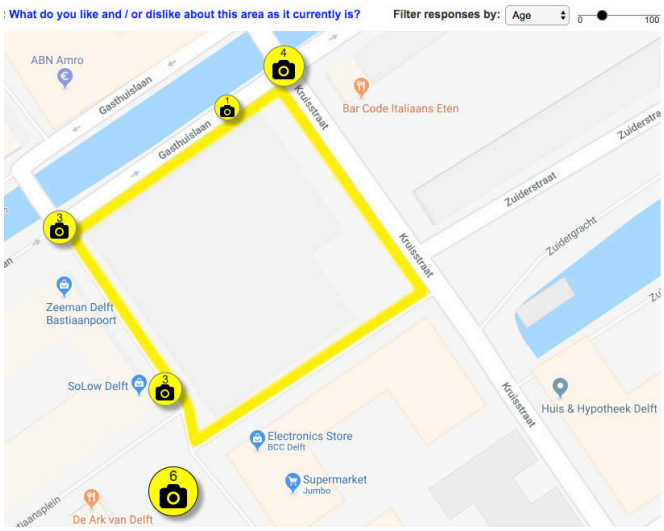


Figure 41: Responses displayed change depending on the age chosen.

U1 exclaimed “Nice!” when I demonstrated the filtering option. 5 / 5 users approved but would also like to see a distinction between visitors and residents, as mentioned before.

5 / 5 users would like to see a demographic summary of participants on the side like in Interface 2. This will be added for the final prototype.

5 / 5 users thought that there was no need for a photo + comment summary of the entire area since the photos and comments are specific to each individual location.

U1 suggested dividing up the slider with more numbers than just 0 and 100, such as 18, 30 and 65, or getting rid of it altogether and simply having another dropdown menu of age groups such as children, teenagers, elderly etc.

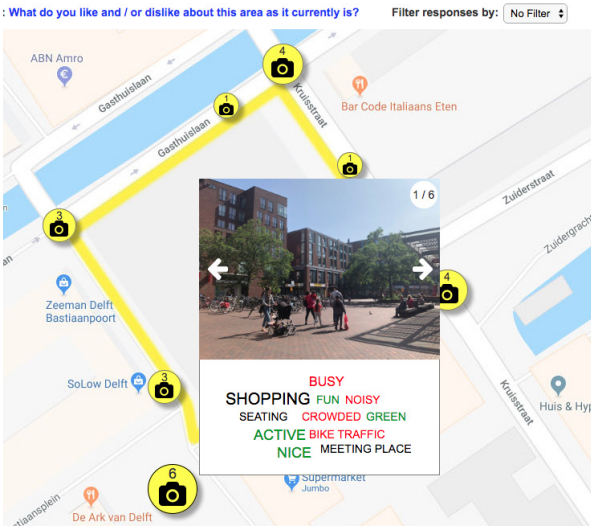


Figure 42: Information displayed when the Designer hovers over the yellow "6 photos" icon.

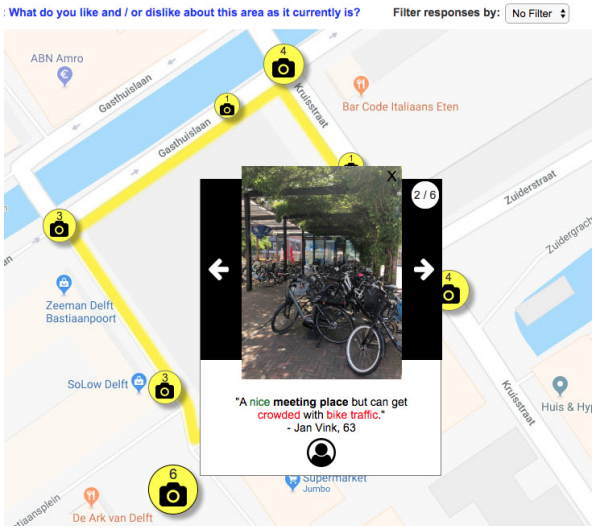


Figure 43: Information displayed when an individual photo is selected.

U1 suggested making each word clickable in the semantic word cloud so they can directly see what photo and comment it came from. This will be applied in the final prototype.

U1 expressed doubt whether 'bike traffic' should be processed as negative. This raises awareness of the system's capabilities and that some words or phrases may be difficult for it to interpret.

U3 expressed doubt that an average citizen would use the phrase 'bike traffic.' She said this was very specific and that a citizen might write something more general, like 'crowded' or 'busy.' The realism of the comments will be improved by asking a variety of people to comment pictures for the final prototype.

U3 exclaimed "Oh I like that!" when shown that individual comments can be viewed.

Interface 2 - General Comments

All participants approved of the question and found the data generated by it very applicable to their work, one describing it as a question that 'explores potential'. Another said that, "If you get these responses and see who [these people] are and what they want, it's already way more than what is currently done [in urban practice]." A third, new participant, agreed by saying, "We normally do SWOT analysis ourselves. This shows the SWOT from the 'expert user' - the person really in contact with this area. Unless you as an urban designer are in close contact with this area, you don't see these minute details. So this tool really helps you get that implicit knowledge to combine with your expert knowledge."

Most agreed that they would not directly translate the ideas but would certainly use them as inspiration. One commented, "I really like this as a start, asking what they would like to see here, but next I would like to suggest ideas and options to them and get more specific."

All users said they would be interested in seeing which citizens continued participating from the last question / session and which dropped out. One user explained, "Maybe when the project is realized you can come back to the people who stopped participating and see why. See where the problems are. See if they would want to participate again and why or why not."

Interface 2 - Screen-Specific Comments

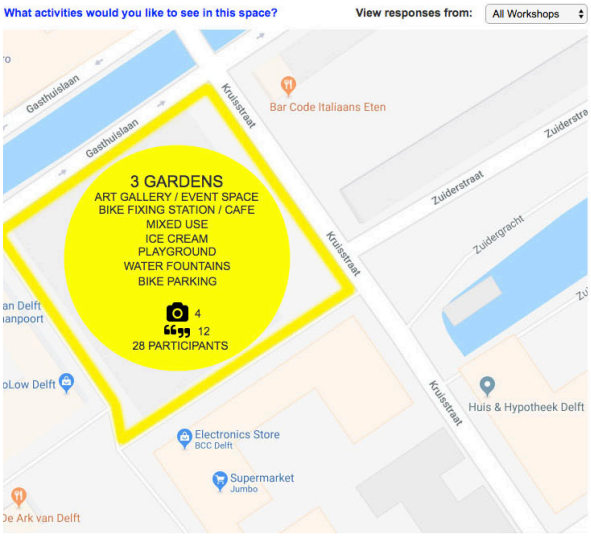


Figure 44: First screen the Urban Designer sees.

5 / 5 users liked the summary of ideas generated by all workshops but suggested better organization to understand which ideas came from what workshop.

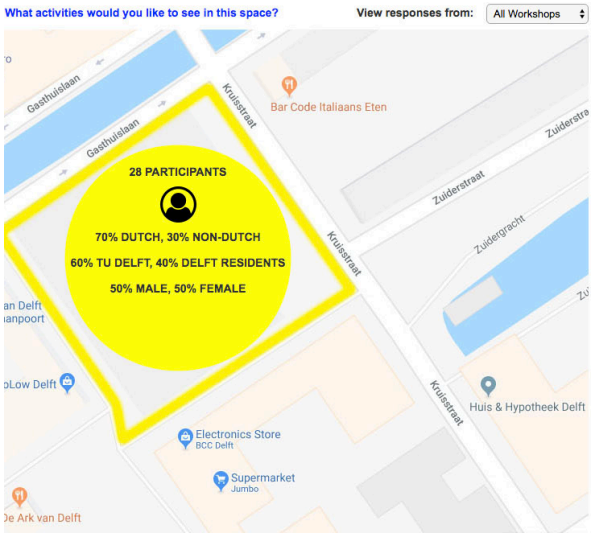


Figure 45: Information displayed when the Designer clicks on "28 Participants."

5 / 5 users liked the demographic summary of all participants but would like it to be more visual (which was planned for the final prototype). They would also like, if possible, to see very quickly what different demographic groups want - for example, "Students want ice cream and bike facilities," "Elderly want gardens." This will be incorporated into the final design.

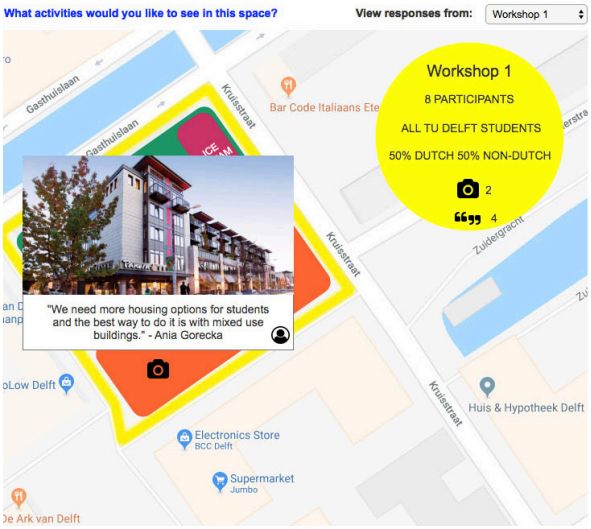


Figure 46–: Information displayed when the Designer hovers over a photo icon.

U1 noticed that the user's age was missing. This will be corrected in the final prototype.

4 / 5 users were skeptical of the high quality of some of the comments, especially this one. They expressed doubt that an average citizen would use the term 'mixed use.' This made me realize that some of the data I had generated was too much from my own perspective and not representative of someone outside of architecture / urbanism. The realism of the comments will be improved by asking a variety of people to comment pictures for the final prototype.

5 / 5 users really liked the demographic summary in the corner and said this information was very valuable to them.

U3 suggested that comments like this could go even deeper if the session facilitator asked the citizen "WHY is this the 'best' housing option?". This responsibility of the facilitator to dig deeper into comments will be made clear in the final design. U2 went on to say that, "If you can ask why they think mixed use housing is the best solution, then you find out the reason and you can use that reason in the negotiation process. You find the underlying reasons and it's more reconcilable [than the form itself]."

4.4.4 Key Findings

These user tests generated quite a lot of positive and helpful feedback for moving forward into the final process and prototype design. Feedback can be summarized into the following most important points:

Link demographic information with opinions / ideas

All participants appreciated the demographic information displayed in both interfaces but agreed that it would be extra useful to see demographic groups linked with opinions / ideas; for example, for the interface to say very explicitly that elderly find the space noisy while students find the space exciting or that elderly want more places to sit while students want an ice cream shop. This would help them understand and prioritize opinions / ideas and allow for identification of tensions if they exist.

Have facilitators dig deeper into citizen comments

All participants admitted that it will be hard to control what kind of comments citizens write but believed that with some facilitation during sessions, citizens could be encouraged to get to the root of their thought or idea. If the facilitator is made aware that they should prompt citizens with 'why?' questions when they are submitting a comment, there is a higher likelihood of the comments being of higher quality.

Make the citizen's relationship to the space more clear

All participants expressed a desire for the interface to distinguish between residents and visitors of the area. All agreed that this was a very important demographic distinction for them to be able to weigh opinions / ideas from both sides.

Remove designer's bias from the comments

With these tests I was made very aware that some of my own designerly bias had made its way into the comments I had generated for the interface. This requires me to 'normalize' them by asking others without my architectural background to write example comments for pictures going into the final design.

Track each citizen's participation over time

Participants expressed an interest in seeing which citizens participate in which sessions and who continues from session to session. I thought this was a very good suggestion that should be incorporated into the final design because it would allow project leaders to pinpoint problems, learn from their process and gradually improve their technique.

4.5 Conclusion of Chapter 4

4.1 Design Brief

This chapter started out by outlining a Design Brief with Design Goal, Interaction Vision and Interaction Qualities for my design, which is "a more structured participation process and a digital interface where urban designers can review citizen generated data to start bringing it into the professional design." The four qualities of the data being *focused, layered, conclusive* and *applicable* were used to measure the success of the interface in 4.4. User Testing.

4.2 Adjusting the Minimum Viable Process (MVP)

Here recommendations were made to U_CODE on how to adjust parts of their Minimum Viable Process (MVP) to make it easier for the Urban Designer to understand and translate citizen data into professional designs. Recommendations were made based on the 11 aspects identified in Chapter 3 as well as all other research from my Empirical Studies.

4.3 Creating the Urban Designer's Interface

This section broke down what kind of data could be generated by citizens from a variety of questions proposed during the Pre-Design, Design Creation and even Post-Design stages of an urban project. It also explained a few different drivers behind the organization of the interface, based on previous insights from Urban Designers.

4.4 User Testing

Finally, this section explained the process of my user testing with Urbanism students from the TU Delft faculty and presented the lower-fidelity prototype that was used to test. A qualitative analysis was done by asking participants to rank the interface on a scale of 1-5 for each of the interaction qualities identified in the Design Brief. Their feedback and recommendations were summarized in order to make clear what improvements should be made to the next version of the interface.

Next Steps

The next and last chapter of this report, 05. Discussion, will provide a final evaluation of my work and of the research and design process itself.

05
Discussion

This final chapter provides an evaluation of the design with professional feedback, reflects on the research questions identified at the beginning of this project and defines contributions made to new knowledge, urban design education and practice. Finally, limitations of the project are pinpointed and recommendations for future research suggested.

5.1 Evaluating the Design with Professionals

Unfortunately due to the timing of this project and most professional Urban Designers being on holiday, only one responded to my request for feedback - Frank Werner of KCAP. If additional comments come in, they will be communicated to the U_CODE team.

Mr. Werner's feedback on my interface can be summarized by the following:


Liked: Photos, comments and semantic word cloud for capturing meaning

Mr. Werner thought that photos and comments were a useful way for citizens to express themselves and give Urban Designers more information about their experience and ideas. He said that some Urban Designers also make semantic word clouds and photo collages to better understand a space, so this is a visual language they are familiar with and can help them understand the citizen's perspective of the current and desired atmosphere.


Agreed: Link demographic information with opinions / ideas

Mr. Werner agreed with the idea of making it clear what different demographic groups want. He said that an individual contribution can be interesting but when the number of participants grows - as U_CODE aims to do - it would be easier to see people split into groups and majorities, if they exist. He did point out that an idea supported by many is not necessarily better or more valuable than one supported by few; however, it does allow Urban Designers to understand what more people want and weigh that against other stakeholders. Mr. Werner even said that this information can be used by the Urban Designer to argue for or against certain design proposals, an act that could prevent public opposition to a design when the project is beyond negotiation.

Agreed: Make the citizen's relationship to the space more clear

As the student participants of the User Test expressed, Mr. Werner also agreed that the interface should distinguish between residents and visitors of the area. He said that this is a very basic distinction they use in every Urban Design project to understand to whom a space 'belongs' and which citizens should have more influence over it. For example, a resident of the area may complain that there is too much car traffic, while a visiting tourist in a car doesn't even consider this problem. Who does an Urban Designer listen to and design for? That's not so straightforward, but this information will certainly help Urban Designers see both sides of the story.

Proposed: Combine citizen data from Interface 1 and 2

Mr. Werner gave the interesting suggestion of being able to overlay results from Interface 1 (*"What do you like and / or dislike about this area as it currently is?"*) and Interface 2 (*"What activities would you like to see in this space?"*). "This would show us if citizens are proposing designs in reaction to current conditions or not," he told me. Indeed, being able to review the results of Pre-Design and Design Creation activities in the same interface could help Urban Designers recognize even more trends, especially if returning participants are tracked, as suggested before.

5.2 Addressing the Research Questions

Three research questions identified at the beginning of this project drove my research and design activities. They helped me to frame the scope of my project and to remain focused when information was inundating and could have led me down other side paths. Based on all my research and design activities of the past few months, my learnings and reflections on these three questions are as follows:

1. What is the perspective of the Urban Designer towards citizen participation?

Through numerous interviews and workshops, detailed in 03. Empirical Studies, it seems clear that at least here in Dutch professional practice and at the TU Delft Urbanism faculty Urban Designers are open to participatory design but their experience and confidence with it varies. The Urban Design professionals and students I spoke with definitely understood the benefits of connecting with the users of their design but they also brought up the important reality that although the user should have a voice, Designers must also juggle the needs of many other project stakeholders, not to mention environmental factors, budget, etc. For me this solidified the concept of the Urban Designer as a "middle man" who must find balance between numerous involved parties and the built environment - not an easy task.

Of course, as mentioned in 5.4.1 Limitations, during this thesis I was only exposed to Urban Designers who practiced or were quite open to public participation. In my previous experience in the American architecture / urban planning world, this was not the case, so it is not possible to conclude that all Urban Designers everywhere feel the same way as those who participated in this project. My Literature Review also highlighted this fact, noting that each culture and society have a different attitude towards participation that can be hindered because of top-down hierarchy and / or expert mindset (Gardesse 2015, Nez 2011, BVBW 2015, Council of Europe 2015). Thankfully, public participation seems to be alive and well in the Netherlands.

2. What kind of information do Urban Designers want from citizens and where does this fit into their design process?

Through my research I found that Urban Designers see citizens as 'experts of their own experience.' Therefore, it makes sense that they would be interested in citizens' local knowledge and daily routines in relation to a project site to better understand how the space is currently viewed and used and how it could be improved in the future. This type of information would be useful at the very beginning of the project, during the Pre-Design phase.

Some of the Urban Designers I interviewed, particularly the students, had little to no experience with co-creation but all were open to designing with citizens and being

inspired by their ideas. Although 3D models could be interesting, all expressed greater value in understanding the 'why?' behind citizens' designs. This would happen during the Design Creation stage where Urban Designers and citizens work together as partners.

3. What is the most effective way to present participatory data to Urban Designers?

Through my interactions with Urban Designers, I learned that not every Designer is the same. Some would like to get a quick summary of information and ideas from participatory processes while others would like to be able to dig deeper into individual comments and even participants. This led me to believe that a layered presentation, from big picture to small, would cater to most Designer's needs. It also meant that a simple PDF report would not suffice - the best option, as proposed in this thesis, would be an interactive interface linked to the other participatory processes of U_CODE, specifically the multi-touch screen table for co-creation.

All Designers expressed keen interest in demographic groups, especially differentiating between visitors and residents of the project area. One professional also suggested combining data from current conditions (in this thesis, Interface 1) and proposed designs (Interface 2) to better understand if citizens are designing based on present gaps.

Designers also liked the semantic and sentiment analysis proposed by U_CODE and saw it as a valuable, visual summary of information about a specific location. Many expressed doubt whether citizens' comments would always be appropriately processed by the computer - or even a human - and stressed the importance of the comments being written as clearly as possible. They admitted it would be impossible to always receive beautifully written comments by all citizens but expressed how much value verbal explanations had for them.

5.3 Contributions to Theory, Practice and Education

5.3.1 Contributions to New Knowledge

As my Literature Review shows, there is a decent amount of research into public participation and participatory design but few sources that dive deeply into the Urban Designer's perspective and how Designers work with citizens in real life. This thesis shines a spotlight on these topics through numerous interviews, workshops and user tests, getting to the core of what Urban Designers need from citizens and how to best incorporate public participation into professional design.

This look into the minds and practice of Urban Designers can inform not only U_CODE's work, but any urban participatory design project. The eleven aspects identified after my interviews, for example, are translateable to any endeavor which needs to take into account the Urban Design perspective.

5.3.2 Contributions to Urban Design Education

By talking to students and professors of the TU Delft Urbanism department, I discovered that participatory design is appreciated and encouraged in their education but often does not go beyond talking to citizens around the project site (Hausleitner 2018). One Urbanism student who participated in my prototype testing poignantly told me:

"At the Industrial Design Faculty, design is really from the user's point of view, I've noticed. In Architecture it's more about beauty and Urbanism is about the underlying function. So it's less important what it looks like but how does it function. And I think that this is a really good reason to cooperate with Industrial Design. **We know about group behavior but we don't really have the right tools to find out what the individuals want.**"

This collaboration between the IO and Urbanism faculties struck me as a very smart move. By simply incorporating the user research methods IO is known for into a few Urbanism courses, students would already have a deeper awareness and confidence in applying these methods to their own work. By practicing participatory design in the 'safe space' of education, Urban Design students would gain valuable experience that they could bring into professional practice.

5.3.3 Contributions to Urban Design Practice

It is my hope that this work inspires Urban Design offices that already practice participatory design as well as those who do not.

For those who do, this work makes tangible the possibility of public participation through digital means, as a few professionals I talked to were more comfortable with pencil and paper as a medium for participation and co-creation especially. As the world becomes more digitized and connected, participatory processes will also go online, and with this design I hope these offices feel less skeptical and more open to testing out digital tools.

For those offices which do not yet incorporate public participation into their practice, this work lays out a rather clear roadmap for them to do so in a way which is specifically catered to Urban Designers and their way of working. My hope is that they are more convinced of the benefits of participation and see the process as valuable and accessible rather than a waste of time and budget.

It is also my hope that this research is incorporated into ISEN-Toulon's multi-touch screen table and the overall U_CODE participatory process, making its way into more and more urban projects over time.

5.4 Limitations, Implications and Recommendations

5.4.1 Limitations and Implications of this Research

One limitation of this work is that this process and interface was designed by and for Urban Designers who are already open to participatory design. It does not take into consideration those who are not so open and proposes no strategy for convincing these kinds of designers. By simply making it as easy as possible for Urban Designers to understand and incorporate public data with my design, it is my hope that skeptics can experience a change of attitude towards participation.

Another limitation is how the system will perform with very large numbers of participants and potentially hundreds of data inputs. This project explored participation and data processing / presentation on a digital but smaller scale. U_CODE should consult someone with more in-depth knowledge of data processing and its capabilities in order to apply this model to mass participation. Only then will it be clear how much the system is capable of and whether or not the data, such as pictures and comments, need to be double-checked by a human facilitator to be organized without error.

A third limitation of this work is that the citizens' designs, photos and comments were all quickly mocked up by myself for the purpose of organizing and testing the interface with Urban Designers. A critical aspect for the multi-touch screen table team to explore would be if citizens choose such potos and write such comments as assumed by myself or if they are very different. Can the interface still support what they come up with or does it need to be adjusted in some way?

5.4.2 Recommendations for Future Research

Further design iteration and user testing will be necessary to pinpoint the details of how data should be graphically displayed within the interface. This project user tested with a lower-fidelity prototype and focused more on content and Information Architecture. A higher-fidelity final prototype will be presented at my defense which will pay more attention to visual design but will not be tested due to time limitations. If U_CODE is interested in developing this interface further, it will be necessary to test and receive additional feedback from Urban Designers.

More research also needs to be done into

the effectiveness of this design in a real urban project context. Though hard to measure, U_CODE should observe how Urban Designers interpret the citizen data presented to them in this interface and if it significantly eases their understanding and translation into professional design.

Ultimately, it is my hope that this thesis sheds light on the perspective of the Urban Designer and inspires U_CODE to incorporate this knowledge into future work in order to maximize the effects of citizen participation and co-creation in Urban projects.

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