Let's talk about Smart City!

Engaging citizens with Smart City through dialogues evoked by playful and speculative experience design

Master Thesis
Chang Hao-Yung | 4745299

Colophon

Let's talk about smart city!
Engaging citizens with smart city through dialogues evoked by playful and speculative experience design.

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Author
Chang, Hao-Yung
howdai1026@gmail.com

Supervisor Team
Chair
Dr. ir. A.P.O.S. Vermeeren
Department of Human Information Communication Design

Mentor
A. Calderón González, M.Sc
Researcher & Teaching staff at Industrial Design Engineering

Dennis Costa & Judith Veenkamp
Waag Society

Executive Summary

With the development of technology, in a city context , the topic of smart city has become more and more popular. Smart city can bring positive changes to citizens' lives but might also cause risk and conflicts. However, in most cases, the development of smart city is a top-down process that rarely involves citizens' opinions.

Building upon the above background, this project aims at designing a playful experience to engage citizens in smart-city-related topics.

In the research through design phase of this project, through conducting the generative session with citizens in Amsterdam, the project aim concretized into the design goal: To trigger citizens' awareness on the possible pros and cons of using the technology of data collection and analysis as a manner to make a city better, and further formulate their stands through more in-depth discussions on smart city topics that are more relevant to their daily lives in a playful way.

In the ideation and prototyping phase of this project, two rounds of prototype test were conducted with Amsterdam citizens, and the insights generated contributed to the iteration of the design.

The final concept: Future News Stand is a co-creatable opinion sensitizer which aims at engaging citizens in the discussions of the possible future scenarios in a city in a playful and speculative way.

The design of Future News Stand consists of two parts.
(1) Future News Co-creation Toolkit is a set of paper tools with instructions that help to imagine and generate future scenarios on a particular topic in a brainstorming session setup.

(2) Future News Stand is a portable installation for evoking discussions about a particular future scenario with citizens on the streets.

The combination of these two parts of design enables the co-creatable quality and the adaptability of Future News Stand. That is, the content on the Future News Stand can be easily changeable, and co-creatable depends on the (stakeholder's) purpose of usage. In this project, the future transport in Amsterdam was chosen to be the main topic for discussions.

The final test with seven citizens in Amsterdam showed the promising abilities of the design to trigger citizens' interests in the future transport in Amsterdam and evoke discussions on it. Equally important, the experience was perceived as playful and enjoyable by the participants.

Besides, the Future news co-creation toolkit is invited and has a high possibility to become part of "co-creation navigator" - Waag's online co-creation tool collection.

Acknowledgement

In the last half-year of my staying in the Netherlands, I am very lucky to have the chance to shape this project in the way I like.

I would like to thank my supervisor team, Alicia and Arnold, for always providing me timely help and constructive feedback. Thank you, Alicia, for sending your positiveness through many video calls. Thank you, Arnold, for your encouragement and warm hug.

Thank you, Denis, Judith and partners at Waag, for your passion on your career path, which makes a magical place like Waag to become possible and realistic.

Thank you to all the participants (twenty-six migrants origin from eleven different countries), for your giving your trust, kindness and valuable feedback even if we don't know each other.

Thank you to all the partners who we worked together, Ece, Emiel, Pablo, Jacco, Pat, Justin and Erica. It was with your accompany that those moments became less difficult and more enjoyable.

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01 Project Introduction

This chapter starts by introducing the background of the project followed by the aim, target group, setup, structure and the plan of this project respectively.

1.1 Background

Due to the potential impacts that emerging technologies might bring, they are receiving more and more attention from policymakers (Rotolo et al. 2015). Emerging technologies can bring positive changes to humans' lives but might also cause risks and conflicts.

In a city context, the topics of smart city have become more and more popular with the development of technologies such as 5G, IOT, data collection and data analysis. This rising trend could bring problems such as privacy and safety that may negtively affect citizens' rights and freedom.

In most of the case, policy-making or technology developments are top-down processes, in which citizens are often being neglected. Therefore, engaging citizens with smart city topics has its importance.

However, societal topics that involve technological knowledge such as smart city are often too complicated for the lay public to understand (Brey 2012).

1.2 Project aim & target group

Building upon the above background, the question of HOW to engage citizens in smart city topics was raised.

In Relevance by Play, Vermeeren, and Calvi (2019) proposed a framework for engaging visitors with museums by relevance creating. This framework suggests: ***seeing designing for relevance as developing ways of integrating meaning-making, play and acceptable visitor effort***.

Even though this project does not aim at creating museum experience, **"engaging citizens in smart city topics" can be seen as designing relevance between citizens and smart city topics.**

Therefore, building upon the above research, the researcher formulated the project aim as:

designing a playful experience to engage citizens in smart city topics.

As for the context where this playful experience would happen is part of the exploration and will be elaborated (in chapter 5) through the development of this project.

Target audiences

For two reasons, the **migrants in Amsterdam** were chosen as the target audiences for

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this project. Firstly, Amsterdam is a diverse ethnicity city. Around 54.4% of the citizens in Amsterdam are migrants (Gementee Amsterdam, 2019). Therefore, it is essential to understand migrants' opinions in a democratic society. Secondly, from a practical perspective, this helped moderate the scope of this project within the given time frame.

Despite starting with focusing on the migrants, the insights and knowledge that would be generated in this project are expected to be applicable to design for all the citizens regardless of their backgrounds. After all, the city belongs to all the citizens.

1.3 Project Setup

This project had two main inputs separately from the academic and civic field.

Academic partner

The chair of this project: **Dr. ir. Vermeeren,** (associate professor at Industrial Design Engineering faculty, TU Delft) is the director of Museum Futures Lab in TU/d at the same time.

Museum future lab explores how museum **experience design can lead to long-term engagement of audiences** with museums or their collections. It focuses on designing experiences that are **relevant** to museum visitors, by connecting museums to the outside world and by applying novel technologies (Museum Futures Lab, n.d.)

The mentor of this project is **Alicia Calderón González** (Researcher and teaching staff at Industrial Design Engineering faculty, TU Delft). **In her practice she explores the potential of design in fostering innovation and tackling societal challenges.**

Civic Partner

Apart from the support of academic partners, Waag is another vital source of input to this project. Waag is an Amsterdam based non-profit organization that focuses on emergent technologies as instruments of social change**. "Making technology & society more open, fair and inclusive" is the core value of Waag.** Furthermore, Waag uses **co-creation methods** to work with citizens, designers, artists and developers to research and develop innovative concepts to reach its core value (Waag, n.d.).

Waag has around sixty staffs that distribute into four teams and thirteen labs under the teams. Among these thirteen labs, **Smart Citizens Lab** has a close connection with this project; therefore, is going to be further introduced. Smart Citizens Lab aims to explore technological tools and applications that enable citizens to become more aware of the co-effect of their lifestyles and the environment. The projects of Smart Citizens Lab range from air and water quality to noise pollution in the city of Amsterdam and are still expanding ("Smart Citizens Lab", n.d.).

Additionally, for reflecting on its current projects and seeking dialogues with citizens, Waag regularly holds public events. **Waag's public events** take place in different spots in Amsterdam, but mostly in the Waag building, at Niewmarkt, city centre in Amsterdam. The event type ranges from co-creation workshops for kids to build AI barbies to board game nights for evoking dialogues on public resource distribution with citizens ("Events", n.d.).

1.4 Project structure

As shown in Figure1, the two triangular shapes represent **"research"** and **"design"** separately, and the horizontal axis represents **time**. The triangular areas represent the proportion of the type of activities that are planned to be conducted. **As time passes by, the proportion of activities transits gradually from research to design.**

Therefore, from left to right, chronologically, the project is divided into three phases: **"Phase i - Research"**, **"Phase ii - Research through design"** and **"Phase iii - design "**.

What is research through design?

Research through design (RtD) indicates ***design activities that play a formative role in the generation of knowledge***, such as gaining actionable understandings of a complex situation, framing and reframing it, and iteratively developing prototypes that address it (Stappers & Giaccardi, 2017).

RtD, as a way of conducting research, formed a significant part of this project. Tools designed for conducting researches and several rounds of prototype iteration for gaining empirical insights (as readers can see in chapter 5 and 6 of this report) shaped a unique characteristic of the project.

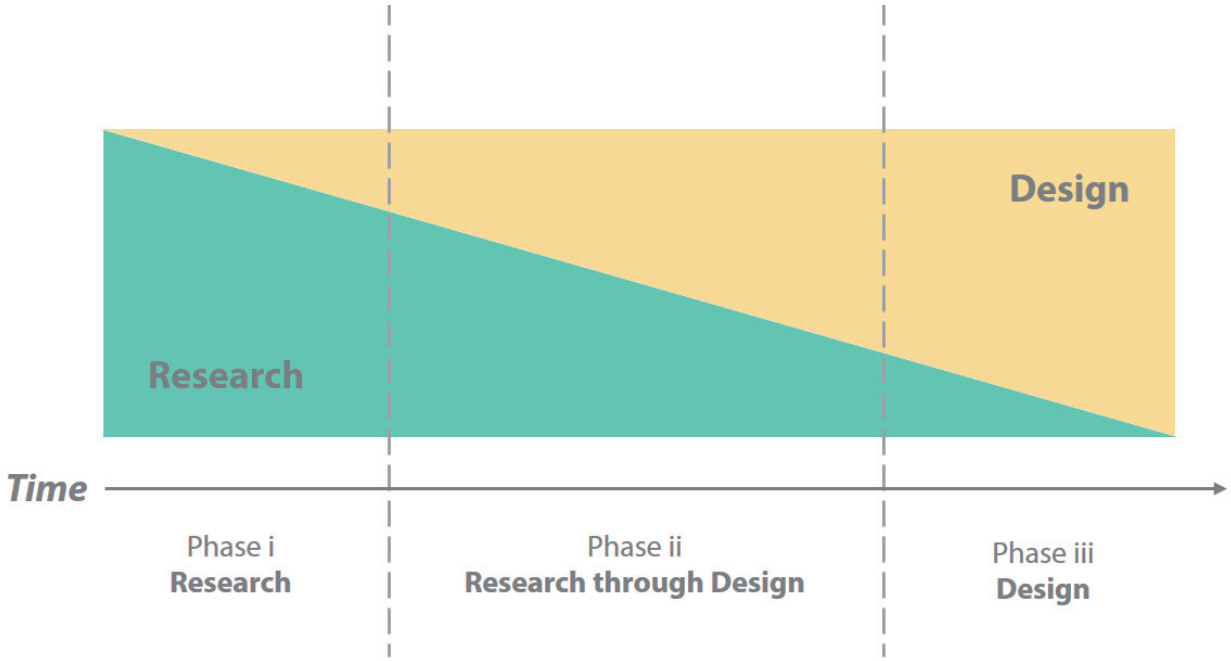


Figure 1. The research-design transitional project structure

1.5 Project plan

Table 1 lists the detailed project plan by its research goals together with the related research/design activities chronologically in three phases, followed by the expected outcomes and the chapters in this report.

Project Phase	Research Goals / Purposes
Phase i **Research**	Seeking for the definition of smart city for communication purpose in this project.
	Learning from exist designs/activites that are similar to the project aim
Phase ii **Research through Design**	Exploring the relevance of smart city with citizens (migrants) in Amsterdam.
	Diverging the ideas based on the result (Design goal) from the above research activities
	Gaining empirical insights from the target group
	Gaining insights & inputs from the stakeholder
Phase iii **Design**	Embodying the research results of the project
	Validating the final design

Table 1. Project plan: Research goals, related activities, expected outcome and reported chapters by phases

	Research/Design Activities	(Expected Outcome)	Chapter in the report
	Literature research & interview	The definition of smart city for this project.	Chapter 2
	Analysis of similar activity/experience design	an exploration (not pre-defined)	Chapter 3
	Research through design Generative research	Design goal for the project	Chapter 4
	Ideation	Direction for the concept development	Chapter 5
	Rounds of prototype testing and iteration	Insights for iterating the design	Chapter 5
	Co-creation session with stakeholder: Waag	Insights for the final design	Chapter 5
	Final design development	The final iteration	Chapter 6
	Final test with the target group	Conclusion for the project	Chapter 7

Phase i

Research

2 What is "Smart City"?

This chapter presents literature researches, and an interview about the definition of smart city and is concluded with the definition of smart city for this project.

Even though the term smart city is often being used, **the concept of smart city is far from being unambiguous** (Dameri, 2012) and needs to be clarified.

Thus, **for the communication purpose in this project, the process of smart city definition seeking was conducted**. This process of definition seeking included both **literature research** and **an interview with Judith VeenKamp**, the concept and project developer of Smart Citizens Lab at Waag.

2.1 Definitions of smart city

The following paragraph shows definitions of smart city from different perspectives, and they are:

broad definition

The British Standards Institute (BSI) defines the term as *"the effective integration of physical, digital and human systems in the built environment to deliver sustainable, prosperous and inclusive future for its citizens" (BSI, 2014)*

citizen focus definition

UK citizens tend to consider a smart city as clean, friendly and have good transport connections. Other words they associate with smart cities (although less frequently) include "technology", "connected", "internet" and "modern" (Duckenfield, 2014)

data-driven definition

IBM defines a smart city as *"one that makes optimal use of all the interconnected information available today to better understand and control its operations and optimize the use of limited resources". (Cosgrove, 2011)*

Judith Veenkamp's Definition

"A city in which there is technology implemented, usually from a sort of a top-down manner. So it's often in the sort of the cooperation between the governments, the municipality, and private companies, collecting data on the city, and trying to, through that technology also make smarter choices within the city to make it more efficient or optimize certain areas."

After clustering the terms that are used in the above definitions, four categories were discovered, which are: **areas, stakeholders, manners/technologies and goals** (see Figure 2 in the next page of this report).

Figure2. Four commonly seen elements in the definition of Smart City

2.2 Definition of smart city for this project

The sameness observed from the definitions

From the above categories, one can notice that **goals** and **manners/technologies** are mentioned in all the definitions. This provides the project with an objective definition of smart city which is that it **should at least include the elements of "goal" and "manner/technology".**

As a consequence, the researcher tried to phrase smart city definition for this project as:

implementing data collection and analysis as a manner (technology) to make a city better (goal).

As for the area, depending on the case, in this project, it is in **"Amsterdam".**

This definition would then be used for **communication purpose** in this project when **conducting design/research avtivities with citizens or the stakeholder.** Besides, this definition can also be seen in the formulation of the **design goal** (section 4.6) for this project.

The differences observed from the definitions

Apart from the above commons in the definitions found, there are still some differences among them due to different perspectives.

As a technology provider, the definition of smart city from IBM misses the element of citizens whom they try to make their lives better through their technologies. Whereas the definition from Veenkamp indicates this phenomenon as "a top-down manner" and "often in the sort of cooperation between the governments, the municipality, and private companies". So, again, the importance of engaging citizens in smart-city-related topics and the contrary current situation is pointed out.

3 Case Study of Similar Activities

Since the project aim is: designing a playful experience to engage citizens in smart city topics, a case study of activities that is highly similar to the project aim was conducted. The case study is for seeing what the interactive elements in this type of experience design are. Hence, in this chapter, three of the activities in "City Lab event" are going to be analysed.

3.1 What is City Lab?

City Lab is a public engagement program of NEMO science museum. For learning more about public values concerning new technologies, City Lab took "smart city" as the first tryout to engage the citizens (NEMO Kennislink, n.d.).

Setup

City Lab program is a multi-activity setup event that takes 3-4 hours in total to conduct. This event so far has been conducted twice. One during ROEF festival at the rooftop of NEMO science museum in June 2018 and one during Inscience Festival in Nijmegen in November 2018. (NEMO Kennislink, n.d.).

3.2 Three iconic City Lab activities

Three of the most iconic City Lab activities were chosen to be analyzed, and they are: "filter bubble", "silent disco" and "smart city scenarios". These activities will first be introduced:

Filter bubble

Filter bubble (see Figure 3) is a conversational experience facilitated by the professional improvising actor, discover how the visitors' opinions were influenced by filter bubbles through this theatrical intervention ("City Lab x Inscience", n.d.).

Figure 3. The installation and setup of Filter bubble ("City Lab x Inscience", n.d.)

Silent disco

This activity consists of short lectures given by experts in which dilemmas were presented (see Figure 4). Visitors are invited to express their opinions by changing position during the lecture. It is an activity in which experts could test their vision with the public. The public is informed about current developments and immediately challenged to take a stand on them by positioning themselves in a particular area of the space ("City Lab x Inscience", n.d.).

Figure 4. The setup and participants of Silent disco ("City Lab x Inscience", n.d.)

3.3 Interaction stages model

After having an overview of the three iconic City Lab activities, the analysis of their interactions compositions was conducted. Even though these three City Lab activities are in different formats, the common pattern of interactions is found.

The common pattern is that they are consist of these three interaction stages: **1) topic informing, 2) thoughts evoking and 3) opinion expressing.**

For providing a clear linkage between these interaction stages to the three CIty Lab activities, the researcher tried to re-describe the above activities by using the defined three stages in the following paragraph:

Smart city scenarios

In this activity, visitors are invited to discuss current smart city developments on the basis of a city map and shape the future of smart city (see Figure 5). Smart city scenarios is an activity in which experts and citizens supported by illustrators to conduct a "signed" dialogues. Citizens could give their vision of the city with the help of experts and visualizers who convert the verbal message to the visual image. ("City Lab x ROEF", n.d.)

Figure 5. The installation and setup of Smart city scenarios ("City Lab x ROEF", n.d.)

In **Filter Bubble**, the actor served as a way to ***inform*** the visitors and to ***evoke*** their notice of the existence of filter bubble. Through the facilitation of the actor, visitors were invited to ***expresse*** their thoughts about filter bubbles in a conversational way.

In Silent Disco, short audio lectures by the experts were given to ***inform*** the visitors about the dilemmas of smart city developments. These lectures then ***evoked*** the visitors' thoughts. Furthermore, they were invited to ***express*** their stands by moving their positions in the space.

In Smart City Drawing, the map was used to ***inform*** the visitors about the current smart city development in Amsterdam. The information the current developments ***evoked*** the visitors' imagination on the future smart city. Afterwards, the visualizers helped the visitors to ***express*** their thoughts visually.

The three stages of interaction for dialogue evoking experience design are depicted in Figure 6. Since these three stages of interaction are **a series of continuous and sequential flow,** they are illustrated one after next with some **overlap areas.**

This interaction stages model for dialogue evoking experience design would provide the framework for the researcher to categorize the ideas in the ideation process (section 5.3) and to analyze the prototype test result (section 5.4 & 5.5) in this project.

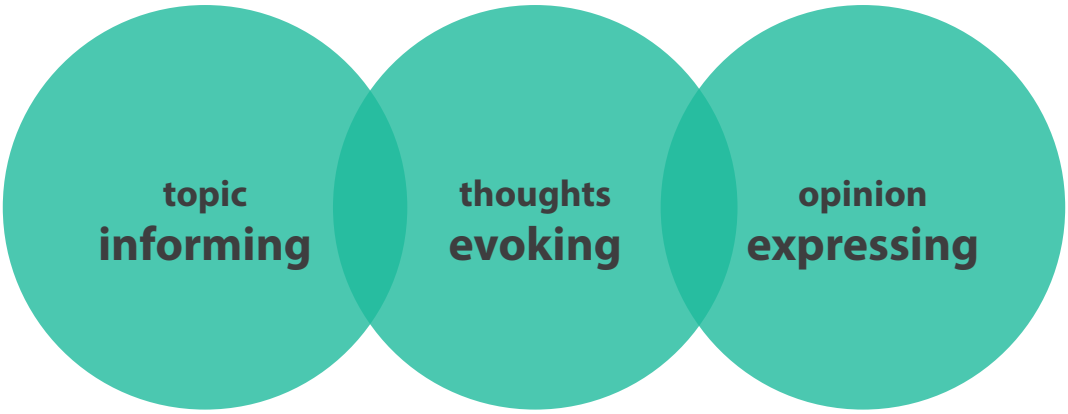


Figure 6. Three interaction stages of dialogue evoking experience design

Phase ii

Research through Design

The second phase of the project: Research through design (RtD) is the main part regarding the amount of insights gaining from the RtD processes. In this phase, two main RtD methods were implemented: Contextmapping (Chapter 4) and prototype testing & iteration (Chapter 5).

4 Generative Research with Migrants

This chapter presents the generative research: Contexmapping, with migrants in Amsterdam, from research questions, method, process, data analysis to the result. The above detailed research process will then be concluded with the design goal for this project as a summary of the findings/insights.

4.1 Research questions

Research Goal

As described in chapter 1, this project aims at designing a playful experience to engage citizens in smart city topics.

In order to achieve the project aim, the following research questions are formulated.

Firstly, since Smart City is one of the public issues in the citizens' daily life context, the researcher took one step back trying to understand the current situation of how Amsterdam citizens (especially migrants) engage in public issues.

Research Question 1

What is the current situation of how citizens (migrants) engage in public issues in Amsterdam?

Secondly, as citizens engagement in smart city topics is seen as a kind of relevance creating, how smart city would be more relevant to citizens also needs to be explored.

Research Question 2

Research Question 2: In the field of Smart City, what topics are more relevant to the citizens and why?

Apart from the above research questions, for understanding how people would react to games that try to evoke the discussion on smart city, two games were designed to try to see the participants' reactions.

(The detailed introduction of the games will be shown in 4.3 Designs of generative research tool: Tool 3 and 4)

4.2 Research method

For understanding the above research questions from citizens (users') perspective and through their life experiences, Contextmapping is chosen to be implemented.

What is Contextmapping?

"People are the experts of their experiences." is the core value of Contexmapping. The research method focuses on understanding people's tacit and latent need, desire wishes from in-depth discoveries of their experience. (As shown in Figure 7)

Generative sessions are one of the most characteristic techniques in Contextmapping, which during the session, tools designed for discovering the in-depth knowledge of people's experience would be used (Sanders & Stappers, 2016).

Since the project aims at engaging citizens in smart city-related topics, it is practical to implement Contextmapping to understand how to motivate them and the concerns they might have in their daily-life context regarding smart city via generative session.

On the other hand, the co-creative characteristic of Contextmapping aligns with the mindset and plan of this project ------ - involving the citizens through the process. Furthermore, this engagement of the citizens in smart city topic can be seen as a way to co-create the policy/city with the citizens as well.

4.3 Designs of generative research tool

For attaining the answers to the defined research questions, four generative research tools were designed and will be introduced in the upcoming pages of this report.

Tool 1 - Sensitizing booklet
(developed from RQ2)
Tool 2 - Interview (developed from RQ1)
Tool 3 - Travel in Amsterdam
Tool 4 - Amsterdam Times

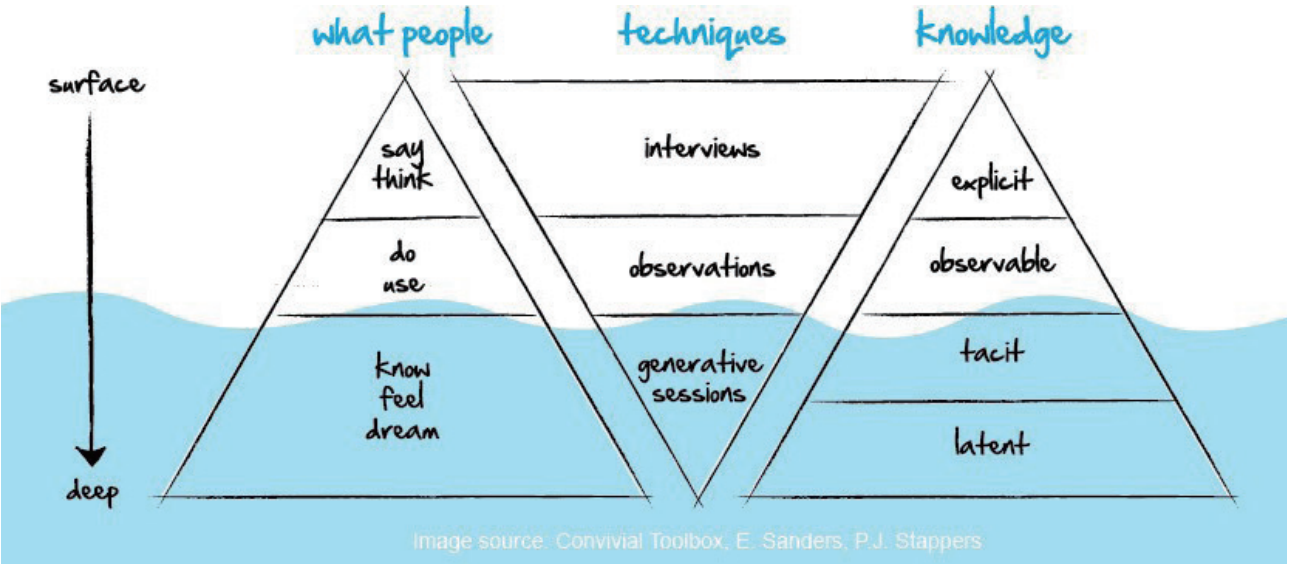


Figure7. Gaining deep knowledge of people's experience through generative sessions (Sanders & Stappers, 2016)

Tool 1 - Sensitizing booklet

The booklet (see Figure 8) was built up with six little exercises that the participants can fill in day by day with ease since it only takes around 5 minutes to finish each of them.

The following shows two examples of the exercises contained in the booklet. The full design of the booklet can be found in Appendix A.

Day 2 - One of a typical weekend day of my life in Amsterdam

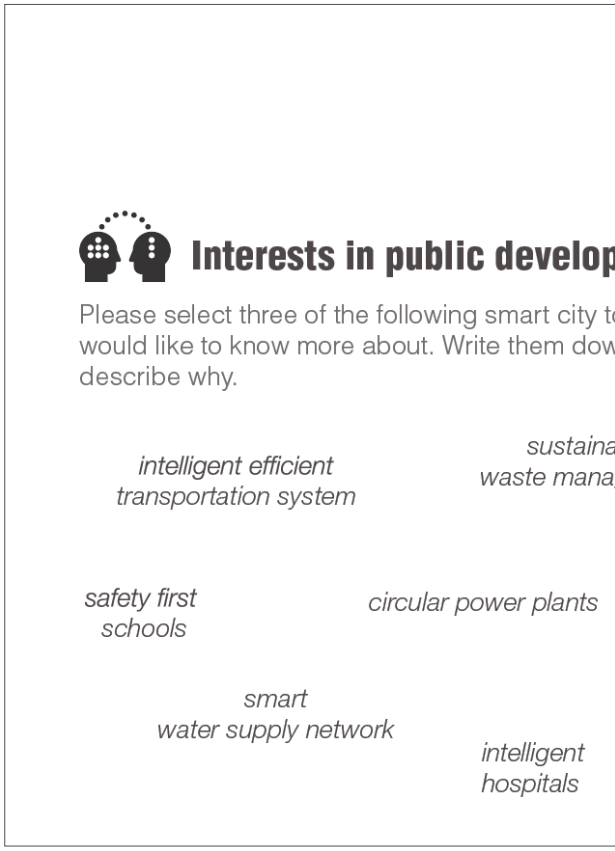
(See Figure 9) A timeline for participants to fill in what do they do (in public spaces) on one of the weekends in Amsterdam and the way how they transport. With this exercise, the researcher tried to discover if there are connections between the citizens' lives and smart city, furthermore, how they are connected.

Day 4 - Interesting public development in Amsterdam?

(See Figure 10) Nine futuristic smart-city-related topics are provided as triggers to the participants in this page. The participants are asked to choose three from them, which they think are most interesting and elaborate on the reasons.

9 futuristic smart city related topic are provided as triggers to the participatns in this page. The participants are asked to choose three from them which they think are most interesting and elaborate the reasons.

Figure 8. The printed sensitizing booklets

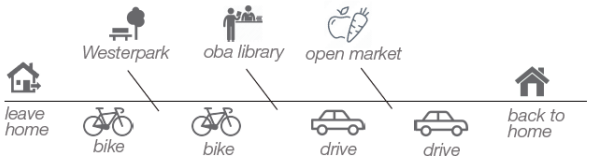


Day 2

ny life in Amsterdam

n a typical weekend day in Am-
g home till going back home.
s that you use or the way of trans-

example:



back home

Figure 9. Day2 exercise, as an example, shows the activities designed in the sensitizing booklet.

Day 4

oments in Amsterdam?

opics in Amsterdam which you
vn on the next page and shortly

able
gement

Smart
community services

AI-powered fair
law enforcement

ubiquitous smart library

Day 4

topics	reasons why I am more interested in these topics
1.	
2.	
3.	

Figure 10. Day4 exercise, as another example, shows the activities designed in the sensitizing booklet.

Tool 2 - Semi-structured Interview

With research question 1: "What is the current situation of how citizens (migrants) engage in public issues in Amsterdam?", a group of questions were developed into a semi-constructed interview.

The reason why the researcher chose to develop a semi-constructed interview was that the answers for RQ1 have higher possibility to be diverse and open. In this way, the researcher can respond to the answers accordingly with suitable followup questions furthermore, deepen the interview.

The interview started with the question: "What are the ways that you engage in public issues now?" By providing examples such as reading newspaper, watch political programs... for participants as a more natural way to recall their memory. Afterwards, the researcher would adjust the followup questions based on the participants' replies and the prepared questions on the list. The question list for this semi-structured interview can be found in Appendix B.

Tool 3 - Travel in Amsterdam

Materials:

- the designed map of Amsterdam (see Figure 11)
- a figure
- a pencil

What is it?

"Travel in Amsterdam" is a role-playing game that provides a speculative story in order to try to see people's acceptance boundary of data privacy.

For making the speculative future scenario convincing, the background story of this game was based on the plan of the municipality of Amsterdam of launching the crowd monitoring system in 2020 ("Policy: Connected city", 2019).

How to play it?

During the game, the participants are asked to reach the assigned destination in Amsterdam by using the navigation system that embedded with the suggestion from the crowd monitoring system.

Figure 11. A picture taken during the session with one of the participant when playing Travel in Amsterdam

While the participants try to approach the destination, the system (played by the researcher) continually asks them to provide different types of personal data for improving the system's algorithm. This process continues until the participants say no, and the participants will be asked to elaborate the reasoning for the rejection for evoking the discussion on the privacy issue of smart city.

Tool 4 - Amsterdam Times

Mateirals:

- the designed Future newspaper (see Figure 12, and the full-size design can be found in Appendix C)
- a pencil

What is it?

Future news paper provides a speculative future news about the waste management in Amsterdam for evoking opinion expression.

For making the speculative game convincing, the news content of Future newspaper was developed based on the circular economy goals of Amsterdam municipality. ("Policy: Circular economy", 2019).

How to play it?

There are three parts of Future newspaper:
1) A news about the implementation of fingerprint sensoring technology on the trash bins in Amsterdam for controling the waste amount is first introduce to the participants. This information is followed by two pieces of opinion from Amsterdam citizens, one positive; one negative, in order not to bias the reader.

2) The participants then asked to fill in their opinions on the newspaper.

3) The participants are asked to create a future news based on the provided content.

Figure 12. The design of Amsterdam Times. At the right-hand side are the boxes for the participants to fill in.

4.4 Research process

Recruitment

There are two criteria for the recruitment of participants in this research that are defined.

First, since the process of smart city policy-making is a long-term plan, citizens who have a long-term plan to stay are prioritized for this research. So the migrants who have a long-term plan to stay will be first considered.

Second, because the engagement of smart city might involve more complex discussion on the societal issues, the focus is set to be adults to better fits this context.

Hence, the criteria are the migrants who have long-term (5 years+) plan to stay in Amsterdam and are adults.

Process

In this research, in total, 4 participants were reached and are listed in Table2. After confirming the participation, the sensitizing booklets were first sent to the participants so that they had a week to fill in the booklets before the sessions.

Session

The session took roughly 1.5 hours for each participant and consisted of four activities:
1) Go through the filled-in sensitizing booklet
2) Conduct the semi-structured interview
3) Play game 1-Travel in Amsterdam
4) Play game 2- Amsterdam Times

At the end of the session, all the participants were asked to compare the booklet and the two games in the session by **the amount of effort they put in** and **how do they like about the activities.**

Participants	Age	Gender	Origin	Living experience in Amsterdam	Family type
A	55	M	Germany	20 years	Family with 1 kid
B	46	F	America	14 years	Family with 4 kids
C	33	M	Germany	3.5 years	single
D	25	F	China	9 years	single

Table 2. The recruited participants for the Contextmapping research

4.5 Data analysis

For having a clearer overview of the collected data in different formats (pictures, recording files of interviews, the filled research materials), **participants profiles** (see Figure 13) were made.

Each of the profiles contains the following information:

- Background information of participants
- Quotes from the participants
- Filled-in generative tools with insights

Through mapping out / clustering the insights on the profile with post-it (see Figure 14), key insights were identified. These keys insights are listed by the order pre-defined research questions and are shown in the next section.

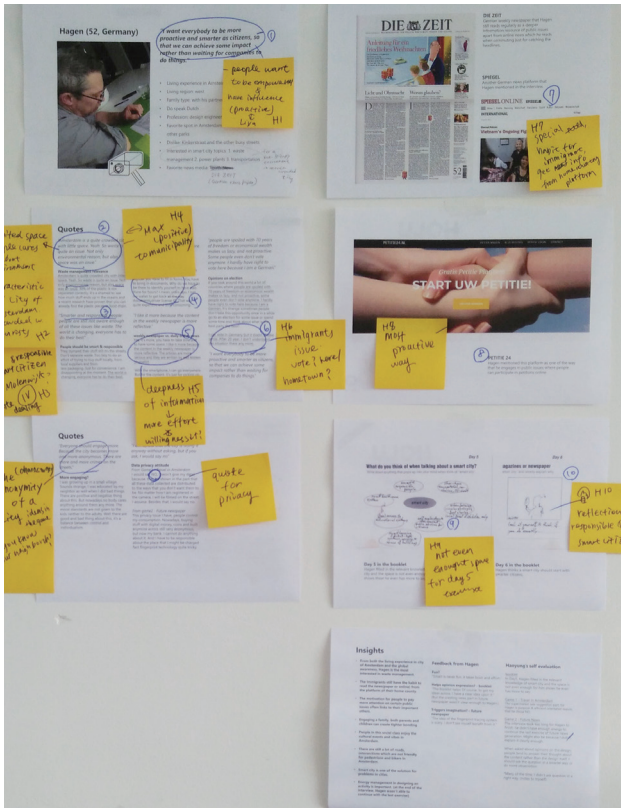


Figure 13. One of the participant profile profiles

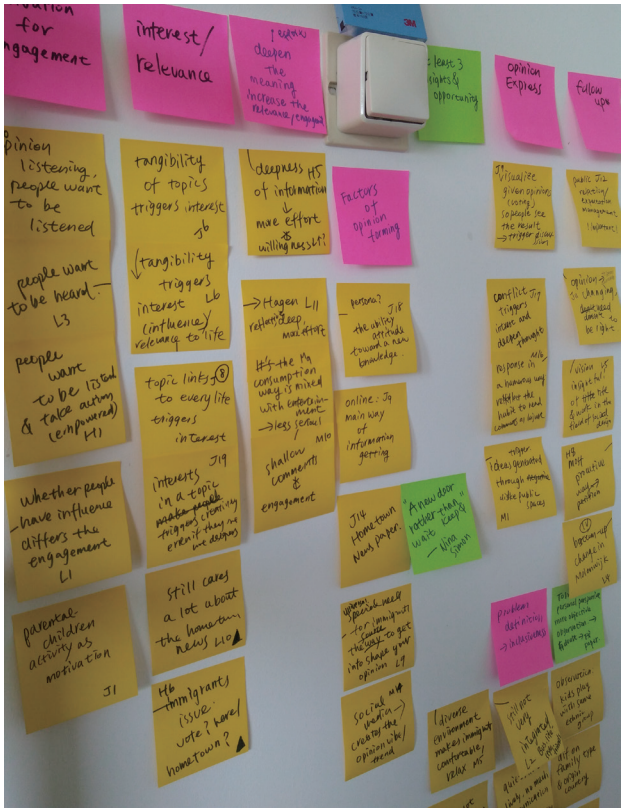


Figure 14. Mapping out the insights

4.6 Result

4.6.1 Research Question 1
What is the current situation of how citizens (migrants) engage in public issues in Amsterdam?

Current ways of public issue engagement

Through the interview part of the session, different ways that the participants engage in public issues were identified. The **passive ways** were information getting, such as reading newspaper, watch the news on the television and reading news through online news platform or even social media. The **active ways** were participating in activities that benefit the public, community voting or elections and online petition etc.

Information consumption habit

One interesting phenomenon observed was that no matter how long the participants stay in the Netherlands, they still have the habit of reading news through the media of their languages (see Figure 15. the German newspaper that participant A uses to read). If we take one step back, this phenomenon applies to the general citizens not only the migrants since it takes **less effort** to consume the information in one's own language. Apart from the above phenomenon, the researcher also notices the tendency that people tend to get information more through **digital way** rather than the traditional physical way due to the convenience and accessibility.

This implies again the importance of effort reduction when engaging people in public issue (like smart city).

A way to increase the engagement

What is worth noticing among the different ways to engage in public issues is that, participant B mentioned one of her favourite ways to engage in public issues is watch Youth News with her children. After watching the news, viewers can vote and express their opinions on the website where they can see other people's (children's) opinions as well. The following is the quote extracted from the interview:

"You can vote and give your opinion online at the end of each show (Youth News), my son likes it a lot." (Participant B, 47, America)

Besides, participant C 34, Germany) also mentioned that he likes to see other people's comments and how people interact with each other below a post of public issue.

The above information led to the first insight:

Insight 1: "Seeing the other people's opinions increases the engagement with the certain topic."


DIE ZEIT
WOCHENZEITUNG FÜR POLITIK WIRTSCHAFT WISSEN UND KULTUR
Anleitung für ein friedliches Weihnachten
Die Großeltern sind gekränkt, die Eltern am Ende, die Kinder außer Rand und Band. Und dann ist auch noch die Gans zäh. Was tun? Wir hätten da ein paar Tipps
Land aus Eis
Liebe, böse Penne
Habt Zuversicht!
Licht und Ohnmacht
Woran glauben?

Figure 15. DIE ZEIT, the german newspaper that Participant A uses to read.

4.6.2 Research Question 2
In the field of smart city, what topics are more relevant to the citizens and why?

In the Day 4 exercise, nine different smart city topics were provided for the participants to choose which interests them more (refer to Figure10 in page27). Table 3 shows participants' ranking of the top three in their mind. Among the provided nine topics, sustainable waste management and intelligent public transport appeared most often in their choices and were ranked higher than the other chosen topics. The following paragraphs illustrate the participants' reason for choosing them.

Sustainable Waste Management
Three participants reported that since Amsterdam is a crowded and even still growing city, the amount of waste causes problems everywhere in the city centre. "I have exactly the same picture as this one, I took it a month ago at the corner close to my house!" said by participant B when seeing the picture illustrates a corner in Amsterdam full of garbage on the Future Newspaper. (please refer to Figure 12 in page 29)

Intelligent Public Transportation
The second most mentioned topic in this research is Intelligent Public transportation. Especially for Participant L, who lives at north Amsterdam, wrote on the booklet that the public space she dislikes most is the bus/ferry station since it's cold in the winter and it takes longer than her expectation to wait for the bus/ferry.

Sub-conclusion
Tangibility evokes more interest, through the research, the smart city topics that **link more to people's daily life** are identified to be more relevant to the participants.

As a result, these two topics **"waste management" and public transportation are chosen for further ideating in the next phase.**

Participants	1	2	3
A	Waste management	Circular power plants	Transportation
B	Circular power plants	Smart community services	Intelligent hospitals
C	Transportation	Waste management	Smart community services
D	Transportation	Waste management	Smart community services

Table 3 The top three choices ranked by the participants among the nine smart city topics provided

4.6.3 Comparison of the three designed tools

At the end of the session, all the participants were asked to compare the booklet and the two games in the session by **the amount of effort they put in** and **how do they like about the activities.**

Sensitizing booklet

The booklet was evaluated as **the most reflection evoking but also took the most effort to complete**. However, since it consists of little exercises spread into six days, the amount of effort also spread into six days so that it was **acceptable** for the participants.

Travel in Amsterdam

Travel in Amsterdam was reported as taken the least effort, that is **the easiest** to finish; nonetheless, most of the participants (3 out of 4) preferred more the other two (booklet and Amsterdam Times) than this game since they **did not learn much from it**.

Amsterdam Times

Participants thought Amsterdam Times triggered their imagination most. However, most participants (3 out of 4) perceived the last part to be difficult. Participant A even did not finish the last part of this game.

The above comparison provides the researcher a deeper understanding of the relevance designing framework suggested by Vermeeren and Calvi, which is, it is important to manage/ reduce participants' effort throughout the experience.

Except for the above comparison, while playing the game--- Travel in Amsterdam (see Figure 16), participant B was positive about developing the system and was willing to provide the data for improving the system at the beginig. However, after a certain point, it was too much for her to provide the data being asked. The conflict was raised in her mind and evoked her to think more about her openness. The following is the quote extracted:

"I like the game (Travel in Amsterdam) because it brought the conflict in my mind and really make me think." (B, 47, America)

Based on this phenomenon observed in the game, the following insight was built:

Insight 2: "Conflicts evoke deeper thought in people's mind."

Figure 16. A picture taken while participant B was playing Travel in Amsterdam.

4.6.4 Other findings/insights

Except for the above insights and discovering of the research question, there are still two interesting findings that the researcher would like to mention.

Thoughts evoking through the conversation
During the session, the researcher realized that the tools designed just served as ways to start the conversation on smart city topics. **Where the in-depth thoughts evoking happen was during the conversation** between the participants and the researcher.

Information provided influences people's opinion
Besides, the information which the designed tools contain has a great influence on people's perception on the topic since it was the primary source that they get information from during the game/session. **As a consequence, it is essential to provide balanced information in order not to bias people.**

The following insights concluded the above findings:

Insight 3
Dynamic conversation evokes deeper thoughts on a certain topic.

Insights 4
It is essential to provide balanced information for not biasing people.

4.7 Conclusion

To sum up and carry the insights identified to the next phase: ideation, the **design goal** for this project is formulated:

To trigger citizens' awareness on the possible pros and cons *(1)* **of *using the technology of data collection and analysis as a manner to make a city better*** *(2)*, **and further formulate their stands through more in-depth discussions** *(3)* **on smart city topics that are more relevant to their daily lives** *(4)* **in a playful way.**

(1) **"the possible pros and cons"** derived from **insight 4: It is essential to provide balanced information for not biasing people.**

(2) **"using the technology of data collection and analysis to make a city better"** derived from the smart city definition for this project defined in Chapter 2.

(3) **"in-depth discussion"** derived from **insight 3: Dynamic conversation evokes deeper thoughts on a certain topic.**

(4) **"more relevant to their daily lives"** indicated the smart city topics in these two fields: **"waste management"** and **"transportation".**

Furthermore, while designing for **evoking the more in-depth discussions,** the following tow insights would be taken into account:

Insight 1: "Seeing the other people's opinions increases the engagement with the certain topic."

5 Research through Design in Molenwijk

This chapter starts by presenting the consideration of choosing the target neighbourhood for designing, followed by the ideation based on the defined design goal in the last chapter. Afterwards, two rounds of prototype testing and iteration in the selected possible contexts are presented. In the end, this chapter would be concluded with the empirical findings for the final design.

5.1 Considerations of the suitable context

Original Target Group ---- migrants in Amsterdam

As described in chapter one, due to Amsterdam's diverse ethnic population composition, this project aimed at focusing on migrants as the target citizens to engage with. First, four citizens in Amsterdam with migrant backgrounds (2 German, 1 American, 1 Chinese) participated in the generative research. However, this composition was not representative enough for the migrants in Amsterdam since the majority (around 64%) of migrants in Amsterdam (OIS Amsterdam, 2018) is with non-western migration background. Among them, the amount of Surinamese, Antillean, Turkish and Moroccan are the top four in Amsterdam. For making the participants group in this project to be more representative, the next phase of RtD was planned to be conducted in the area where the residents are with a more diverse ethnic background.

Feedback from the stakeholder --- Waag

From the observation and calculation of the visitors of Waag's public events, these visitors are discovered to share some similar characteristics. These characteristics are: highly-educated, working on the related field such as technology industry, education, design, social science, et cetera. With the core value of open, fair, and inclusive (Waag, n.d.), Waag gave the feedback to this project as to try to reach citizens who are less likely to know Waag and more different from their current visitors.

The intersection of the above target - Molenwijk

After the above consideration, the researcher focus at the regions where meets both the above requirements of having **residents with more diverse ethnic backgrounds** and with **relatively lower education level in Amsterdam**.

This focus brought the context where the next RtD activities would be conducted to **Molenwijk, a community situated at Northern-west of Amsterdam.** Molenwijk is a neighbourhood where **the residents' education level is relatively lower in comparison with the other districts** in Amsterdam and **with a higher percentage of residents with non-western migrants background**. More detailed research of Molenwijk was then conducted and is being presented from the next page of this report.

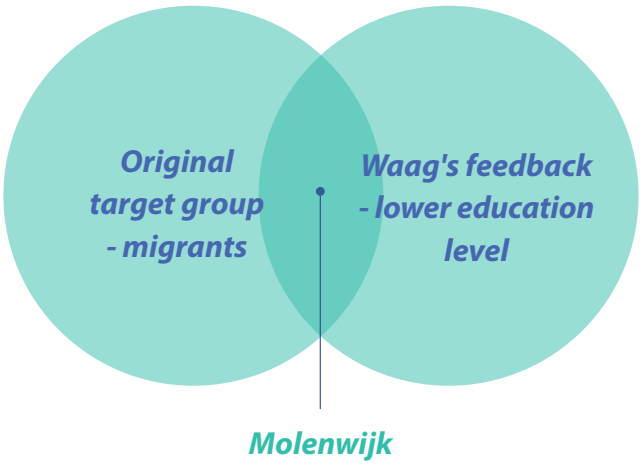


Figure17. The intersection of the original target group and Waag's feedback.

Introduction of Molenwijk

Molenwijk is a residential area situated in the western part of Amsterdam-Noord district. This green neighbourhood consists of 15 high-rise apartment buildings that contain in total 1256 households (Wiki, 2019). See Figure18 of the aero photo of Molwnwijk and Figure19. of the vibe in the neighbourhood of Molenwijk.

Figure18. The aero photo of Molenwijk (Middelkoop, 2015)

Figure19. The greenery public space in Molenwijk (Mol, n.d.)

Statistics of education level

According to the City of Amsterdam's section Onderzoek, Informatie en Statistiek (OIS: Research, Information and Statistics), one can see from *Table4: Population 22 areas from age 15-74 by highest completed education level, 2015*, in the region North, the percentage of people attain high education level is 24%, which is the second-lowest compare with the other regions in Amsterdam. To be more specific, most of the population in the area of North West attain low (39%) and centre level (40%) as their highest educational achievement.

5.4b Population 22 areas from 15-74 years by highest completed education level, 2015 (percentages) 1)

gb / std	low	center	high
DX01 Center West	12	28	60
DX02 Center East	13	26	62
A Center	12	27	61
DX03 Westerpark	19	27	54
DX04 Bos and Lommer	32	30	38
DX05 Oud-West / De Baarsjes	19	28	53
E West	22	28	50
DX06 Geuzenveld / Slotermeer	41	39	19
DX07 Osdorp	35	42	23
DX08 De Aker / New Locks	25	45	30
DX09 Slotervaart	29	34	37
F New West	33	40	27
DX10 Old South	15	24	61
DX11 Buitenveldert / Zuidas	17	33	50
DX12 De Pijp / Rivierenbuurt	16	28	57
K South	16	27	57
DX13 Old East	23	28	49
DX14 Indian Neighborhood / Eastern Docklands	23	28	49
DX15 Watergraafsmeer	17	33	50
DX16 IJburg / Zeeburgereiland	20	30	50
M East	21	30	49
DX17 North West	39	40	21
DX18 Oud-Noord	37	34	28
DX19 North East	36	39	25
N North	37	38	24
DX20 Bijlmer Center	39	41	19
DX21 Bijlmer East	39	40	21
DX22 Gaasperdam / Driemond	36	41	23
T Southeast	38	41	21
ZX99 Westpoort	*	*	*
ASD Amsterdam	25	32	43

Table 4. Population 22 areas from age 15-74 by highest completed education level, 2015 (OIS, 2018)

Statistics of ethnic background

As for the ethnic background, one can see from *Table5. Population by city districts and migration background, 1 January 2019*, the district of North where Molenwijk situated has the third-highest percentage of non-western migrants (38.3%) habitants ,which is only lower than the districts of New West and Southeast in Amsterdam.

2.1.14 Population by city districts and migration background, 1 January 2019

									totally non-western	
district	Surinamese	Antillean	Turkish	Moroccan	other non-western	western	Dutch	total	abs.	%
A Center	2508	710	970	1507	8532	23831	48804	86862	14227	16.4
B Westpoort	8	-	5	2	20	50	92	177	35	19.8
E West	6552	1531	7563	14128	15335	29672	71127	145908	45109	30.9
F New West	9628	1508	20105	32551	19173	23382	51617	157964	82965	52.5
K South	4745	1315	2528	4178	15683	36422	81095	145966	28449	19.5
M East	8997	1563	5695	12688	15935	25167	70255	140300	44878	32.0
N North	6809	1218	6099	9572	13526	12296	47680	97200	37224	38.3
T Southeast	25341	4328	1089	2062	23529	9746	22515	88610	56349	63.6
Amsterdam	64588	12173	44054	76688	111733	160566	393185	862987	309236	35.8
percentages										
A Center	3.9	5.8	2.2	2.0	7.6	14.8	12.4	10.1	4.6	
B Westpoort	0.0	-	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
E West	10.1	12.6	17.2	18.4	13.7	18.5	18.1	16.9	14.6	
F New West	14.9	12.4	45.6	42.4	17.2	14.6	13.1	18.3	26.8	
K South	7.3	10.8	5.7	5.4	14.0	22.7	20.6	16.9	9.2	
M East	13.9	12.8	12.9	16.5	14.3	15.7	17.9	16.3	14.5	
N North	10.5	10.0	13.8	12.5	12.1	7.7	12.1	11.3	12.0	
T Southeast	39.2	35.6	2.5	2.7	21.1	6.1	5.7	10.3	18.2	
Amsterdam	100	100	100	100	100	100	100	100	100	

Table 5. Population by city districts and migration background (Gementee Amsterdam, 2019)

The public spaces in Molenwijk neighbourhood

In the area of Molenwijk, library, shopping centre, the green areas in the neighbourhood, are the public spaces which are the possible context for the final design to happen. See Figure20 to 23 of the public spaces in Molenwijk.

Figure20. Library in Molenwijk, Chang. June 2019

Figure21. Inside of the Library, Chang. June 2019

Figure22. The front of shopping center in Molenwijk, Chang. June 2019

Figure23. Public areas in Molenwijk, Chang. June 2019

Molenwijk Werkplaats

Apart from the above public spaces, there is a community-centre like space for holding events in the neighbourhood called Molenwijk Werkplaats. As we can see from Figure24 that some exhibitions and workshops once took place at Werkplaats in Molenwijk, and this place was also considered as the possible context for the final design.

Figure24. An exhibition in Molenwijk Werkplaats (Framerframed, 2019)

5.2 Ideation

Divergence: Wall of ideas

For conceptualizing the playful experience, the ideation process was conducted. In the process, the design goal and the insights gained from the previous research were the principal directions. Afterwards, for having a clearer overview of these ideas, they were clustered based on the interaction stages model developed from the analysis of the City Lab activities in Chapter 2, by ***informing, evoking and expressing*** (see Figure25).

Convergence: Select from the ideas wall

In the following paragraphs, the selection of ideas in the informing, triggering and expressing stage will be illustrated one by one. These chosen ideas in the different stages would be combined into one prototype and would be tested in Molenwijk.

Figure25. The overview of ideas generated in the ideation phase.

Informing stage

Filter1: Design Goal

In the informing stage, different ideas of how to inform people were generated. These ideas were first examined by the defined design goal (see 4.7) to see which ones fit better. As a result, the three directions of ideas which **are: (1) topic-oriented category, (2) role-playing, and (3) content container** were chosen, and they are shown as below:

(1) Topic oriented category

Under this category, the ideas were generated based on the chosen topic. For example, when talking about waste management in the field of smart city, there were ideas such as the map showing the best route for garbage collection, or a physical smart garbage bin which can analyze the waste and collect private data through the analysis (see Figure26).

Figure26. Topic oriented catagory: ideas of waste management of smart city

(2) Role-playing

Under this category, scripts were developed base on the possible future scenarios of waste management and tranport in Amsterdam. In the concept, people are invited to join and play different roles to see things from different perspectives (see the left-hand side of Figure27 for the draft of ideas).

(3) Content container

Under this category, ideas were generated regardless of the topics. To make it clearer, example ideas are given such as future newspaper, future news radio, future cinema that aims at informing possible future scenario no matter what the topic (content: future news) is (see rigt-hand side of Figure27 for the draft of ideas).

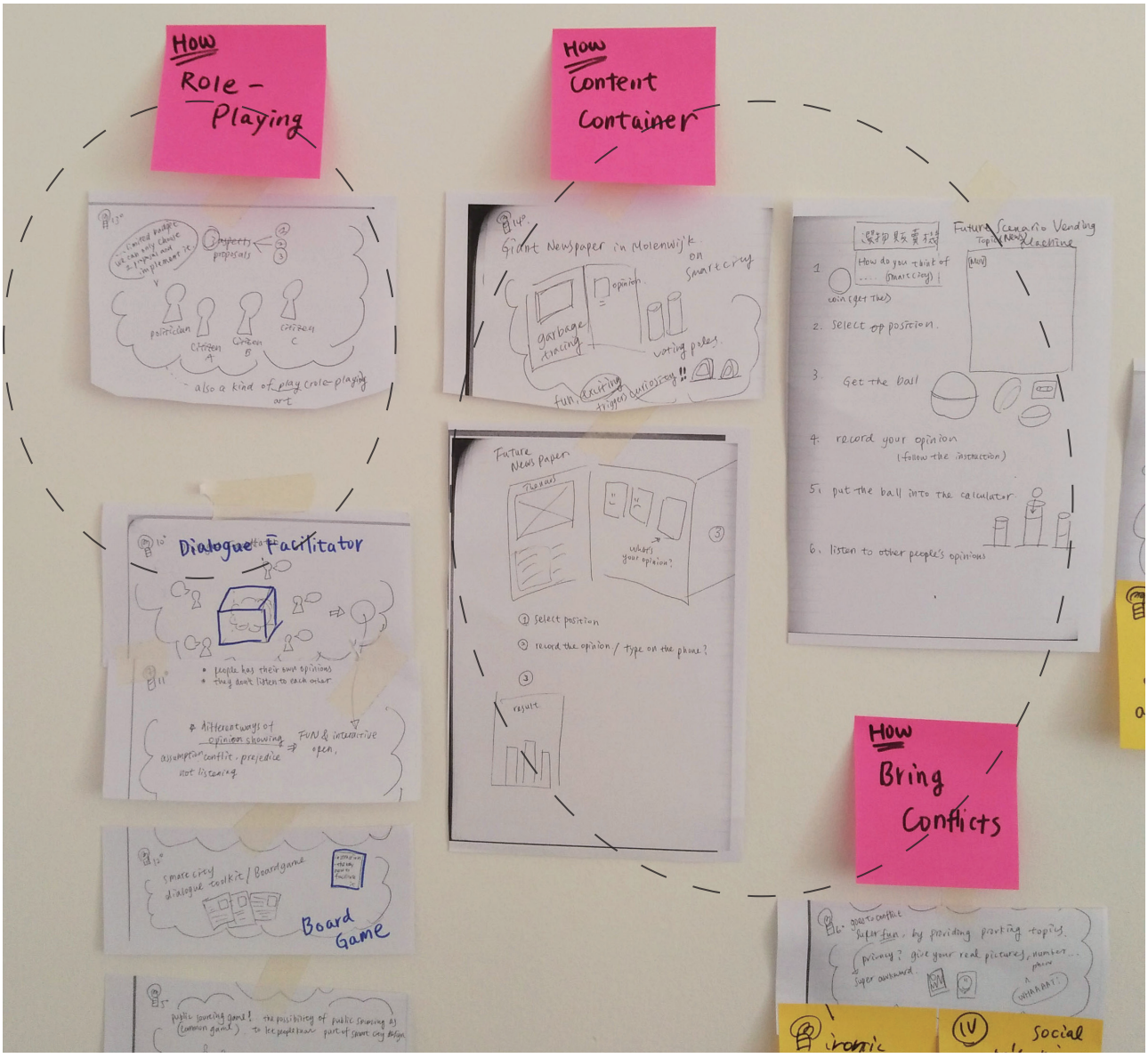


Figure27. The categories of role-playing (left) and contain container (right).

Filter 2 - Viability

To consider the diverse projects in Smart Citizens lab of Waag, including projects that deal with air quality (Hollandse Lutchten), sound pollution (Amsterdam Sounds), and transportation in the city (Mobility Urban Value), the concept that can **benefits the diversity of projects would have a higher viability and can be more long-lasting for the organization.**

Conclusion of informing stage

To exam the above ideas from the perspective of the defined viability, the ideas in the "topic-oriented category" focus on the ceratin topics so whenever there is a new project, the design has to change. This would make the ideas least viable for Waag.

The same as for "role-playing", it would cost more to develop and adjust to diverse topics since it might involve the re-write of the designed scripts (about future scenarios).

Among the three chosen directions of ideas, content-container has higher flexibility to adapt to different topics since the content (future news)can be changeable regardless the media; as a consequence, this direction was chosen to be further developed.

The possible concept of content-container was shown in the sketch below in Figure28. Human-size giant newspaper. In the picture, one can see the future newspaper: “Amsterdam Times”, which contains the spaces for “headline”, “picture” and “text” of the possible topics (future news).

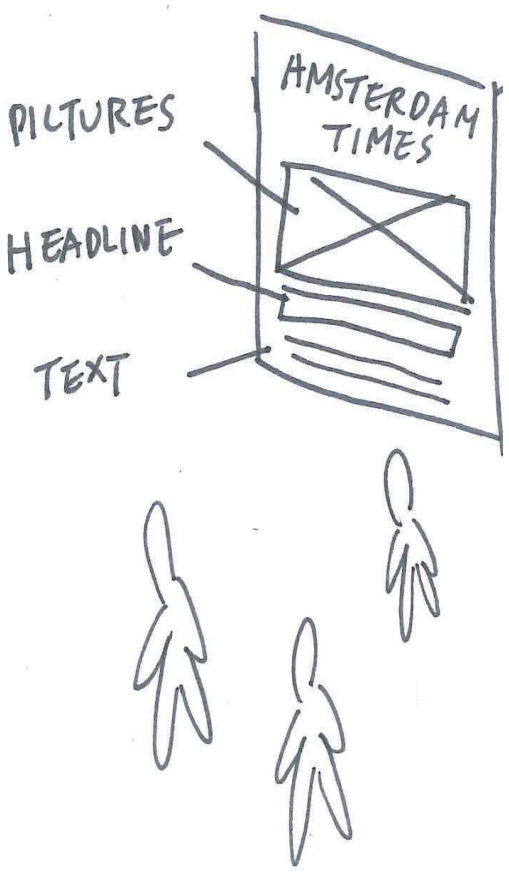


Figure28. Human-size giant newspaper

Eovking stage

In the evoking stage, what topics should be told and what aspects do we want to evoke the citizens to think were considered. The topics chosen to be brought up has already been defined in the design goal, which are: “waste management” and “mobility” since they were reported to have higher relevance with citizens in Amsterdam.

Expressing stage

In the express stage, ***"how to help/invite people to express their opinion? "***was the focus for ideation. Besides, the insight gained in the generative session: ***"Seeing the other people's opinions increases the engagement with the certain topic."*** provided the direction to develop the ideas.

The following sketch in Figure29. Opinion Recorder Vending Machine shows the preliminary idea for the design of expressing stage. This concept is a machine that invites people to express their opinions on a certain topic by providing opinion recorders. After people recording their opinions, they can use the recorder to vote for their stands toward the topic.

This idea contains both **qualitative (the overview of the opinions by the collector), and quantitative way to record the opinions** hence was considered promising for further developing into the prototype.

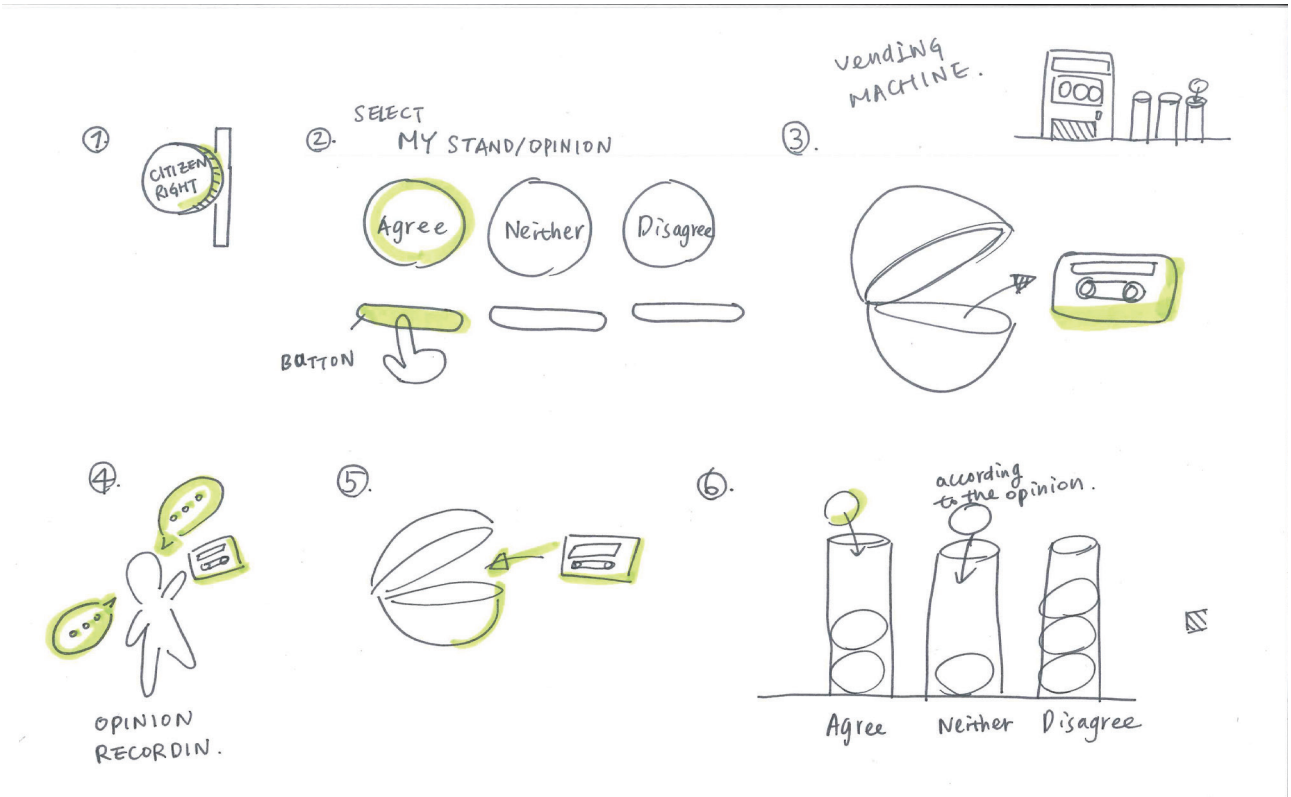


Figure29. The preliminary idea for the design of expressing stage.

5.3 Prototype test and iteration - 1

This section starts by presenting the prototype of the chosen ideas in the ideation phase, followed by the test setup in Molenwijk, data analysis, and concludes with the insights for the next round of RtD.

Research Question

This first round of the RtD by prototype testing was the first approach of this project to Molenwijk.

The followings were the main research questions for this round of test:

1. Can the residents **position themselves in the future scenario and express their opinions** with the aids of the prototype?
2. **How would the residents react** to this type of design (their acceptance, attitude)?
3. Would **the language** influence the interaction?

Intro of the prototype

See Figure30. Round 1 prototype in the next page of this report, there are three parts of this prototype.
The first part, on the left-hand side, there is the future newspaper (the tool: Amsterdam Times in the previous generative session) that contains the news about future waste management in Amsterdam.
The second part, in the middle of the picture, is a vending machine that sells opinion recorders.
The third part, on the right-hand side of the picture, is the opinion collector with columns for people to vote their stands with the recorder.

Figure30. The Prototype for the first round of the RtD in Molenwijk, there are three parts from left to right.

Take a closer look at the design of the recorders(see Figure31) ; it's a card with the front side having a drawing of a recorder and the backside having a QR code for people to scan and record their opinion.

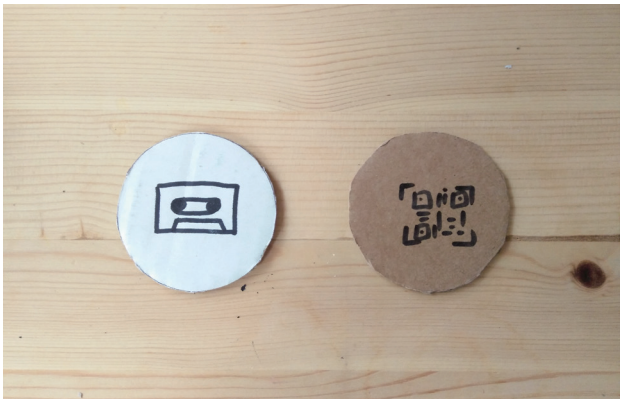


Figure31. The close look of the design of opinion recorder card

Test setup

First, the opinions gathered from the last RTD phase with the same piece of future news of waste management were made into recorder cards and placed onto the opinion collector before the formal test.

The test was then conducted at the front of the shopping centre in Molenwijk on a Saturday afternoon. Four groups (2+1+2+2) in total, seven people participated in the test, and they are described as below:

Group 1 - 2 participants
friends, Italians, age 19 and 20

Group 2 - 1 participant
father with a baby car
unspecified ethnic background
age around 35-40

Group 3 - 2 participants
friends, Irish, age 25-30

Group 4 - 2 participants
father and son (age 10)
Moroccans

Testing process

This test was conducted at the front of the shopping centre in Molenwijk (see Figure32). The test started with the researcher approaching the residents either when they were about to get into the shopping centre or leaving.

The researcher first had a brief self-intro, followed by explaining the research purpose and checked the willingness for participation.

After getting the confirmation, the researcher guided the participants through the following interaction steps:
1. The researcher explains what is in the future newspaper

Figure32. The front of the shopping center in Molenwijk, Chang June 2019

2. The researcher gives the "citizen right" coin to the participants.
3. The participant inserts the coin to the recorder vending machine.
4. One recorder drops out of the machine.
5. The participants record their opinions.
6. The participant puts the recorder card onto the opinion board based on their stands.

Findings

About the interaction mechanism (of position themselves in the future scenario and express their opinions)
- Some participants asked for more detailed information that was not provided on the future news to better understand the future scenario before they answered.
- Some participants reported that they need some more time to think before recording.
- All the participants were able to position themselves in the given scenario and responded with their opinions on it even though some responses were shorter and simpler; some were longer and deeper.
- None of the participants read the newspaper; they only watched the picture and listened to the researcher's explanation.
- Participants were more interested in listening to the opinion from the opposite stand from themselves.

React
- Group 1 and 3 said it was interesting and group 3 even stayed to continue the conversation on privacy issue for around 15 minutes.
- Participant from Group 4 asked whether this news is real because he thinks it is a very good policy.

Language
- Some participants find it hard to speak their thoughts in English, which was observed when they were trying to find the English words to use or even asking the person next to him/her.
- All the participants were not native English speaker, except for group 3 (the group of Irish friends), this influence the depth of opinion expression as the non-native speakers' answer tended to be way shorter.

Others
- For avoiding biasing the participants, the researcher tried not to join the conversation. Thus, with a group of more than one person, the conversation was deeper as the discussion would be longer and had more chance to have different thoughts pop up during the conversation.

Conclusion for the next step

Overall, from the above findings, the interaction mechanism of this prototype proved to work, which can be seen from that the participants were able to position themselves in the future scenario and expressed their opinions even though the language was still a barrier for some participants. For further developing the prototype, the following directions for improvement and discovery are listed.

To test the future news in radio format

In the context of the front of the shopping centre, none of the participants read the future newspaper. Apparently, the media of articles on the paper is not suitable for this context. Together with the consideration of co-creativity, radio made by the text-to-voice platform was chosen to be tested in the next round of RtD. Even though video can make the experience more immersive, considering the flexibility and co-creativity of topics, this option was not considered.

Discover: how to evoke deeper thoughts through contents providing

"How would the contents of future scenarios about smart city influence the deepness of the thoughts evoking and the depth of discussion?" is the next step to be discovered. (The topics of the contents would still be in the field of waste management and transportation.)

To discover how to evoke deeper discussion

In this round of test, after listening to other people's opinion, the participants expressed their thoughts to the opinions. This made the discussion deeper, but it was not shown or recorded on the prototype. Thus, the next group of participants would not see it. Besides, how to trigger people's interests in listening to other people's opinion was also open for exploration since the participants were guided by the researcher to do so in this round of test.

To test in the different possible contexts in order to define the most suitable context

As the setup will have significant influences on the interaction design of the experience, it is essential to know the differences of the possible contexts for this project in order to find the most suitable context to make the design happen.

5.4 Prototype test and iteration - 2

Based on the conclusions in the last section, the discovery of content providing, discussion evoking and finding the most suitable context in Molenwijk were the main goals for this round of RtD in Molenwijk.

In this chapter, a prototype development consist of content generation and different ways to trigger the discussion would first be brought out. The iterated prototype was then tested in different contexts in Molenwijk and with another non-migrants comparison group. In the end, the overall conclusion, which leads to the final design will be revealed.

5.4.1 Prototype Development

This section consists of three parts: 1. the content development of the future news and 2. the development of opinion cards & boards, and 3. The combination of two sets of the prototype for the next round of test.

5.4.1.1 The content of future news

Brainstorming with employees from Waag

Brainstorming with employees from Waag For testing the co-creativity of this content container concept and enhancing the diversity of the materials of future news, the brainstorming session with four employees from Waag was conducted.

Process

Based on one of the insights from the generative session: ***"Conflicts evoke deeper thought in people's mind."***, the brainstorming question of future news about the smart city in the field of waste management and transportation was steered toward dark scenarios. That is, participants were asked to think of the dark scenarios in the future.

In order to clarify what do we mean by "smart city" in this session, the definition of smart city from the research phase (see chapter 2) was provided and it is: ***implementing data collection and analysis to make Amsterdam better***. To first diverge the ideas, each of us first wrote down six ideas on the post-it and then together, we shared the ideas. Afterwards, we choose the one that is most interesting from the six ideas everybody generated by themselves to further develop (see Figure 33). When further developing the future news, the brainstorming sheets of future news were provided, as shown in Figure34.

Figure33. Picture taken while choosing the most interesting ideas for further developing, Chang July 2019

Figure34. The co-creation material: Future Newspaper - Amsterdam Times

Result

In this brainstorming session, many funny and interesting ideas of future news were generated (see Figure35). Some of them were closer to reality, while some of them were more speculative. These ideas brought the range of the future news into a broader level as these people are more familiar with the topic and aware of the possible consequences that implementing data collection and analysis to make Amsterdam better may bring. However, whether these ideas are plausible enough or how participants react to these ideas will be further examed and presented in the next section.

Figure35 Some ideas generated in the brainstorming session

Speculation management

"Which ideas of the future news should be included in the design?" and **"How to choose from them?"** are the main questions going to be discussed in this part.

Speculation management

Auger (2013) suggests that **it is important to have careful management of speculation while implementing speculative design; if the speculation is too far into the future or too implausible, the audience will miss the connection with the design which will result in the lack of engagement.**

Based on the above argumentation, the future news ideas were ranked and chosen by its plausibility, the ones that are fun but not plausible were eliminated. Afterwards, the remain ideas were composed into two complete future news; one about waste management and one about transportation. Still, the standard of "Whether a piece of fictional future news is plausible enough?" remains hard to be defined in this stage. As a consequence, the two pieces of complete future news would be further tested to see their plausibility perceived by the participants.

Avoid biasing the audience

Additionally, while implementing speculation as a way to evoke dialogues of future scenario, the background and personal perspective may cause the designer to steer the design into a certain direction thus bias the audience (Tsekleves et al. 2017). Based on Tsekleves's finding, the contents of the two pieces of future newspaper were designed with an equal amount of positive and negative possibilities of the future scenario.

Conclusion

The two pieces of future news story about the topics of waste management and transportation were designed. To test different ways to inform people, the full content these pieces of news were made into audio files. That is, the design consists of two parts: 1. visual: headlines of the future news 2. audio files of full content of the news.

Figure 36 and Figure 37 in the upcoming pages of this report shows the visual design of these two future news stories and the brief of the interaction flow of this experience.

Amsterdam Times

The most trust-worthy news radio in the universe since 2019.

How would the future waste management in Amsterdam be like? Discover it throught the future radio and share your thoughts with us!

Step 1

Pick up the headphone and listen to the future radio.

Step 2

Take a recorder and scan the QR code to record your opinion.

Step 3

Vote according to your stand and check the result of other people's opinion!

Figure36. Future News 1 - waste management: the brief of the interaction flow of this experience (left) and the visual design shows the he

Amsterdam Times

30 July 2025

New fingerprint trash tracing garbage bin pilot testing in Amsterdam.

Tax calculation bases on the amount of waste and the recycling rate at the end of the year.

eadlines (right)

Am Amsterdam Times

The most trust-worthy news radio in the universe since 2019.

How would the future public transportation in Amsterdam be like? Discover it throught the future radio and share your thoughts with us!

Step 1

Press play and listen to the future radio.

Step 2

Take a recorder and scan the QR code to record your opinion.

Step 3

Vote according to your stand and check the result of other people's opinion!

Figure37. Future News 2 - public transportation: the brief of the interaction flow of this experience (left) and the visual design shows the h

Amsterdam Times

30 July 2040

MASS --- the largest transportation service provider in Amsterdam combines all the transportation ways within the system.

Data gather and analysis technology has reduced transportation time by 7 minutes per person per day.

Free transportation as long as you pay with the data.

You don't bike? Then your insurance fee will go higher!

MASS has the potential to become the largest surveillance system in Amsterdam.

eadlines (right)

5.4.1.2 Development the way to help opinion expression

Development of the opinion cards
In this developement stage, "how to evoke deeper discussion" is the main direction for exploring.

Thus, the following recorder cards (see Figure38) were developed in order to see whether the information on the recorder cards would have influences on the relevance of the opinion cards to people.

The pieces of information contained on the cards are the name, age, profession, the living experience (years) in Molenwijk.
Besides, the last one on the right-hand side of the picture is feedback dots. After people listening to other opinions, they can draw a red/green dot on the card to show their disagreement/agreement to the opinion.

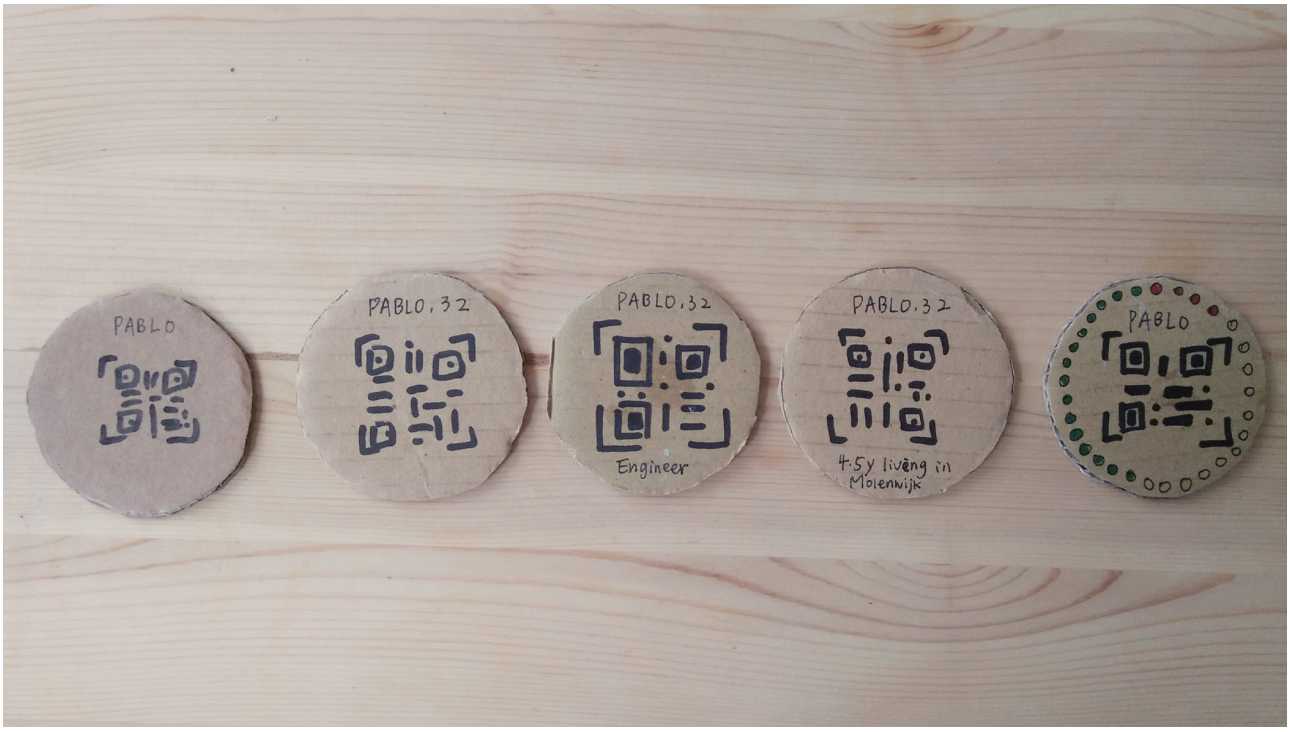


Figure38. Opinion cards that have different information on it.

Development of the opinion collectors

Except for the columns for voting, another type of opinion board was develope for testing whether which would evoke deeper thoughts.

Different from the first version of the opinion board, the new version (see Figure39) uses coordinate for people to position their opinions. The horizontal axis is positive and negative, while the vertical axis is the level of concern.

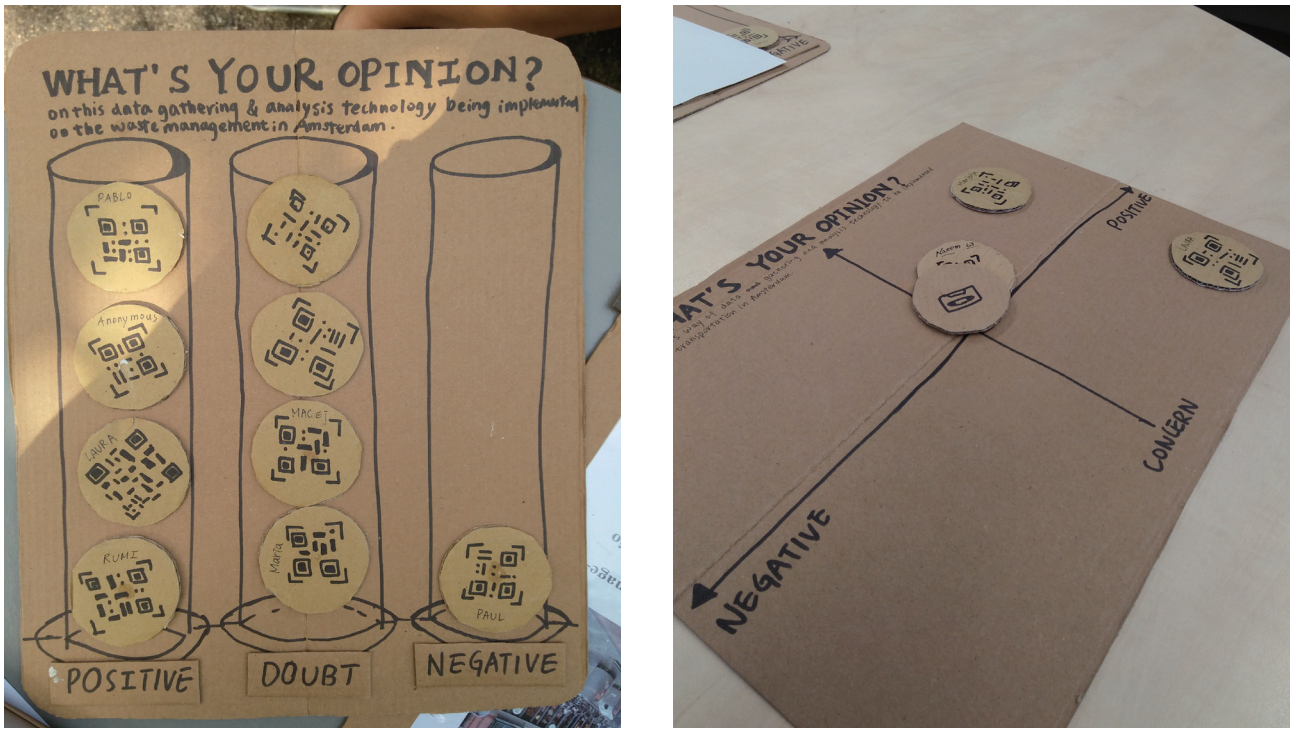


Figure39. Different formats of opinion collectors: columns with choices of positive, doubt, negative (left) and axis with positive, negative and concern level (right).

5.4.1.3 The iterated sets of prototype

For having an efficient testing process, the above designs were combined into two sets of prototypes:

Set A. Waste Management
- with column opinion board
See Figure 40

Set B. Public Transportation
- with axis opinion board
See Figure 41

Figure40. Prototype set A

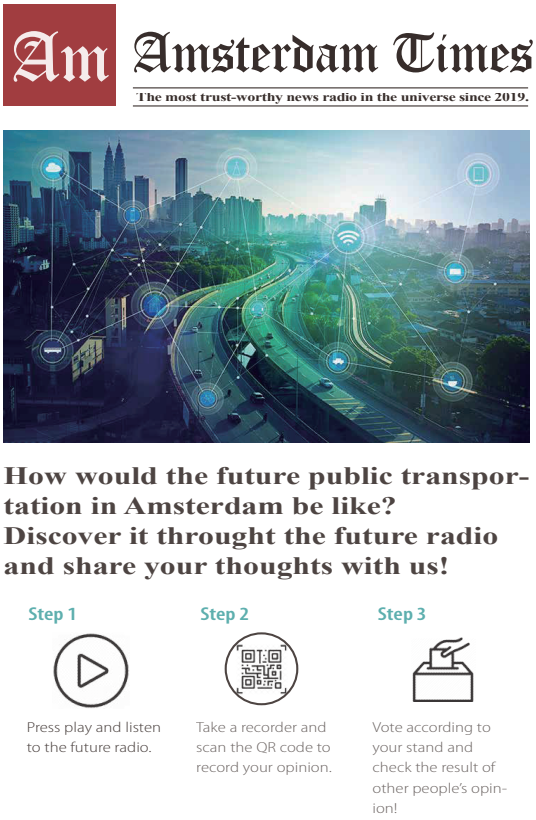


Figure41. Prototype set B

Amsterdam Times 30 July 2025

New fingerprint trash tracing garbage bin pilot testing in Amsterdam.

Tax calculation bases on the amount of waste and the recycling rate at the end of the year.

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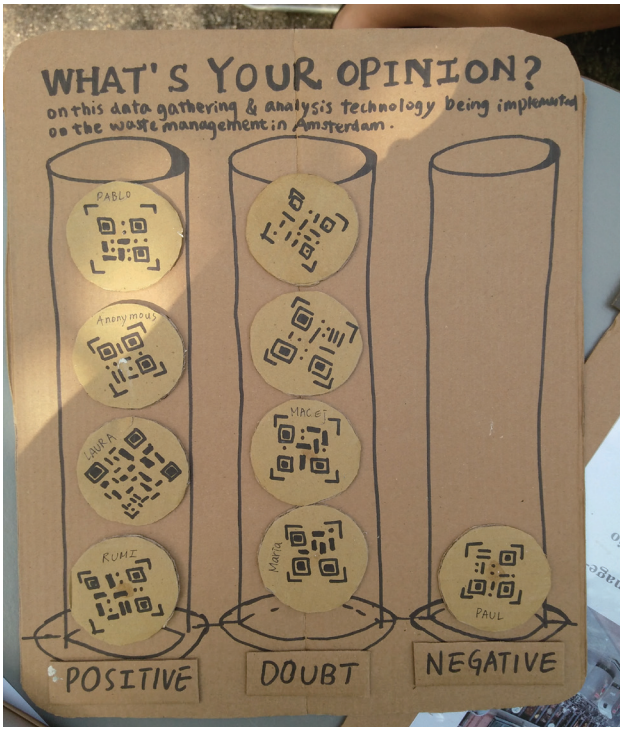


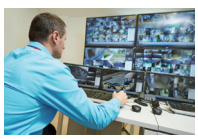
Amsterdam Times 30 July 2040

MASS --- the largest transportation service provider in Amsterdam combines all the transportation ways within the system.

Data gather and analysis technology has reduced transportation time by 7 minutes per person per day.

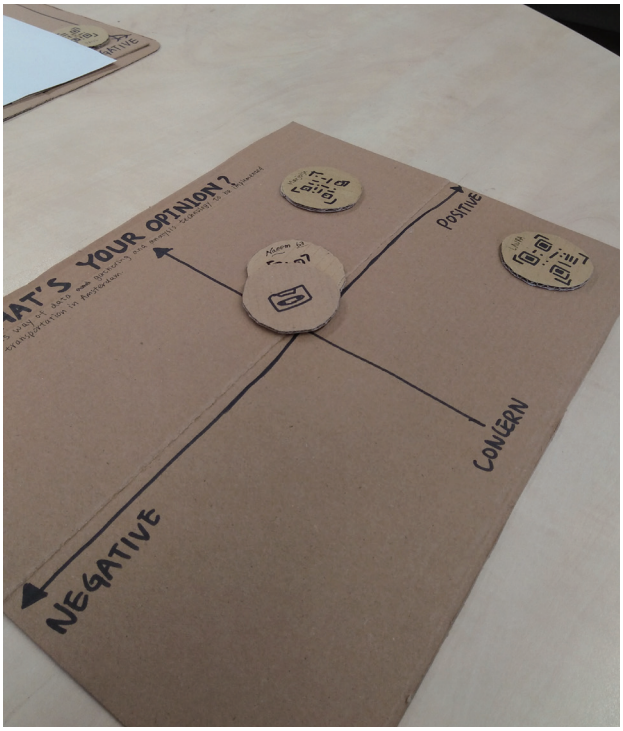
Free transportation as long as you pay with the data.

You don't bike? Then your insurance fee will go higher!



MASS has the potential to become the largest surveillance system in Amsterdam.

+



5.4.2 Test in different public spaces in Molenwijk

Test Goal

In this round of test, to see which set of prototype achieve a better performance regarding the design goal (see 4.6) was the primary goal. Whether the future news is plausible and playful was also going to be tested.

Besides, in order to seek for the most suitable context in Molenwijk neighbourhood, the RtD process would be conducted in three different public spaces in Molenwijk, which are the building entrance of one of the apartments, the library and the square at the front of the shopping centre.

Testing process

To avoid the possible bias caused by the testing order, 3 of the participants were asked to test Set A first, while the other three were asked to start with Set B.

After experiencing the two sets of the prototype, they were asked to compare them from the following aspects:

1. Opinion boards: Which evokes deeper thoughts of them?

2. Opinion cards: which pieces of the information are more relevant to them, so that triggers more of their interest to listen to the opinions?

3. The two pieces of future news: Which evokes deeper thoughts of them? Also, how do they perceive the plausibility?

In total, five residents participated in this round of test in different spaces, and they are listed in Table6.

Participants	Age	Gender	Origin	Where did we test	Most Prefer language	Second Prefer language
M	40-45	M	Turkey	Building entrance	Turkish	Dutch
N	65	M	India	Front of shopping center	Indi	Dutch
C	70	F	Indonesia	Library	Spanish	Dutch
L1	25	F	China	Front of shopping center	Chinese	English
L2	19	F	Italy	Front of shopping center	Italian	English

Table 6. Participants of the second round of the RtD in Molenwijk

Figure42. Testing with Participant N at the front of the shopping centre in Molenwijk with the help of Laura Alvarez, an architect who works on community-building projects in Molenwijk, Chang July 2019.

Result - Comparison of the contexts (different public spaces in Molenwijk)

Table#, shows the comparison of different public spaces.

Entrance at a building

As shown in Figure43, the test was set next to the entrance building. Even provided with lemonade and seats for attracting people to come, in general, people were in a hurry in this context that participant M even didn't have time to finish the second set of the prototype.

Library

The residents who visit the library (see Figure 44) were usually not in a hurry. However, based on a one-day observation at the library, a distinctive pattern of the visitor group of the library was discovered. They are mostly either parents with little kids (under 6-years-old) or elderlies age above 60. Some rejections were gotten from the parents since they have to take care of their kids at the same time.

Shopping centre square

This space has the largest amount of people pass by and with a wide range of background (ethnicity, age, family types et cetera). Besides, it's an open-air area which makes it suitable for the discussions in the experience (see Figure45).

Molenwijk werkplaats and the community centre in Molenwijk neighbourhood They were once considered, but after visiting, the former one was struggling with engaging the residents thus have little visitors, and the latter one was closed during the research period of time. Consequently, these two options were not considered in this project for the final design.

Conclusion

For reaching larger amount of people with a more diverse background (ethnic background, age, family type etc.) and considering the residents' time availability, the shopping centre square was chosen to be the context for the design to happen in Molenwijk.

	Entrance at a building	Shopping center square	Library
available time	hurry	ok	ok
amount of people	least	Most	way less than the square (about 5 people/hour)
type of people who pass by	the residents from the building	diverse from age, ethnic background	The majority are specific groups like: 1. Parents with little kids (age under 7) 2. Elderly age above 50
Other note	Avoid 5-6 before lunch time	Better to catch people before entering	Saturday even quieter Elderlies are the newspaper reader
For discussion	open-air open for talking	open-air open for talking	sometimes too quiet for discussion

Table7. Comparison of the public spaces in Molenwijk

Figure43. **The entrance of the building** - *a picture taken while testing with Participant M, Chang July 2019*

Figure44. **The library in Molenwijk** - *The environment and test setup, Chang July 2019.*

Figure45. **The front of the shopping centre** - *picture taken while testing with participant N, Chang July 2019.*

Findings & sub-conclusions

Comparison of the information on the opinion cards

In total 7 participants were asked to compare the information provided on the opinion record cards.

- All of the participants liked the design of the green and red dots that represent agree and disagree. This helps them to choose which opinion card to listen to. Participant La (19, Italy) thought the cards with more red dots would even trigger more of her interests since it might contain the value that has less social desirability and can thus trigger more of her interest. Participant M thought the ones with more dots may have more useful content in it thus would trigger more of his interest.
- The information of living experience was though irrelevant to most of the participants except for when the topic relates to this neighbourhood.
- The information of age and professions were considered irrelevant to most of the participants (5 out of 7)
- Participant L2 and M2 thought having their own name on it makes them value more the opinion that they are going to give so that they would be more serious when recording.
- Apart from the information provided on the opinion cards, the participants usually want to listen to the opinion opposite from their stand. This phenomenon is the same as observed in the last round of test. It shows that conflicts trigger not only deeper thoughts but also curiosity.
- Participant Li (25, China) suggested having hashtags on the opinion card because she wants to know what's in the cards first and then she can decide which to listen to, however when asked whether she would like to leave hashtag on her opinion card, she replied no because it's too much effort.

Sub-conclusion of opinion cards

For maintaining the quality of the opinions, the information of name was chosen to be on the opinion cards since the participants think they would be more serious if they were asked to leave their names on it. Besides, considering the future usage of the design which is for Waag to collect opinions in a new neighbourhood, having names of participants on the opinion cards can make them more recognizable.

The feature of red-green dots on the opinion cards provided a way of opinion expression after the participants listened to a piece of opinion. At the same time, it was reported by the majority of the participants (6 out of 7) that this information triggered their interests on listening to a piece of opinion especially if there were more red dots (disagreement).

As for the other information, the relevance depends on the topic itself. For example, if the topic relates to the neighbourhood, then the living experience can be preferably included. In the same time, the willingness of information provided should be considered. The above are suggestions for future usage of the design.

Comparison of the two designs of the opinion boards

- 6 out of 7 (including the test with the comparison group in section 5.5.3) participants reported that the design of the axis board triggered them to think more deeply. While 2 participants would still prefer the column board because it's simpler. Besides, participants stated that the axis board better position their opinions.

Sub-conclusion of opinion boards

The decision of opinion boards choosing can be based on the purpose of the (future) usage. If efficiency and convenience are prioritized, then the opinion board with column can perform better; if the deepness of the opinion and conversation are more important, then the type of the opinion board with axis can work better. In this case, as the design goal of the project contains triggering deeper thoughts, the axis one is more preferable.

The plausibility of the two pieces of future news

- Even though the participants were all able to position themselves in these two pieces of future news and express their opinions, the different deepness of opinions could be observed. This finding will be further elaborated in section# overall conclusion.
- Comparing the two pieces of future news, in general, the waste management (shorter: 2 pieces of news, less speculative) one was perceived easier to understand and give opinions to while the public transportation one (longer: 5 pieces of news, more speculative) took more time for the participants to think and was perceived more complex and more thoughts triggering.
- In general, the future news of public transportation took longer for the participants to think about how to reply due to the following reasons given by the participants:

"This involves more data than the fingerprint one, so I think it's more dangerous and complex." Participant L3 said.

"Which one should I respond to? All of them or just one?" Participant C said.

"Wait, I need more time to think about it, I can't make the answer perfect now, can I stop it(the recorder)?" Participant M2 said

- Participant C (70, Indonesia) said in the test that "you know, for an old person like me, I am 70 years old, what does the future news in 2040 mean to me? To me, it's less relevance than another one (waste management)."

After listening to the future news radio

- While being asked, "What's your opinion of the above news?" after listening to the future news radio, almost all the participants needed some time (5 to 10 seconds) to think about how to answer in both sets of the test.

- Some participants asked "opinions on what?" and participant C asked, "Do I have to respond to all of the headlines or just one?" This showed that either the question was not clear to them or they were given too little time to think or both.

From the findings collected in these two parts of "plausibility" and "after listening", the conclusion couldn't be drawn yet as it requires a more comprehensive comparison and consideration which will be further discussed in section 6.5.4 "overall conclusion".

other findings

- Since in the last round of test, while expressing, the participants tend to gaze at someone (either their friend or the research). This was observed from all of the participants except for Participant Li, she was gazing at the question on the opinion board when recording her opinion. To have a short summary, this eliminated the option once had which was to have a stand-alone installation since this might greatly influence people's willingness to interact with the installation and thus reduce its functionality.

findings and sub-conclusions from language perspective

In these two rounds of test in Molenwijk, while approaching the possible participants, there were many rejections due to the language. Those residents replied that they don't speak English and then went away. Besides, in the informing stage, the different understanding levels of the content were also observed which influence the deepness of the opinion expressed. To better achieve the design goal of triggering deeper thoughts, and have more chance to reach a wider group of people in Molenwijk, I started to look for the second most suitable language. From table8, the preferred languages in both rounds of tests are listed. It is clear that except for English, having a Dutch version of the future news radio can lower the effort of the majority participants in Molenwijk even though they come from very diverse origins. Consequently, in the final test, two languages of future news radio would be provided.

Besides, the speed of the radio was too quick to Participant L3, and no break in between the paragraphs made her hard to process and digest the news especially when it's in the language that she's not that familiar with. Even though the other participants didn't mention it clearly, the language is clearly a barrier for many of the participants. So the adjustment of the speed and break of the future news radio would be considered in the final design.

Participants	Age	Gender	Origin	Most Prefer language	Second Prefer language
1	20	F	Italy	Italian	English
2	45-40	M	--	Dutch	--
3	25-30	M	Ireland	English	--
4	25-30	M	Ireland	English	--
5	10	M	Morocco	Dutch	English
6	40-45	M	Morocco	Arabian	Dutch
7	40-45	M	Turkey	Turkish	Dutch
8	65	M	India	Hindi	Dutch
9	70	F	Indonesia	Dutch	English
10	25	F	China	Chinese	English
11	19	F	Italy	Italian	English

Table8. all the participants joined these two rounds of the RtD avtivities in Molenwijk

5.4.3 Test with the Comparison Group

The RtD process so far had been conducted with 12 residents from Molenwijk with a wide range of ethnic backgrounds including Moroccan, Turkish, India, Chinese, Irish, and Italian. The average English ability of these participants is relatively lower except for three of these twelve participants (including 2 native speakers). Besides, the ideas of speculative design and Smart City are more likely new to the majority of these 12 residents. ***In order to exam whether language ability and the familiarity of the concept of Smart City (which is defined as: "implementing data collection and analysis as a way to make the city better." in this project.) would influence the experience and how it is influenced,*** the following test was conducted with Marjolijn and Laura, the visiting designers of Molenwijk Werkplaats. The test was conducted at the front door of Molenwijk Werkplaats as shown in Figure# with the same testing process as described in the last section.

In this test with the comparison group: Laura and Majorlijn (L and M), three significant differences in comparison with the previous 2 rounds of the test were identified:

1. a happy vibe

This was observed through that Mojorlijn laughed out loud when heard some parts of the future news radio and during the whole process, even though sometimes the discussion became more serious, the general vibe was happy and light.

2. the deepness of the opinion

These two participants expressed their opinions not only based on their life experience but also from a societal aspect, furthermore, their opinions were elaborative and had strong arguments.

3. after the test

The conversation on this topic continued for around 5 minutes even after the opinion recording (which was observed in one of the group from the round 1 test.). Besides, when the test finished, Participant M asked whether there are more pieces of future news since she found it very fun.

Figure 46. The test with comparison group

5.4.4 Overall Conclusion of the RtD in Molenwijk

In total 14 participants joined the RtD test in Molenwijk, origin from seven different countries.

The following two main findings present the overview result of the RtD in Molwnwijk:
The mechanism of the design (future scenario informing/thoughts evoking / opinion expressing) works with all the participants.
That is, the two pieces of future news are all plausible enough that the participants were able to position themselves in the future scenario and address their opinions. It's only that the different deepnesses of opinions observed, and the reasonings are described as below.

Only when the effort (in this case was mainly caused by the language and familiarity with the topics) was acceptable for the participants, did they feel the playfulness and showed a more proactive attitude in the test. This was seen from the two Irish participants in round1, participant L1 and L2 in round 2 and the comparison group).

Next Step

- The content of the future news needed to be adjusted in order **to balance the informativity of the content and the audiences' effort.**

- To **reduce the effort caused by the language,** a second language version of future news radio would be provided.

- After listening to the future news radio, almost all the participants (including comparison group) needed some more time to think first and then started to express. **Bridging** the interaction between informing and expressing stages for the majority of the residents in Molenwijk was the main direction that still needed to be designed.

- As the previous tests were done by the active approach to the participants, the interaction vibe was more like a guidance by the researcher. An **attractive design** for evoking people's curiosity and interests was planned to be further developed.

Phase iii

Design

6 Final Design

This chapter presents final design of this project: Future News Stand, followed by the interaction flow, which shows how to facilitate the discussion on future scenarios with citizens via the design in a chosen public space.

Figure47. the final design: Future News Stand

6.1 Final design

Future News Stand is a co-creatable opinion sensitizer which aims at engaging citizens in the discussions of the possible future scenarios of cities in a playful and speculative way.

In this project, the smart city in Amsterdam was chosen to be the main topic for discussions.

The design of Future News Stand consists of **two parts**: **Part A. Future News Co-creation Toolkit**, which allows the discussion topic to become co-creatable and adaptive according to the stakeholder's purpose (see Figure 48); **Part B. Future News Stand,** a portable installation for triggering discussion about a certain future scenario with citizens on the streets (see Figure 49).

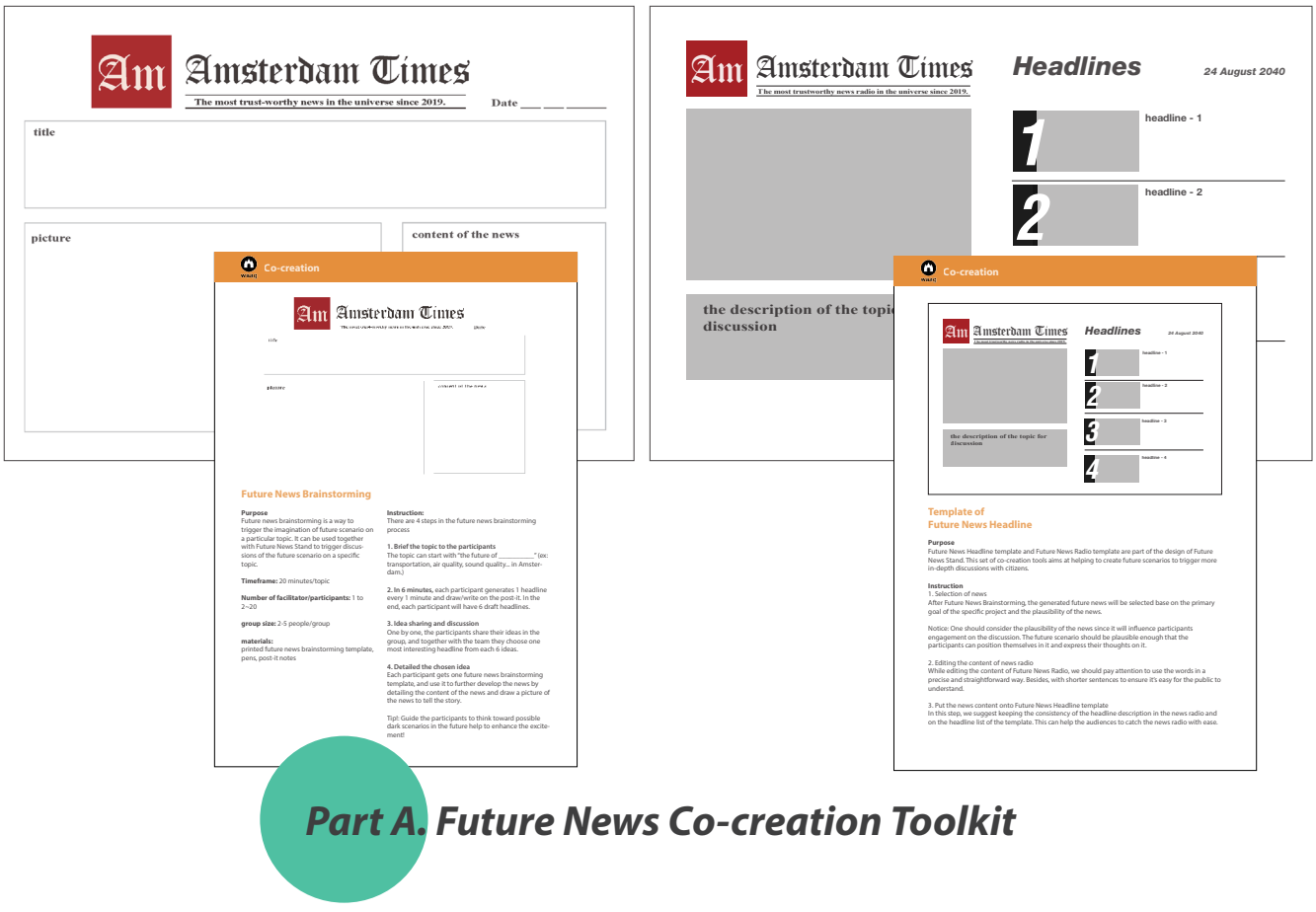


Figure48. Overview of tools & instructions in Future News Co-creation Toolkit

Figure49. the front (left) and back (right) side of Future News Stand

Part A. Future News Co-creation toolkit

Future news toolkit is a set of tools that help to imagine and generate future scenarios on a particular topic in a co-creative way. In this way, the content of Future News Stand becomes changeable. Furthermore, this makes Future News Stand adaptable to not only the current but also the future projects that Waag might have.
The toolkit consists of the following two sets of tools:

1. Future News Brainstorming sheet and its instruction
Future news brainstorming sheet is a tool **for triggering the imagination of future scenarios in a brainstorming session**. These brainstorming sheets (see Figure50) can be used alone or together with Future News Stand depending on the user's (in this case is the stakeholder: Waag's) purpose. The instruction manual shows the purpose, the number of facilitator and participants, the timeframe, materials and instructions needed for conducting this brainstorming session (as shown in Figure51). The design of the instruction referred to the other co-creation tools on Waag's online co-creation tool database: Co-creation navigator. The file of this instruction manual can be found in Appendix D.

Figure50. Template of Future News brainstorming sheet

waag **Co-creation**

Future News Brainstorming

Purpose
Future news brainstorming is a way to trigger the imagination of future scenario on a particular topic. It can be used together with Future News Stand to trigger discussions of the future scenario on a specific topic.

Timeframe: 20 minutes/topic

Number of facilitator/participants: 1 to 2~20

group size: 2-5 people/group

materials:
printed future news brainstorming template, pens, post-it notes

Instruction:
There are 4 steps in the future news brainstorming process

1. Brief the topic to the participants
The topic can start with "the future of _____" (ex: transportation, air quality, sound quality... in Amsterdam.)

2. In 6 minutes, each participant generates 1 headline every 1 minute and draw/write on the post-it. In the end, each participant will have 6 draft headlines.

3. Idea sharing and discussion
One by one, the participants share their ideas in the group, and together with the team they choose one most interesting headline from each 6 ideas.

4. Detailed the chosen idea
Each participant gets one future news brainstorming template, and use it to further develop the news by detailing the content of the news and draw a picture of the news to tell the story.

Tip!: Guide the participants to think toward possible dark scenarios in the future help to enhance the excitement!

Figure51. Instruction of Future News brainstorming sheet

2. Future News Headlines/Radio template and their instructions

Future news headline and radio template are for the stakeholder to co-create and adapt Future News Stand depending on the topic they want to talk about. After filling the template of future news radio (see Appendix E), one can insert the text of future news radio into text-to-voice service such as google translate. In this way, the future news radio would be available in audio format.

The instruction manual of these templates (see Figure54) provides the steps and tips for using them and is design with referring to the other co-creation tools on Waag's online co-creation tool database: Co-creation navigator. The complete file can be found in Appendix E.

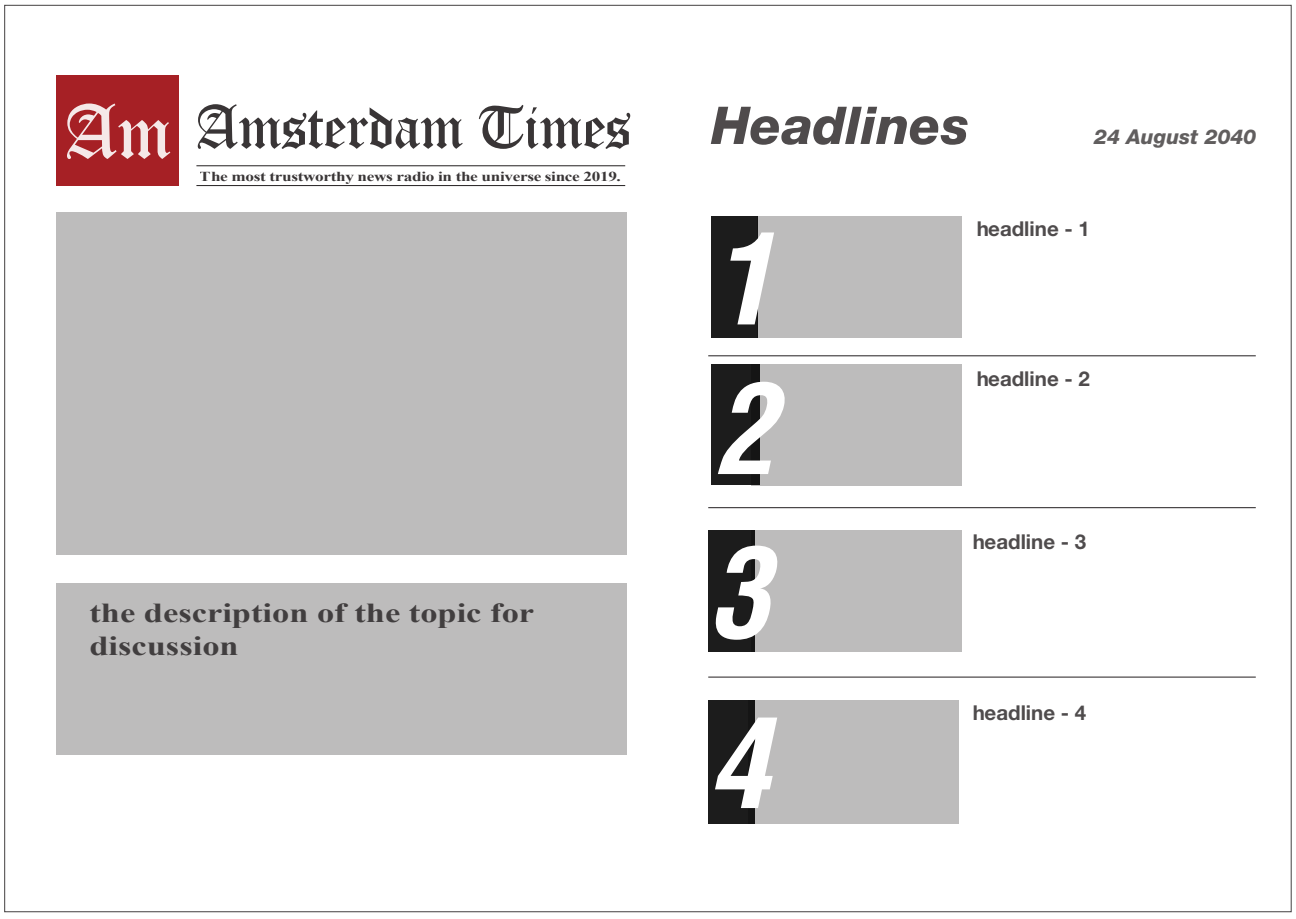
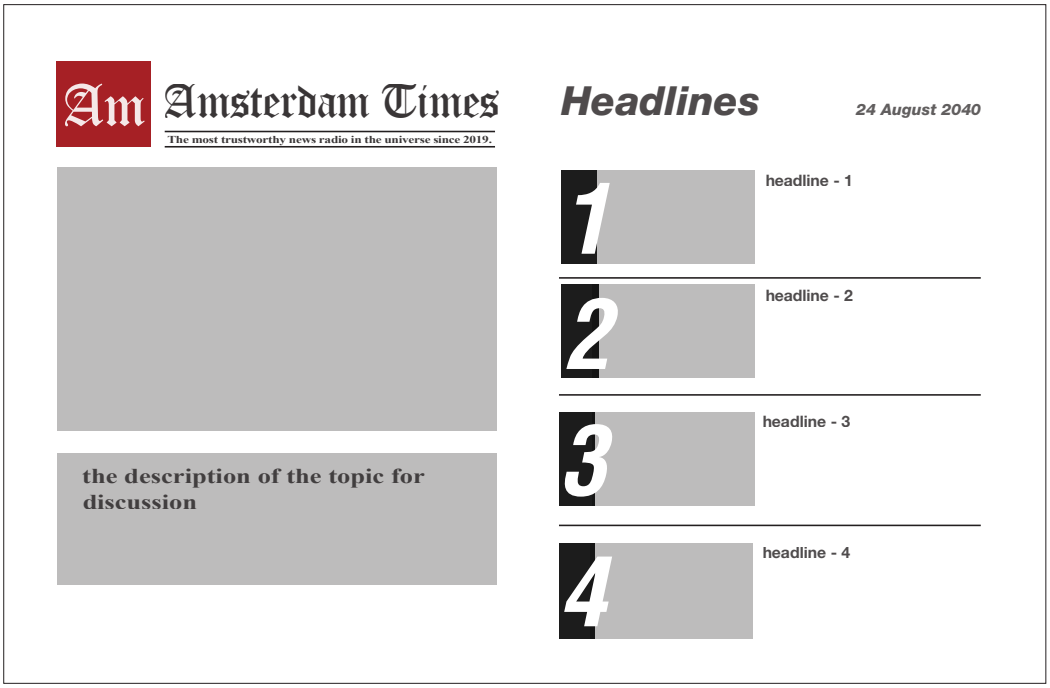


Figure53. Template of Future News Headlines



Template of Future News Headline

Purpose
Future News Headline template and Future News Radio template are part of the design of Future News Stand. This set of co-creation tools aims at helping to create future scenarios to trigger more in-depth discussions with citizens.

Instruction
1. Selection of news
After Future News Brainstorming, the generated future news will be selected base on the primary goal of the specific project and the plausibility of the news.

Notice: One should consider the plausibility of the news since it will influence participants engagement on the discussion. The future scenario should be plausible enough that the participants can position themselves in it and express their thoughts on it.

2. Editing the content of news radio
While editing the content of Future News Radio, we should pay attention to use the words in a precise and straightforward way. Besides, with shorter sentences to ensure it's easy for the public to understand.

3. Put the news content onto Future News Headline template
In this step, we suggest keeping the consistency of the headline description in the news radio and on the headline list of the template. This can help the audiences to catch the news radio with ease.

Figure54. The first page of the instructions for Future News Headlines and Future News Radio

Part B. Future News Stand - front

Purpose

Future News Stand is an **installation** that helps **to trigger discussions on certain future scenarios** with speculative future news. Another primary value is **to create relevance with a new group of people**; thus, this stand and its setup are designed to be portable.

Setup

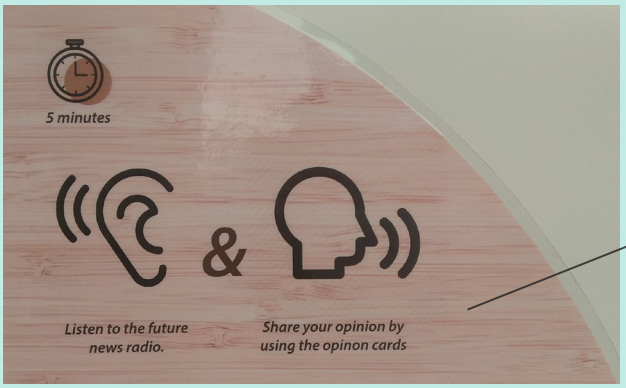
At least one facilitator is needed for operating this installation while two can make the process smoother. The facilitators can refer to the interaction flow described in page 92-93 to facilitate this experience.

Figure55 shows the look of the front side of Future News Stand and the elements on it.

Elements on the front side of Future New Stand

Sign

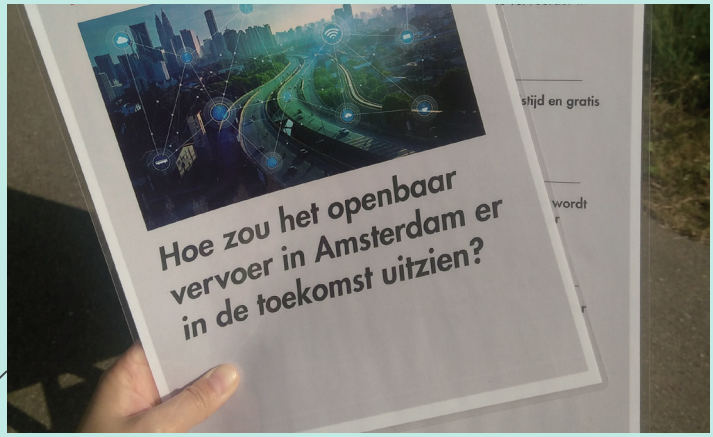
Future News Stand and the subtitle "What is going to happen in the future?" was designed with the intention to trigger people's curiosity.



Flow description card

For inviting people to join an activity, it is important to communicate the affordance of the activity (Norman, 2001). Thus the interactions and estimated time spending of this experience are shown in the flow description card.

Figure55. The front side of Future News Stand and the design elements on it.



Future news headline cards

Future news headline cards contain the main topic and the headlines of the news in the future news radio. The use of headline cards and their features will be described in the following page of this report.

Opinion cards and markers

Opinion cards are designed for triggering opinion expression and stand formulation while the markers are for name writing on opinion cards. The details of the design of opinion cards are on page 96.

Speaker

The speaker is used for playing future news radio.

A closer look at Future News Headline cards

Am Amsterdam Times

The most trustworthy news in the universe since 2019.

How would future public transport in Amsterdam be like?

Headlin

Figure56. the design of Future News Headlines

In practical, **at least two sets** of Future News Headline cards would be printed. One is placed on the Future News Stand, and another is carried by the facilitator. Two main functions of future news headline cards are:

1. As a portable explanation of the design for inviting people

Since Future News Stand is used on the streets, people might be either attracted by its appearance and come to this stand or invited by the facilitator to the stand. In the later situation, these headline cards can **help explain and invite people** to join.

2. An overview of the news in the future news radio

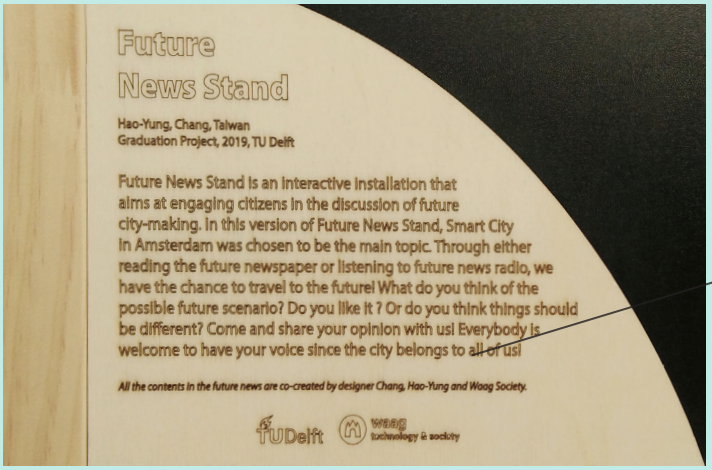
The design of **the numbered headlines** (see the right part of Figure #), together with **the corresponding hints in the news radio** ensure that **the participants can easily follow up the future news radio.** Also, after listening to the future news radio, when discussing, these cards can serve as a list of the future news.

In this final design, **two languages (Dutch and English)** of future news cards and future news radio are available for the participants to choose for reducing participants' efforts.

Part B. Future News Stand - back

Elements on the backside of Future News Stand - Opinion Board

Opinion Board is designed for letting the participants position their opinions with opinion cards. The reason for placing Opinion Board at the backside of the stand is **to prevent any possible bias** that may happen as a result of seeing each other's opinions. Figure57 shows Opinion Board and the design elements on it.



Description card

This card shows a broader scope of the project description, including the purpose of this design, the stakeholder involved, and the basic information about the designer.

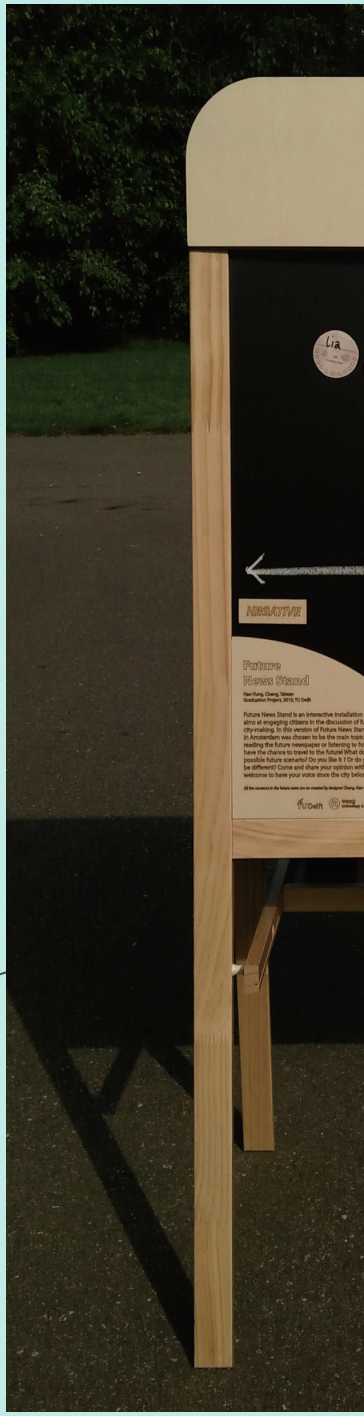
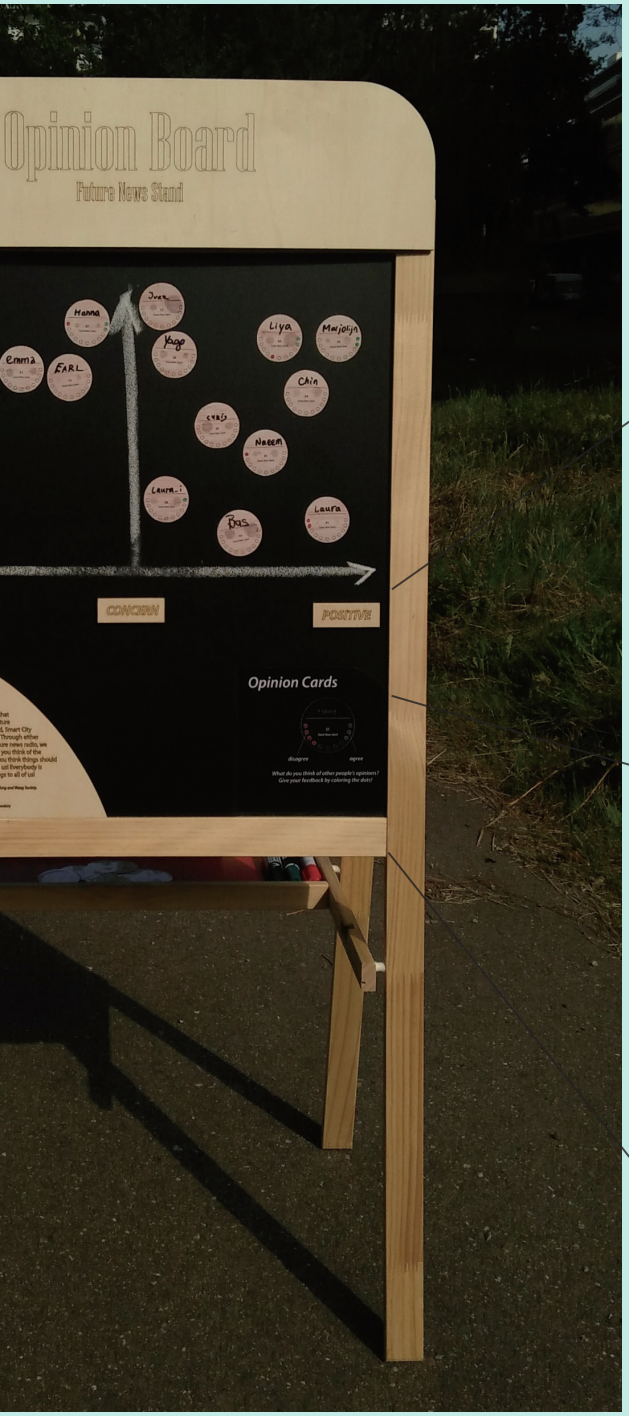


Figure57. The backside of Future N



ews Stand - Opinion Board and the design elements on it.

Opinion board

Opinion board is a space for positioning citizens' stands towards the content of future news radio. According to the previous research, this axis type of opinion board helps the participants to have a deeper reflection on their perspectives and relatively compare their opinions with others. As a result, this type of opinion board was chosen to be implemented in the final design. The horizontal axis represents the tendency of the opinions by being negative on the left and positive on the right-hand side while the vertical line represents the level of concern experienced by citizens.

The labels

Since this stand is a co-creatable content container, different labels are provided to make the design flexible and adaptable according to other chosen topics in future implementation.

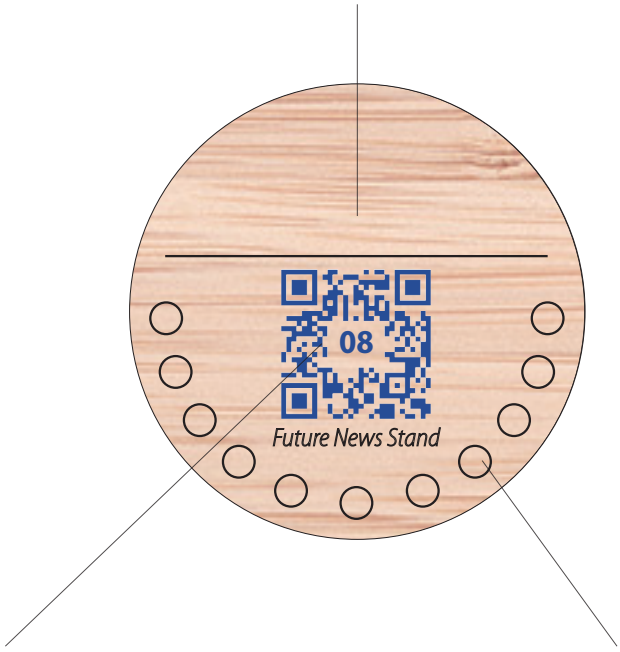
Instruction for opinion cards

The details of this design can be found on page 97.

A closer look at opinion cards & its instruction

Opinion cards are designed for triggering thoughts on the content of future news radio by inviting the participants 1) to record their opinions 2) to position their stand on the opinion board and 3) listening to other people's opinions and give feedback. Each opinion card represents one participant and contains his/her opinions. Figure58 below shows the design elements on opinion cards.

Space for name
This is for participants to write down their names.



The QR code and numbers in the centre
This QR code links to a webpage that has a simple interface for the participants to record their opinions. After recording and positioning the opinion card, the participants can scan the QR codes on the other opinion card to listen to other people's opinion. Participants can either use their own phone or the phone provided by the facilitator to scan the QR code for recording/listening depends on the convenience.

Feedback dots
After listening to other people's opinion, the participants can fill in the blank dots with either red or green colour to give feedback to the opinion. Green means agreement while red means disagreement.

Figure58. The close look of the design elements on opinion cards

Instruction for opinion cards

The instruction situates at the right bottom of Opinion Board shows how to interact with other people's opinion cards. Figure59 below shows the location and the detailed design of opinion cards instruction.

Figure59. The close look of opinion cards instruction and its location on Opinion Board

6.2 Interaction flow

Where?
Depending on the purpose of stakeholder's project, one can choose the area where the engagement/relevance is planned to be created. It is suggested to use this installation at a spot that has more people who pass by in the chosen area such as the public space nearby supermarkets or shopping centres for encountering more people.

Number of facilitator v.s. participants
It is suggested to have two facilitators as a group. One is the main facilitator, while another one helps on the control of audio, or facilitate if there is more than one group of visitors at the same time. The participants can be in groups of 1 to 6 people.

How long?
5 to 15 minutes per group of participants, 1,5 to 2 hours in total.

Interaction flow

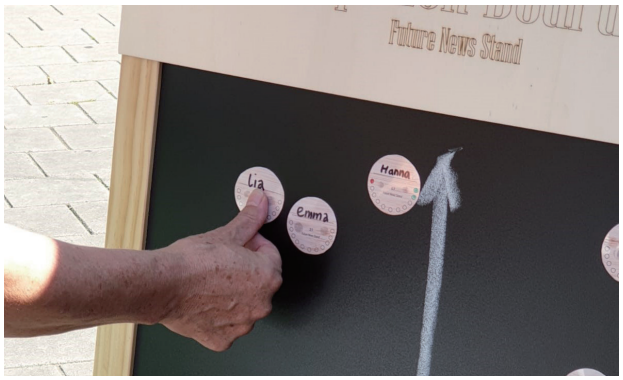
1) Attracting /Inviting
The participants come to the stand under either of the following conditions: a. Attracted by the stand or b. The facilitator approach to invite them with the printed news cards as a tool for briefing.

4) Bridging
To ensure the smooth transition among the interactions, the facilitator start the bridge process with asking ***"Are the pieces of news clear?"*** and then gradually guide the participants to think on the topic with the questions like: ***"What do you like/dislike in the news?".***

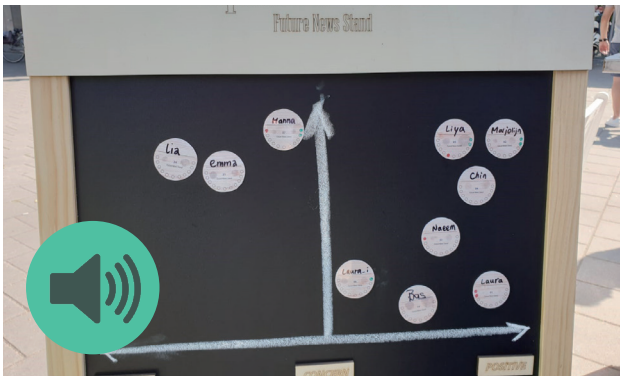
5) Expressing
At the end of bridging, the participants will be invited to record their opinions with opinion cards. At this point, marker pens are provided to the participants to write their names on the card.

2) Introduction
At the front of the stand, the facilitator briefly introduces the project and the process of the experience. During the introduction, the description card served as an aid to show the participants what to expect in this experience.

3) Listening
The facilitator provides the news headlines cards and plays the news radio.



6) Positioning
After recording the opinions, the facilitator invites participants to come to the backside of the stand: opinion board, and position their opinion cards on it.



7) Listening to other people's opinion
Next, depending on the availability of the participants, they can choose to listen to other people's opinions by scanning the QR codes on opinion cards.

7 Validation

This chapter starts by presenting the final test, including the test goal, setup, process followed by the result and recommendation for further developing the design. Besides, the feedback from the stakeholder: Waag would be shown at the end of this chapter.

7.1 Test in Molenwijk

Test goal

It was proved in the previous rounds of RtD process that the participants/residents were able to position themselves in the future scenarios and further express their opinions through the previous designs. In this validation phase, the other perspectives of the final design would be examed, and they are described as below:

1. Attractiveness

1a) Whether the design is ***attractive enough*** to ***trigger people's curiosity***?

1b) whether the ***perceived affordance*** is clearly conveyed for inviting participants to join?

2. Acceptable effort

Whether a) the ***content adjustments of the future news radio/news headlines*** and b) the ***Dutch version*** help to reduce the effort to consume the information of the future scenario?

3. Bridging between informing and expressing

Whether the ***bridging questions*** help to have a ***smoother transition*** after people listen to the future news radio and before expressing their opinions?

4. The design of opinion cards

From the previous RTD process, whether to have the feature of QR code was remain uncertain. Thus, in this round of test, the feature of QR code was taken away to see what would be the difference and if it is necessary to have it. Consequently, the fourth test goal is:

What is ***the difference between without or with QR code*** as a linkage to opinion recording and listening?

5. Overall experience

As the new features were added into the design, the overall experience would also be checked again and it would be examed by the following research questions:

4a) Does the final design ***better achieve the design goal?***

4b) How do the participants perceive the ***overall experience/design?***

Setup

As the previous test suggested, this final test was conducted at the front of the shopping centre in Mplenwijk for achieving a more diverse ethnicity and a larger amount of people. It took 10 to 15 minutes for each group and 1.5 hours in total, on a Saturday afternoon. As shown in Figure 60, the setup consists of these five parts:

A. The prototype: Future News Stand, together with a speaker

B. A facilitator

C. The future news headline cards (Dutch and English version)

D. A phone for recording the opinions (which was taking a picture at that moment)

E. A laptop for playing the future news radio and providing the evaluation questionnaire

Figure60. The test setup of the final validation

Testing Process

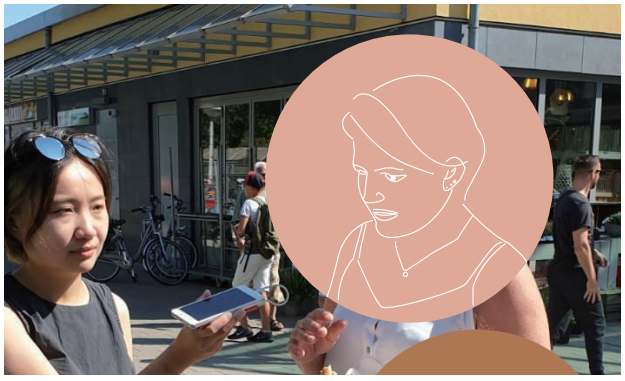
Step 1 to 7 in the testing process are the same as the interaction flow in p92. The difference is the extra step: 8 evaluation; this is for getting both quantitative and qualitative feedback from the participants.

1) Attracting /Inviting

The participants came to the stand under either of the following conditions: a. Attracted by the stand, they came and started to read the information on the stand by themselves.
b. The facilitator approach to invite them with the printed news cards as a tool for briefing.

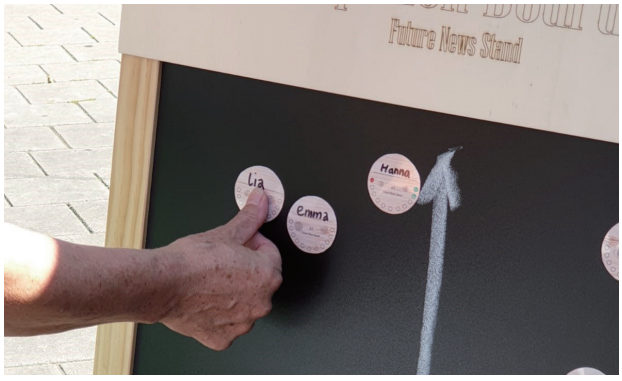
2) Introduction

At the front of the stand, the facilitator briefly introduced the project and the process of the experience. During the introduction, the description card served as an aid to show the participants what to expect in this experience.



5) Expressing

At the end of bridging, the participants were invited to record their opinions in around 20 seconds to 1 minute. At this point, the opinion cards and marker pen were provided to the participants to write their names on the card.

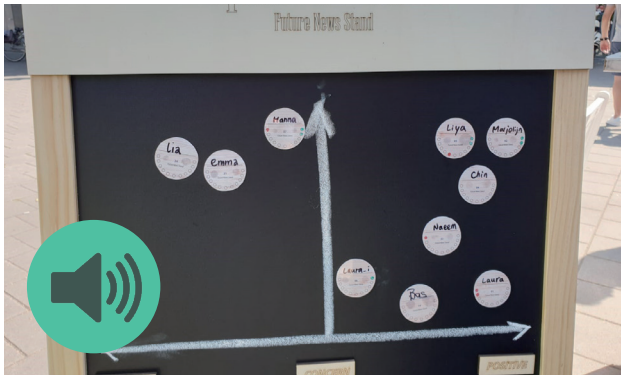


6) Positioning

After the participants finished recording their opinions, the facilitator first briefly explained the labels on the axis and subsequently invited the participants to position their opinion cards.

3) Listening
The facilitator provided the news headlines cards according to participants' language preference and played the news radio accordingly.

4) Bridging
After listening to the future news radio, to ensure the smooth transition among the interactions, the facilitator started the bridging process with asking "Are the pieces of news clear?" and then gradually guide the participants to think on the topic with the questions like: "What do you like/dislike in the news?".



7) listening to other people's opinion
Next, depending on the time availability of the participants, they can see if they want to listen to other people's opinions by scanning the QR codes.

8) Evaluation
As the participants finished the experience, if time permitted, they were invited to fill in the evaluation questionnaire on the laptop next to the stand and share their thoughts of the experience.

7.2 Results

In 1.5 hours, 7 participants experienced the prototype, two of them were attracted (see Figure 61) and came by themselves while the other five were invited by the facilitator (see Figure 62). Among these 7 participants, 6 of them filled in the feedback questionnaire whereas one who did not fill due to the lack availability of time. Thus, the following results are based on the observation, short interview after the experience, recording files of opinions and the filled-in questionnaires. These results will be presented by order of the test goals.

Figure 61. This participant was attracted to the stand out of curiosity.

1. Attractiveness

1a) Whether the design is attractive enough to trigger people's curiosity?

In the 1.5hrs, the following phenomenons were observed regarding attractiveness:

- Many people were staring at the stand from a distance while on their ways of walking.

- While playing the future news radio, people who were nearby were observed also paying attention to listen to it. Even though they did not join the discussion, sometimes they frowned or smiled when they heard some part of the news.

- Roughly five other people came closer to read the content on the stand while the facilitator was busying on facilitating. Thus, the facilitator was not able to approach them, and they left.

1b) whether the perceived affordance is clearly conveyed for inviting participants to join?

- In general, it was easy to invite people to try out the experience in this round of test. The printed news headline cards helped as an aid to inviting people away from the stand (see Figure 62) while the flow description helped to clarify the affordance of the design when they were at the stand (see Figure 63)
- While inviting people, I explained these

Figure 62. The other five participants were invited by the facilitator with the news headline cards for explaining the design from a distance.

Figure 63. One of the pictures taken while the facilitator was explaining the expected interation with the aid of flow description card.

designs (point to the news cards and the stand) are my graduation project and asked if they are interested in trying it out. This might raise more of their willingness to experience Future News Stand in comparison with future implementation.

2. Acceptable effort

Whether a) the content adjustments of the future news radio/news headlines and b) the Dutch version help to reduce the effort to consume the information of the future scenario?

The following reactions were observed while playing the future news radio:

-5 out of 7 participants were continually nodding and sometimes smiling or frowning as the news radio played (see Figure 64).

- Their eyesights followed the headlines on the news card whenever a piece of news started, and while the news continued, their eyesights were somewhere else.

- After listening to the news radio, the facilitator asked: "was everything clear for you in the news radio?" to all the participants. Most of the participants replied that it was quite clear with ease.

In general, the adjusted content of news and bi-lingual versions of the news helped to reduce the efforts of the participants when consuming the information. This brought a smoother experience, and the participants were observed more positive and engaging in the test. This positiveness can also be seen from the feedback questionnaires in the fourth paragraph: Overall experience.

3. Bridging between informing and expressing

Figure 64. One of the pictures shows that the vibe while the participants were listening to future news radio.

Whether the bridging questions help to have a smooth transition after people listen to the future news radio and before expressing their opinions?

With the bridging questions, most of the participants just naturally started to express their thoughts in an elaborative way (see Figure 65). The next opinion recording action was more like a summary of their talks. The above observation indicated that the bridging conversation indeed helped to smoothen the interaction between informing and expressing.

- What is worth notice is that there was one participant who did not see the cause-effect relationship among the pieces of news at first. But in the later bridging phase, his question was solved with the facilitator's explanation.

Figure 65. During the bridging stage, very often, the residents already started to elaborate on their thoughts.

4. The design of opinion cards

What is the difference between without or with QR code as a linkage to opinion recording and listening?

At the end of the bridging conversations, the facilitator then told the participants that we are going to record their opinions if they are ready. At the same time, the facilitator provided participants with opinion cards that are without QR code (see Figure 66).

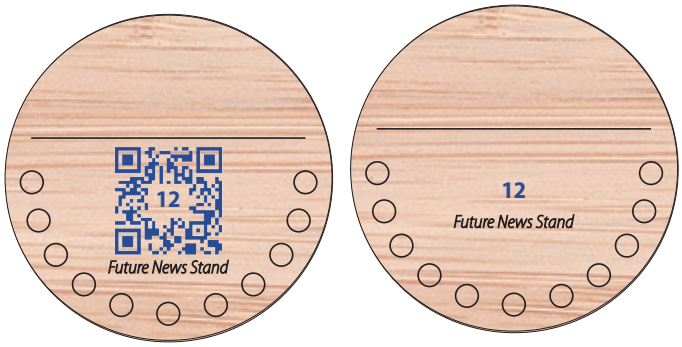


Figure66. The design of opinion cards: with and without QR code (at left and right accordingly).

The following findings were then observed:

While recording (at the front side of the stand)

- Some participants were confused because they did not see the linkage between opinion recording with the opinion cards.
- One participant asked why do we need the card.
- The others just accepted the card and started to record their opinions by the phone that facilitator provided.

After positioning the opinion (at the backside of the stand: Opinion Board)

- Most of the participants showed low willingness to listen to other people's opinion One participant said: "I am not interested in other people's opinion; it will not change mine anyway."
- Another participant said: "I am not going to listen to all these opinions. I have to go."
- Only one group of participants listened to another opinion, and it was under the invitation of the facilitator.

sub-conclusion

From the above observation of the final test, while started to record, the missing linkage between the action of opinion recording and opinion card confused the participants. Furthermore, after positioning the opinions, the decrease of willingnesses to listening to other opinions was observed in most of the participants. This decreasing has a negative effect on the design since understanding other opinions might further evoke thoughts on the discussion. However, whether the absence of QR code has direct affection on the decrease of the willingness to listening to other people's opinion cannot be concluded. Since it might be due to participants' lack of availability in this context.

After-test

As the openness of the opinion card design still remained, an after-test was conducted specifically focus on this design. Two of the participants in the final test were provided with the opinion cards with QR code and asked to compare the differences. Participant S and T reported the followings:

- *"I think it is a smart adds. It matches the topic you are talking here, makes the stand smarter."*
- *"Yeah, definitely, I think it makes other opinions* ***more accessible and inviting****. I would be more likely to listen to them."*
- *"Oh, I deleted the scanner on my phone, but* ***I would use the phone that you provide, that is not a problem."***

5. Overall experience

5a) Does the final design ***better achieve the design goal?***

For refreshing readers' memories, the design goal is provided again as below:

To trigger citizens' awareness on the possible pros and cons of using the technology of data collection and analysis as a manner to make a city better, and further formulate their stands through more in-depth discussions on Smart-City topics that are more relevant to their daily lives in a playful way.

For answering test goal 4a, the following questions were developed based on three key qualities in the design goal: **"relevance", "thoughts evoking"** and **"playfulness".**

Question 1. Relevance
Do you see this topic connect to your life?

Question 2. Thoughts triggering
Does the design trigger you to think about the pros and cons of data collection and analysis?

Question 3. Playfulness
Was the experience fun/playful for you?

The participants were asked to rate these questions from 1 to 10. Besides, both Dutch and English version of questionnaires were provided for eliminating possible misunderstanding of the questions. In total, 6 participants filled in the questionnaire. The outcome of the average scores are listed at the right-hand side, and the scores given by individuals of each question can be found in Figure67.

Question 1. Relevance
Do you see this topic connect to your life?
1: no, 10: yes

average score **8**

Question 2. Thoughts triggering
Does the design trigger you to think about the pros and cons of data collection and analysis?
1: no, 10: yes

average score **8.5**

Question 3. Playfulness
Was the experience fun/playful for you?
1: no, 10: yes

average score **8.7**

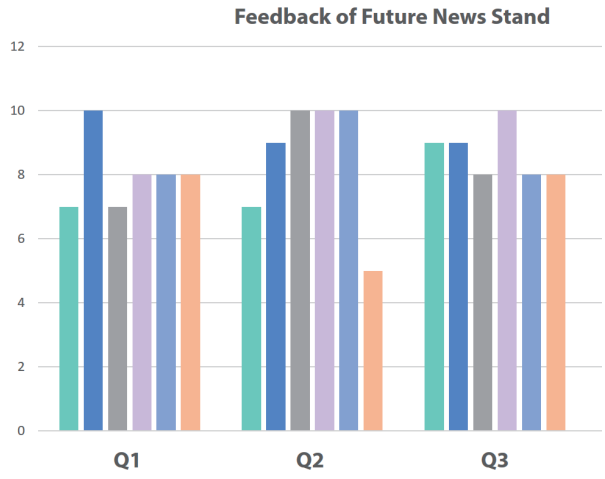


Figure67. The result overview of the feedback questionnaire

The result of these three quantitative questions provided **an overview achievement of the design regarding the design goal from the participants' perspective**, which is **highly positive**. However, this quantitative part does not tell much in-depth message. For further examing the above test goal, **the extracted quotes from the recorded opinions** are provided (see Figure68)for giving readers a more comprehensive understanding of the actual conversations/discussions triggered through the experience.

Well, I'm very positive about this, because I'm also a very regular public transport user. It concerns me that it seems to me that it's like a private company.

I'm a person that still trusts a little bit more the government. But yeah, the moment they start selling the data, my concern is not little, my concern is very high. Because I'm not that healthy person...said participant R

"when you're not paying for the public transport and you're using your data instead is worrisome,

because I do like to go on a bike... I think, in general, we should use money as a currency for everything and not data because of privacy. So that's a worrisome message if that's something that would happen in the future, and I sure hope it wouldn't" said participant V

"...I'm very privacy-minded. But you have to give up some privacy obviously, for the sake of okay…(convenience)"

They do need some that they need some data they already get that your card already tells us who we have you get it personal garden it will you on how often you use it, where you get on when you get off. That's all they need to know. They don't need it all like marriages, how many kids I've got, what kind of work I'll do if I religious or not….said participant Z

Figure 68. Five quotes extracted from the recorded opinions during the test

"It seems to me important because it's very personalized. And also you can make your choice of transportation. this is going to be a reality" *said participant Z*

"Like about the project is the free transportation and exchange of your data.

So it becomes interactive and then it all will be electric and preferable by solar cell empowers itself." said participant U

Conclusion of test goal 5a

Since the topic of transportation is the same, **the final design has a similar achievement on relevance with the previous design**. Besides, the relevance of transport has already been proven to have a strong relevance with the citizens in Amsterdam.

When it comes to **thoughts triggering,** these quotes showed various perspectives and values in their opinions. Some addressed the dilemma; some expressed the expectation or suggestions for the future, while some tend to overlook the negative consequence in the content. Regardless of the varieties in the opinions, **opinion expression can be seen as an explicit way of thoughts triggering.**

As for **playfulness,** from the scores given by the participants, it is the highest among the three questions. This difference can be traced to an improvement in the structure and wording of the future news radio and a more familiar language version provided. Most of the participants also confirmed the reduction of the effort regarding information consumption by reporting it was clear, as described in the previous test goal. Thus, one can conclude that **the final design achieved better in the playfulness from both participants' perspective and the observation of the researcher.**

As a conclusion of research question 5a, the final design has similar performance regarding relevance and thoughts triggering and these two qualities are highly scored in the final test. Apart from the above, a more significant difference is that the playfulness quality was achieved better in the final design, mainly due to several improvements that reduced participants' effort spent in the experience.

5. Overall experience

5b) How do the participants perceive the ***overall experience/design***?

Question 4 and 5 in the questionnaire were designed for understanding how the participants perceive the overall experience. Below shows the questions and the result followed by the quotes from the short interview with the participants after the whole experience.

Question 4. Overall Experience
How was the whole experience for you? (Listen to the radio and express your thoughts)

1 means hate face :(
10 means smile face :)

average score 8.7

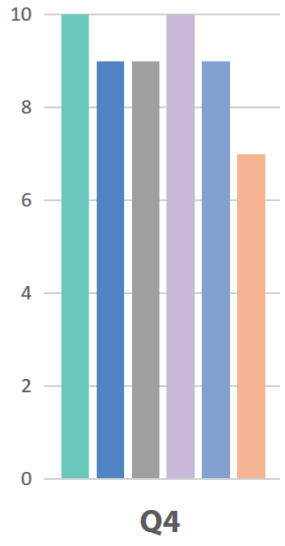


Figure69. The line graph shows the individual answers to question 4 of the questionnaire

Question 5.
How do you feel about the design of Future News Stand (& news radio)? Please use 1 to 3 adjectives to describe it.

The short answers from the 6 participants:

- interesting, makes you think, concerning

- multimedia and personal is the right way to communicate

- Creative, sociable

- curious triggering, worth learning

- A topical theme (an actual(important for now) topic) now and will become even more.
(original sentence: Een onderwerp dat nu erg actueel is en nog meer zal worden)

- interesting, good things to learn

Quotes from the short interview after the whole experience

Quote 1: "I was curious about it. I always like this kind of new things happens here from time to time." said participant Z

Quote 2: "I've worked for my whole life, and I like to spend my time learning new things. It worth to spend my time." said participant Z

Quote 3: "It(Future News Stand) is very

well-made, I like it a lot." said participant W

Quote 4: "I like the socialness like now, you know, we are talking." said participant Y

The above result shows that this experience was perceived as highly positive by the participants. Furthermore, from the qualitative parts of the result, except for the qualities mentioned before, participants also reported **other qualities of the experience such as "sociable", "good things to learn" and "topical".**

Conclusion

The above results indicate that final design: Future News Stand has a positive performance regarding attractiveness, affordance, and in achieving the defined design goal, which is:

To trigger citizens' awareness on the possible pros and cons of using the technology of data collection and analysis as a manner to make a city better, and further formulate their stands through more in-depth discussions on Smart-City topics that are more relevant to their daily lives in a playful way.

However, there are still some improvements that need to be done or further testified, and they are listed in the following paragraph.

Recommendation

The design of the opinion card

The feature of QR code on opinion cards strengthens the perceived bonding between physical cards and the digital recorded opinions. Besides, the existence of the QR code on the opinion cards makes them more inviting and accessible to the participants. The possible problem of implementing this feature -the popularity of the scanner- can be solved by a phone provided by the facilitator. However, whether this extended interaction can be within the perceived affordances to participants in the context of public spaces should still be testified.

Besides, the material can be later-cut woods with protection spray and covered on top with transparent plastic sheets to make it re-usable and more long-lasting.

Interaction flow card

The suggest time-spending can be adjusted into 10 minutes as most of the participants talk more than 5 minutes without including the other parts of the experience.

Besides, since the design of the interaction flow card is proven to work, this can be made into laser cut wood to have a more consistent appearance and to be more durable (Than laminated paper).

Suggestion to the facilitator

Since the context is on the street with the public, the facilitator faces very diverse people, it is suggested to be more patient when encountering someone who is less familiar with the topic.

Besides, if possible, gathering different groups of people can increase the dynamic of the discussion and reach more people in the same amount of time.

Setup

Except for Future News Stand itself, it is important to provide a suitable setup that allows people to stay and talk for a while (around 10 to 15 minutes). The suggested setup might be a tall table or a bench next to the stand.

Limitation

Language
Even though the Dutch version of Future news and radio improved the overall experience, the language was still a limitation, especially in the bridging and discussion part of the experience.
The inconvenience of the communication might influence participants' feeling towards the experience as it increased their effort.

Researcher's presence
The overall feedback from all the participants was positive. The researcher's presence might influence the participants' answer during the evaluations, although she tried to stay away from them when they were filling the questionnaire.

Time availability
Besides, due to the limited time available in the context, people only stayed short after filling the questionnaire. It was not very possible to get much quantitative feedback as input to this project.

7.2 Feedback from Waag

The **co-creatable quality** and **the precision of topic choosing** of the design are two of the most appreciated characteristic by the stakeholder.

"I really like that; it's a format that you can use on all types of different topics. So that's something that we as Waag definitely can use, as well, when we're doing co-creation, or we want to have more awareness about

subjects or collect first ideas or inputs from outside so that I liked very much." from Judith Veenkamp - the project and content developer of Smart Citizens Lab, Waag

"...the topic is very important. And then it is every day there is a data privacy scandal. And every day we get new information about the Smart City. So it's like he's on the very top of the agenda." from Denis Costa - the project manager of Smart Citizens Lab, Waag

Creating relevance with new audiences
Figure70 shows the opinions collected during these rounds of tests in Molenwijk. The majority of the opinions located on the right-hand side of the board, which are with a more positive attitude towards the provided future news of transport in Amsterdam. This phenomenon is relatively rare to be seen from the current visitors of Waag because normally they have more serious concerns and would be more cautious on privacy issues. This opinion distribution, together with the reasoning behind it, which are more benefit-focus considerations brought a new perspective to Waag.

Implementation at Waag

This project is invited to have an internal presentation at Waag, and the part of co-creation toolkit design is also invited to be part of Waag's online co-creation toolbox: Co-creation navigator (see Figure71).

Apart from the above internal sharing, the researcher plan to write a blogger about the design, and this blogger would be posted on Waag's website together with the link of co-creation toolkits as an open source for the public to download.

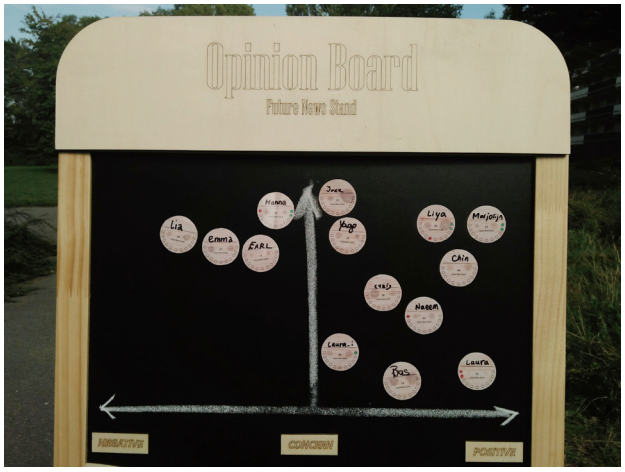


Figure70. opinions collected in Molenwijk during the tests

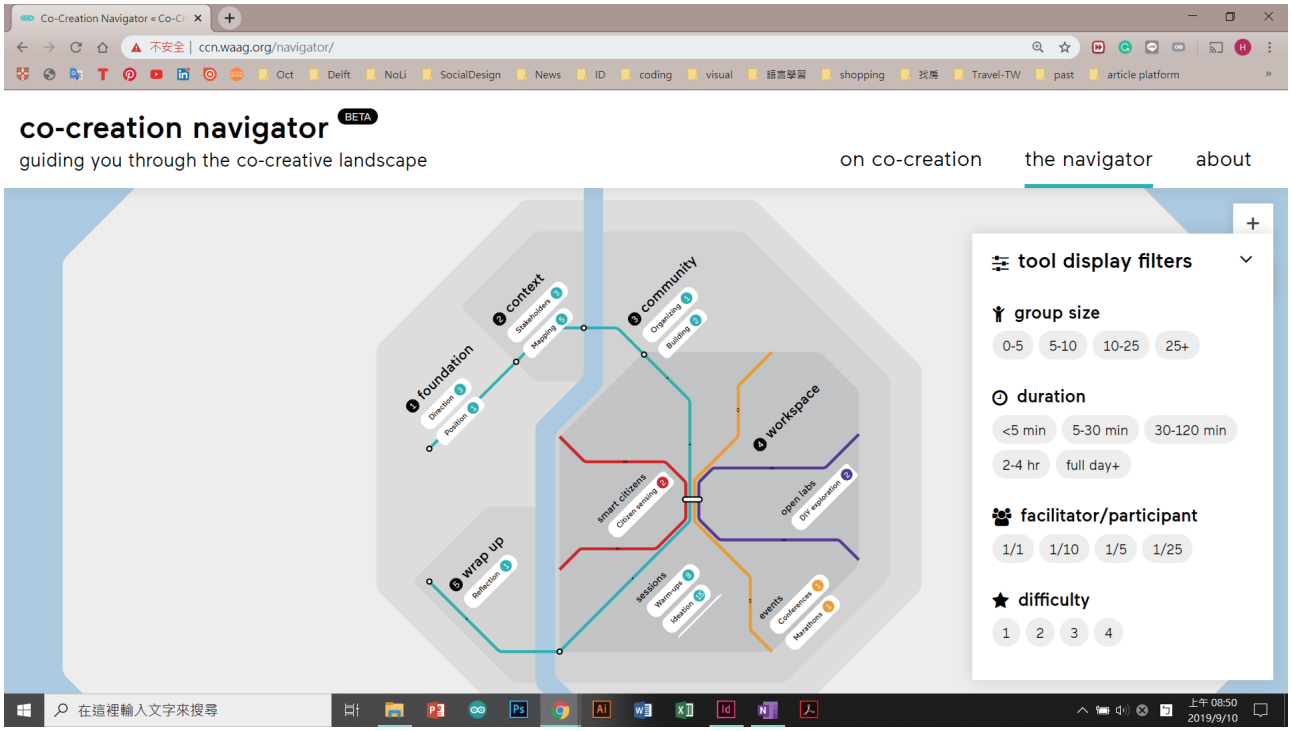


Figure71. Co-creation navigator: Online co-creation toolbox from Waag

8 Reflection

This part presents the researcher's reflection on the six-month journey with twenty six citizens origin from eleven different countries.

Learnings from co-creation tool development

In this research, the design of "Future Newspaper" appears in different formats throughout the process. In the beginning, it appeared in the game: Amsterdam Times where it was perceived too difficult but afterwards when in the brainstorming session with Waag, it stimulated a lot of great ideas. One thing I learn from this co-creation tool developing process is that keeping a flexible mind and using the tool in the right way at the right moment with the right people help unlock the power of co-creation.

The misinterpretation of qualitative research data

When analyzing the qualitative data, I sometimes misinterpreted the result and generalize a phenomenon that only belongs to some particular cases. This misinterpretation generated some unnecessary worries and wrong assumptions that sometimes hindered the process from moving on. To be aware of whether the result is generalizable or not is important when implementing qualitative research methods.

Importance of acceptable effort in designing playful & knowledge acquiring experiences

During the research through design process in Molenwijk, I once put most of my focus on reducing the effort for the audiences. Especially with the language barrier, this made me feel lost since it was more like a usability test than an experience design. After going through the process, I realized the importance of balancing the audiences' effort in designing the experience. In the end, I am happy to see that the participants enjoyed the experience.

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