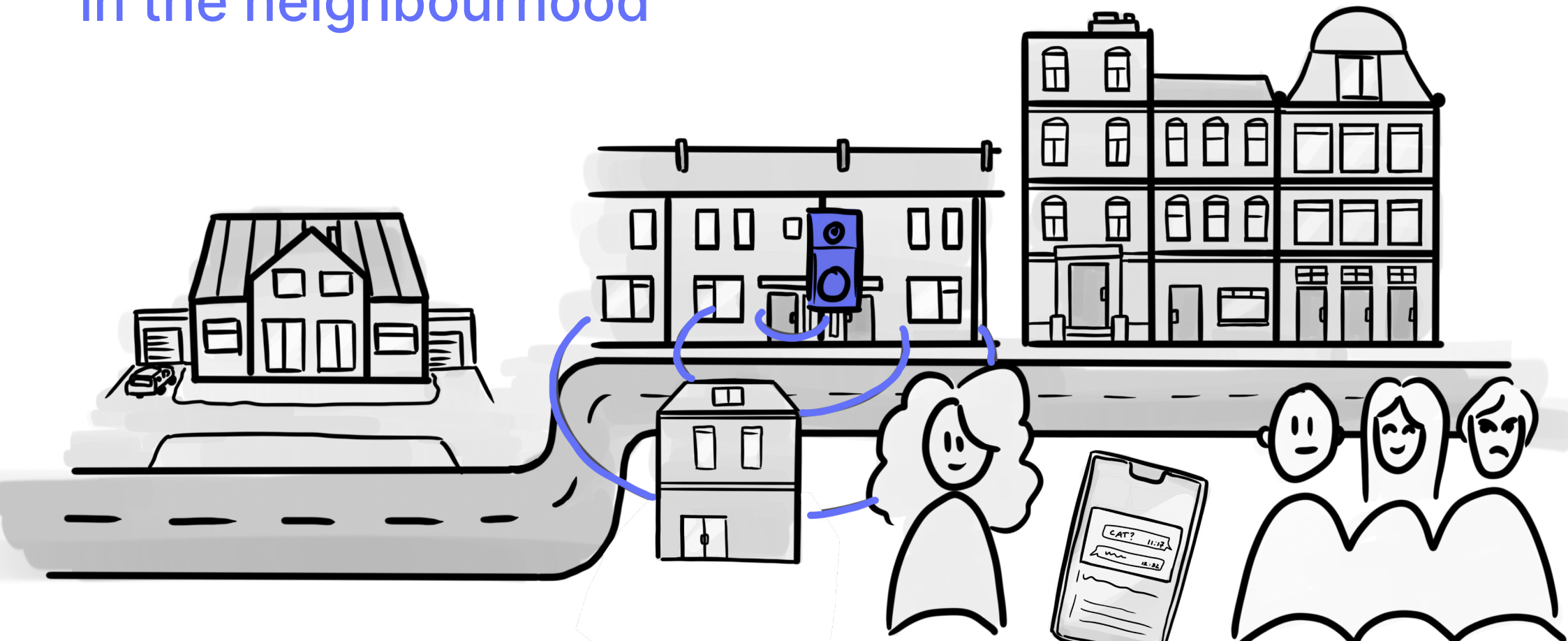
How smart is your doorbell?

opening doors to **dialogue** in the neighbourhood



How smart is your doorbell?

Opening doors to dialogue in the neighbourhood.

Silke Snijder
4557999

Master thesis
Delft, July 2024

Design for Interaction
Delft University of Technology
Faculty of Industrial Design Engineering

Supervisory team
Chair: Nazli Cila
Mentor: Sofie Dideriksen
Client mentor: Hein Wils

Acknowledgements

This marks the end of my time studying in Delft, and I am very happy to end it with a project like this.

Even though the graduation project is individual, I could not have done this without the support of so many people around me.
First of all, I want to thank my supervisors, Nazli and Sofie. You truly made a dream-supervisory-team. You supported the way I was taking the project and suggested so many papers, methods, asked me critical questions and laughed with me about the project.
I would also like to thank Hein, my client mentor from Responsible Sensing Lab. Thank you for your enthusiasm about this project, for teaching me all about the Municipality of Amsterdam and providing so many interesting connections. I really enjoyed being able to work from the AMS office once a week, including fun lunch times, interesting conversations and valuable feedback from the rest of the team.

Furthermore, I am incredibly grateful that I got to work from Studiolab. This community and space really helped me to focus, get inspired and learn from all of the others there.

I would also like to thank everyone in my personal network. This project was challenging at times and you supported me throughout. My family and friends were stuck with me talking about doorbells for half a year, but they remained interested and helpful.

Special thanks go out to my partner, mom, Sterre and Noa. Your help has been wonderful.

Finally, thank you to everyone who contributed to this project as a participant in interviews, roleplaying and evaluations, the wonderful actors in the concept video, and everyone I had smart doorbell chats with.

Contents

Abstract

More and more smart doorbells (SDBs) are making their way to the front doors in the Netherlands. Equipped with camera and microphone, owners experience the benefit of convenience and feeling safe. However, due to its big field of view, those living around the smart doorbell can be captured too. This might lead to many issues, including social tensions in the neighbourhood. Little research has been conducted about lived experiences around smart doorbells.

This project aimed to explore social dynamics around smart doorbells in the neighbourhood. Inspired by a research-through-design approach, an interview study and scenario-based roleplaying provided insights about current critical awareness, tensions experienced, how these are dealt with and barriers and drivers to dialogue.
There is little knowledge and critical awareness about SDBs, both from owners and neighbours. When they are aware of the doorbells, neighbours experience discomfort due to now knowing about, having no access to and no control over smart doorbell footage. There are many factors that lead them to avoid the SDB and related issues. However, people don't just 'talk to their neighbours', as they experience many barriers to dialogue.
A set of speculative doorbells was designed with the aim to encourage dialogue.

Four concepts were iteratively prototyped and tested, from which two were combined into the final speculation: 'the___doorbell'. The adjective 'smart' has been removed, inviting people to question what 'smartness' means in relation to the doorbell.
This speculative doorbell consists of one body and three different lenses, each their own character and expressiveness.
Imagined in an alternative present, the___doorbell and it's owners are shown in a concept video. Through watching this video, the social, honest and curious doorbell aim to encourage a rich critical reflection, covering multiple of the identified social tensions in the neighbourhood. The video is presented with an 'instruction manual', carefully guiding the reflection and dialogue when used in a group setting.

The concept was evaluated in groups and by individuals. With its light-hearted presentation, the__doorbell invited to talk about smart doorbells related to social dynamics in a nuanced yet critical way.

This project presented dialogue as a short-term intervention on a neighbourhood level, but might also stimulate dialogue with the other actors involved, including policy-makers.

Introduction

Society is increasingly filled with sensors. They have made their way in public and private environments, some noticeable, some hidden. From weather sensors, crowd sensors in public spaces, cameras on smart phones to smart home products; according to Andrejevic & Burdon (2015) the shift to a discrete monitoring infrastructure creates a 'sensor society'.

The smart doorbell (SDB) is another example; equipped with camera, microphone and speaker it collects a huge amount of data. Through WiFi the owner receives notifications on their smartphone when motion or doorbell ringing is detected. The SDB lets people know what is happening in front of their door at any time, no matter where they are.

You have probably seen them on many front doors as the use of these smart doorbells in the Netherlands has grown rapidly. Multiscope (2023) reported that 1.2 million Dutch households used smart doorbells in 2023. Paying more attention to the presence of doorbells throughout this graduation project, the researcher too literally saw them appear in areas where they weren't before. Responsible Sensing Lab made a striking visualisation of the growing number of smart doorbells in a particular neighbourhood in Amsterdam, see Figure 0.1.

As the popularity of the SDB is increasing, so is the (critical) discussion about them in the Dutch media. Even though the smart doorbell is privately owned, it blurs the boundary between private and public data collection. The wide angle lens and good microphone allows the smart doorbell to see and hear a lot more than just the area around the front door. Many front doors in the Netherlands face the street, the smart doorbell therefore often records a lot of public space too.
A lot of this debate, as well as existing literature, focussed on the benefit of safety, versus the harm of invading other people's privacy. But what about other consequences and values?

Responsible Sensing Lab, client of this project, indicated an interest in the impact of smart doorbells on neighbourhoods. They mentioned a survey conducted by the municipality of Amsterdam (Heijnen & Bosveld, 2023) about the use and experience of cameras in public space. It showed that 17% of respondents reported smart doorbells to be 'disturbing'. What makes smart doorbells disturbing to people, and is this confined to the city of Amsterdam? Scope
Little research around actual experiences with smart doorbells has been conducted, introducing a starting point for this graduation project.
When talking to people about this subject, their first response usually was: "Oh interesting, but what is the problem with smart doorbells?". It makes a contradiction apparent, as some people find smart doorbells disturbing, while others see no problem whatsoever. This tension sparked curiosity and brought up many more questions.
What are actual lived experiences of smart doorbell owners and neighbours? What are values and tensions in the neighbourhood, what consequences might result from SDB use?

This project explores social dynamics around smart doorbells in the neighbourhood. Based on a thorough understanding of the context, the SDB is reimagined to encourage smart doorbell dialogue in the neighbourhood.

Figure 0.1. Visualisation of increasing numbers of smart doorbells in a neighbourhood in Amsterdam (Responsible Sensing Lab, n.d.-b)
The red dots show SDBs in 2022, the pink ones were added in 2023.

Collaborators

A collaboration is established with the Responsible Sensing Lab (RSL). They explore “how to integrate social values in the design of sensing systems in public space” (Responsible Sensing Lab, n.d.-a). Responsible Sensing Lab is a collaboration between AMS Institute and the Municipality of Amsterdam.
Many different stakeholders and experts are involved, creating a multi-disciplinary lab in which responsible sensing systems can be (re)designed, tested and implemented.
RSL has experience working with the topic of smart doorbells. The ‘Shutterring’ (see Figure 0.2) was developed in a project collaborating with The Incredible Machine and Studio Phil Procter (Responsible Sensing Lab, n.d.-c). It’s a smart doorbell cover that diffuses what the smart doorbell sees, and only makes visitors visible when they slides up the cover to ring the bell. The project “aims to make smart doorbells more responsible by ensuring the privacy of bypassers and owners while keeping the main functionality of the device intact”.

The master thesis of Sofie-Amalie Torp Dideriksen (Torp Dideriksen, 2022) in collaboration with RSL aimed to challenge the design of smart doorbells from the perspective of privacy, through a feminist lens. Alternative privacy-centric smart doorbells were designed and presented in an exhibition.

In 2024, Responsible Sensing Lab initiated the Consortium Slimme Deurbellen (or Consortium Smart Doorbells). Different stakeholders such as municipalities, interest organisations and universities are connected and work together towards responsible use of smart doorbells.
In-depth research focussed on lived experiences in neighbourhoods with smart doorbells forms a good addition to the goals described in the consortium’s project plan.

Throughout this graduation project, guidance was provided by client mentor Hein Wils and the rest of the team at Responsible Sensing Lab.

Figure 0.2 Shutterring (Responsible Sensing Lab, n.d.-c)

General approach

This graduation project was explorative in nature and took inspiration from a combination of approaches.

The project started with the approach of '**research through design**' (RtD), in which design is used as a tool to inform research. There are many ways to define RtD. As described by Stappers and Giaccardi (2017), the common element in all definitions is that "they advocate the contribution of designerly activities and qualities to the knowledge outcome, especially those activities that introduce prototypes into the world, and reflect, measure, discuss and analyze the effect, sometimes the coming-into-being, of these artifacts".
Throughout the project, many materials and activities were designed to inform the research. Examples include a sensitising booklet and scenarios for a roleplaying study, as well as speculative concept prototypes and an 'instruction manual' to inform evaluation and reflection.
Elements from **speculative design** were also applied. It is an approach that uses designed artefacts or scenarios as a medium to question the present, as well as imagine alternative futures. Auger (2012) defined its purpose as following:

> "Speculative design proposals are essentially tools for questioning. Their aim is therefore not to propose implementable product solutions, nor to offer answers to the questions they pose; they are intended to act like a mirror reflecting the role a specific technology plays or may play in each of our lives, instigating contemplation and discussion.".

In this graduation project, speculative design was applied by imagining alternative smart doorbells and their resulting interactions, to encourage people to have dialogue about the role of smart doorbells in the neighbourhood. This dialogue might improve social tensions but could also help us to shape more preferable futures regarding smart doorbells.

Mitrović et al. (2021) explain three key elements to speculative design through a diagram which they call the 'Lifecycle of Imaginaries', see Figure 0.3. Through understanding the origin, a speculation can be crafted driven by a certain interest, that ultimately aims to influence the future reality.

This project was divided into four cycles, which are shown together with their respective research activities in Figure 0.4.

- Cycle 1 focussed on the exploration of the context. Based on the insights, a focus area was chosen.
- Cycle 2 presents a deep dive into this focus area. In both of these cycles, materials were designed (RtD) to generate rich insights. The findings from Cycle 1 and 2 can be seen as the origin (A) and help to understand current social tensions around smart doorbells.
- Cycle 3 revolved around the creation of a speculative design intervention. It shows the iterative process between ideation and prototyping, which resulted in a final concept; the speculation (B).
- Cycle 4 aimed to evaluate whether this speculative concept achieved its goal of encouraging dialogue. The project was reflected upon, relating the speculation to reality (C).

Finally, reflection played an important role in this project. This included reflection on design decisions, activities and research findings, as well as reflecting from personal experience. This was done through an auto-ethnographic activity which reflected on the researcher's own experiences with a smart doorbell.

Throughout the report, the blue boxes and frames show personal opinions, experiences or reflections form the researcher.

The following design assignment was used as a starting point to the exploration: “Design short-term interventions to represent different interests and values, and create more re-sponsible interactions in neighbourhoods where smart doorbells are being used.”

The initial project brief can be seen in Appendix A.

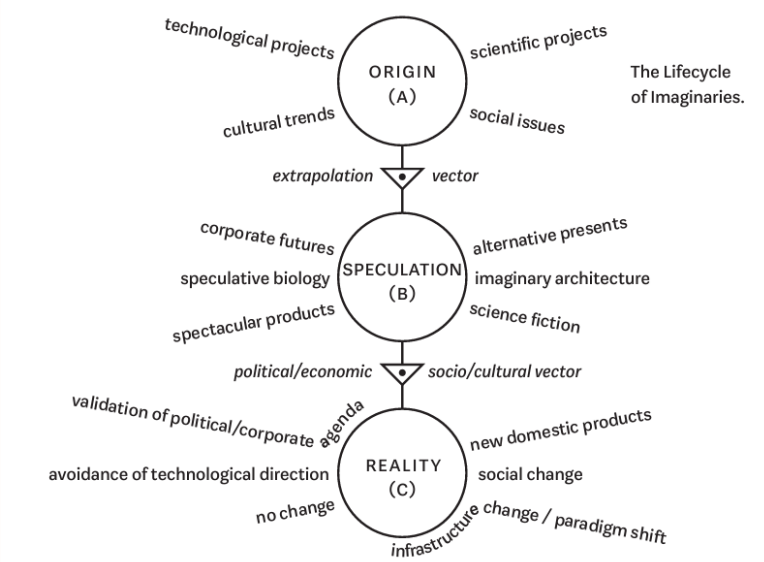


Figure 0.3. The Lifecycle of Imaginaries (Mitrović et al.,2021, p.27)

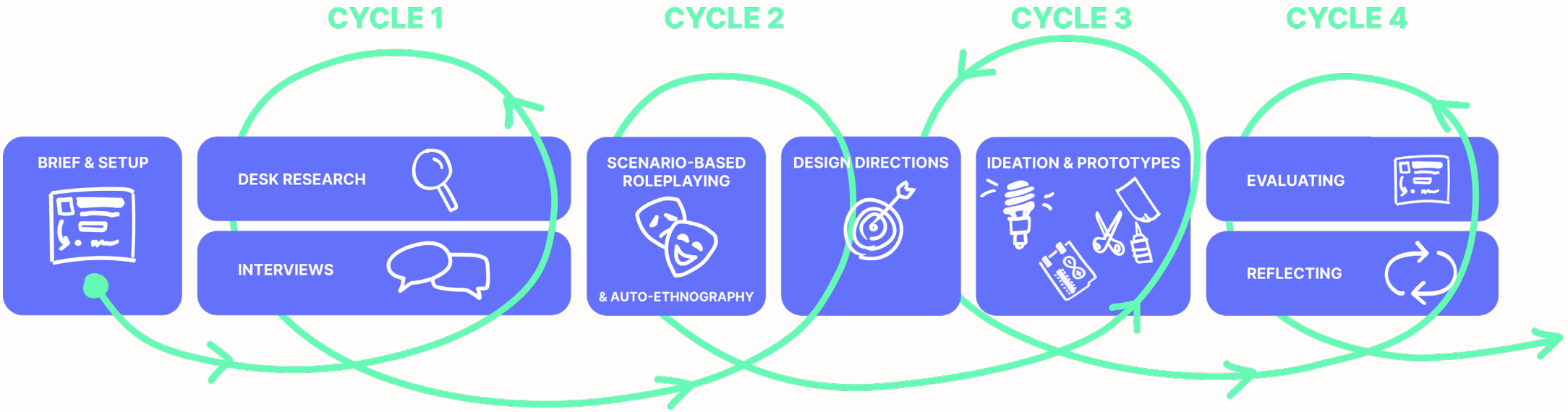


Figure 0.4. Process cycles with research activities

CYCLE 1

exploring and defining the context area

What are smart doorbells, who are its users, and how do they use them in neighbourhoods in the Netherlands? Before even thinking about interventions, it's important to first understand the context.

To guide the explorative research in this cycle, two main research questions with sub-questions were formulated:

1. **What is the context of use of the smart doorbell in the Netherlands?**
    - What is a smart doorbell?
    - Which actors interact with it?
    - What interactions happen around smart doorbells? How are they used?
    - What potential benefits and harms does the smart doorbell induce?

2. **What are interests, values and needs of people living in neighbourhoods with smart doorbells?**
    - What does it mean to be a neighbour in the 21st century?
    - What are broader societal values?
    - How do users experience living around smart doorbells?
        - What are their interest, values, needs?
        - What might be conflicting, where do tensions arise?

Throughout the research activities, these questions were kept in mind. Chapter 1 will describe the smart doorbell itself, the actors involved and the potential consequences related to smart doorbell use. Chapter 2 further explores the neighbourhood in the 21st century in the Netherlands. Finally, chapter 3 zooms in on actual experiences related to the smart doorbell in the neighbourhood.

CHAPTER 1.

The smart doorbell & actors

The terms ‘smart doorbell’, ‘video doorbell’, or ‘slimme deurbel’ in Dutch will all be referred to as ‘smart doorbell’, in short SDB.
They are popping up everywhere, according to research performed by Multiscope (2023), 1.2 million households used a smart doorbell in the Netherlands in 2023.

Recent news coverage indicates that smart doorbells are a hot topic. From articles published in major newspapers like NRC and de Volkskrant (Logtenberg & Smouter, 2024; Venneman & Sabel, 2024; Figure 1.1) to the episode fragment about SDBs on the Dutch television show Radar (‘Deurbel Met Camera: Uitkomst of Ergernis?’, 2023) and podcasts and radio shows (van Burik & van der Burg, 2024; van den Berg, 2024), the media vocalised concerns regarding the SDB. This includes the invasion of privacy of passersby and neighbours, resulting complaints with Autoriteit Persoonsgegevens (the Dutch DPA), the rules that consumers have to adhere to when installing the SDB, and how the Dutch policy can easily get access to smart doorbell footage.

From this short introduction, it becomes clear that multiple actors (e.g. users, neighbours and law enforcement) are involved in different ways. To gain a deeper understanding of the context around smart doorbells, we first need to know about the smart doorbell itself (Chapter 1.1). After that, a network of connected actors (Chapter 1.2) will be presented to comprehend the complexities of interactions around this product. Finally, some potential consequences of SDB use (chapter 1.3) will be highlighted.

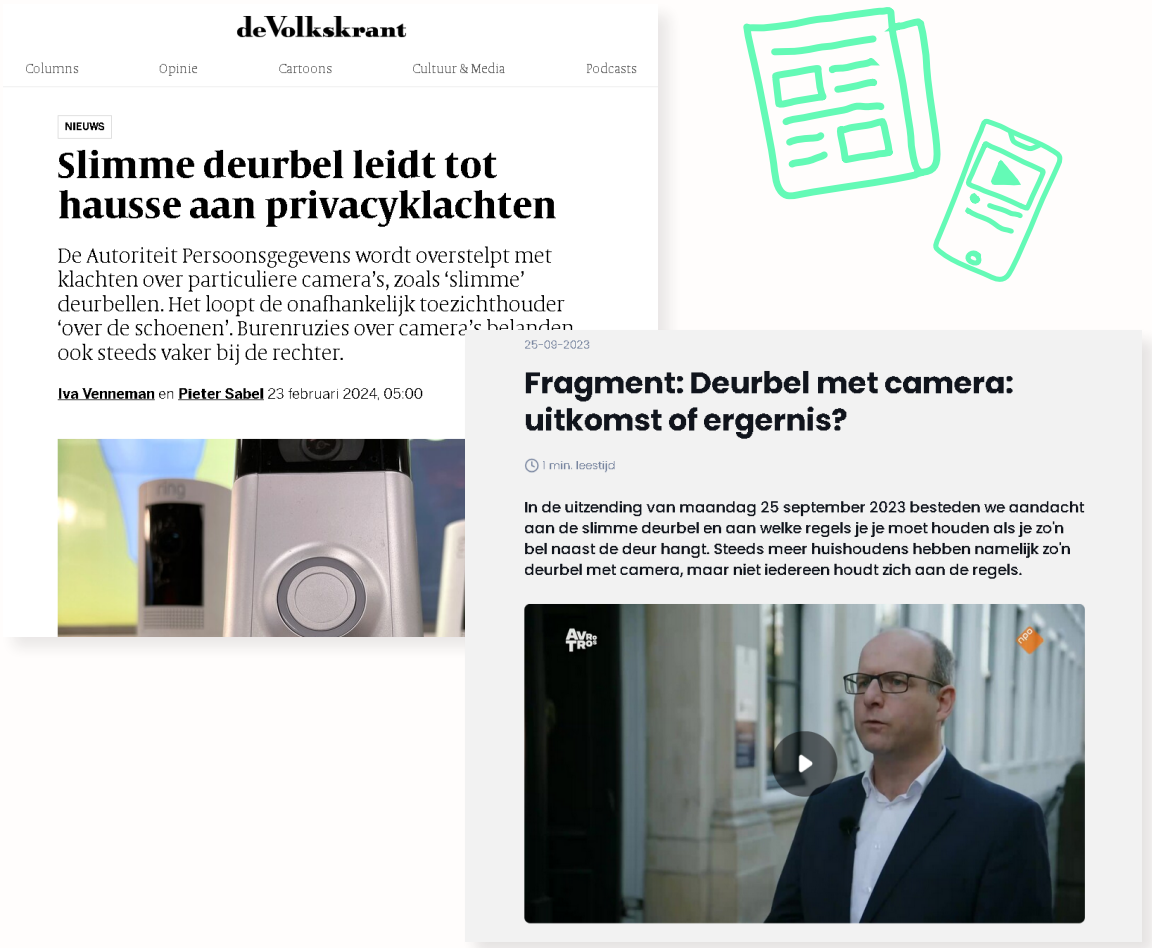


Figure 1.1. Newspaper screenshots (Venneman & Sabel, 2024; ‘Deurbel Met Camera: Uitkomst of Ergernis?’, 2023)

1.1 Object: the smart doorbell

The smart doorbell is a smart home device, showing what is happening outside in front of the front door, without having to open it. It can be seen as a combination between a surveillance camera, and intercom and a doorbell. The device itself is small and equipped with a wide angle camera and microphone, see Figure 1.2. Whenever motion is detected by the camera or someone rings the doorbell, a notification is send to the owner's smartphone, showing who is at the door. The owner and person at the door can talk to each other through the doorbell.

There are many different smart doorbell brands and models. The brands Ring (owned by Amazon), Google Nest and Eufy are most popular according to 'top selling lists' of Touch electronics stores (Coolblue, n.d.). These models (see Figure 1.3) were also seen most on the street throughout this graduation project and were mentioned in conversations with SDB owners. These brands of smart doorbells will be referred to throughout the thesis, their respective websites were used as source for basic product related information in this section (Eufy, n.d.-b; Google Nest, n.d.-b; Ring NL, n.d.).

Smart doorbells collect data and how this is stored depends on the model and brand. Some brands, like Eufy, store data locally on the device itself, a 'homebase' or external hard drive. Others, like Google Nest and Ring, store data in 'the cloud' on servers of the SDB manufacturer. SDB footage may be visible for the owner for a certain amount of days, hours, or they can only view live footage.
The footage could be visible for the owner for a couple of hours and disappear after that, or they can only view live footage. Some models give owners extended access to their SDB footage through monthly payments. An example is the Ring Protect Plan (Ring, n.d.). The basic plan starts at €3,99 a month per device and offers video storage for up to 180 days, options to save and share video and pictures, advanced notifications and more.
Some smart doorbells offer full functionality with a one-time payment, other brands require an ongoing subscription to access all features.

Figure 1.2. Ring Doorbell, installed next to a front door (Ring NL, n.d.)

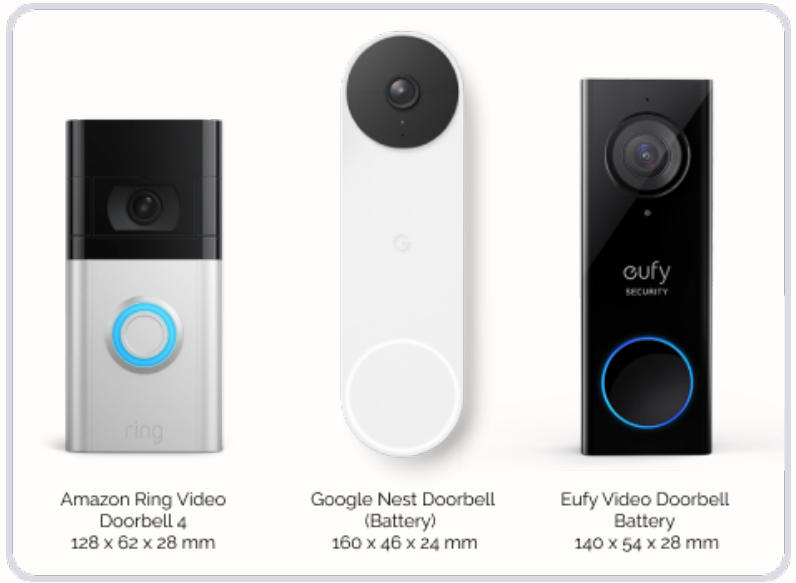


Figure 1.3. Selected smart doorbell brands (Eufy, n.d.-b; Google Nest, n.d.-b; Ring NL, n.d.)

1.1.1 What does the smart doorbell see and hear?

An important concept related to the smart doorbell is its 'field of view' (FoV). It refers to the range of what the smart doorbell can see. The FoV of smart doorbells commonly ranges between 130 and 180 degrees horizontal, depending on the model (Pattison Tuohy, 2024). The green area in Figure 1.4 shows an example of what the field of view of a SDB could be.

Also relevant is what the doorbell can hear, but this is more difficult to determine. It's not literally visible what the boundaries are, like the camera field of view that can be seen in the app. Consumer Reports, a US based independent organisation striving for a transparent and fair marketplace, tested the audio range of a few smart doorbells (Grauer, 2024).
Conversations were picked up clearly by the SDB from 6 to 9 meters away, depending on wind conditions.
As the range of smart doorbell is so big, the recordings extend far beyond the area around the front door. This can include activities of visitors, passerby's, neighbours and anyone else passing the smart doorbell range.

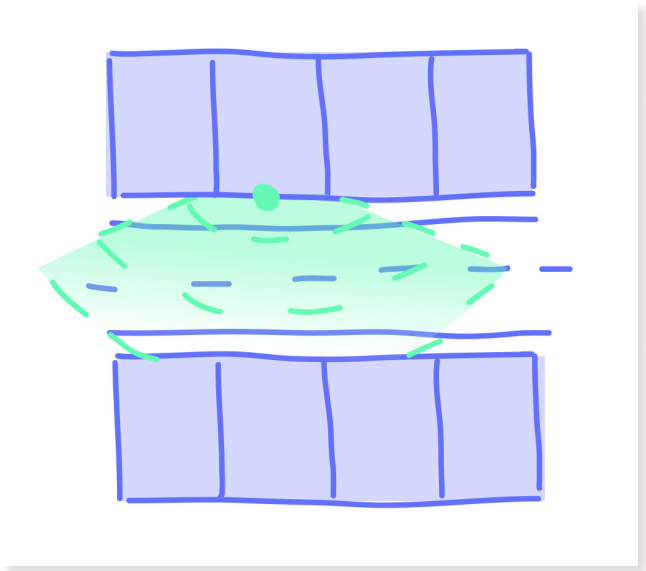


Figure 1.4. Schematic drawing, showing example of SDB range

1.1.2 How is a smart doorbell used?

The smart doorbell is operated through an app, often provided by the manufacturer. This app is used to set up the doorbell, communicate with visitors, access recordings, settings and more. The SDB can often be connected to other smart home devices such as a smart tv, voice assistant or even smart door locks. The apps used to operate the Google Nest, Ring and Eufy SDB all provide integration with other smart cameras. Some screenshots of the apps are shown in Figure 1.5.

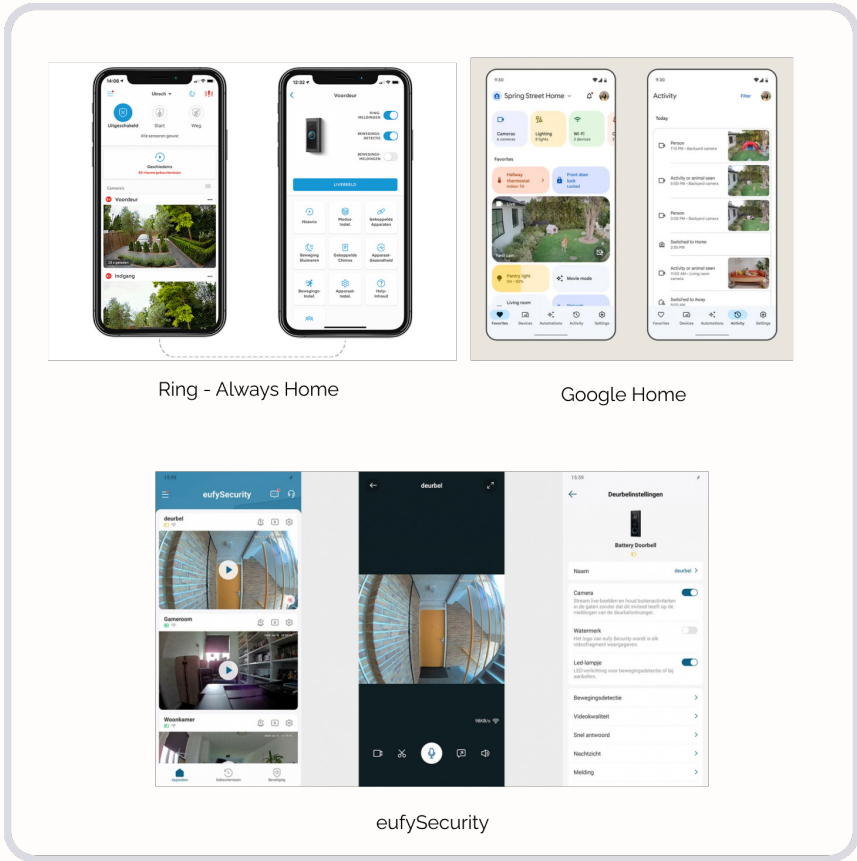


Figure 1.5. The smart doorbell / smart camera apps (See Image References for references)

Setting up the smart doorbell is generally easy, while additional settings can be configured for further customisation. After initial onboarding and connecting to a smartphone and the local WiFi network, the SDB immediately. In the case of Amazon Ring, an additional tutorial to customize settings is prompted, but it's not necessary to go through this. It includes instructions for mounting the device, inviting shared users, connecting your existing chime alert and optimizing motion detection (AppFind, 2023).
When users do take the time for advanced settings, it's possible to set up motion or activity, indicating from which areas they want to receive motion alerts (Ring, Google Nest and Eufy).
For some SDBs, owners can set up privacy modes or zones (see Figure 1.6). A rectangle can be drawn to cover certain areas, which will not be shown on live footage or be recorded (Ring NL, 2024). It's unclear whether privacy zones can be set on Google Nest and Eufy doorbells.

Some smart doorbells offer more features than just notifying motion and doorbell ringing. Depending on the brand and settings, they can automatically detect humans, pets, packages, vehicles and familiar faces (Eufy, n.d.-a; Google Nest Help, n.d.-a). These features are powered by artificial intelligence. The SDB sends notifications to the owners smartphone based on these categories.

Figure 1.6. Ring privacy zones (Ring NL, 2024)

Responsible Sensing Lab provided a smart doorbell for me to test. When setting up the Google Nest myself, I was surprised how little was needed to start using the device. Paired to my phone and WiFi network, it immediately gave popup notifications stating a person (me) was detected.

Playing around with the doorbell, I learned that the light under the camera 'blinks' green when someone looks at the footage live. This is however almost impossible to see, especially when standing more than half a meter away. Additionally, how can anyone but owners know what the little green blinking light means?

I tried to find settings for privacy zones with no luck. Other extensive settings can be found but it's easier to just use the doorbell as is.

Additionally, I interacted with a friend's Ring app and couldn't find the privacy related settings I was looking for. Perhaps, this is because her partner set up the device and connected it to his smartphone initially. We spent a good amount of time watching doorbell recordings from the last days.

People can **directly interact** with the SDB in different ways. This includes the owner buying and installing the doorbell, going through settings, receiving notifications, communicating through the doorbell, reviewing footage and sharing footage. Other people can also interact with the doorbell directly, such as visitors who press the button and hear a sound. They can also speak through the doorbell.

There are also **indirect interactions** with the smart doorbell. Some examples include setting off motion detection and being recorded outside of the front door area. The smart doorbell sometimes indicates its presence and recording with a blinking light or sound, but people have to be close enough to the SDB to notice that. Household members, service workers, passersby and neighbours can be recorded, while they might not be aware of it.

Figure 1.7 shows a few of these direct and indirect interactions.

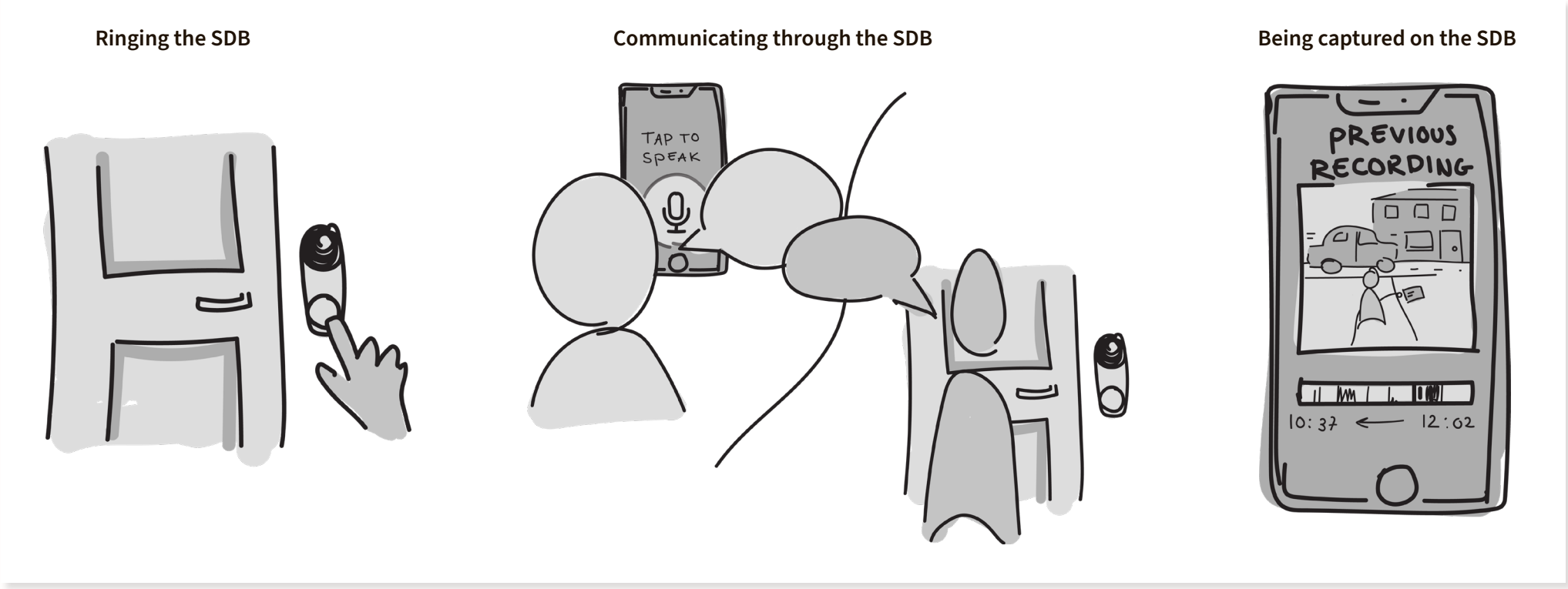


Figure 1.7. From direct (left) to indirect interactions (right)

1.2 Network of involved actors

As shown in the previous sections, multiple actors are directly and indirectly involved with the smart doorbell. SDB owners and their visitors play an obvious role, but other actors are involved too as shown in the introduction.
To understand the interactions around the smart doorbell better, a network of involved actors was created. These actors might all have different values, needs and interests that are affected by each other. Smart products specifically exist in an ecology of connected things.
The network includes humans, as well as non-humans, technology and non-living things, in order to broaden the perspective beyond the most direct user, the smart doorbell owner.

Based on all research activities in cycle 1, the following actor network was created (see Figure 1.8 on the next page). More actors might be involved but based on discussion with the client mentor, who saw the network multiple times, it was decided that the current level of detail fits the goal of the network; to create an overview of an insight in interactions between different actors.
The following sections further explain the actors and associated interactions.

1.2.1 Human

The first category of actors are human actors. These consist of primary and non-primary users of the smart doorbell. Tan et al., (2022) refer to the owner of a smart home camera as the **primary user**. In the case of the SDB, the visitors, household members, service workers, passerby's, neighbours and any other people that interact with the doorbell or are recorded are called **the non-primary users**. These users interact with the smart doorbell, but "do so with comparatively limited awareness, consent and control compared to the primary users who own and operate them.".

Different types of interactions exist for primary and non-primary users.
A service worker can experience a forced, but direct interaction with the SDB as they have to ring it and are made aware of the SDB when they hear a sound or see a light. A passerby can also experience a forced interaction when walking past a SDB, since they have no agency in being recorded (except for physically walking around it). This interaction can be indirect as well as direct or explicit though, depending on whether they notice the SDB and are aware of what the product does. A primary user can interact directly with the doorbell and visitors through the SDB, but can also interact indirectly by being recorded somewhere in the FoV themselves.

This project focusses on **interactions between primary users** (smart doorbell owners and household members who have control over and access to the doorbell) **and non-primary users, specifically neighbours**.

In categorizing the human actors like this, the decision was consciously made to adopt the name of 'non-primary users' for the people that indirectly interact with the SDB.
Tan et. Al. argued that a benefit of seeing these actors as users rather than subjects can help to "encourage us to attend to them with the usual consideration we give to users – such as maximizing benefit, reducing harm, and creating a usable, useful and enjoyable experience". They showed how other literature referred to 'usees' or 'secondary users', but that to me implies a hierarchy and reinforces the idea that these actors have less agency.

By choosing to use these terms, I try to broaden the perspective and include other users than just SDB owners, who are equally important.

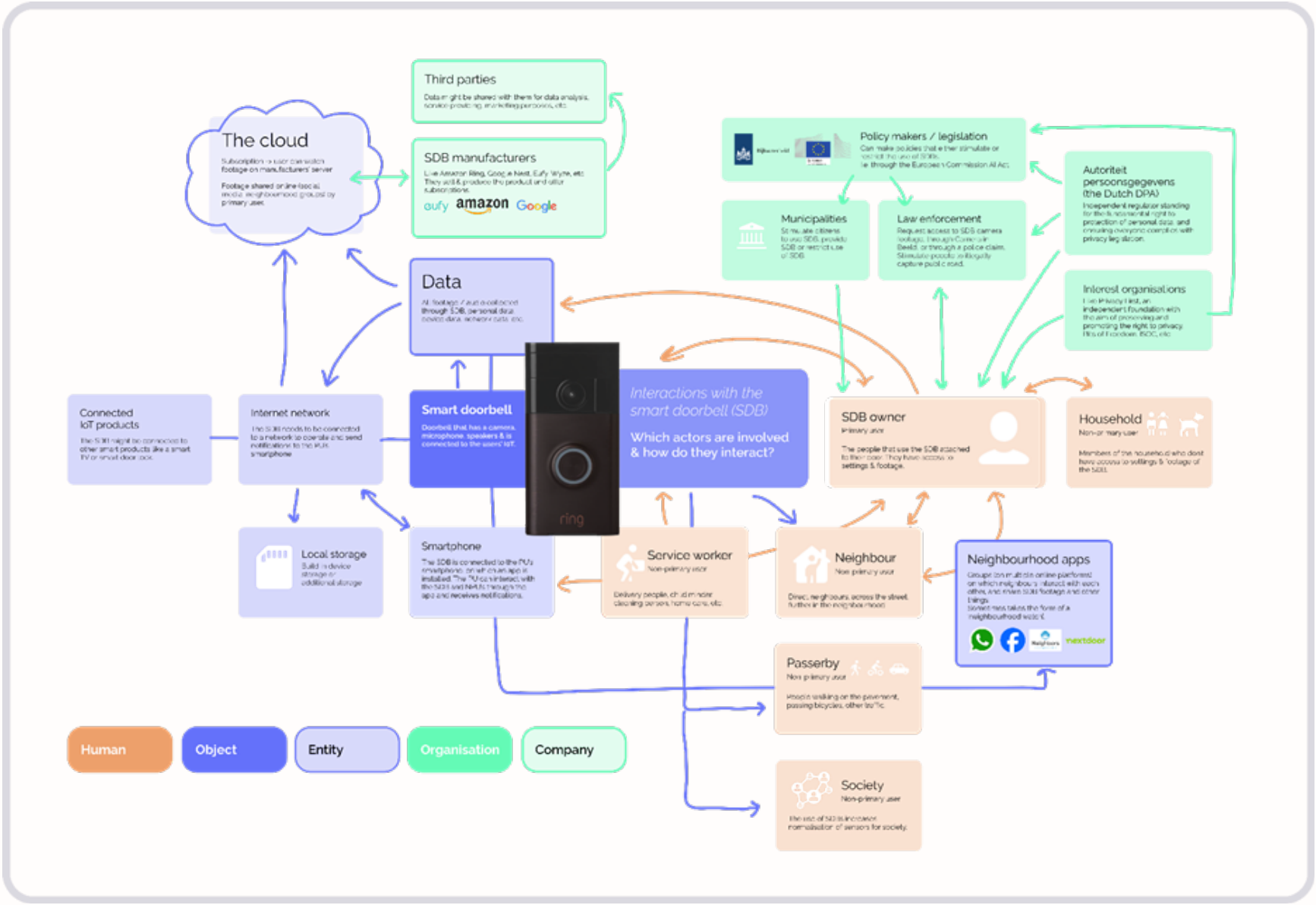


Figure 1.8. Network of involved actors

1.2.2 Object & entity

The actors in blue refer to objects and entities, as inanimate 'things' interact with the other actors too. Some of these things are not 'physical' in the direct context of the doorbell, such as data or 'the cloud'. These are called entities in this network.

Centrally positioned is **the smart doorbell**, the network started around this 'thing'. Around the SDB are other 'things' which support the functions and features of the SDB, interactions with these often happen automatically. The **internet network** allows the smart doorbell to identify whether a person or package is at the door, and send the appropriate notification to the primary user's **smartphone**. The SDB might be connected to other **IoT home devices**.
The smartphone of the SDB owner runs the app, utilising the phone as a display to review camera footage, receive doorbell notifications, operate settings and to communicate through. Operating settings and communicating through the doorbell requires manual, direct primary-user interactions.

The final actors in this category relate to **data**, **storage** and communication. As mentioned in Chapter 1.1, the smart doorbell records footage that may be **stored locally** or in **the cloud**, depending on the model and subscription.
SDB footage can also end up in the cloud when users share footage on social media platforms such as TikTok, Instagram, YouTube and WhatsApp. Footage is also shared on **neighbourhood platforms** like Nextdoor and Neighbors by Ring (only available in the US) which allow neighbours to share and communicate with each other. Neighbors by Ring deserves a special mention being an app made by Amazon Ring. Ring users can share all kinds of safety related messages, but are also encouraged to share a 'Ring Moment' "that makes you smile" with their Community (Ring, 2024).

1.2.3 Company

The **smart doorbell manufacturers** fall under the company category. They develop and offer the physical product as well as subscription services, these often relate to data storage and extensive artificial intelligence applications, such as facial and package recognition (Ring NL, n.d.-b; Eufy, n.d.-a; Google Nest Help, n.d.-a).
Specific information regarding data collection, storage and use by these companies is difficult to find. Some examples were found regarding Ring, but it is not certain whether this holds for all smart doorbell companies. The findings in this section are therefore not generalisable to every SDB company.

Data that is stored in the cloud poses a potential security risk, if not well-protected. A lot has previously been reported on Ring's lacking security, their doorbells were easily hackable (Stump, 2020) and top-level access to unencrypted customer footage was given to 'Data Operators' in an Ukrainian office, where they labelled and tagged objects in customers' video footage (Biddle, 2019). They have since improved their data security, including the addition of mandatory two-factor authentication and optional consumer end-to-end encryption (Priest, 2021).

SDB manufacturers can collect more data than just video recordings. The BBC submitted a data request at Ring in 2020 (Kelion, 2020), revealing logs of all motions detected, doorbell presses and app actions (such as opening the app, zooming in, accessing live-view, etc). According to privacy expert Frederike Kaltheuner interviewed in this article, "data access requests only ever show us the tip of the iceberg of the amount of data that companies collect about us".

What exactly happens to that data is difficult to find. **Third-party** data sharing is mentioned in both Ring and Google Nest's privacy policies (Google Nest Help, n.d.-b; Ring, 2021), in example for the purpose of storing or analysing data to improve services and optimise user experience. Google explicitly states to separate consumers' Nest video footage and sensor data from personalised advertisement purposes (Google Nest, n.d.-a). Eufy also shares data with third parties and shares examples of

personal data processed and its purpose (Eufy, 2023).
Even though SDB companies explain the purpose of data sharing, the specifics about the third parties involved and the services that they provide remain vague. This could be risky, as data outside of the EU is not protected under the GDPR (Responsible Sensing Lab, n.d.).
When consumers connect their smart doorbell to other third-party products or services themselves, Ring states that the privacy policies of those parties apply, which they "strongly advise you to read" (Ring, 2021). Ring states to not be responsible for the way that third parties not owned or monitored by them handle data.
Furthermore, SDB companies' terms of service state consumers to be responsible for complying with local regulations when using smart doorbells, they may have to warn others that they are recording (Google Support, 2022; Ring, 2021).

Researching the role of smart doorbell manufacturers in relation to data processing proved challenging due to complex terms of service and privacy policies.
In the case of Google Nest, an overarching page with privacy and security information (Google Nest, n.d.-a) was found. To get to know more, I was directed to multiple different pages. This included the Google wide privacy policy which further confused me, as Google offers many different products and services.
On another FAQ page, I found that supplemental terms of service apply when using Nest Doorbells with a Google account. It felt a bit like navigating through a maze.

Another observation is that the policies mention that data is collected and used for the described purposes, only 'with your consent'. Do all people completely read privacy policies, especially when they are difficult to understand? I think that a lack of clear, easy to find and understandable information can make it difficult for consumers to be aware of what they consent to and what responsibilities follow from that for them.

1.2.4 Organisation

The last category of actors are the organisations. These consist of governance and policy makers, law enforcement, municipalities, interest organisations, watchdogs, and possibly more.

Policy makers can decide on rules for smart home devices, the use of public sensors and information privacy. An example is the AVG (Algemene Verordening Gegevensbescherming) or GDPR in English (General Data Protection Regulation), which ensures that personal data is protected.
Municipalities can restrict or stimulate SDB use. The municipality of Almere started a 'Digitale deurbel' pilot in 2018 with the aim to decrease the amount of burglaries (Almere Dagblad, 2019). The municipalities of Nissewaard, Eindhoven and Den Haag followed and gave out free smart doorbells to their citizens in certain unsafe neighbourhoods (Bouma & Damen, 2020). The City Council in Amsterdam however vocalised their worries about smart doorbells in the city, but local rules have not yet followed (Velzel, 2024). They did mention their interest to organise a 'stadsgesprek' (city dialogue) in collaboration with the Consortium Smart Doorbells.

Law enforcement, or the Dutch police, is mainly involved in the network through requesting smart doorbell footage. Primary users are encouraged to voluntarily enrol their camera (including their smart doorbell) in the 'Camera in Beeld' database. Approximately 314.000 camera's owned by citizens have been registered already (Venneman & Sabel, 2024).
The police can contact camera owners through this database (Politie, 2021) and claim smart doorbell footage as shown in an article by Wichgers et al. (2024). The address and name of the smart doorbell owner can end up in criminal files when the footage is used as evidence in a criminal case. Through encouraging people to participate in this database, the police might legitimise illegal recordings.
Recording public space or other people's property with cameras around the house is not allowed in the Netherlands (Autoriteit Persoonsgegevens, n.d.). Exceptions are possible when there is a legitimate interest or when filming a part of the public road is truly inevitable. However, VPNgids (van Kastel, 2019) found that 87,6% of all registered cameras in the 'Camera in

Beeld' database have recorded public space. As highlighted in the more recent publication by Venneman & Sabel, Autoriteit Persoonsgegevens also concluded that most smart doorbells are installed 'illegally', based on previous investigations regarding privacy complaints.
According to Evelyn Austin, director of Bits of Freedom (interest organisation advocating for freedom of communication and privacy), the police is stimulating citizens to violate the law, as well as bypassing democratic control ('Deurbel Met Camera: Uitkomst of Ergernis?', 2023).

Autoriteit Persoonsgegevens (AP), or the Dutch DPA, is an independent regulator standing for the fundamental right to protection of personal data, and "ensures that everyone complies with privacy legislation" (Autoriteit Persoonsgegevens, 2024). Anyone can file a complaint to the AP when an actor is not complying with any sort of privacy regulations. In the case of smart doorbells, the AP simply does not have the resources to check whether all 1.2 million doorbells are set up like they should be. According to them, "it's really the responsibility of the people who purchase a camera to set up that camera properly" ('Deurbel Met Camera: Uitkomst of Ergernis?', 2023).
Venneman and Sabel also reported on the limited resources of Autoriteit Persoonsgegevens. The AP received 1050 phone calls in 2023 from citizens who suspected a camera in their neighbourhood to film more than allowed. The AP would normally inform citizens about camera rules and investigate whether privacy is being violated, but that is impossible due to capacity shortage and simply too many complaints. Venneman and Sabel state that due to this lack of capacity to adequately enforce privacy legislation, at least 38 court cases in 2023 were filed concerning neighbour conflicts around camera's.

The final actors in this category are interest **organisations.** There are multiple interest organisations that stand up for privacy rights, including Bits of Freedom that was previously mentioned and Privacy First. Interest organisations might interact with primary and non-primary users directly, or with other actors through i.e. initiating and performing research, asking critical questions and lobbying to change policy and legislation.

1.2.5 Consortium

Finally, an extra layer is added to the actor network , the 'Smart Doorbel Consortium', initiated by Responsible Sensing Lab (RSL).
This consortium "conducts research on citizen experiences with smart doorbells, explores regulations and solutions to improve transparency in their usage, and develops guidelines and feature requests" (Responsible Sensing Lab, n.d.-b).
The participants include RSL as initiator, different municipalities (Amsterdam, Breda, The Hague, Groningen), interest organisation Privacy First, the VNG (Association of Dutch Municipalities), Delft University of Technology (IDE) and AMS Institute. Additional stakeholders participate in the Coalition Smart Doorbells, including Autoriteit Persoonsgegevens.

The consortium has three main objectives:

1. "National research to understand citizen experiences with smart doorbells.
2. Exploring regulatory and non-regulatory solutions to address concerns related to smart doorbells
3. Developing national and European guidelines and feature requests for manufacturers".

This graduation project can provide insights and a starting point for the second goal of the consortium.

The network of involved actors visually shows the relevant actors around the smart doorbell. Making this network allowed me to zoom out and shift focus from only a human or primary user perspective, to the other actors involved. The resulting broader perspective helped me understand the complexities between interactions around the smart doorbell and their potential consequences.

1.3 Potential consequences of smart doorbell use

As briefly mentioned in the introduction, the use of smart doorbells provides benefits to the primary user and possibly to other actors. Common mentioned benefits include answering the door from wherever, enhancing safety, receiving packages more easily or monitoring kids playing outside (Komando, 2023). In casual chats with smart doorbell owners more specific benefits were mentioned, like being notified of a visitor when you're in the backyard, preventing your car or expensive bike from being stolen or being able to rewatch an incident that occurred around the front door.

However, smart doorbells might also cause risks or harms and many cases of challenges related to SDBs are known. Little scientific research has been performed about smart doorbells specifically. Studies about smart home cameras and digital neighbourhood watches were included in this chapter and applied to the context of the smart doorbell.

The following sections will describe some relevant potential risks and harms related to the smart doorbell, but is in no way a complete overview.

1.3.1 Leaky doorbells

Chapter 1.1 showed that the field of view of the smart doorbell is large. It is almost inevitable that other things than own property are also recorded by the SDB, potentially infringing privacy of non-primary users.

Pierce (2019) introduced the concept of 'leaky sensor fields'. This is one of the key sites of 'digital leakage' , through which "seemingly private or secure digital information is surreptitiously collected, shared with additional parties, and used in unexpected and unsolicited ways". Pierce showed clearly how these leaky sensor fields physically spill over camera owners' properties through a design study in which smart home camera footage was modified with pink overlays.
Figure 1.9. shows the "leaky videos".

Building on this work, Pierce et al. (2020) characterize "smart camera sensing as diffuse and leaky: it tends to spread out spatially, crossing personal, social and political boundaries". They state that every camera can be leaky, but the 'digital analytics' related to smart cameras add layers of leakiness and diffusion. Smart cameras don't just capture images, they can automatically detect motion, people and faces and notify owners about other people's activities on their smartphone.
Due to the wide field of view and digital analytics, smart doorbells too are leaky and diffuse. The smart doorbell does not always indicate that it is turned on or recording, and when it does, it might be impossible for non-primary users to see. NPUs around the SDB can be recorded, often without their knowledge or explicit consent, invading their privacy.

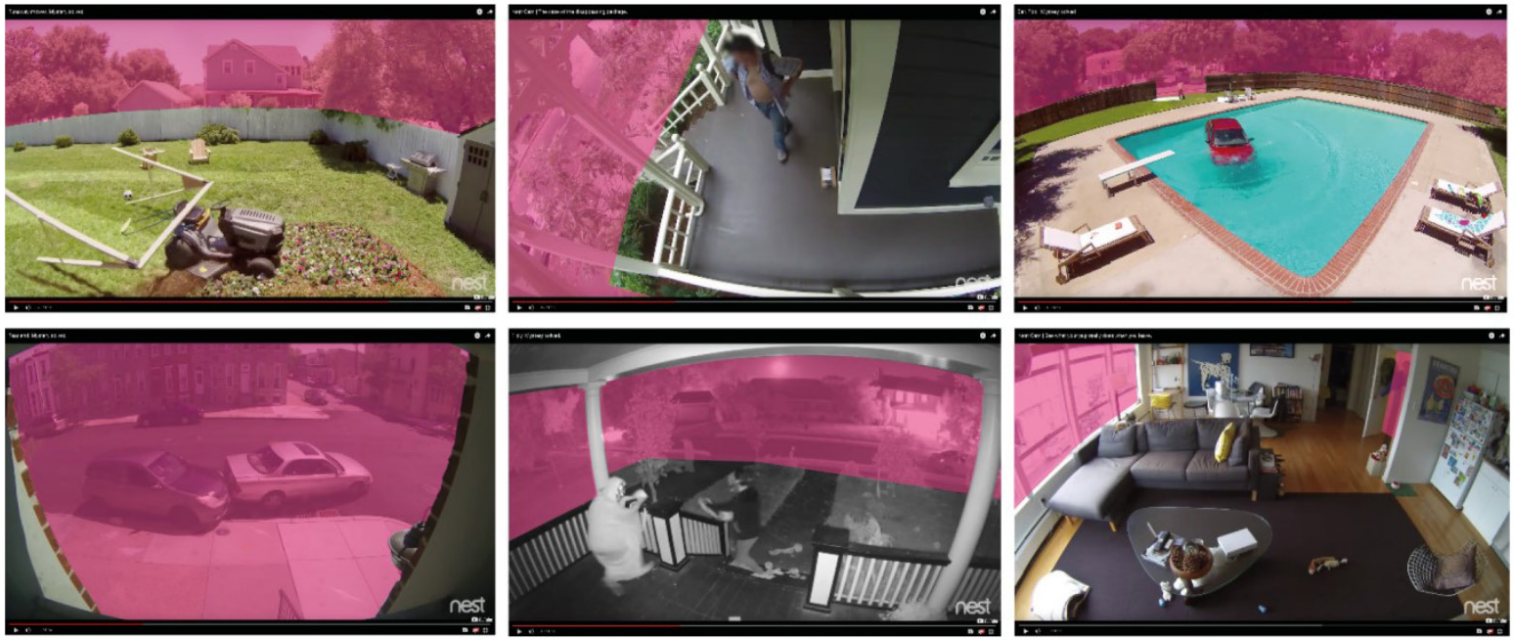


Figure 1.9. Leaky smart home security cameras (Pierce, 2019)

1.3.2 Social tensions with non-primary users

Because of the leaky character of the smart doorbell, non-primary users might be affected in multiple ways apart from (or resulting from) infringement of their privacy.

Tan et al. (2022) researched every day use of smart home cameras and showed ways in which they "mediate multiple modes of everyday surveillance". This could lead to social tensions in households and neighbourhoods.
Ur et al. (2014) found that "parent-teen trust would be negatively impacted by the auditable smart-home devices" in the home-entryway.
The New York Times shared stories of mainly women experiencing smart home-enabled domestic abuse, and stated these are "part of a new pattern of behavior in domestic abuse cases" (Bowles, 2018). Technology in the home, including cameras, can be used to assert power and control over a partner. In a more recent article, a victim mentioned to be tracked through their smart doorbell (Silva & Franco, 2020).
In chapter 1.2.4, it was mentioned that 38 court cases were filed in 2023 about neighbour conflicts around cameras. A legal expert at ARAG (a legal aid firm in the Netherlands) stated that the amount of conflicts regarding privacy and smart doorbells has increased over the past years, causing or increasing friction between neighbours (ARAG, 2024). 35% of the respondents (N=1500) in their research found the SDB to be an infringement of neighbours' privacy.

Social tensions can arise within households and in neighbourhoods as a result of smart doorbell use.

1.3.3 Perception of safety

An often mentioned benefit of the smart doorbell is increased safety. Whether actual safety in neighbourhoods is improved by the presence of SDBs can be questioned. According to Marc Schuilenburg, professor in digital surveillance, having a camera does not prevent home burglaries, it might only deter burglars (Venneman & Sabel, 2024).

Smart doorbells or cameras do seem to improve primary-users feeling of safety (ARAG, 2024; Mäkinen, 2016).

Contradictory, longer-term consequences might actually lead primary users to feel less safe, due to a heightened awareness of suspicious activity in their surroundings.
Molla (2019) stated this as a consequence of the use of apps like Nextdoor and Neighbors by Ring where suspicious activity (often captured on SDB footage, see Figure 1.10 for examples) is easily shared with neighbours, "creating an exaggerated sense of how bad crime is". Even though objectively no real crime might be happening, the constant app alerts and focus on 'suspicious' activity can increase feelings of unsafety and spread racism (Antonelli, 2019).

Whether this safety-perception paradox also holds for Dutch SDB owners outside of neighbourhood apps remains unclear from literature. Possibly, continuously being prompted to pay attention to your surroundings by your own SDB might increase alertness and stress levels too.
Chapter 2.5 explains more about the connection between the smart doorbell, the neighbourhood and digital neighbourhood watch apps.

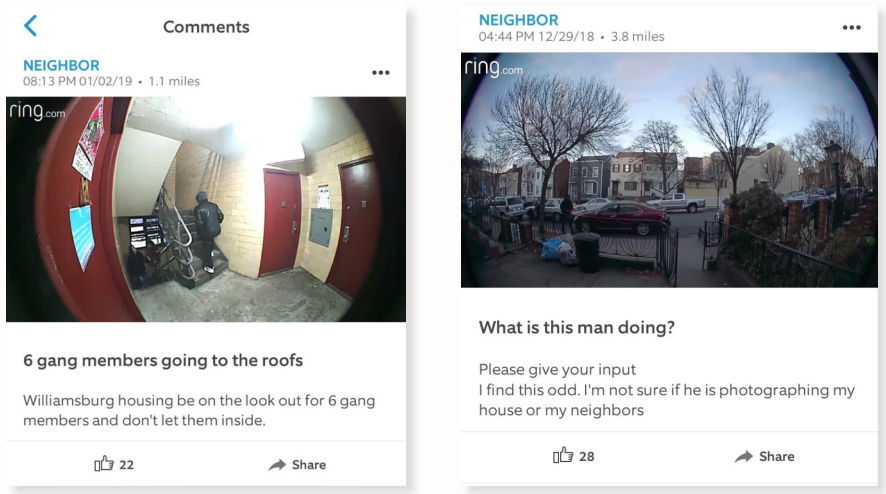


Figure 1.10. Screenshots of Neighbors by Ring posts (Haskins, 2019)

1.3.4 Societal effects

The potential consequences of the smart doorbell go further than the non-primary users that indirectly interact with a SDB. Society as a whole can be affected in many ways by this technology, a few of which are highlighted in this section.

Through the smart doorbell, people are now engaged in "new types of surveillance practices and processes". Primary users are both agent and subject and participate in lateral (peer-to-peer) surveillance (Kelly, 2022). Kelly also explains how the smart doorbell blurs the distinction between communicating through the device (a beneficial feature) and data collection (risk of surveillance).
Kurwa (2019) researched the community app Nextdoor, and stated that "widespread use of the application traps people in surveillance – even if one does not participate in Nextdoor, one cannot opt-out of being watched by those who use the application", thereby depriving a sense of freedom of those watched. Something similar could be said about the smart doorbell. By installing a SDB, a primary user is forcing potential leaky data collection and possibly surveillance onto the non-primary users around them.
Widespread privatized, lateral surveillance might come with many risks and harms of its own. Selinger and Durant (2022) argue through a slippery slope argument that "current social problems will likely intensify: the police are poised to become more powerful, reasonable expectations of privacy are set to erode, and vulnerable communities are being set up to suffer disproportionately".

The smart doorbell could potentially be seen as a 'foot-in-the-door device', a concept introduced by Pierce (2019) about smart home security cameras.
This refers to a product that normalizes and integrates a technology into society, paving the way for future adoption of product features that previously might have been deemed unnecessary, or unacceptable.

1.3.5 Increasing power of law encorcement & big tech

The final risk or harm related to the use of SDBs that is mentioned in this project, is the increasing power of those with access to the collected data.

Privacy expert Frederike Kaltheuner stated in an interview with BBC (Kelion, 2020): "What's most interesting is not just the data itself, but all the patterns and insights that can be learned from it. … This isn't just about privacy, but about the power and monetary value that is attached to this data". The question remains, what exactly is the data used for?

Bridges (2021) stated that Ring extends "the industrial police-surveillant state through its opaque partnerships with law enforcement" in the US context through the Neighbors by Ring app. These police partnerships have been criticized a lot, the police assistance tool was recently removed from the app (Wroclawski, 2024). Even though such partnerships don't exist in the Netherlands, chapter 1.2.4 showed that Dutch police can request or claim access to SDB footage.
Furthermore, Pierce (2019) mentions 'hole-and-corner' applications of smart home cameras, which show how digital leakage could be used for other applications that are concealed from or downplayed to users. He shares the example of Roomba, the vacuum cleaner that also created maps of people's homes and which were speculated to be sold to third parties.
A connection to the concept of surveillance capitalism could be made. Zuboff (author of the Age of Surveillance Capitalism), defines it as "the unilateral claiming of private human experience as free raw material for translation into behavioral data", which is then made into "prediction products and sold into behavioral futures markets" (Laidler, 2019).
Surveillance capitalism can drive companies to shift from products that sense and monitor, to products that 'actuate' and intervene in people's behaviour towards profitable outcomes.
There is no concrete evidence that smart doorbells are used towards this purpose. However, the product's characteristics would fit it.

1.4 Conclusion & take-aways

This chapter explored the smart doorbell, interactions with different types of actors, and showed to what potential consequences that could lead. A few take-aways are presented:

- Smart doorbells collect a lot of data through different types of sensors
- SDBs in the neighbourhood afford **direct** and **indirect interactions** with **primary** and **non-primary users**.
- Additionally, **objects and entities** (smartphone, connected devices, data, storage, the cloud), **companies** (smart doorbell manufacturers, third parties) and **organisations** (policy makers, municipalities, law enforcement, the AP and interest organisations) are involved in the network of the smart doorbell.
- Common benefits of smart doorbell use include enhanced safety and different types of convenience.
- Smart doorbells are **leaky** and **diffuse**, non-primary users might be recorded in the camera 'spillage' without their knowledge or consent.
- **Social tensions** can occur in households and neighbourhoods as a result of SDBs.
- There might be a **safety-perception paradox** around the SDB. While primary users report to feel safer, long-term use could actually lead them to feel more unsafe due to heightened awareness of their surroundings.
- Society can be affected by the use of SDBs in multiple ways through the introduction of **widespread lateral surveillance**, possibly **normalising** this type of technology in the future.
- Authorities and SDB companies might hold a lot of **power** by collecting all types of data through the smart doorbells.

- This chapter showed that research into lived experiences around smart doorbells is missing.

Much of the literature related to smart home cameras and smart doorbells is written from an abstract, high-level perspective. Very little is known about actual lived experiences from primary and non-primary users, especially about the SDB context, which was also stated by Kelly (2022).
While I do see value in a more abstract analysis in creating an overview, I can't help but wonder what is actually going on in neighbourhoods. Chapter 1.3.2 hinted towards social tensions in the neighbourhood, which brings up so many questions. **How do the people around these smart doorbells experience them?**

CHAPTER 2.

Exploring the neighbourhood

Since smart doorbells are attached to peoples' front doors, they often film part of the public space too. The use of these products is situated in neighbourhoods in which people live relatively close together. It is therefore relevant to dive deeper into neighbourhoods in the Netherlands, guided by the following research questions.

2. What are interests, values and needs of people living in neighbourhoods with smart doorbells?
    - **What do neighbourhoods in NL look like?**
    - **What does it mean to be a neighbour in the 21st century?**
    - **What are broader societal values?**
    - How do users experience living around smart doorbells?
        - What are their interest, values, needs?
        - What might be conflicting, where do tensions arise?

2.1 Neighbourhoods in the Netherlands

Centraal Bureau voor de Statistiek (Statistics Netherlands), or CBS, defines that municipalitites are divided into ‘wijken’ and ‘buurten’, which both translate in English to ‘neighbourhood’. The term ‘neighbourhood’ in this graduation project refers to ‘buurten’, while ‘wijken’ will be interpreted as districts, which cover one or more connected neighbourhoods (Bresters, 2019). In 2023, there were 342 municipalities in the Netherlands, divided into 14221 neighbourhoods and 3352 districts (Centraal Bureau voor de Statistiek, 2024).

According to (Völker, 2009), the neighbourhood is in research generally seen as a geographic area, an administrative entity, local networks where neighbours interact with each other or what citizens consider to be their neighbourhood. This last ‘definition’ of neighbourhoods will be considered in the scope of this project. When citizens speak about their neighbourhood, they might be talking about the entire administrative entity their house is located in, or just a part of the street that they are in contact with.

In the Netherlands, population density differs greatly per municipality, with most dense municipalities located in the big cities in the west (de Randstad). The Netherlands is the second most densely populated country in the EU (Eurostat, 2024), resulting in many people living close to each other.

It’s also relevant to take a closer look at the architecture and planning of neighbourhoods. In the Netherlands, 42% of all houses are ‘rijtjeshuizen’, or terraced houses (Centraal Bureau voor de Statistiek, 2023a), housing about 60% of the population (Centraal Bureau voor de Statistiek, 2016). Depending on the amount of space available, these blocks of houses might have small front yards, or are located right on the pavement and road. In urban areas, there often are no front yards and houses face the street directly. Some of these houses can be referred to as ‘etagewoning’ and are divided into multiple apartments on the different floors. Neighbours sometimes share the front door, or the separate front doors are located right next to each other. Figure 2.1 shows some typical Dutch houses.

Figure 2.1. Typical Dutch rijtjeshuizen and etagewoningen, facing both sides of the street
(See Image References for picture references)

These common types of houses, along with the high population density, leads to people having many neighbours in the Netherlands. Not only next door, but often also across the street and upstairs or downstairs.

It's important to note that this isn't the case everywhere, as freestanding houses, apartment complexes, or houses on courtyards also exist.
This research will focus on the types of houses that face the road and have neighbours around them.

2.2 Social interactions among neighbours

As seen in the previous section, people in the Netherlands generally live in close proximity to each other. Living in neighbourhoods, people have social interactions with each other.
Beate Völker (professor of Sociology at the University of Amsterdam) researched social networks in Dutch neighbourhoods extensively, a few of her publications form the main source for the following section.

According to Völker (2009), neighbour relationships are 'weak relationships' and important for 'small jobs'. They still are, although less intensive than other relationships, part of people's network. Neighbour relationships are important for borrowing small things and supporting each other with small repairs around the house (Völker & Flap, 2007), and about 20% of people in the Netherlands visited their neighbours in 2018 (Völker, 2019). Völker (2009) stated that "people like and trust neighbours less than the other members in their personal network" (translated). This trust is not dependent on whether people live directly next to each other, but on the extent to which they are in each others network.
Similarly, trust is an important factor in neighbourly interactions around the smart doorbell. Bernheim Brush et al. (2013) researched the sharing of security camera data among neighbours in neighbourhood watch groups. They found that whether people are willing to inform their neighbours about their cameras is not based on proximity (neighbours being in the field of view), but on whether they have a trusted relationship.

There are more factors or conditions for local communities and social interaction to arise. Völker (2009) mentioned four conditions: having opportunity to meet, mutual dependency, attractiveness of the other as 'interaction partner' and having alternatives to contact.

Where social interactions and networks mainly occur on a microlevel, social cohesion characterises an entity such as a neighbourhood on a macrolevel (Völker, 2019). Higgins and Hunt (2016) state that social cohesion "describes how the residents think and feel about their neighbourhood". To what extent do neighbours get along, help each other, or feel safe? They describe some factors that increase social cohesion including stable, long term residents, friendship among neighbours, good schools and presence and use of local amenities like libraries and parks. Other factors include the design of the public space, having communal entrances, the width of pavements, and the presence of greenery, play areas and small shops (Völker, 2019).

2.3 Being a 21st century neighbour

Social cohesion in the Netherlands has changed a lot from the 1960s. Völker (2019) describes how upcoming modernisation and collaboration between the different churches in one of the prominent political parties at the time, ended pillarization and decreased cohesion within the pillars. These developments (leading to depillarization), are often seen as "starting point of the individualisation and the erosion of social cohesion in Dutch society".
This same publication shows that social cohesion has decreased between 2000 and 2018, while trust in neighbours has increased. Mollenhorst (2015) something similar: the frequency of contact with neighbours decreased, while liking and trusting neighbours increased between 2007 and 2013 in the Netherlands.

More recent numbers too show that neighbourly contact is decreasing, and that older people (aged 65 and over) have most contact with their neighbours (Centraal Bureau voor de Statistiek, 2023b).
A report by Gemeente Amsterdam (Ahamiane et al., 2021) found that the amount of citizens in Amsterdam that have contact with their neighbours

has been decreasing over the last years, but increased for many during the Covid-19 lockdowns. About 25% of people even developed new neighbour contacts. These relationships arose on the sidewalk near the front door or on the street somewhere else in the neighbourhood. While contact is generally decreasing, it's not impossible to build new connections with the neighbours.
Furthermore, neighbourly interactions are not always positive. Kester (2019) reported that 19% of all respondents (N=27.000, Dutch context) had been in a neighbour dispute over the last three years.

A generation difference might play a role in decreasing contact in neighbourhoods. RTL Nieuws (2020) stated that people in their 30s often don't introduce themselves to neighbours. Bente Londen, director of Beterburen, mentioned in the article that this could be due to being raised with social media. "They know what their friends do and very much have their own life. They think they don't need the neighbours. If they need something, they don't ask their neighbours.". In contrast, she states that "the older generation was really dependent on each other, they did much more communal things. … There was much more connection".

2.4 The digital neighbourhood

Even though social cohesion and contact have been decreasing, some of it might have taken an new form.

Technology and social media have become intertwined in our lives. While existing in digital social networks might lead to not needing neighbours anymore, neighbour interactions are also moving to digital realms. Many neighbourhoods have Whatsapp or Facebook groups, used to discuss and coordinate all types of things. Other neighbourhood platforms used in the Netherlands include Nextdoor and Buurtapp.nl.
1 in 3 people use some type of neighbourhood app, according to a survey commissioned by VPNgids.nl (Janssen, 2023). Most people reported to use these apps for safety reasons. The survey also found that fights occur in about 20% of the group chats and over 40% of people is sometimes annoyed by the messages they receive.

We are not only part of a physical community or neighbourhood, but also of a digital one.

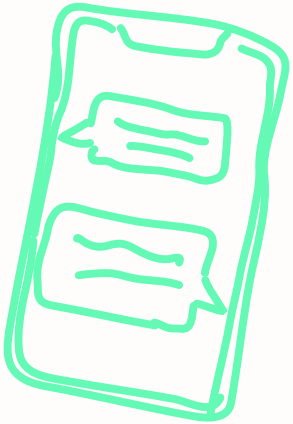


Figure 2.2. WABP signpost *(See Image References for picture reference)*

2.4.1 The digital neighbourhood watch

Apart from casual social media groups or neighbourhood platforms, there are also registered digital neighbourhood watches (DNW), called WhatsApp Buurtpreventie (WABP). These groups are dedicated to increasing safety in the neighbourhood. Neighbours can enrol through the official website as member to an existing group, or as moderator when there is no group in their street yet. Streets often place signposts or stickers indicating they have a DNW, see Figure 2.2. Around 9.500 WABP groups are active at the moment (WABP, 2024).

2.4.2 Sharing SDB footage

The smart doorbell plays a big role in the digital neighbourhood interactions, pictures and videos are easily shared in the neighbourhood groups.
This can include actual helpful alerts but messages can also steer towards a skewed interpretation of video footage. Chapter 1.3.3 showed a message sent by a neighbour to inform others about 'strange' activity. Through sharing SDB footage, "incidents or labels that are timebound in physical life are made permanent and decontextualized in digital space" (Kurwa, 2019). People can easily be labelled as suspicious, strange or threatening. Duin (2024) shared an anecdote of a neighbour voicing his discontent with dog poop on the pavement, after which he posted a doorbell video exposing the 'offender', leading to a lot of discussion.
Rather than the primary-user sharing footage, neighbours might also ask for footage when an incident occurred.

> At the start of this project, someone I had a casual chat with showed me a recent conversation in their neighbourhood chat group. A neighbour lost an item and was afraid it might have been stolen. This neighbour asked whether anyone had video recordings so they could see what happened. One neighbour replied they had a smart doorbell that might have recorded something, but they couldn't access the video footage.

2.4.3 Impact on social dynamics

The digital neighbourhood watch, potentially augmented by smart doorbell footage, can in-fluence social dynamics in the neighbourhood greatly.

Mehlbaum and van Steden (2018) describe that digital neighbourhood watches can create a sense of digital community and increase social cohesion. Some DNW participants they interviewed mentioned that social control is returning through social media.

However, while social cohesion and even perception of safety can increase due to digital neighbourhood watches, "they often default to lateral surveillance, ethnic profiling, risky vigi-lantism, and distrust towards neighbours and strangers" (Mols & Pridmore, 2019). Similar findings regarding stereotyping, ethnic profiling and discriminatory practices were found by others (Kurwa, 2019; Mehlbaum & van Steden, 2018; Smithuijsen, 2022).

The DNW can play a big role in the 'safety-perception paradox', as explained in chapter 1.3.3. While increased cohesion and support may enhance feelings of safety in the neighbour-hood, this type of participatory policing might simultaneously increase "feelings of unrest and fear" (Pridmore et al., 2019).

2.5 Societal values

The final part of this chapter zooms out and provides insights into the 'societal values' of the Netherlands. As this graduation project specifically focusses on smart doorbells in the context of Netherlands, having an understanding of some of these values can help to draw connections to the later findings of this research.

Societal values are of course impossible to define as they might be different for every individual. However, there are certain societal values that hold true for many people. The Dutch government published the core values of the Dutch society; which are freedom, equality and solidarity & work (Ministerie van Sociale Zaken en Werkgelegenheid & Pro Demos, 2014).

In recent years, there has been a general change in value orientations in the Netherlands. Eisinga et al. (2012) published the results of an extensive national survey executed between 1980 and 2011. It measured whether and how the value orientations of Dutch citizens changed over the years. A family-civil value orientation (appreciation of marriage and family) used to be most common in 1980, while hedonistic values (importance of pleasure and fun) were most important in 2011. The importance of economic-civil values (importance of profession, financial security and moving forward) increased as well.
Eisinga et al. state that the fixation on consumptive hedonistic pleasures has become so important over the past decades that "individual self-realization seems to have become the central cultural value in Dutch society" (translated), contrasting the Dutch cultural (Calvinistic) tradition. This shift is driven by prosperity growth, technological development and individualisation. Especially the younger generation and childfree people increasingly focus on work and leading an exciting life.

According to Eisinga and colleagues, this increase in hedonism could make societal engagement much more difficult: "In a strongly hedonistic and materialistically oriented society, individualism can turn into hyper-individualism, narcissism and indifference, people lose interest in their environment and values such as equality and solidarity are simply pushed aside" (translated).

2.6 Conclusion & take-aways

This chapter explored (digital) neighbourhoods, social interactions and societal values in the Netherlands. The main take-aways are summarised below:

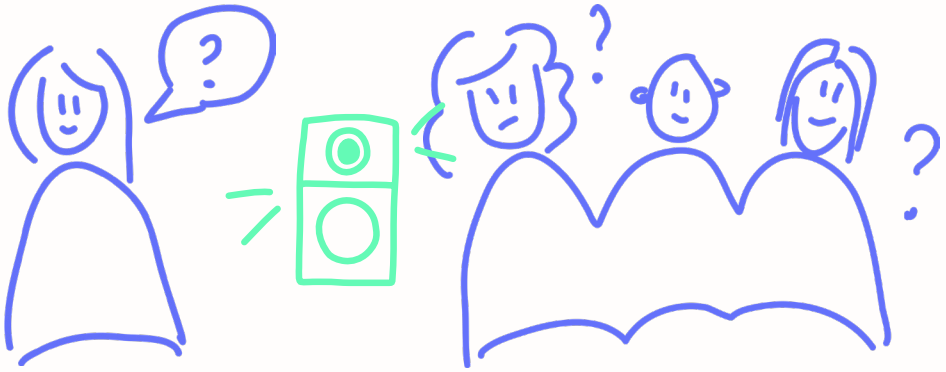
- Many people live close to each other in the Netherlands. Most people live in houses that somewhat directly face the road. A single smart doorbell might therefore capture activity from many other households too.
- Important factors in social interactions and social cohesion in neighbourhoods include:
    - Trust
    - Opportunity to meet, mutual dependency, social capital, alternatives
    - The design of the public space
- Social cohesion and the amount of contact with neighbours has been decreasing, while trust has increased.
- Smart doorbell footage is easily shared in digital neighbourhood groups.
- Engaging in the digital neighbourhood can increase social cohesion, but can also lead to lateral surveillance, distrust, ethnic profiling and vigilantism.
- In Dutch society, core values are freedom, equality and solidarity. Hedonistic values have gained importance and could lead to people pushing aside other, more collectivistic values.

CHAPTER 3.

Interactions & experiences in the neighbourhood

As previously concluded in chapter 1.4, little is currently known about lived experiences with smart doorbells.
This chapter presents insights from semi-structured interviews about the interactions that occur around SDBs in the neighbourhood, and how people experience that. The following questions guided the research:

2. What are interests, values and needs of people living in neighbourhoods with smart doorbells?
    - What do neighbourhoods in NL look like?
    - What does it mean to be a neighbour in the 21st century?
    - What are broader societal values?
    - **How do users experience living around smart doorbells?**
        - **What are their interest, values, needs?**
        - **What might be conflicting, where do tensions arise?**



3.1 Method

To learn more about lived experiences, qualitative research in the form of semi-structured interviews was performed.
As mentioned in the introduction, quantitative research showed that 17% of citizens in Am-sterdam have a negative attitude towards smart doorbells (Heijnen & Bosveld, 2023). Qualitative research might give insights into what this attitude entails, and why people feel this way.

Many short conversations about smart doorbells were held over the course of this graduation project.
Additionally, 8 explorative, in depth interviews were iteratively conducted with primary users and non-primary users. Participants were chosen to represent different types of neighbourhoods and areas in the country, as well as diversity in age, gender and background. All participants were Dutch. For information about the participants, see Table 3.1.
One SDB expert was interviewed. Results from this interview were not incorporated in the analysis of the other interviews, but did provide valuable background knowledge.

The interviews range from more casual to formal interviews and observation. All interviews were semi-structured and the topics as well as the way of questioning was iterated upon (see Figure 3.1 for the topics).

The detailed questions for these interviews can be seen in Appendix B. As the motivation behind participants' statements was important, answers were most often followed by the question why they stated that.

Figure 3.1. Interview topics

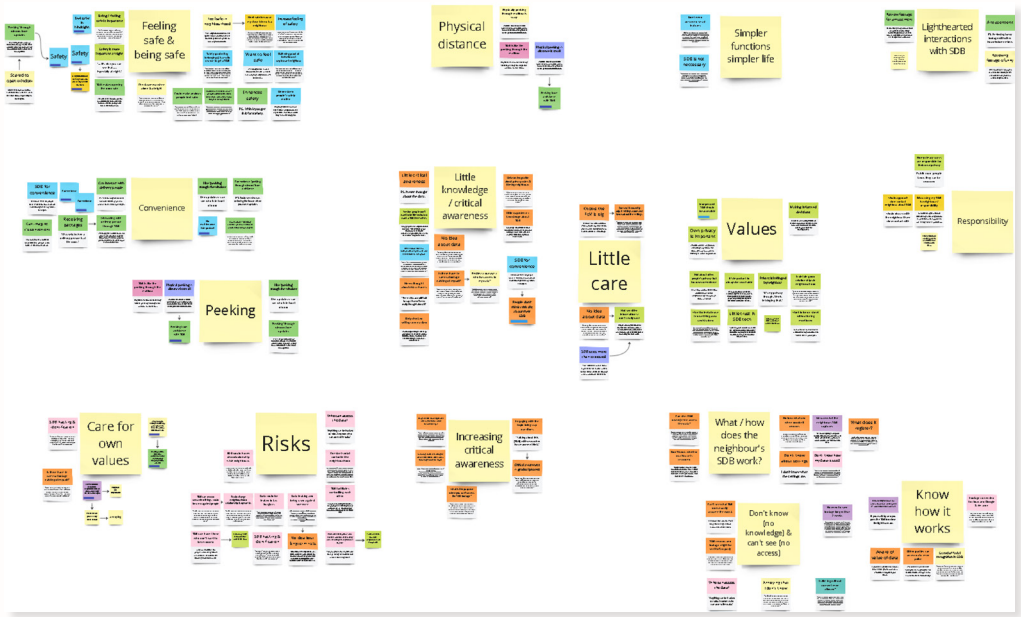
Table 3.1. Interview participants

	Type of actor	Type of interview	Gender	Age range	Living area	Neighbours	Type of house
P1	Primary user	Explorative conversation / interview	M	25-30	Industrial area	One next door.	Renter, main living area on 2nd floor.
P2	Primary user	Explorative conversation / interview	F	20-25	Rural area	Few and far away.	Homeowner, free standing house.
	'what ' primary user				Big city centre	Either sides, across, upstairs.	Renter, terraced house in city centre, 2nd floor.
P3	Primary user	Explorative conversation / interview	F	50-60	Rural residential area	On either sides and across.	Homeowner, terraced house.
P4	Potential primary user	Semi-structured interview	M	25-30	Small city residential area	On either sides.	Homeowner, main living area on 2nd floor.
P5	Non-primary user (neighbour) & potential primary user	Semi-structured interview	M	25-30	Small city residential area	On one side and across.	Homeowner, main living area on 2nd floor.
P6	Primary user	Semi-structured interview, observation	F	25-30	Big city residential area	On either sides and above.	Renter, main living area on 2nd floor. Facing street, not in SDBs FoV.
P7	Non-primary user (neighbour)	Semi-structured interview	F	50-60	Small city residential area	On either sides and across.	Homeowner, semi freestanding house.
P8	Non-primary user (neighbour)	Semi-structured interview	M	40-50	Medium sized city centre	On either sides and across.	Homeowner, main living area on 2nd floor.

Figure 3.2. Process of analysing interviews: coded transcriptions -> statement cards -> clusters -> insight cards -> overarching themes

Analysis of the interviewed followed different steps. This process is presented as linear, though in reality more iterative. Figure 3.2 gives a schematic overview.

First, the notes taken during the interviews and audio transcriptions (only during the later interviews) were coded. After that, statements were extracted and placed on statement cards (Sanders & Stappers, 2012, p. 224). A layer of interpretation was given to the colour coded statement cards. In the third step, clusters of statement cards were created to find patterns and themes, which were then translated into 'insight cards' that clearly show higher level insights.



Small area of Miro board with clusters

The insight cards were divided into different categories: **general observations**, **benefits and harms**, **feelings** and **factors that influence the context** (social, physical / situational and personal factors) are presented. **Values**, **needs** and **tensions** were extracted. Some were mentioned literally by participants, others result from the combination of insights.

Labels on the bottom of the card indicate which type of actor experienced this and what values the insight might relate to. Pictures were added to make the cards visually distinguishable and easier to interpret. An overview of the insight cards, including all image references, are shown in Appendix C.

These insight cards provided valuable insights, but the connection between them was not clear yet. The cards were again clustered into overarching themes, showing how the separate insights relate to each other. See Figure 3.3 for a visual overview of some of the insight cards and clustering.

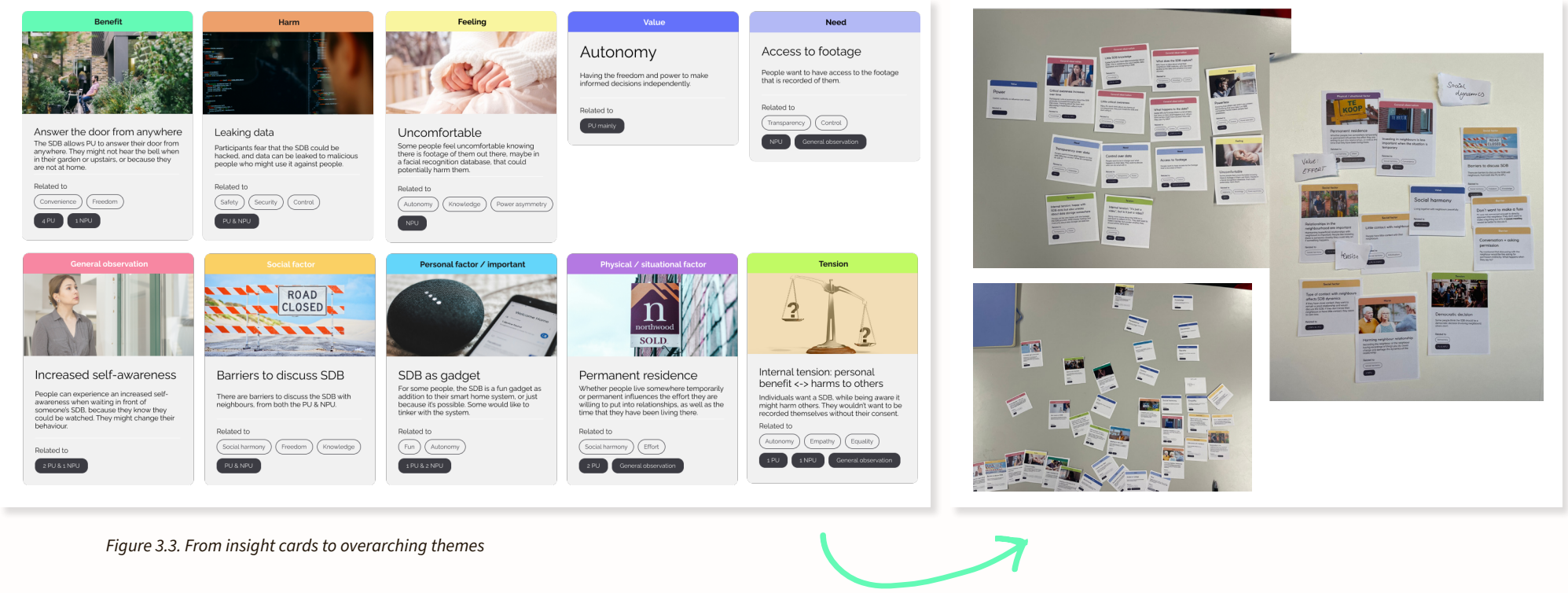


Figure 3.3. From insight cards to overarching themes

3.2 Insights

In the following sections, the most interesting insights will be presented. First, some general insights will be shared. This is followed by the four overarching themes.

3.2.1 General insights

In literature and news articles, privacy is one of the most mentioned values in relation to the smart doorbell.
This was not the case in the interviews: it wasn't mentioned much and some people even didn't care about privacy at all: "I don't really care if the neighbours would record me with their SDB, they probably wouldn't be able to see much" (P4).
The researcher often had to specifically ask for privacy related things to which the NPUs mainly responded. It became apparent that privacy can mean different things for different people. For some participants, it was related to living unbothered, while others related the word 'privacy' to the principle of not being watched at all, or not being watched without their consent. It required some effort to pinpoint what participants meant when they referred to 'privacy'.

Consequently, the meaning of all values, benefits and harms might differ for everyone. This became especially clear when participants were talking about safety, convenience and control. Many participants mentioned safety to be an important benefit of the smart doorbell. It was observed however that only women were talking about safety from harm and danger when opening the door, while men reported on the safety of belongings, such as the car parked in the front door. To address this difference in meaning, the latter will be referred to as 'property security' instead of 'safety'.
Another example is 'convenience'. Some participants reported it to be about having no maintenance, for others it was about easily interacting with delivery workers, or deciding whether the person in front of the door is worth the effort of walking down the stairs.
Interpretations regarding 'control' were related to being reachable at all times or knowing what is happening around them. For others, it was about knowledge, access and control over data. Control might also be related to having the power to make decisions.

One last general insight is highlighted as an opportunity.
PUs reported that the SDB facilitates for light-hearted, amusing interactions (see Figure 3.4). This can be seen as a benefit, although currently only for primary users, as they have access to the footage.
This insight inspired to approach the design phase from a positive perspective, rather than from a big negative warning sign.

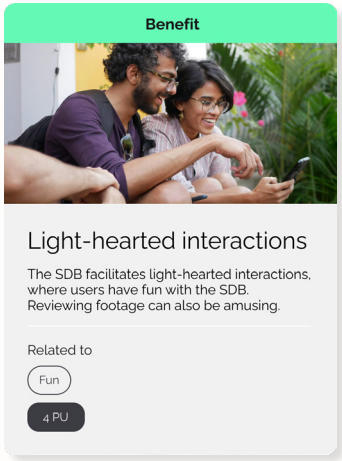


Figure 3.4. Insight card: benefit of light-hearted interactions for PUs

Values seem to be intertwined as well as difficult to pinpoint and define. How can we design for 'societal values', when these are different for everyone?
Based on a conversation with the supervisors, it was decided that 'needs' would be more useful in the design phase of this project, as they describe a more concrete context.
Additional needs were formulated for the four overarching themes.

3.2.2 Insights through overarching themes

The most emerging insights led to the following four overarching themes, which will be presented in the following sections.
On each figure, related insight cards are grouped and numbered. These same numbered bullet points are used to visually connect the written explanation to the specific insight cards in the overarching themes.

The insight cards marked with a star were later taken as starting point for Cycle 2.

3.2.2.1 Knowledge & critical awareness

The first overarching theme (see Figure 3.5) is related to the participants' knowledge and critical awareness about smart doorbells.

1. Both the PUs and NPUs have little knowledge about smart doorbells. NPUs have even less knowledge, as they have no idea about the SDBs field of view, settings and what happens to the data. P7 asked many questions; "How far does it reach? Is it always on? When does it record? We live right across. What does it see? I don't know.".

2. Not everyone is aware they might be interacting with smart doorbells, or they don't mind. Additionally, there is little critical awareness (awareness of potential consequences of smart doorbell use). When asked about potential benefits and harms, P6 responded "these risks are difficult to say. I haven't ever really thought about it".

3. When aware of the SDB, some participants experience a heightened sense of self-awareness when standing in front of the door; "I know they can watch me from inside. Not unpleasant, just 'vague' to be aware of this. It feels a bit powerless" (P2). Knowing that others could be watch them unseen made participants feel powerless.
Furthermore, having a bit more knowledge about SDBs and potential consequences makes non-primary users feel uncomfortable with their data being 'out there'. Being aware the data is in companies' hands also makes them feel powerless.
Another tension was observed; when awareness increased, so did discomfort.

4. It was observed that the critical awareness of some participants increased rapidly when engaging with the topic. Throughout the interviews, it became apparent that discussing the topic and being encouraged to answer slightly critical questions prompted reflection. They started to ask the researcher questions too, some even noticed and mentioned this change themselves: "talking about this [SDB] with you has made me think…" (P7).

5. Some very concrete needs regarding access to data, transparency about data usage and control over data were mentioned by participants.

6. Finally, the values of knowledge, transparency, control and power were connected to the above mentioned insight cards.

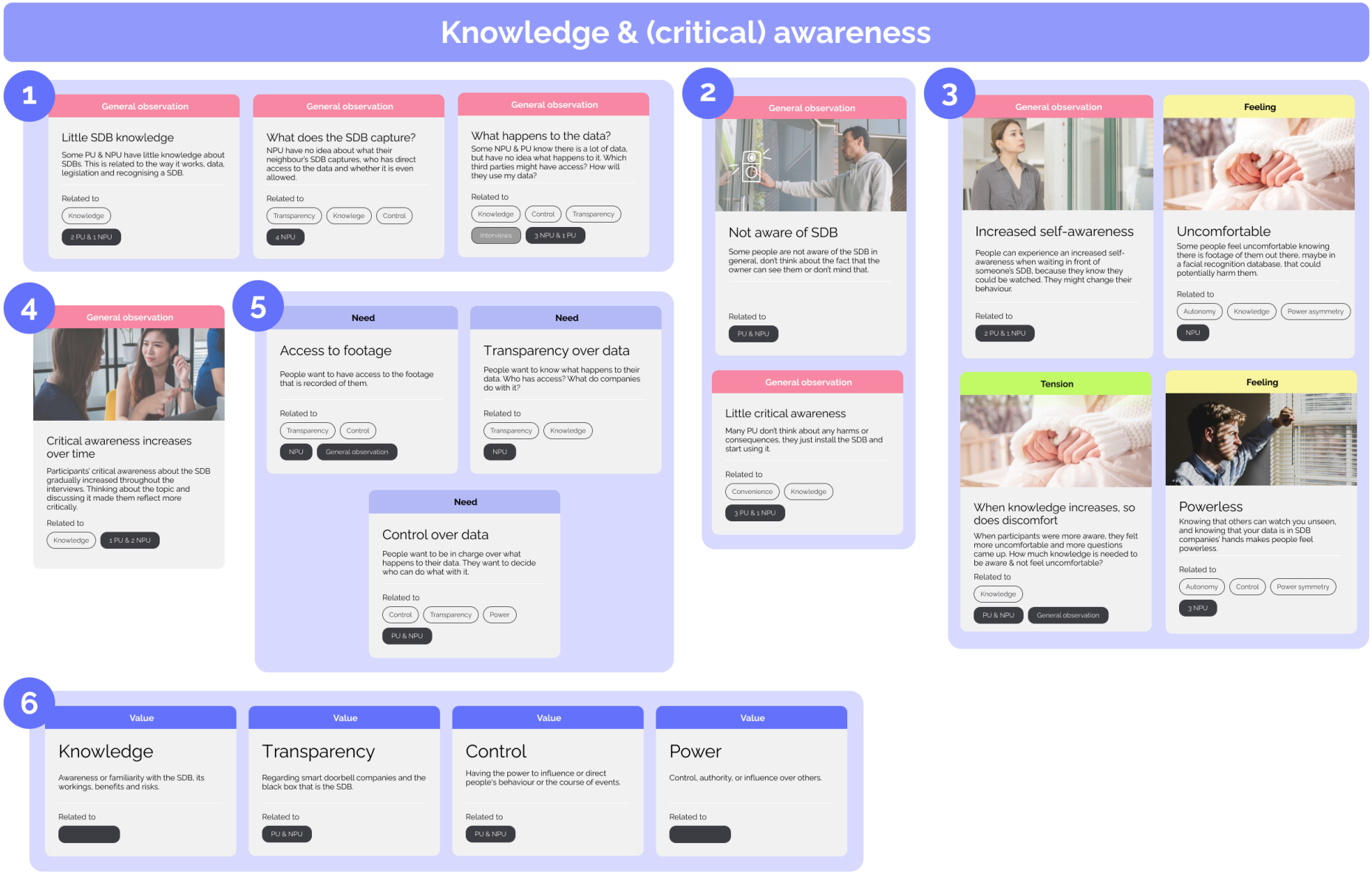


Figure 3.5. Overarching theme: knowledge & critical awareness

3.2.2.2 Reasoning from own perspective

The second theme (see Figure 3.6) describes the observation that PUs primarily reasoned from their own perspective.

1. Primary users mostly mentioned benefits and harms relevant to themselves directly, although some related to other actors when specifically asked. An overarching value that appears to be especially important to PUs is autonomy. This relates to having the freedom and power to make decisions based on what is important to them. The PUs decide to buy and install a SDB with a certain personal benefit in mind, often without considering potential consequences to other actors.
   For non-primary users, reasoning from another perspective than their own seemed to be easier, they could empathise with primary users or imagine why they would get a SDB.

2. The biggest overarching experienced benefit of the smart doorbell is phrased as 'informed decision-making' by the researcher. The SDB affords PUs the opportunity to make informed decisions regarding their front door, putting them in charge. The value of being in control was connected to this.

   The motivation for informed-decision making might be based on many different values, most often mentioned by the participants were safety and convenience.

3. PUs mentioned they wanted to feel safe often, which was also imagined to be an important factor by NPUs: "I think many people might get a feeling of safety from the SDB" (P8). Some PUs reported that they do feel safer since having a SDB.

4. Every participant mentioned convenience in relation to the SDB, although this was only directly experienced by the PUs. Being able to easily interact with delivery workers was seen as a benefit, as is being able to answer the door from anywhere.

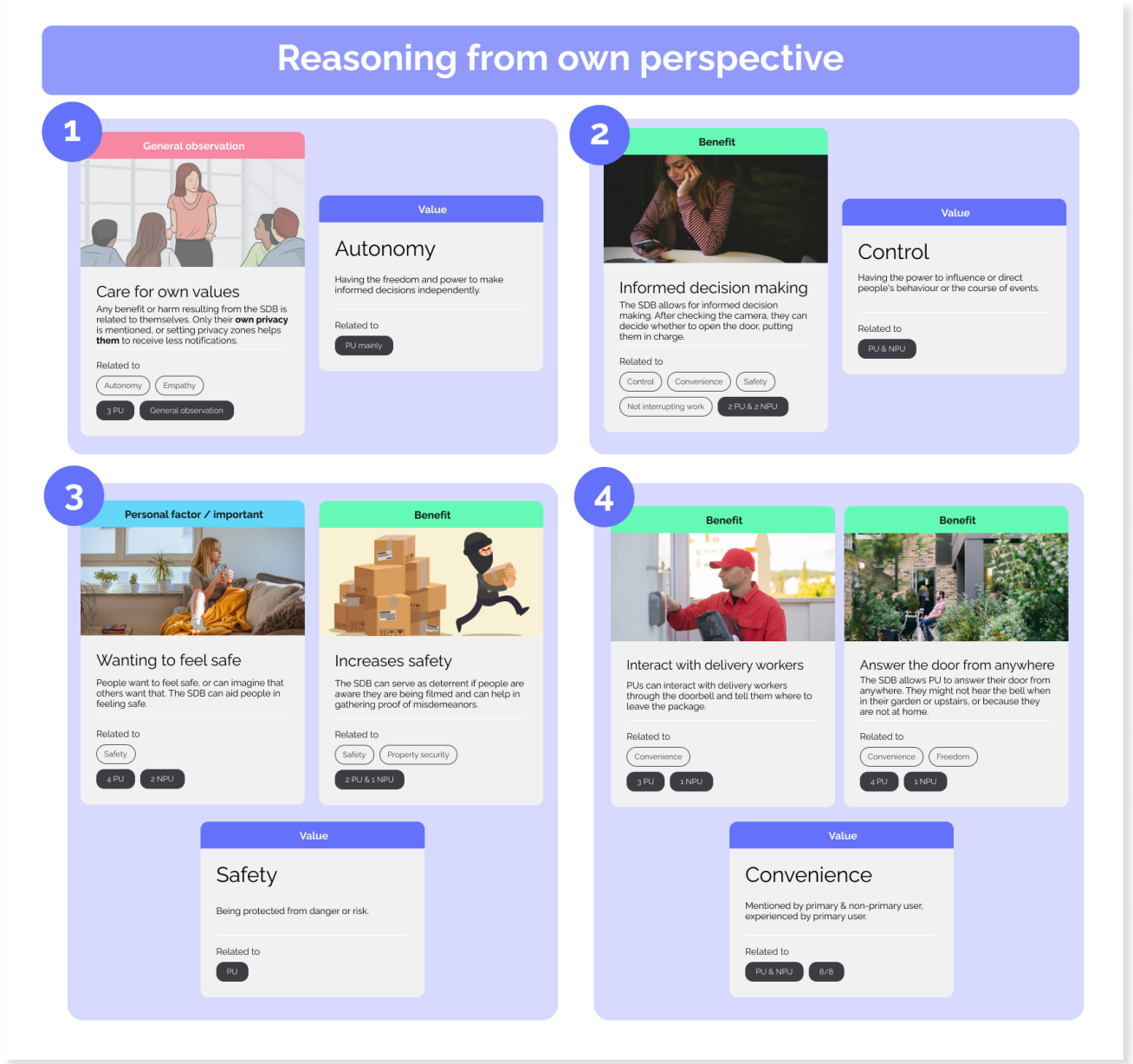


Figure 3.6. Overarching theme: reasoning from own perspective

3.2.2.3 Social dynamics

Many insights have to do with social dynamics in the neighbourhood and are therefore clustered in an overarching theme (see Figure 3.7).
In this thesis, the term '**social dynamics**' is related to the way that people interact with each other within neighbourhoods.

1 Only NPUs related the SDB to potential harms for neighbourhood dynamics. Some of them mentioned that recording the neighbours or the neighbours having recordings of them might change dynamics. They stated that the SDB facilitates constant monitoring, which might lead to heightened social control. This harms the value of living unbothered, mentioned mainly by NPUs: "I want to be able to feel at ease undisturbed" (P7).
A tension became apparent; when is someone watching out for another person, and when does it become watching over? Some participants reported to feel watched (watching over) while others didn't and might frame it as 'watching out for'.

2 Almost all participants reported to have little contact with their neighbours. Investing in relationships is less important when the situation is temporary. When one of the neighbours is renting a house, they are less willing to invest effort into relationships with each other.

3 However, participants do seem to value relationships in the neighbourhood. P6 mentioned that "personal contact with the neighbourhood is important to me. That you know where you can go when something were to happen, someone you can count on". She had little contact with the neighbours, but realised that was partly due to her taking little effort. For most participants, the type of contact should be casual.
Some participants stated that the type of contact they have would also impact their attitude towards smart doorbells. They want to maintain a good relationship with their neighbours if they have close contact. When there is little contact, there is nothing to maintain and they cared less for this value.

4 A tension was identified around making 'democratic decisions' about the smart doorbell. Some participants felt neighbours should be included in the decision to get a smart doorbell and would approach others actively to discuss this. Another participant however stated "I don't think people discuss hanging the doorbell with their neighbours" (P8), and wouldn't do so himself either.

Some participants wanted to discuss the topic but experienced some sort of barrier to do so. One neighbour highly valued social harmony and didn't want to make a fuss. She was concerned, but not enough to approach the SDB owner directly. A casual meeting would be better, "it's winter, you don't really meet each other casually on the street. I don't want to make it into a big thing" (P7).
A barrier explained by another neighbour was about the dilemma that might occur when discussing the topic; what if they don't approve? For him, discussing would be like indirectly asking for permission. "What kind of conversation would that be? I'm going to hang a doorbell, it's going to film you, is that okay for you?". Asking poses the risk that the other person doesn't agree with the smart doorbell, and then they have to do something with that, which is unclear. "If you just hang it, chances are big no one will ever say something about it" (P8).

5 A few different values were extracted from and connected to these insights.
Some participants highly valued being able to live unbothered. Their privacy being infringed would harm that value.
Most of the participants valued social harmony, but the interpretation of that might differ. Having little neighbour contact doesn't mean these relationships aren't important. This value was more explicitly mentioned by NPUs. Wanting social harmony and wanting to live unbothered can form a value conflict in the context of smart doorbells.
A personal factor that influences these social dynamics is the amount of effort people are willing to put into relationships.

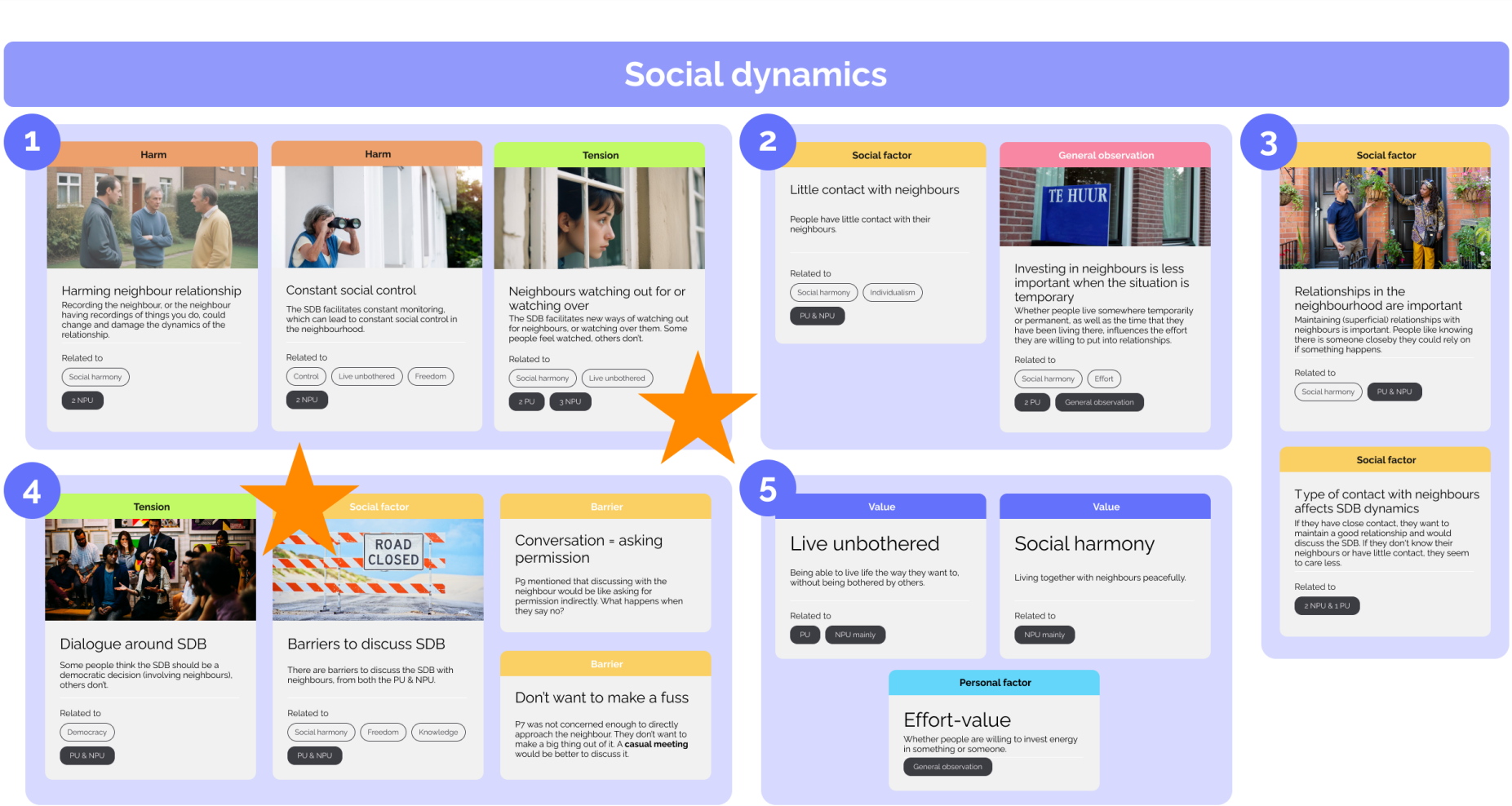


Figure 3.7. Overarching theme: social dynamics

3.2.2.4 Feeling in control & not having control

The final overarching theme (see Figure 3.8) is about feeling in control, which appeared in different ways. It is also part of some of the other themes, but needs to be unpacked further.

1. It seemed as though primary users want to feel in control over their surroundings. Some participants compared the SDB to 'peeking through the door', allowing for informed decision-making. Most PUs wanted to be reachable everywhere, all the time. Whether they are in the middle of something or not at home, they wanted to know what is happening around their front door.

2. Most non-primary users found the smart doorbell totally unnecessary and some even had an explicit negative attitude towards it. It's not just that they don't care about always being in touch with their surroundings and neighbourhood, they actively don't want to know everything: "I don't constantly want to hear form neighbours everything that is wrong. Every wrongly placed garbage bag, 'there's a suspicious person here', etc. I don't want to be bothered with that" (P8).

3. Non-primary users experienced a lack of control regarding what data is being captured. They had no knowledge about, access to and power over the data. Knowing that other actors do have knowledge and control over data on which they are captured, made them feel powerless.
   Some participants accepted this and preferred to ignore the problem: "Nowadays there's cameras everywhere. I see it as something you'd can't really do anything about. It's scary if you think about it, but if I worry about it too much I'll make my life more difficult. It's a bit putting my head in the sand. I've accepted it's part of life." (P5).

4. Primary users do know what data is captured and have access to this, but they don't have power over what happens to the data after that either. The PU can decide to store data locally through choosing a specific SDB brand, but when that's not the case, they don't have knowledge about or power over what companies use their data for.
   For NPUs, this lack of control translated to the suspicion that SDB companies misuse personal data, resulting in distrust. This was not mentioned by PUs, who all used Ring or Google Nest smart doorbells.

5. Different concrete needs for the PU and NPU were extracted from the overarching theme of control. While the PU needs control over what happens to their data, the NPU first needs access to said data. Furthermore, some NPUs need the ability to not participate.

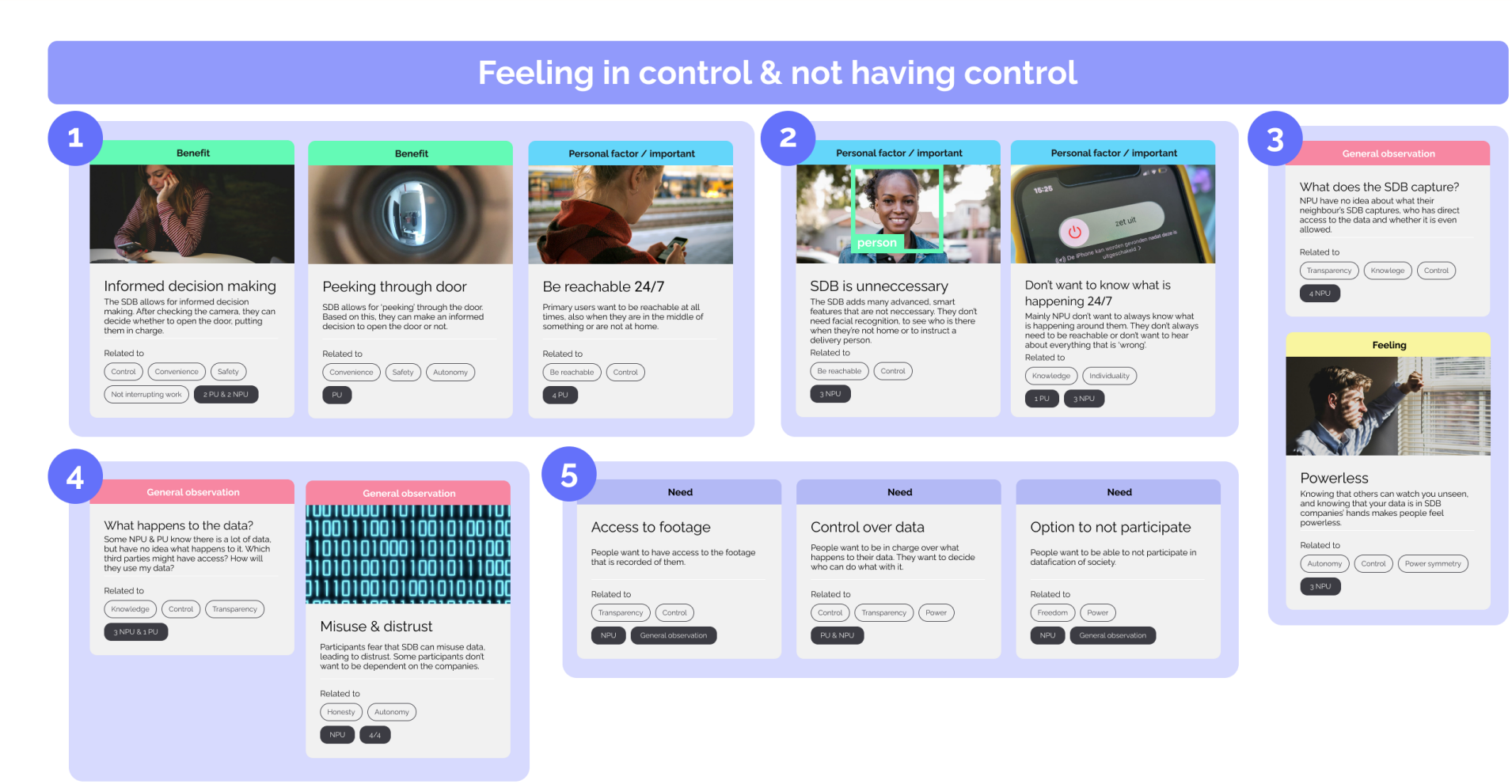


Figure 3.8. Overarching theme: feeling in control & not having control

3.2.3 Additional tensions

Some other tensions (shown in Figure 3.9) were identified based on the interviews, which are presented in the following section.

1. The first row of insight cards shows internal tensions that participants reported.

2. A tension or contradiction around safety became apparent, which relates to perceived safety versus actual safety. Two participants reported that they wanted to, or understood why people would want to protect their property using a SDB. They called this 'safety'. When asked, they reported their neighbourhood is actually very safe. Additionally, almost every participant mentioned safety to be a benefit to the smart doorbell. Even though their immediate surroundings were safe, participants stressed the importance of feeling safe.

3. The last two insight cards are about the question of who is or should be responsible for SDB privacy. One participant noted that privacy is a hot topic and legislation is in place for almost everything regarding privacy, but not for the smart doorbell.

   Some primary users clearly stated that privacy is the responsibility of the non-primary user, "people know they can be recorded on public roads" (P1) and "I expect them to approach me if they have a problem with the SDB" (P2). Other participants stated they would proactively discuss the SDB with their neighbours and take responsibility in that way.

3.3 Discussion

The findings of the interviews included general insights regarding the meaning and interpretation of values, four overarching themes and additional tensions experienced by primary and non-primary users. The following section will further discuss some of the findings that stood out.

Privacy wasn't mentioned much by participants, while almost all media publications about smart doorbells do. There could be many reasons as to why participants did not mention or care about privacy, though a likely reason is having little awareness about smart doorbell consequences, and thus possible infringement of privacy.
Some of the extracted values can be clearly linked to the shifting Dutch value orientations, as explained in chapter 2.5. Values such as convenience, comfort and autonomy fit with the increase in hedonism and individualism.

The findings show that there is a difference between having knowledge about smart doorbells and being critical aware about them, but they are related. Little knowledge makes for little critical awareness. A bit more knowledge however seemed to bring up many questions for especially NPUs that remained unanswered, leading to discomfort.
PUs might also experience discomfort due to a lack of knowledge, but this is related to what happens to their data and not what it entails.
Shortly engaging with the topic during the interview already increased participants' critical awareness, but not their knowledge about smart doorbells around them. Many questions about field of view and data usage came up and remained unanswered.
This poses the question, what level of knowledge is needed to not feel uncomfortable? Or might increased knowledge and awareness alone not be enough?

While initially surprised by the finding that almost all participants reported to have little contact with their neighbours, chapter 2.4 showed how this is line with the bigger societal trend of decreasing neighbourly contact.

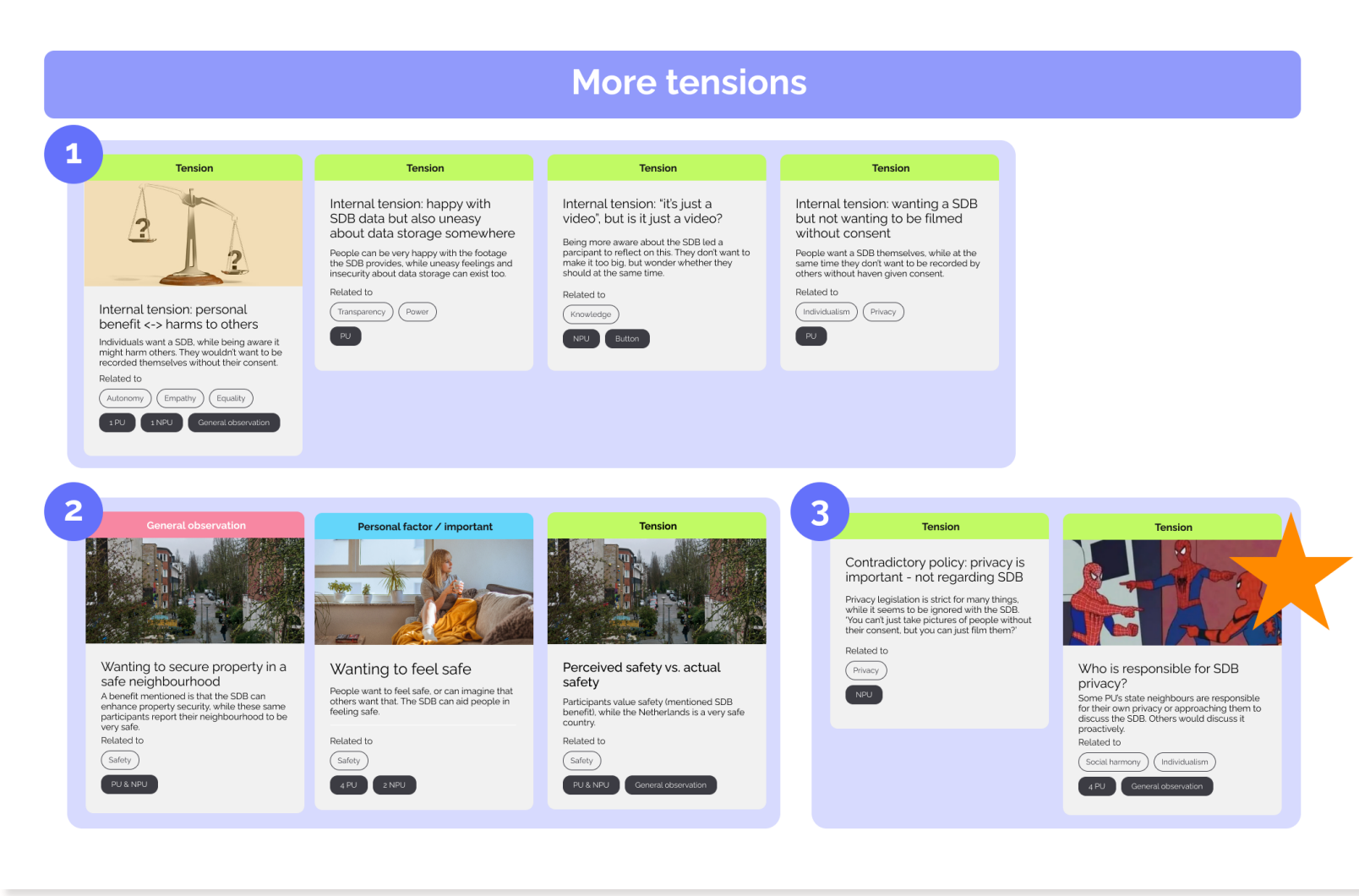


Figure 3.9. Additional tensions identified based on the interviews

The type of relationship people have with their neighbours was mentioned to affect SDB dynamics. Participants stated that the smart doorbell would be discussed with neighbours when there is a good or trusted relationship. The literature in chapter 2.3 presented the same, having a trusted relationship is an important factor in informing neighbours about cameras. However, since people generally trust their neighbours less than other people in their network, discussing smart doorbells in the neighbourhood might be difficult.

Other findings worth unpacking more are the explicit negative attitude of some NPUs towards the smart doorbell, actively not wanting to know everything about their surroundings and not wanting to participate in this. This might be broader than the smart doorbell context and concern a frustration with datafication of society.
The unwanted consequence of 'trapping the neighbourhood in surveillance' was previously described in chapter 1.3.4. Non-primary users have often not given consent and can't opt out. P7 phrased strikingly: "She hung up this camera, but I might be filmed. I wasn't asked. … I want to be on the street without being monitored. That is just a principle.".

The insights show a mismatch between perceived safety and actual safety. Participants in the interviews stated that their neighbourhoods are not unsafe when explicitly asked. From 2012 to 2021, the amount of registered crimes in the Netherlands almost halved (Centraal Bureau voor de Statistiek, 2024a). However, there was a small increase of traditional crimes (burglary, theft, violence, vandalism, etc) for the first time in years in 2021, as well as the amount of people feeling unsafe in the neighbourhood.
There could be many different reasons for this mismatch. Chapter 1.3.3 explained the safety-perception paradox, perhaps participants felt more unsafe because of the increased attention to their surroundings.
It could also be that safety is simply mentioned a lot in relation to the smart doorbell, because the marketing and communication around these products often mention the word 'safety' or 'security'. In example: Eufy's app is called 'Eufy Security' and Ring highlights the benefits of 'Safety', 'Convenience' and 'A safe feeling' with user testimonials centrally on its Dutch SDB product page (Ring NL, n.d.-b; see Figure 3.10).

The smart doorbell is only one mechanism through which people address the need to feel safe. As perceived safety is such a big topic in and of itself, **this project will not focus on safety related tensions in the neighbourhood.**

A tension that remains within the scope of the research is the one regarding responsibility.
Who is responsible for correct or ethical smart doorbell use? According to smart doorbell companies' privacy policies, that's the primary user. PUs are held responsible for compliance with all laws and regulations regarding data protection and privacy, also regarding non-primary users (Google Support, 2022; Ring, 2021). Autoriteit Persoonsgegevens also places responsibility on PUs to install the smart doorbell properly. However, the answers from primary users in these interviews suggest that they are not aware of this responsibility or place it with another actor.
Maybe it's a more interesting question to ask; who *should* be responsible?

Figure 3.10. Screenshot of Ring product page, showing 'Kind words from our satisfied users', about 'Safety', 'Convenience' and 'A safe feeling' (Ring NL, n.d.-b).

3.4 Limitations

There are many factors that might have influenced the outcomes of this interview study, some of which are presented in the following section.

Due to the small amount of participants in this explorative qualitative research, it's difficult to say whether these findings are generalisable to other neighbourhoods in the Netherlands. Furthermore, not all insights were experienced by everyone. The insight cards and overarching themes show an overview of the diversity of experiences, feelings, values and needs that these specific participants had with smart doorbells.

Participants were recruited through the extended network of the researcher. Even though effort was taken to minimize bias in interviewing, they might have given socially desirable responses or based on what they thought was expected from them. An attempt was made to include participants from different social, economic and educational backgrounds, but the selection of participants could have been much more diverse.

It's important to remain aware that these overarching themes and all other insights result from the researcher's interpretation of the data. Even though results were discussed with the supervisors, researcher bias and incorrect interpretations might have impacted the findings.

One of the biggest limitations of the setup was not having sensitised the participants about the topic, although this was intentional. Seeking insights about current knowledge and critical awareness would have been difficult if participants were sensitised beforehand.
However, this resulted in difficulty for participants to share about their values regarding their neighbourhood and the smart doorbell, as they often had never thought about the topic before. Perhaps, they would have shared different insights or expressed other values if they were sensitised about the topic beforehand.
Reflecting on previous SDB experiences was difficult on the spot without any concrete situations. Participants were however able to imagine themselves in a certain scenario, the 'what if' questions proved valuable.

3.5 Conclusion & take-aways

Many insights and overarching themes were extracted from the explorative interviews.

- There is little knowledge and critical awareness about smart doorbells, although the latter increases quickly when engaging with the topic.
- PUs value autonomy. Their decision to get a SDB affords them the benefits of informed-decision making, specifically regarding safety and convenience.
- People value maintaining relationships with their neighbours, although they have little contact. Barriers prevent conversation about SDBS, yet it is clear that they could harm social dynamics in the neighbourhood. Does the SDB afford PUs to watch out for their neighbours, or watch over them?
- PUs want to be in control over their surroundings, NPUs experience a lack of control regarding their data captured. Uncertainty of what companies use data for leads to distrust. NPUs freedom is harmed, there is no option to not participate with SDBs in the neighbourhood.

The insights resulting from this interview study form a good starting point in exploring experiences with smart doorbells in the neighbourhood.
They clearly show that there are conflicting values or tensions in the neighbourhood around SDBs.
The social dynamics theme leaves open many questions, indicating it could be interesting to research this topic in depth. The insights cards marked with a star were taken as starting point for the next cycles.
Finally, the responsibility tension remains. It will be parked for now and reflected upon in chapter X.

When discussing the SDB with others, everyone asked 'why don't people just discuss it with their neighbours?'. This question came by on many social media threads, but apparently, enough barriers exist to keep neighbours from talking to each other about smart doorbells. What other barriers are there, and what could drive neighbours to discuss smart doorbells?

CHAPTER 4.

Scoping the context

This is the final chapter in cycle 1 and aims to scope the context of the project.
From all research activities up to now, it became apparent that experiences and use of the smart doorbell highly depend on their context. It's not possible nor desirable to generalise and define this into one, static context.
Many factors that make up the context around smart doorbells in the neighbourhood were identified.
They were summarized in a visual overview, shown in Figure 4.1. Recognising there might be many more factors that influence SDB interactions in the neighbourhood, it is a good starting point to understanding the context area.

Chapter 3 identified thought-provoking themes, especially the tensions concerning social dynamics prompted numerous questions for the researcher.

The project will therefore focus on social dynamics in neighbourhoods with smart doorbells.
In particular neighbourhoods where front doors of houses face the road or other public space, as well as the presence of other neighbouring houses, will be considered.

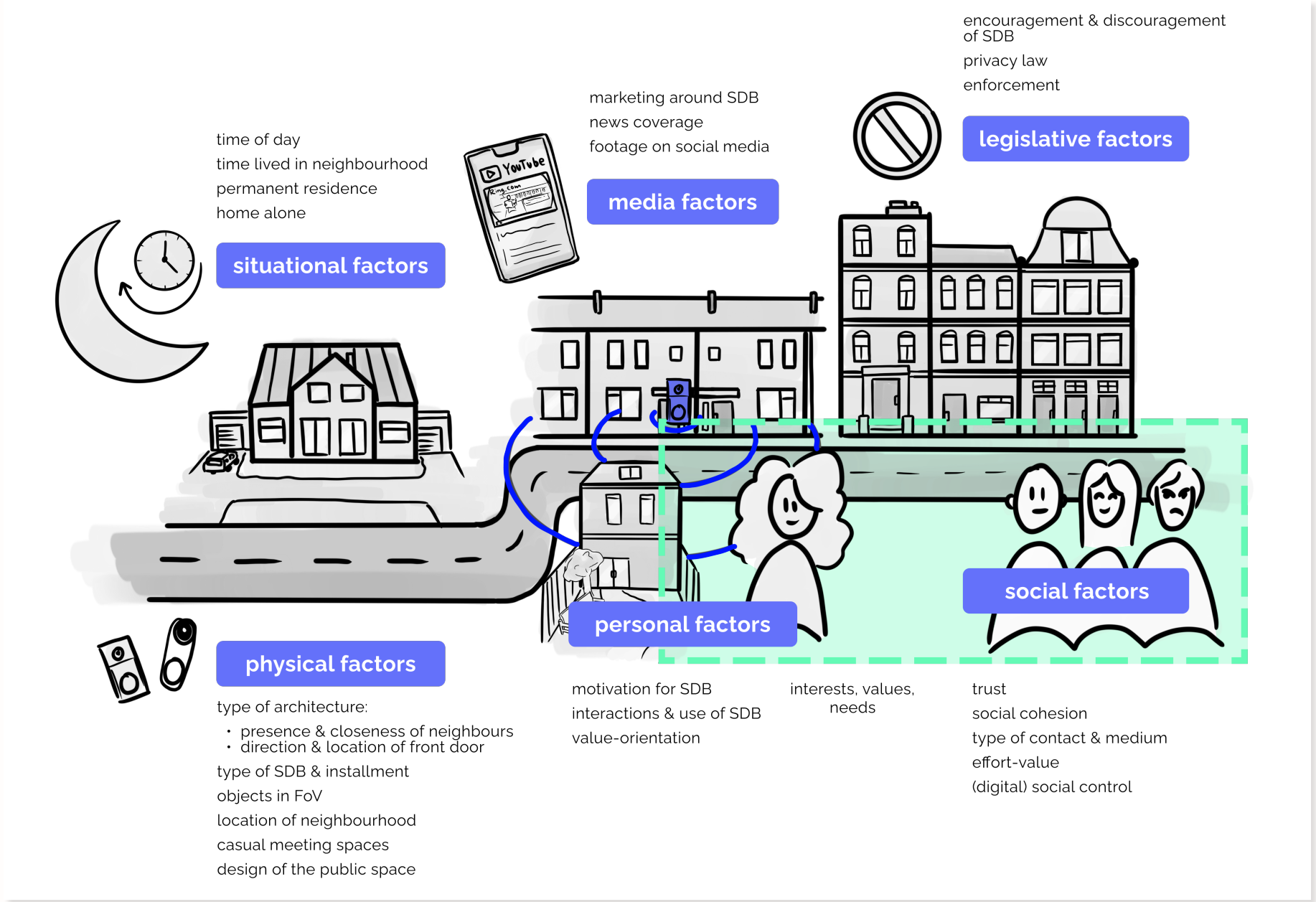


Figure 4.1. Context factor map

CYCLE 2

deep-dive into neighbourhood dynamics

chapter 5. a smart doorbell at my front door

chapter 6. communication around SDBs in the neighbourhood

This cycle presents a deep dive into neighbourhood dynamics around the smart doorbell. The overarching theme of 'social dynamics' presented some tensions concerning dialogue around SDBs.
Through auto-ethnography and scenario-based roleplaying, these tensions are explored further.

The following research questions were kept in mind to guide this small deep-dive:

1. **How are (value) tensions in the neighbourhood around smart doorbells dealt with?**
    - What is the line between watching out for and watching over?

2. **What might dialogue between neighbours around smart doorbells look like?**
    - What are barriers or drivers to discuss the SDB with neighbours?
    - How do people respond to more concrete, situated contexts?
    - What do people say, do, think?

CHAPTER 5.

A smart doorbell at my front door

Reflecting on the smart doorbell in my personal context has played an important role throughout this project, but especially in cycle 2. It served as a good starting point to dive deeper into neighbourhood interactions.

RSL provided a SDB (a Google Nest) to use and try for myself, see Figure 5.1. The aim of this activity was that it would provide a better understanding of how the product works, but also what it would be like to be a primary user. Appendix D explains this experiment in detail, below are some of the key reflections.

- I felt reluctant to install the doorbell myself, as I immediately saw that the direct field of view around my house would cover at least 7 households
- I did not want to talk to my neighbours and kept delaying the experiment. I realised I felt barriers to discuss the smart doorbell with them, even though (or maybe especially since) I have no relationship with them.
- The idea of installing this doorbell felt too uncomfortable as I am aware of potential risks due to this graduation project. After a few weeks, I decided to scratch the experiment.

Although I did not install the doorbell or talk to my neighbours, these reflection exercises provided me with valuable insights. The barriers for dialogue can be very high, even when there is no relationship with the neighbours. The reflections also provided valuable inspiration for the sensitising materials used in the next research activity, the scenario-based roleplaying.

Figure 5.1. The Google Nest doorbell that never made it to my front door

CHAPTER 6.

Communication around SDBs in the neighbourhood

Interviewing primary and non-primary users provided many insights, but were from the perspective of one person talking about their experiences.

To find out more about social dynamics and dialogue, smart doorbell experiences need to be discussed with multiple people at the same time.
Additionally, the interviews demonstrated participants were able to imagine themselves as primary or non-primary user.

Based on these considerations and the research questions, the decision was made to apply the method of scenario-based roleplaying.

6.1 Method

Scenario-based roleplaying is a method that lets multiple people in different roles to play out and reflect on specific, situated scenarios around the smart doorbell in the neighbourhood.

Chapter 1.2 has shown the many actors involved with the SDB, roleplaying can aid in understanding their dynamics better.
Rattay et al. (2023) phrased strikingly: "Adopting an entangled and relational way to understanding sensor networks prompts us to consider the situatedness of multiple actors (including the human and non-human), how desirable actions and interactions can take place, and how value tensions can emerge from the interdependencies between multiple actors.".
They created a method for scenario-based roleplaying workshops that consider multiple actors, interdependence, situatedness and performativity. Pschetz et al. (2019) describe a method for combining speculative design, drama and deliberation.

Inspiration for the general approach of the roleplaying, structure of the workshop sessions and designed materials was taken from both papers for this graduation project.

A set of smart doorbell scenarios was created taking inspiration from personal experiences, casual conversations with others (examples provided were used with their consent) and examples seen online throughout the project on websites like YouTube, Dumpert and Reddit.

The scenarios cover the four types of 'extended sensory-perceptual monitoring' in smart home cameras as described by Tan et al. (2022), to ensure broadness and diversity. These include 'anticipatory monitoring', 'focal monitoring', 'retrospective review' and 'undirected monitoring'.
Additionally, scenarios focussed on finding drivers and barriers to dialogue.
The scenarios were formulated with a variety of context factors (see chapter 4) in mind that can affect SDB dynamics, like time lived in a neighbourhood, the medium of contact or the way NPUs become aware of the SDB.

Participants (N=8, divided over three sessions) were recruited through the extended personal network of the researcher, aiming for a diverse set of participants, including different ages, genders and backgrounds.
Participants were explicitly instructed to share and act scenarios out freely, aimed to limit potential bias caused by them knowing the researcher.
See Table 6.1. for the list of participants.

Table 6.1. Scenario-based roleplaying participants.

	Gender	Age	Living area	Type of house	
P1	F	25	Urban residential area	Renter, apartment in townhouse on 1st floor	pilot, design student
P2	F	24	Urban residential area	Renter, apartment in apartment building on 3rd floor	pilot, design student
P3	F	24	Residential area	Renter, apartment in apart-ment building on 5th floor	pilot, design student
P4	M	60	Rural residential area	Homeowner, neighbours nextdoor and across	
P5	F	58	Rural residential area	Homeowner, neighbours nextdoor and across	
P6	F	23	Centre of small city	Renter, apartment on 1st floor above a store	
P7	F	29	Urban residential area	Homeowner, townhouse. Neighbours close next door and across the street	
P8	M	27	Urban residen-tial area	Renter, townhouse. Neighbours close next door and across the street	

A pilot was conducted with 3 design students. The pilot data was used in the analysis as this session went well and little to no changes to the setup were made after that.

The interview study (chapter 3) showed how difficult it was for participants to talk about their experiences without having thought about SDBs before. All participants therefore performed a sensitising assignment before the session (see Figure 6.1). This allowed them to already get familiar with the smart doorbell and reflect on their experiences in the neighbourhood, which is helpful in gaining understanding about tacit or latent knowledge (Sanders & Stappers, 2012, Chapter 3; Sleeswijk Visser, 2012, pp. 76, 77).

Each session lasted 2 hours and started with an introduction, followed by a bodily warm-up exercise to make all participants feel at ease and energised.
After that a set of scenarios was played out, changing roles every few scenarios. Each scenario card was read out by the researcher and participants were asked to respond and play it out based on their respective roles. A mock-up smart doorbell was attached to a door close by to immerse them more in the context and encourage enactment.
After each scenario, some 'provocative' questions were asked to stimulate deeper reflection and dialogue. Luria et al. (2020) formulated thought-provoking topics and questions regarding socially relevant agent behaviours and roles, which were taken as inspiration. Approximately 8 scenarios were played out per session. The sessions ended with a collective reflection.

Figure 6.2 shows three scenarios, see Figure 6.3 for some of the additional materials. In Appendix E, the full set up and all materials used for the scenario-based roleplaying can be seen.

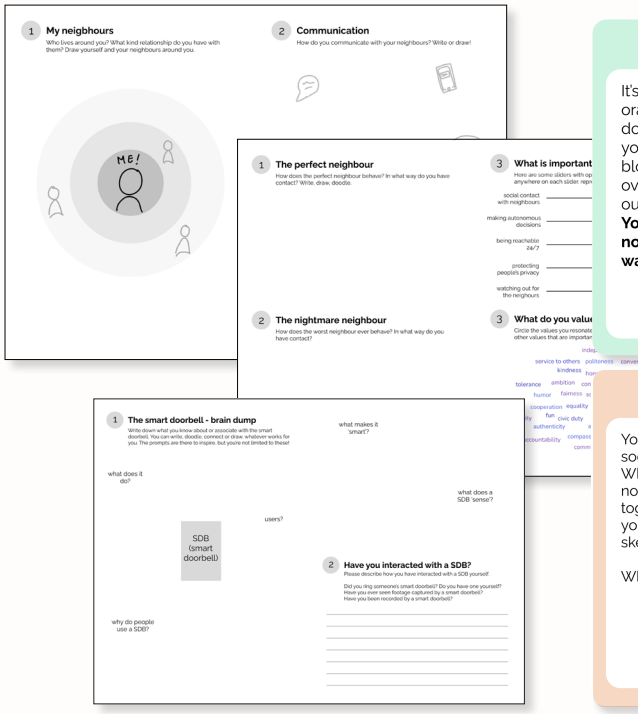


Figure 6.1. Sensitising booklet pages

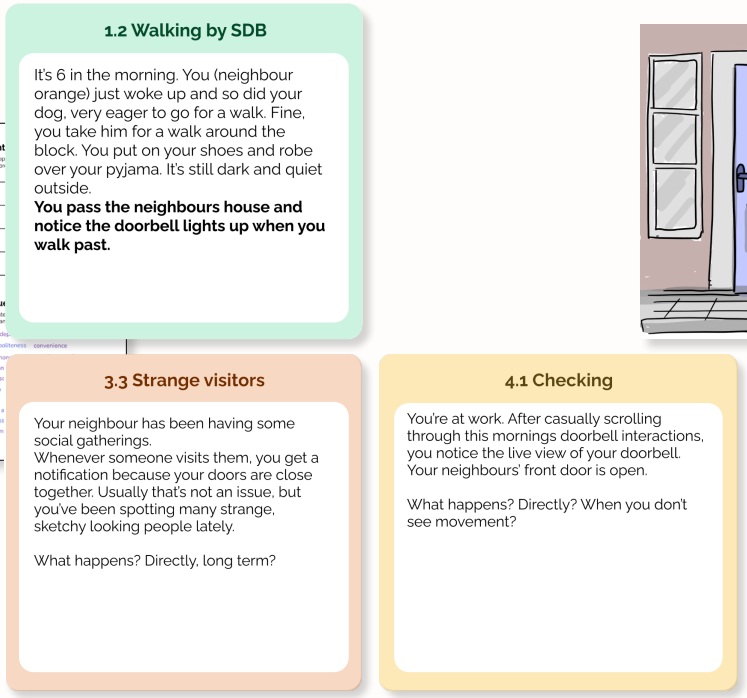


Figure 6.2. Scenario cards

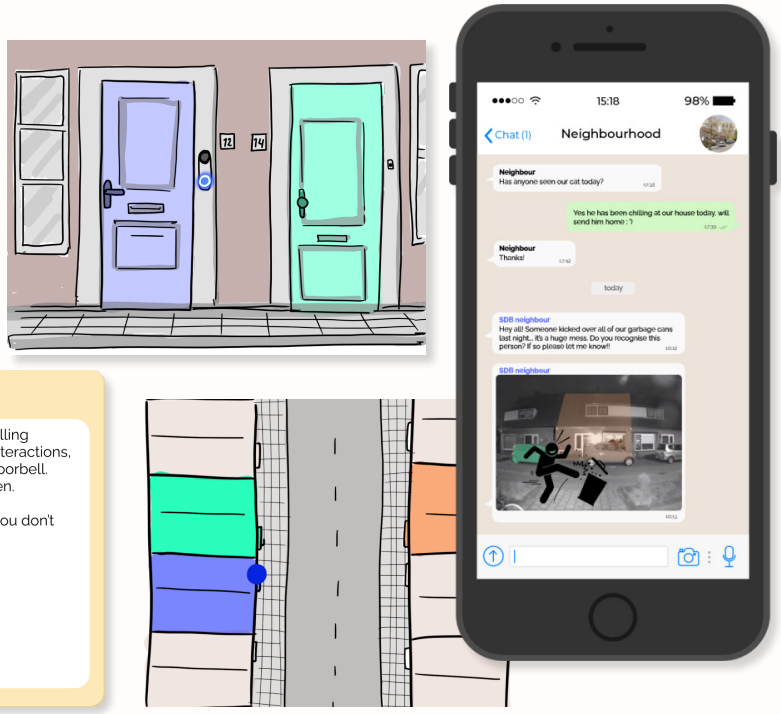


Figure 6.3. Additional materials: neighbourhood map, front door image, neighbourhood groupchat phone notification

Notes were taken during the sessions and audio was recorded. Figure 6.4 gives an impression of the sessions.
The transcripts were roughly coded and statement cards were used to analyse the data, a similar process to the analysis in Chapter 3. Figure 6.5 shows a screenshot of the Miroboard.
The analysis was less explorative than in the interview study and was guided to answer the main research questions of this cycle.

^ *Figure 6.4. Impression of roleplaying sessions*

Figure 6.5. Small area of Miroboard

6.2 Insights

In Cycle 1, a variety of tensions were described in the form of insight cards. The roleplaying enriched the previous insights as it helped to understand some of the tensions better, and brought many other dynamics and factors to light. A few bigger, general insights are first presented. After that, specific insights about dialogue and tensions are explained.

6.2.1 General insights

The following sections present some general insights resulting from the roleplaying.

6.2.1.1 Watching out for / watching over

The tension of 'watching out for / watching over' was already identified in cycle 1.
During the roleplaying, participants reflected on this tension in many of the scenarios. The general consensus seemed to be that the difference between the two depends on the intention of watching, but it remains a delicate balance. 'Watching out for' the neighbour is related to coincidentally seeing something and acting on that. 'Watching over' the neighbour is actively trying to see things.

From a PU perspective, participants stated the SDB can provide more information than is good or desirable; "I don't want to know what my neighbours are fighting about" (P4).
It creates an opportunity to watch over others easily, P5 stated "You can be a lurker. People who really like to watch the neighbours can see everything".
It became apparent (especially from scenario 3.4 where a package was open) that smart doorbell footage can easily be interpreted wrong or show skewed information. This led to arguments between the neighbours. The PU blamed the NPU of opening the package without having seen that specifically on the footage, resulting in the NPU feeling accused and "incredibly spied on" (P5).

Participants agreed it would be 'watching out for' when it allows them to help someone, for example in the scenario where the neighbour left their front door open. P3 mentioned: "it's also nice that someone check on you in a way, like some sort of social control". Another participant mentioned that the SDB could be useful to keep an eye out for elderly or needy neighbours that require a bit more care; "You can also explain it positively: she is watching out for the entire neighbourhood" (P4).
However, if SDB owners would tell their neighbours often about things they saw (even with the best intentions) or 'start making comments about the people they have over" (P2), a boundary is crossed.

For some participants the balance for 'watching out for / watching over' completely changed when one particular value was more important than others, in both cases related to the value of safety. According to P1 (PU) and with P2 and P3 agreeing, it was okay to send the neighbour a message about something you saw on the SDB "when it's really clearly a safety thing". P4 was primary user in scenario 3.3 and stated he would record the neighbour's strange activities and report this to the police. Throughout the entire workshop, he did not agree with the smart doorbell, but would actively watch and listen to his neighbour in this scenario. When asked about this, he stated "this is about my safety, those guys live right next to me", indicating that his own safety is most important in this scenario.

6.2.1.2 Discomfort by SDB capturing interactions

The roleplaying showed that a lot of discomfort can arise due to the smart doorbell. Some of the scenarios caused quite some awkwardness, shame or insecurity.
NPU's were worried that the doorbell might catch their weird or awkward behaviour and felt insecure. The participants reported to usually not care that neighbours might see them tripping on the street or walking in their bathrobe, but that it's different when it's recorded. They worry when something like this happened, and they afterwards realise a smart doorbell might have seen it. Although acting on this (approaching the PU to check) would only draw further attention to it: "Did people hear me? It was a private conversation. I'd just worry about that, but wouldn't act on it. If I ask, that would be a reason for people to watch it. Then I'd be embarrassed" (P1).
The insecurity about whether the PU saw something remains, "it would be awkward. When you see each other again and think 'maybe she knows about it, maybe she doesn't'." (P6).

6.2.1.3 Heightened self-awareness

Being aware that there is a SDB can lead to heightened self-awareness and discomfort.
P3 (NPU) mentioned she would be much more aware of the people coming to visit and what their appearance towards the neighbours is; "What do they see from me? How do I present myself? Because now I know she actively looks at the footage. There's a difference between someone having a SDB and someone actively looking at the footage".

6.2.1.4 Access to each others' data

Participants reflected on having knowledge about and access to PUs SDB footage. Some mentioned they would like to see the SDB field of view once to see how it was set up. Others were more sceptical, because what if the PUs change the settings after showing it? P4 stated: "Okay, let's say they share the settings, but what if they change it after? That's the benefit of maintaining access. You have more control. Control over what they could record".
When there is no (standard) access to footage, neighbours need to trust each other. P7 brought up a real-life situation where they (P7 and P8) approached their neighbour together: "someone [the PU] could say, okay, I'll blur it, no worries. But do you ask to see that then, for proof? … If you can't even trust the neighbour to not film you in your house, you have to move". They weren't sure whether their neighbour spoke the truth but chose to trust them, as they also didn't want to disturb the balance in the neighbourhood.

PUs did not want to share their footage with neighbours, "I wouldn't want to share it, unless it's important for the neighbourhood. It's my camera" (P6).

Additionally, most participants did not think permanent or standard access to the PU's smart doorbell was necessary. Standard access might be useful to check whether the settings remain the same, but seeing footage of themselves often leads to heightened self-awareness for NPUs, and more discomfort. Many even stated they would rather not know what was being recorded by the PU. "Sometimes you just don't want to know. I mean, your phone also collects everything you do. As long as I don't know about it, and I think there's not really anything out of the ordinary, then it's fine" (P6).
Knowing without being able to do something about it again creates discomfort.

6.2.1.5 Perceived effectiveness

Even when there is something that NPUs could do about the SDB, a possible course of action, the perceived effectiveness of that action plays a big role.
When the entire neighbourhood has smart doorbells already, some participants would just accept it, as it would feel impossible to do something about it. P4 mentioned; "do I then have to have a conversation with 4 people? [about their SDBs] They already have one. If I want to have my way, 4 doorbells have to go. That's never going to happen". Others mentioned they would start closing the curtains at night, or install a SDB themselves, even though they don't agree with it.
It appeared that the neighbourhood decides on the social norm together, and when the NPU really doesn't agree, P2 illustrated "I would just not live there".
When there is little perceived effectiveness of dialogue or any other action, NPUs feel powerless, leading them to, unwillingly, accept the presence of the smart doorbells in their neighbourhood.
P4 stated: "I think we should learn to live with not knowing for certain [about what data of us is out there]. The only thing you can do is take a look at how the SDB across from you is set up. But other than that, what can you do?".
NPUs would not ask PUs to remove the smart doorbells, or physically object in any other way. Some laughingly mentioned they could paste stickers or spray paint over it, but then realised they would be captured on camera. The only plausible course of action would be to have a conversation and adjust the settings (field of view, data storage, privacy zones) of the SDB. P8 was the exception, and went as far as offering the PU to pay for part of a different SDB, if the current one would not allow for setting privacy zones.

6.2.1.6 The owner decides

All participants played both PU and NPU roles in different scenarios. They discussed who should take the initiative of dialogue in the collective reflection, leading to many different answers.
Some decided the NPU should start dialogue, as they have a problem with their neighbour's smart doorbell. Others thought the owner should discuss the doorbell proactively with neighbours, but did conclude this was not a realistic scenario, as everyone just installs the smart doorbell. Some mentioned that the seller should have an obligation to ensure responsible use.
Participants also remarked there should be signs or stickers provided indicating that you might be recorded, and were surprised to learn that these stickers come with the doorbell (at least Google Nest) and are obligatory if the PU records public space.
Finally, many of the participants mentioned a role for the government, legislation or other types of central rules. P8 couldn't imagine any "democratic decision making with the neighbourhood", the law decides.
Even though all participants could reflect on who should take initiative or have responsibility, they concluded that the owner ultimately decides what happens, as they are the ones who buy and install the doorbell.

6.2.2 Tensions & dialogue

When tensions around the SDB occurred in the roleplaying, there were a few different approaches to dealing with that.

By far the biggest was **avoidance** in any way, shape or form. NPUs would rather change their behaviour, go around the doorbell, close the curtains, leave through the back door or change their routine.
Some participants had **accepted** that data is collected of them everywhere, "of course I would rather not have it, but you know it's happening. It's more that there is really no other option. So I just live with it" (P6).
Accepting the SDB appeared in two ways. A few participants didn't want to know (because if you don't know, you can't care or worry), and chose to put their head in the sand to live in **ignorant bliss**. The other form is the **unwilling, but informed acceptance**.
For a few participants **one value outweighed all others** in a particular scenario, and they would handle based on that.
Finally, participants reported on and showed how they would approach **dialogue** to deal with the arising tensions. It was thought best to discuss the SDB casually and not make a big thing out of it, and to ask information without expressing judgement. Even though texting the PU would be easier and has a lower threshold, approaching them in person would be better as it's immediately clear what the PU's reaction is. Texts are more difficult to interpret.
Observing the dialogues in the roleplaying showed that approaching the PU in person might elicit more empathy towards the NPU. The NPU was able to explain their perspective and feelings. However, almost all participants mentioned that an in-person dialogue is much more difficult, as they are confrontation avoidant: "I then 'accuse' someone of something, to their face, which I would find very difficult. I'm very afraid that if someone gets defensive or is good at gaslighting, I will clam up and not be able to express myself" (P2).
Through dialogue, neighbours can find ways to solve tensions together.
It may also be that the conversation itself can solve the problem as the NPU sees little is recorded, or privacy settings have been applied. Of course, it's also possible that the neighbours cannot solve the tension, but this did not occur in the roleplaying.

6.2.3 Combining tensions, barriers and drivers

As seen from the previous sections, the tensions and the ways that these are dealt with are greatly intertwined. Recognising that every situation and context is different, there still was a lot of overlap in the general way that tensions were dealt with by and between neighbours.

The following diagram (Figure 6.6, on next page) shows different paths of things that could happen when a smart doorbell is installed in a neighbourhood. It was created by combining all insights from the roleplaying, as well as some previous insights from the interviews.
The boxes in yellow show primary user actions. The boxes in blue show what a neighbour (NPU) might experience and do. The boxes in orange indicate how tensions are dealt with at which part of the 'smart doorbell journey'. Finally, pink and green show the barriers and drivers to dialogue.

The 'discomfort loop' is indicated with a dashed grey box. It shows how an increase of critical awareness, information or even access to the PU's SDB footage can lead to more discomfort when there is no possible course of action, or no perceived effectiveness of action. Increased knowledge and awareness on its own is not enough. The discomfort can affect neighbourhood dynamics, as it might create social tension between neighbours, while the PU might not even be aware of that. To deal with the discomfort, NPUs usually avoid the SDB altogether, ignore the discomfort or accept it. When they have 'suffered long enough', they may decide to approach the PU and start dialogue. There are many other drivers (some more situations or factors) that lower the threshold or encourage the NPU to start dialogue.

The main barriers and drivers are shown in Figure 6.7 with a bit more context and explanation. Some are experienced by only the PUs or NPUs, but there is overlap for most.

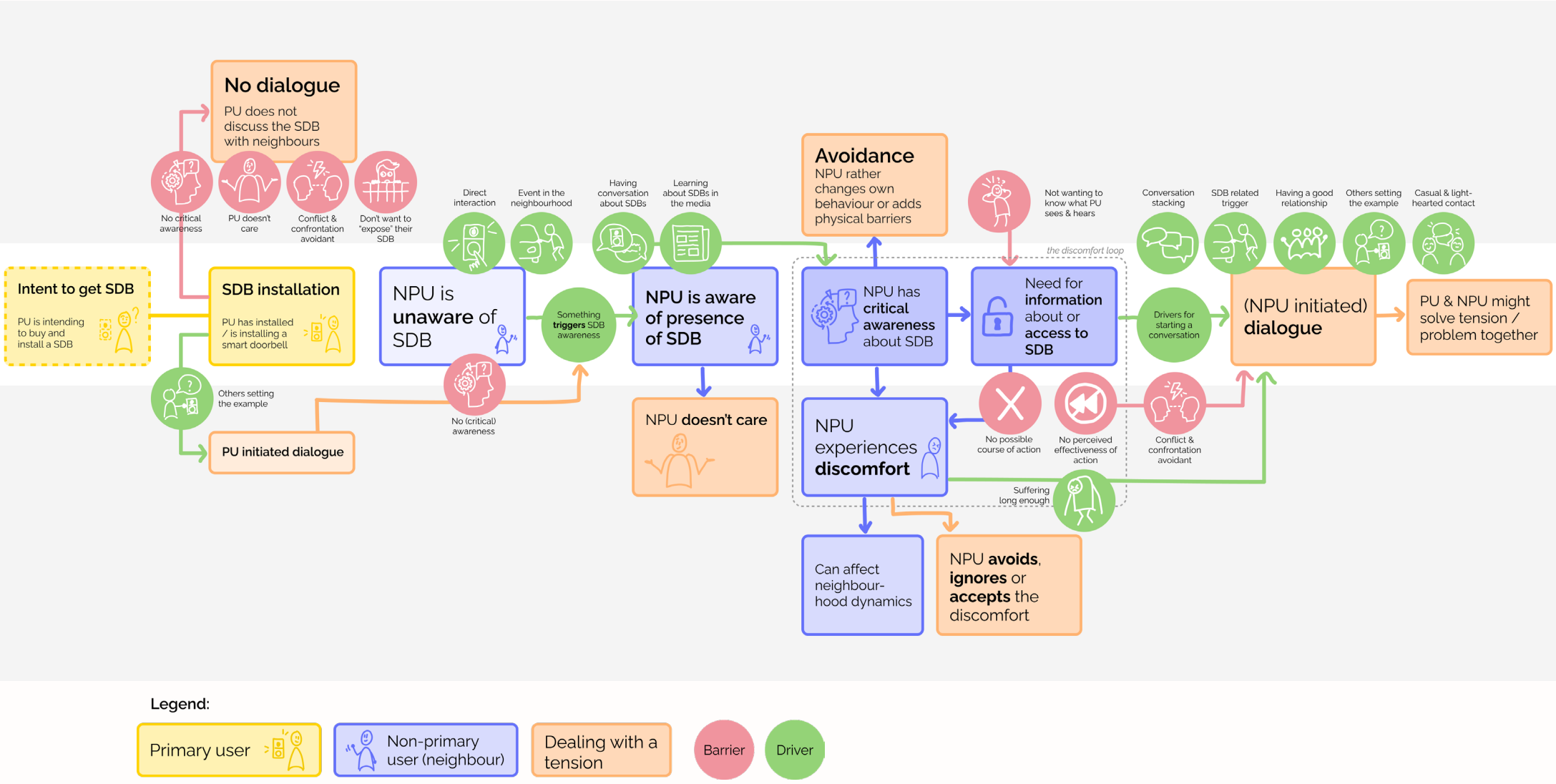


Figure 6.6. Tensions, barriers & drivers diagram

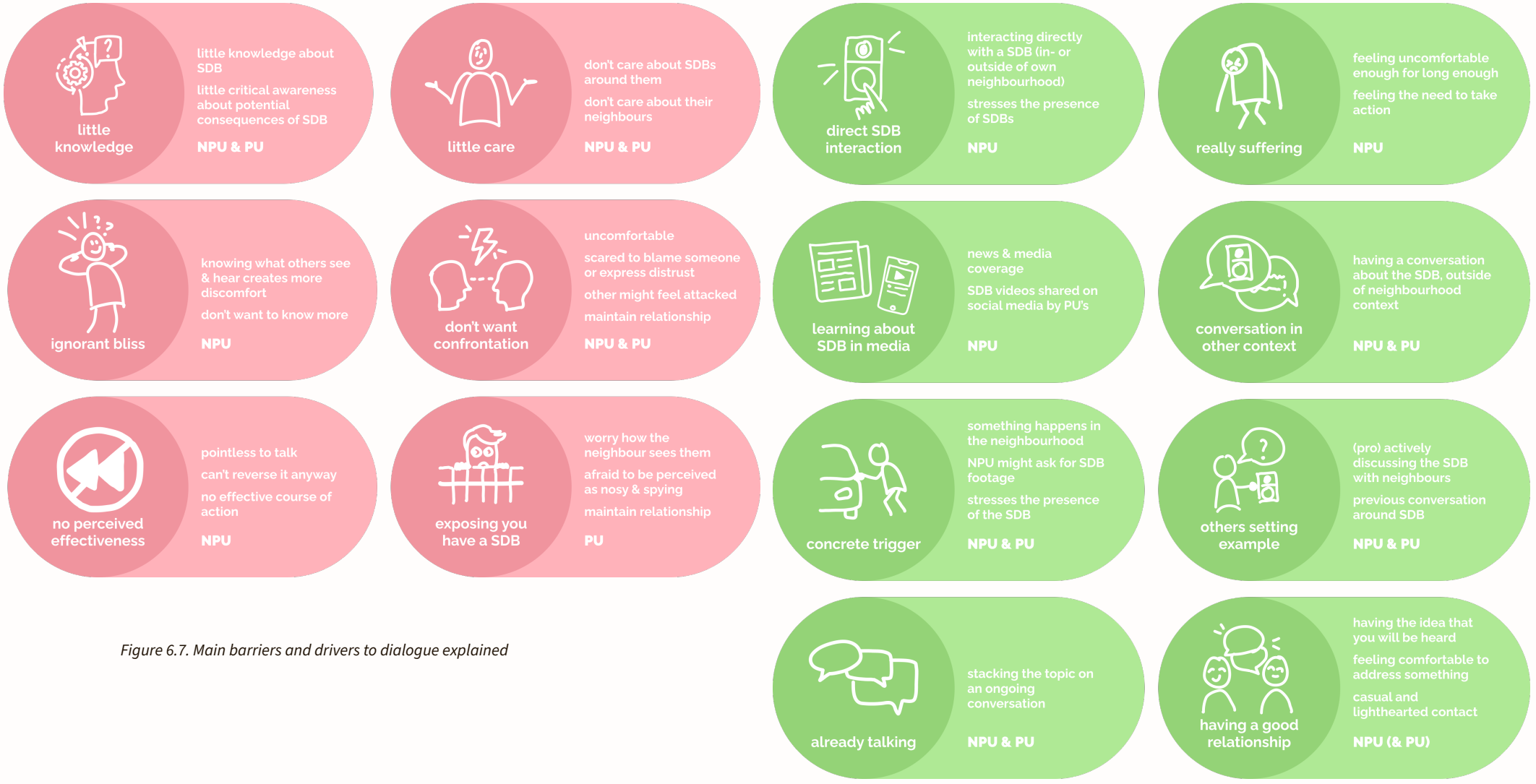


Figure 6.7. Main barriers and drivers to dialogue explained

6.3 Discussion

Chapter 6.2 explained insights from the scenario-based roleplaying in detail. A few of the findings will be discussed further in the following section.

Participants mentioned how the boundary between 'watching out for / watching over' is easily crossed when PUs let NPUs know they have been watching. A similar thing was mentioned in the interview study when the tension was first identified. Watching up to a certain amount is okay, depending on the intention, but sharing what you saw with a neighbour is overstepping. Not just the intention of watching, but what PUs do based on acquired information is of huge importance in this tension.

Another finding that already appeared in the interview study was that being aware of the SDB can lead to heightened self-awareness and discomfort. In chapter 3, participants related this to standing in front of someone's SDB and waiting for them to open. Role-playing showed that the increased self-awareness reaches much further than the PUs front door. Neighbours might become self-aware of how they walk, what they say or what they look like. When this insecurity is triggered, they often think back about previous situations "I would go back in my memory and think about what I did yesterday, or when I had a date over" (P1). The self-awareness doesn't just regard their own behaviour or appearance but extends to the people who visit them.
It might appear from the insights that every participant truly 'suffered' or got stuck in the 'discomfort loop', which is not the case. The level of discomfort experienced is of course different for every person, the same holds for confrontation avoidance. Some people approached their neighbours easily or impulsively, or didn't experience any discomfort as they would just shrug their shoulders. This probably depends on people's character too.

It is clear that the smart doorbell affects social dynamics in the neighbourhood. Chapter 1.3.3 presented potential consequences of SDB use on a societal level, some of which were seen in the roleplaying.

It became apparent that many participants had accepted the presence of smart doorbells around them and were convinced they couldn't do anything about it. They referred to other ways in which data is collected about them by companies and concluded that's just present-day reality.
These insights, combined with very little critical SDB awareness in general (chapter 3.2.2.1) and the massive number of smart doorbells in use, indicate that smart doorbells might be quite normalised in Dutch society already. People expect their data to be used and (unwillingly) accept that. Some don't care about their data being captured or don't even realise it. That would make the SDB a foot-in-the-door device, potentially paving the way for future development and features that facilitat more tensions.

Before the roleplaying, the idea of having access to each others' smart doorbell data had come up as a way to 'solve' some of the tensions. In this way, there would be transparency regarding what the PUs SDB can see and record from the NPU.
The participants reflection on having knowledge about and access to PUs SDB footage was surprising. Some wanted to see the field of view once to feel more in control and mentioned trusting that the PU won't change it is of great importance. Even though a lack of trust could lead to discomfort, most still didn't want standard access. Being able to review footage of themselves often would increase self-awareness and discomfort too, as well as knowing what is recorded without being able to do something.
Based on this, it can be concluded that having a concrete course of action and high perceived effectiveness of that action are important when knowledge and awareness are increased. In other words, informing people and creating awareness alone is not enough.

Who should take the initiative to have dialogue about SDBs in the neighbourhood remains unclear. Participants did see roles for many different actors, indicating multiple possibilities for design interventions.

6.4 Limitations

This research activity provided valuable insights and a greater understanding of social dynamics around the SDB in the neighbourhood. There are however quite some limitations that might have impacted the results.

The selection of participants and small sample size does not give an accurate representation of society. The aim was to have a diverse group of participants for the sessions, including different ages, genders and backgrounds. Due to the limited time available for setting up and some participants having to cancel the sessions, the diversity could have been better.

The participants were recruited through the personal (extended) network of the researcher, careful consideration was given to prevent potential bias in answers because of this. However, the fact that the participants personally knew the researcher, as well as each other, seemed to help them to speak freely and enact the scenarios comfortably. Again, due to time limitations, one workshop consisted of only two participants who were part of the same household. A benefit of this was that they could easily refer to real life situations in their own neighbourhood, but conversations got off topic more quickly. It was easier to stay on topic with a group of three participants, that lived in different households. While the sessions with three participants were easier to manage, they were more difficult to analyse.

Having multiple participants allowed observation of dialogue and interactions. It was possible to see and hear from both neighbours. Due to the collective reflection that happened throughout the session effortlessly, participants might have influenced each other in their answers and behaviour. It would be interesting to conduct future research about this, and whether different combinations of types of participants within a session will lead to different answers and enactments.

A very important thing to note is that this is still roleplaying after all. Even though the participants tried to imagine themselves in a specific situation and context, they might act different in real life. As seen in chapter 4, there are many different factors that are at play around smart doorbell interactions. It's impossible to take all of these into account when enacting scenarios and reflecting. Real life situations might also be different from the presented scenarios.
The interpretation of the data by the researcher obviously also influences the resulting insights, as well as having really concrete research questions to answer rather than performing a complete explorative, thematic analysis.

The insights and data are not generalisable for everyone or all neighbourhoods in the Netherlands and in no way 'complete'. However, when sharing the findings with many different people (supervisors, other students, RSL, consortium), it seemed to resonate with them. People often drew parallels to their own neighbourhoods, indicating that the experienced SDB dynamics described in this chapter might be similar for others.

6.5 Conclusion & take-aways

Scenario-based roleplaying allowed to gain deeper understanding of social dynamics and tensions around smart doorbells.
Some key take-aways are presented below:

- The line between watching out for neighbours or watching over them is thin. It depends on the intention, whether people accidentally or actively watch, and what they do with the information they acquire.
- The SDB capturing interactions can lead to awkwardness, shame, in-security or worry, resulting in discomfort.
- Awareness of the SDB leads to a heightened sense of self-awareness for NPUs.
- Having access to the PUs smart doorbell footage is not desirable. It might help to see how the SDB is set up, but they need to trust that the PU does not change this. Many NPUs would rather not know what is being recorded of them.
- There needs to be a possible course of action to object to the smart doorbell, and perceived effectiveness of said action. Otherwise, the NPUs feel powerless and unwillingly accept the presence of the SDB. Plausible courses of action are limited to dialogue and changing settings.
- Tensions are dealt with through the following mechanisms: avoidance, acceptance (ignorant bliss and unwilling, informed acceptance), one value that outweighs all others and dialogue. Through engaging in dialogue, solutions might be found to the problem.
- There are many barriers that prevent dialogue between neighbours, but also many drivers that encourage or lower the threshold.


SONY

CYCLE 3

re-imagining
the smart doorbell

chapter 7. design directions
chapter 8. from ideas to prototypes
chapter 9. the ___ doorbell

The previous two cycles aimed to explore and create a rich understanding of ‘the origin’ . Cycle 3 focusses on ‘the speculation’, through imagining an alternative present.

In chapter 7, previous insights are combined into a design direction for the short-term intervention. Chapter 8 presents ideation and prototyping and is partly written in first person perspective, indicated by the blue frame around the pages.
The final concept is shown and explained in chapter 9.

CHAPTER 7.

Design directions

Based on the insights from Cycle 1 and Cycle 2, multiple design directions for short-term interventions to improve social dynamics in neighbourhoods with smart doorbells were explored.
The 'actual interventions' could be seen as possible goals of the intervention, while 'reimagining the smart doorbell' relates more to the mechanism through which a chosen goal might be achieved. The chosen direction was translated into a more concrete design goal, and combines elements from both categories. Figure 7.1 shows the design directions, as well as the design goal.
The elements of the design goal were selected based on multiple considerations.

It became clear early on in the project that **dialogue** between neighbours can be a powerful intervention, critical awareness increased rapidly during the interviews in Cycle 1. It was an important reason for diving deeper into dialogue and communication in Cycle 2 which showed that 'just talking to your neighbours' isn't as simple as it might seem. Responsible Sensing Lab was also interested to explore dialogue further.

The decision to '**reimagine**' the smart doorbell was mainly inspired by curiosity. As such, elements from speculative design were included.

I was personally intrigued by the question what it would be like if the smart doorbell would be a more active actor in the neighbourhood, rather than the 'silent', sometimes hidden observer it is currently.
What other roles can the smart doorbell take on?

The final part of the design goal, the 'light-heartedness', was inspired by previous findings in Cycle 1, as well as a personal vision and reflection.
In the interviews, PUs reported to experience light-hearted interactions around the smart doorbell (chapter 3.2.1), often related to reviewing footage. What if NPUs could also experience some kind of light-heartedness around the smart doorbell?
Furthermore, insights from the roleplaying showed that a casual and light approach to dialogue might work better than a serious conversation.

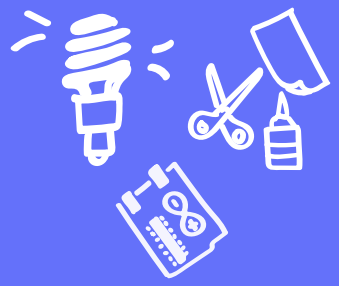
The conversations around the smart doorbell in the media and literature felt very heavy and serious to me. I wondered whether a lighter approach could shake the debate up and lead to new perspectives.
A final consideration for light-heartedness was to the design goal moving towards speculative design. Many speculative projects I had seen before seemed to rely on a very 'dystopian' context, which is also a commonly mentioned criticism of speculative design (Mitrović et al., 2021) .
I am convinced these scenarios can serve a function – i.e. to make people aware about a pressing issue – but then what? I didn't want to create critical awareness in a negative way, afraid that would lead to a pessimistic mindset and continuation of the discomfort loop. That mindset might become a barrier to dialogue, again leading people to avoid addressing SDBs in their neighbourhood.

Some other 'requirements' for the design goal included the space for making interactive prototypes and exploring possible municipality involvement. The latter was partly based on findings from the roleplaying, in which participants could see roles for many different actors in improving SDB dynamics, including municipalities.

Finally, the design goal should lead to **an intervention that does not wait for tensions to arise** in neighbourhoods and can also be applied before social dynamics have been affected. The intervention should address the smart doorbell in any case, whether tensions are already present or not.

Figure 7.1. Possible design directions and combined design goal

CHAPTER 8.



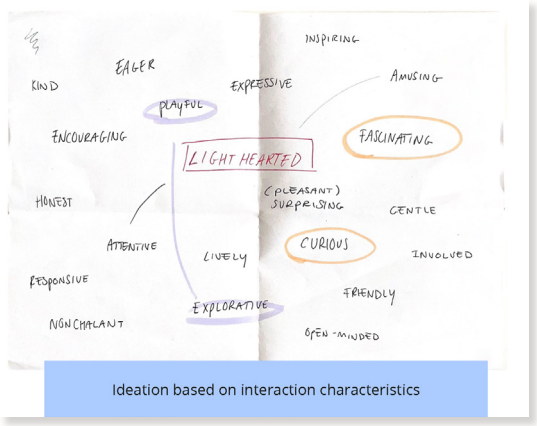
From ideas to prototypes

The ideation process started with very rough ideas that were iterated upon a lot.
The plan initially was to organise ideation sessions with other design students, but the supervisors challenged me to see how far my own imagination could get me.
Quite far as it turned out, the co-creation sessions were not necessary anymore. Input from others has been included through feedback on the ideas and prototypes.

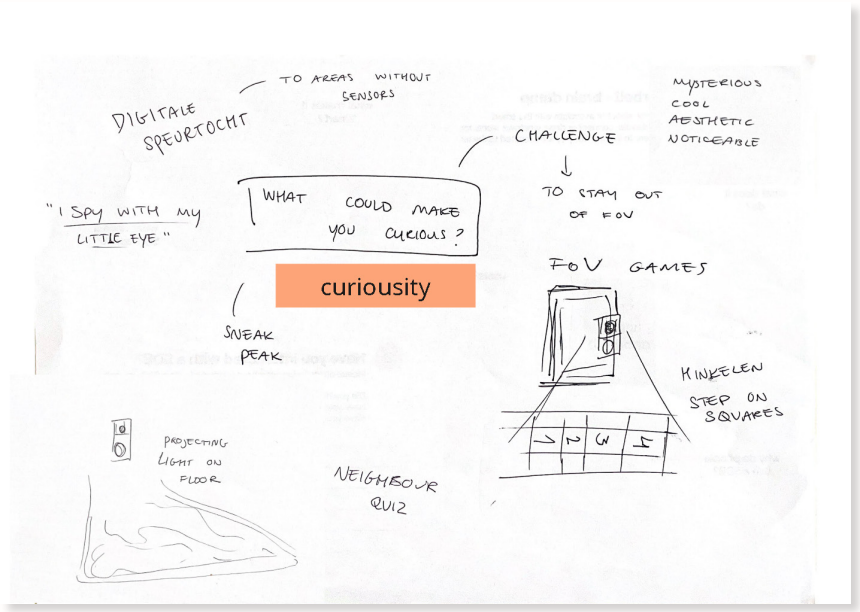
8.1 Ideation

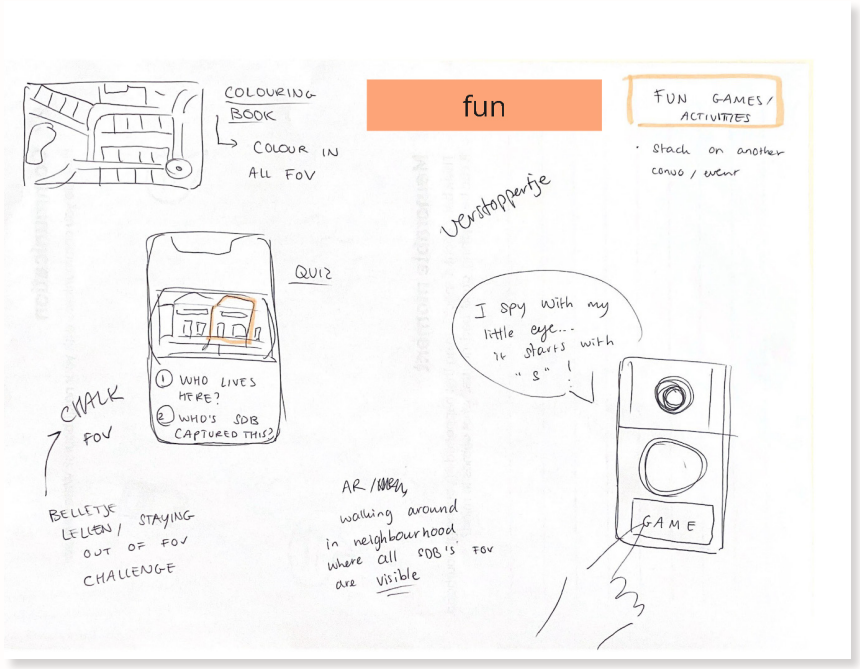
A few different approaches to ideation were applied, first in some particular order but later all mixed together. Ideas were sketched out on paper and placed all around the table to have overview. The design goal and main findings from cycle 2 were pasted on the wall.
Some sketches and illustrations are shown throughout this section.

First, many different interaction qualities around 'light-hearted' were explored. What should a light-hearted interaction mean in this context? Should it entice curiosity, empathy, be playful, explorative? These interaction qualities were starting points for many ideas.
Different metaphors and analogies were explored to reflect on characteristics that the interaction could have.

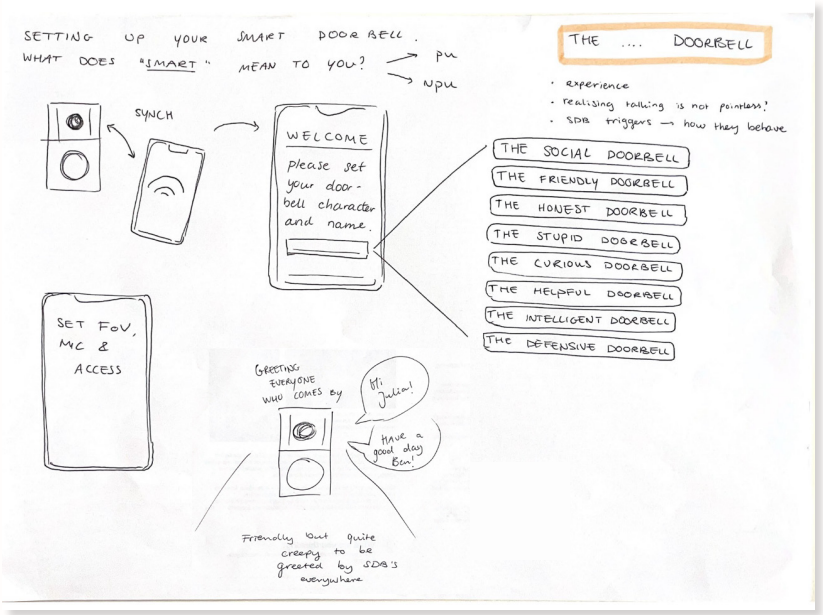


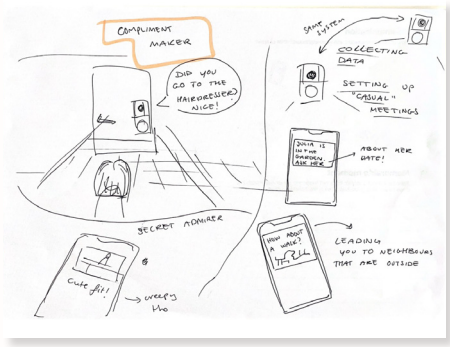
Ideation based on interaction characteristics

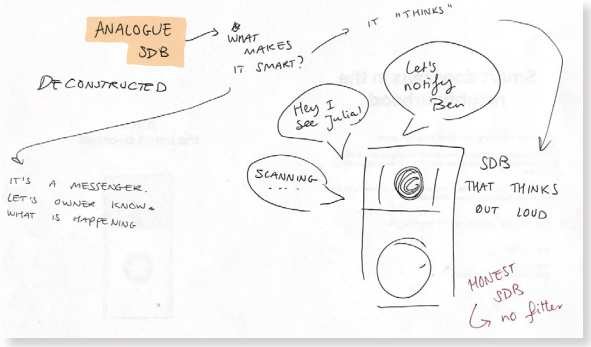




Many ideas built on ‘reimagining’ the character or behaviour of the smart doorbell.
A reflection about the adjective ‘smart’ proved to be very helpful. Why do we call it a ‘smart’ doorbell? What does smart even mean? It factually means that the doorbell is connected to a network, sends notifications to your phone when it detects movement or someone pressed the button, and applies AI analytics to recognise who or what is at the door.
By using the word smart, I feel like we are giving the doorbell some sort of ‘authority’. The doorbell is smart, so whatever it notifies us of must be true. I would like to question the use of this adjective.
What if the doorbell would instead be friendly, social, curious or transparent? How would it behave, what would it look like, what settings would be applied?

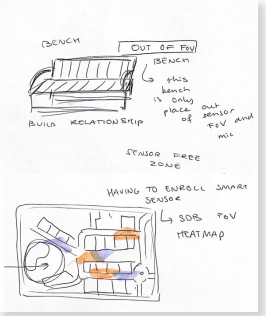


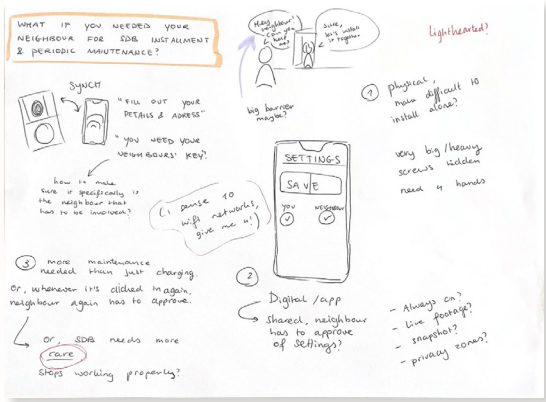


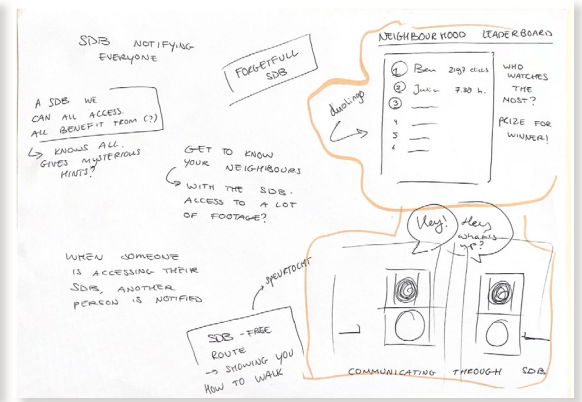


With some ideas I aimed to let the doorbell disrupt common interactions through doing something unexpected, like complimenting all passersby, which lets them indirectly know that they are in their neighbour’s ‘familiar faces’ database.

Furthermore, I wanted the interactions to not only occur when standing in front of someone’s door, or ringing their doorbell. Indirect interactions with the SDB might capture neighbours, often unaware they are in the FoV. The interactions should represent this and occur at other places too.
I played with the ideas of having shared systems where the PU needs the neighbours for a functioning SDB, receiving 2-way notifications (PU and NPU both receive notification when NPU is detected), open-access neighbourhood SDB statistics or dedicated smart doorbell free zones.



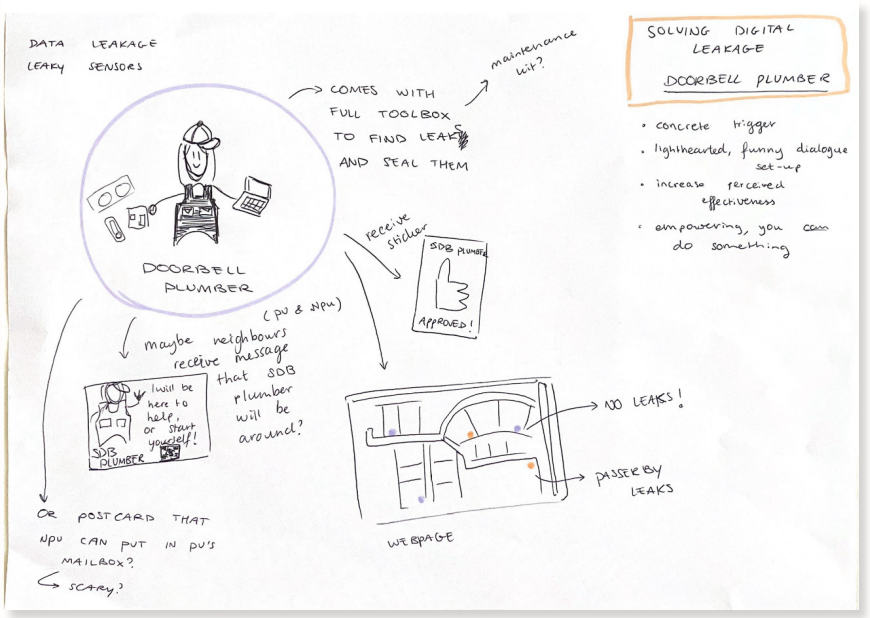




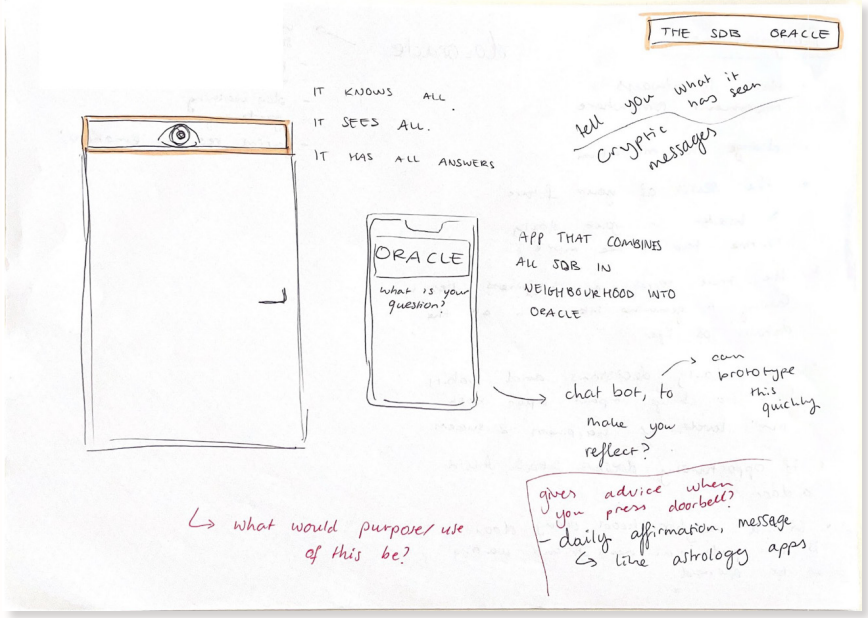
If the SDB needs to be a more active participant in the neighbour, what does that mean? What does an active neighbour do? And what might caring for a smart doorbell together look like? Through questions like these, I tried to think about the smart doorbell as a thing that can encourage social contact between the neighbours.

A final category of ideas is labelled ‘random things’ in my sketches.

The doorbell plumber is a more unusual, but probably disruptive idea. It builds on the concept of ‘leaky sensors’ as explained in chapter 1.3.1. Leaks are usually repaired or patched by a plumber, so why not introduce a doorbell plumber? This playful and light-hearted interaction would make people aware of leaky doorbells around them, while also offering a toolbox of solutions. This could include helping people to set up privacy zones or installing physical barriers.



A final idea worth mentioning is about the smart doorbell being an oracle. The doorbell can see and hear everything in the neighbourhood, especially when it would be connected to other smart doorbells.
Who would have access to the oracle’s wisdom? Would it answer all of your questions about the neighbours?



8.2 Concepts, prototyping & testing

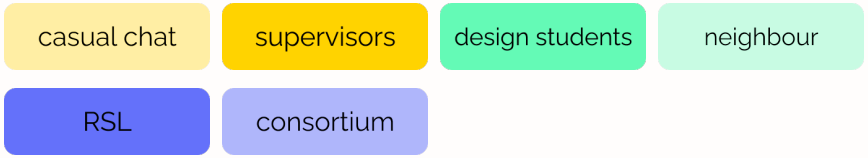
After ideating for a while, I felt 'stuck' on paper. As many ideas built on each other and starting to come alive in my mind, the decision was made to start prototyping these. The meaning or goal behind these concepts and specific resulting interactions became clear through the prototyping activity itself. The prototypes were iteratively developed and evaluated, inspired by the research through design approach.

Four concepts and prototypes are presented in the following sections. A fifth concept was experimented with extensively, but the prototype, concept and intended goal didn't connect well together. The decision was made to instead focus on developing and testing the four other prototypes. The left out fifth concept is shown briefly in Appendix F.

Prototypes were evaluated or tested with all kinds of people throughout the process. Many of these 'tests' were quite casual and consisted of a short conversation, letting them interact with something, and asking them some questions.
The prototypes were also shown to and discussed a lot with the three supervisors. They helped to ask critical questions, reflect on the goal of each of these prototypes and think towards potential applications of the designs.

The concepts were also presented and evaluated in a more structured way with other actors.
One neighbour tested a concept in her own neighbourhood. A group of design students reflected on three of the prototypes (that were finished at the time) as designers, but also from a neighbour perspective. An in-depth presentation was given to the team at RSL, sharing the project and prototypes thus far. For this session, some notetaking materials with guiding reflection questions were designed. A short presentation was given during the soft launch of the consortium.
Finally, a semi-structured interview was conducted with an employee from a digital innovation team at a big municipality in the Netherlands. The concepts were shown and discussed, but the conversation focussed more on the potential role and application of speculative design within municipalities. Some insights from this municipality interview will be discussed in Chapter 11.

In all evaluations, the prototypes were presented as interactive as possible to their respective levels of fidelity at the time.
The insights from these evaluations and discussion of that will be shown throughout the next sections. The following blocks indicate which test or evaluaton contributed the insight:



8.2.1 The ... doorbell

The concept 'the … doorbell' is a settings flow that lets the PU set the character of the smart doorbelll, see Figure 8.1. This concept questions the 'smartness' of the doorbell, already explained in chapter 8.1. What does 'smart' mean, but more importantly, what other character could a doorbell have?

The primary user sets up the doorbell by adding it to the 'connected home' app. It starts with a simple and familiar onboarding process. The app then asks to name the doorbell and set its character. Depending on the character chosen, the doorbell introduces itself and presents the settings it applied already. Only the social and honest doorbell were prototyped for now, but many different characters can easily be added.
I see this settings flow as part of a 'prototype family'. The concept can encompass much more, including physical representations of the social or honest doorbell. The social doorbell greets all of the neighbours, while the honest doorbell thinks out loud and lets everyone audibly know what is being recorded.
This concept could achieve reflection and dialogue through letting the PU experience different kinds of characters. It's a big contrast from the normal smart doorbell where PUs simply connect the doorbell, hang it and don't have to go through extensive settings.
Being forced to experience this expanded onboarding process, the PU is encouraged to think about the role that these speculative doorbells could have in the neighbourhood. Dialogue is more related to the physical representations of this concept. What happens when you are greeted by a social doorbell? Could this be a driver to start casual dialogue with the neighbour?

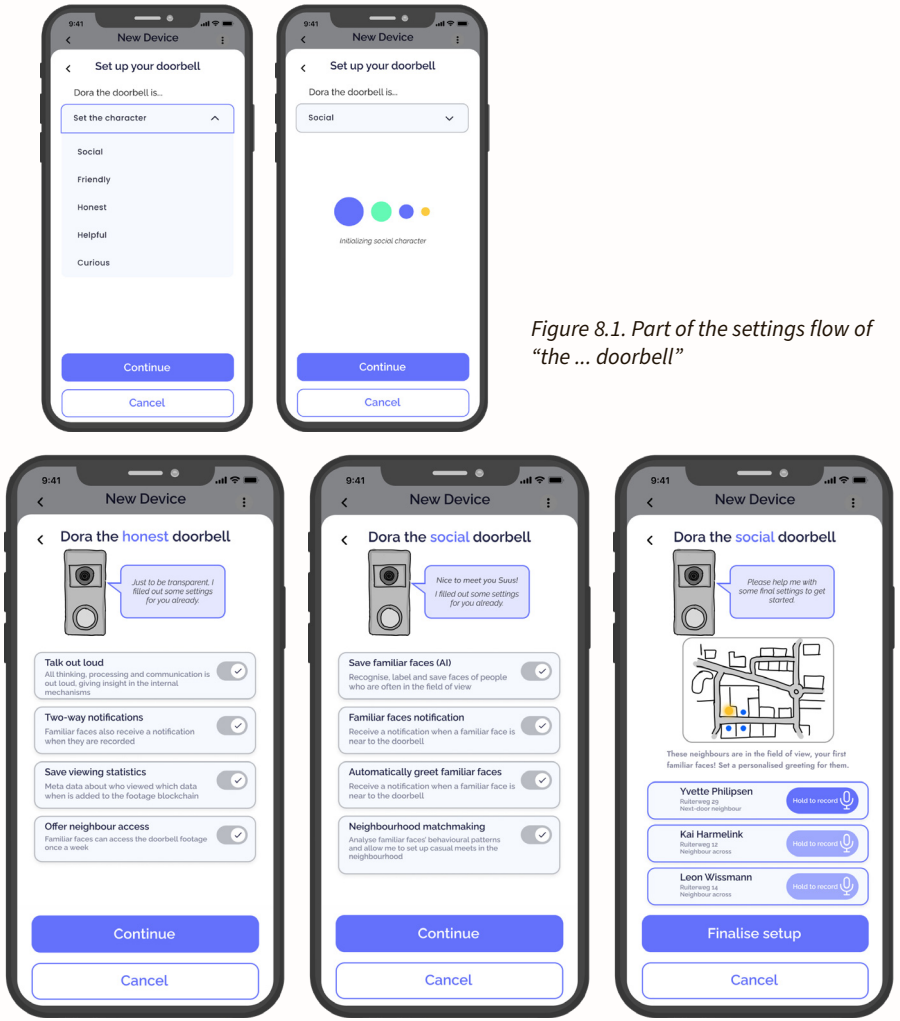


Figure 8.1. Part of the settings flow of "the ... doorbell"

design students

According to the design students, this prototype could increase awareness about the potential harms of a smart doorbell.
A doorbell that greets them would be a good trigger to talk about it. It made them think of 'holle bolle Gijs' in the Efteling, the garbage bin that speaks when someone throws something in. Something 'a bit weird' like a talking doorbell might encourage conversation. They agreed that the physical representation of the doorbell should match their characters.

supervisors

This could remain a digital prototype, and be implemented on a website where information is given about proper smart doorbell use, like Autoriteit Persoonsgegevens. This could encourage PUs to reflect on the way that they set up and use their smart doorbell.
The supervisors liked the idea that this can form a prototype family. It would let people interact with alternatives, enable them to see the difference and compare those.

RSL

Presenting this concept at RSL led to quite some reflective questions, which is an important goal of the intervention.
Who decides on a specific behaviour or the character of the doorbell? Can the NPUs also decide how the doorbells around them behave? And if a curious doorbell is asked for any neighbourhood gossip, when will the doorbell answer and when will it not?
The team members mentioned that it would be good for me to think about the goal of the prototypes and evaluate them based on that. They mentioned that it would be nice if an intervention could lead the neighbourhood to make a collective decision about the doorbells (i.e. only this model, apply these settings, etc).

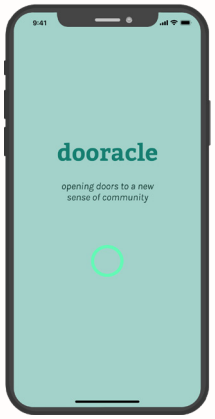
8.2.2 Dooracle

'Dooracle' is a concept about a doorbell oracle. It explores how social cohesion might be enhanced by an intelligent, all-knowing network of doorbells. In this speculative scenario, doorbells are no longer just an announcement of a social interaction. Dooracle creates social interactions.

Dooracle is an app that combines all doorbell data from the community. It identifies all kinds of patterns in the data, like physical activity around the house, social interactions, vehicle usage, noise levels, visitors and daily habits. It connects neighbours based on that data to create a more caring community.
Community members receive inspirational daily quotes or affirmations such as "behind every door is a neighbour to connect to" or "the lines between neighbours blur when kindness knows no boundaries". This was inspired by many apps (like astrology app Co-Star) sending out 'daily affirmations' and the rest of my social media timelines being filled with all sorts of affirmations. The daily notifications that dooracle sends are applied to a neighbourhood context, and aim to place the speculation in today's society, hint towards boundaries that dooracle might cross and add some humour.
Members also receive notifications about neighbours that might need some care (see Figure 8.2). In this way, care is distributed through the neighbourhood and they are encouraged to interact with each other. The care notifications are based on what the network of doorbells detected.

A visit can be planned automatically, as dooracle knows when both neighbours are home. Dooracle is like a community manager, that allows neighbours to ensure their (social) safety and security together.

Figure 8.2. Care notifications & daily affirmations



This concept aims to explore and reflect on the tension of 'watching out for / watching over' neighbours. What data analysis and behaviour is acceptable when the goal is to care for each other, improve safety or increase social cohesion? And how does this relate to interactions facilitated by current smart doorbells?
Figure 8.3 shows additional app screens.

supervisors This idea stood out from the others, it seems to be about social cohesion. It's less strictly only about smart doorbells. It investigates the balance of what neighbours are allowed to see and act upon.

supervisors It clearly reflects on the topic of watching over neighbours. The examples given immediately lead to comments like 'I don't want to live in that neighbourhood'. The care messages that dooracle sends maybe can be more nuanced to create more of a grey area.

RSL This concept generated most critical questions, which didn't surprise me as it's probably the most speculative.
Some questions were about how to decide as a community on what use of the smart doorbell is acceptable and where to draw the line. Can you opt in or opt out? Do you have some sort of control in joining this?
It was however not really clear whether and how the concept would be used. It almost seemed as if the team members considered it as a 'real' concept rather than a speculation. One person mentioned that it is all technically possible.

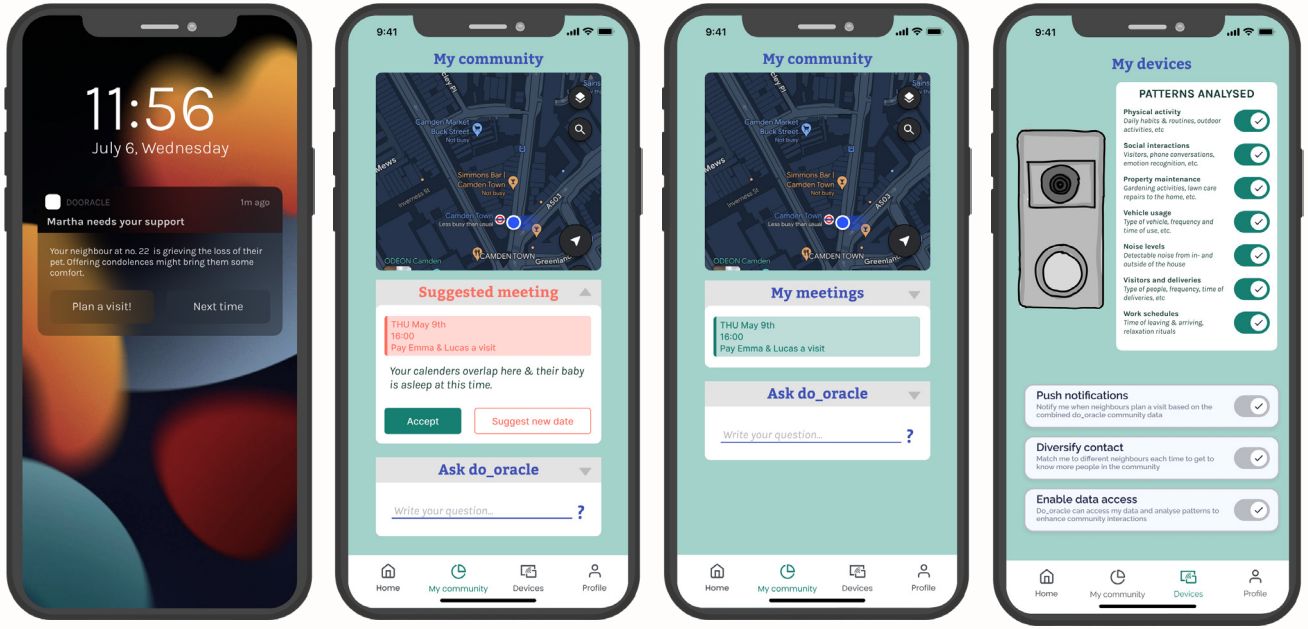


Figure 8.3. Dooracle planning a meeting with a neighbour & pattern analysis settings

I think that's partly what makes this concept so interesting, the only difference with the current doorbells is the analysis, interpretation and use of collected data. The product itself remains the same.
The team member asked me many questions to which I don't have an answer either. What if this would be the case in a few years? What will it lead to if we make the doorbell even smarter than it already is? I was happy that the concept brought about questions like this. It was also described as 'creepy', which I would agree with.
A worry that came up is that too much creepiness in the concept might lead to avoidant behaviour and take away from constructive dialogue.

8.2.3 Het slimme deurbel kleurspel

Het ‘slimme deurbel kleurspel’ (smart doorbell colouring game) aims to create awareness about the presence of smart doorbells in a simple, light-hearted way. This is the only concept that is not speculative and doesn’t really imagine an alternative role for the SDB.

The concept is a piece of paper with outlines of the person’s own neighbourhood (see Figure 8.4). The instructions are simple: “Go on an adventure in your neighbourhood and colour all the houses with a smart doorbell. Bonus points if you also colour the range that the doorbell sees and hears. Make something nice and stick it on your fridge after!”.

It relates back to colouring pages as a playful activity as a child, which I found to be quite relaxing. Framing it as ‘a neighbourhood adventure’ can make the activity more exciting.
A legend, usually present on a map, was added. This allows the neighbours to indicate which type of doorbell is installed where. It could serve a practical function to the adventurer (referencing the doorbell models and locations later), entices to engage with the activity seriously, but is mainly intended to let them get physically close to the doorbell. The adventurer might have never interacted with a smart doorbell before. What does it do? Do they notice a light blinking, does it make a sound?
When designing the colouring page, I did not expect any direct interactions between the PU and adventurer to occur, but anticipated that a PU might later review notifications or footage and wonder why someone with a colouring page was near their front door.
The legend also stimulates people to use multiple colours. This could possibly encourage more creativity while colouring, allowing for a less ‘analytic’ or serious mindset during the activity, and more light-heartedness.

The adventurer can be reminded of the SDBs when they hang the colouring page on the fridge. Even though the colouring is probably a one-time activity, this could make the impact last longer.

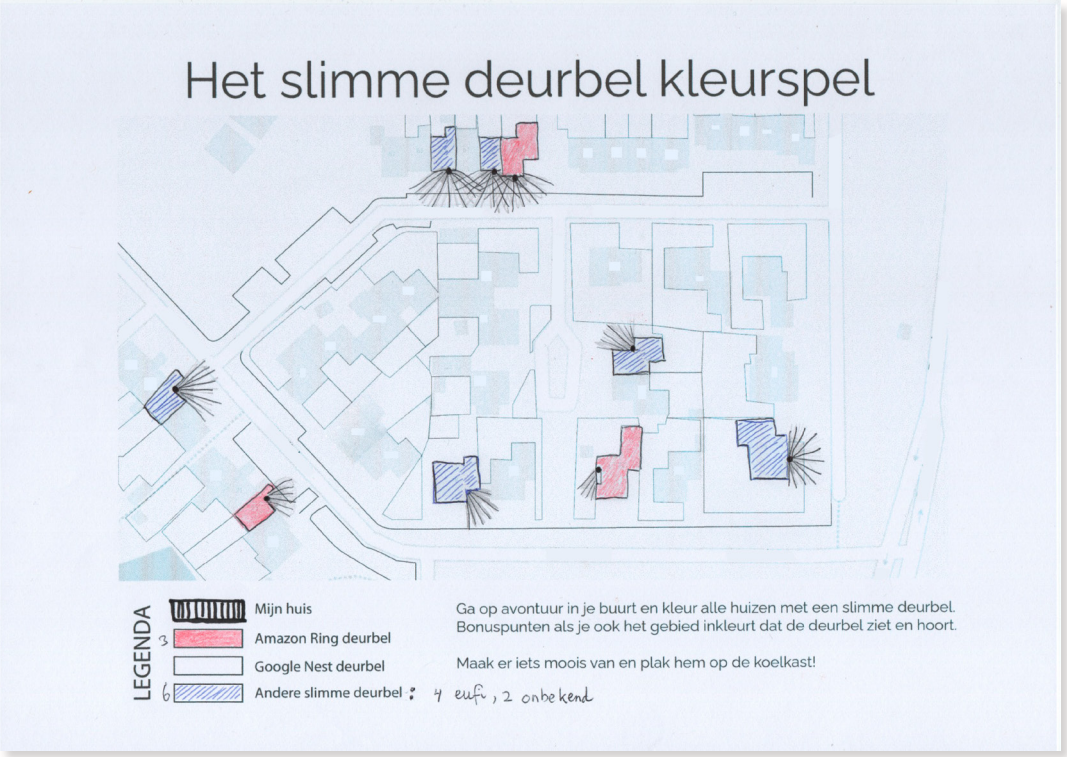


Figure 8.4. Het slimme deurbel kleurspel, filled out by a neighbour

neighbour

This colouring page was tested by a neighbour who had previously been interviewed (Cycle 1).
She went on ‘an adventure’ as instructed, and coloured in all the houses with a smart doorbell and their respective fields of view. Afterwards, she was interviewed about this experience over the phone and consented to the use of her anonymized artwork (colouring page) in this thesis.

The activity itself was fun, but left her feeling uneasy after; “like big brother is watching me”. There were many more smart doorbells in her neighbourhood than she expected.
Because she had to get physically close to the doorbells to find out the brand of the SDB, PUs got notified when motion was detected.

Two primary users saw her and came outside to see what she was doing. This could be a perfect conversation starter as the PU initiates a conversation, rather than the other person having to do that. She told them it was for a research project, as she didn't feel comfortable enough to ask about the SDBs. She approximated the field of view of the doorbells on the colouring page and didn't want to ask to see the it on the PU's phone. She worried they would feel uncomfortable and get defensive.

When reflecting on the activity, she didn't really see the reason why she would colour this page. We speculated a bit about potential scenarios, and mentioned she would do the activity out of curiosity when the colouring page appeared in her letter box. She imagined the colouring page could be part of a bigger 'getting to know your neighbours' theme box, or a set of activities. People might even introduce themselves in a fun way in front of the SDBs of neighbours further away in the neighbourhood.
According to her, this activity could be a nice way to introduce the topic of smart doorbells and potential harms to the neighbourhood. However, a bit more context about the topic would be needed.
Having more concrete tips for dialogue with PUs would be a good addition, they could make people feel prepared and confident when approached by curious primary users. They could even be printed on the back side of the colouring page.

design students

Upon showing this concept, the design students immediately thought about 'belletje lellen' (ring and run), a game they used to play as kids.
When told about the neighbour's experience, they too commented that some sort of practical advice should be included that can make a conversation with the PU or other neighbours easier.
They saw it as a first step in addressing SDB dynamics: awareness of the smart doorbells around you. Something else would need to follow. They mentioned that the activity could possibly lead to a conversation with the entire neighbourhood when everyone would receive a colouring page in their mailbox. It could be framed like 'finding easter eggs' in the neighbourhood, an activity to do together.

supervisors

These colouring pages could be easily be thrown into people's mailboxes as a physical probe (RtD), along with some questions to get feedback about potential impact of the intervention.
The concept could also serve as a way to sensitize consortium members or other big stakeholders in the topic and engage them in the discussion. It could allow them to reflect on the smart doorbell in their own neighbourhood, moving the topic from an 'abstract level' where they only talk about something, to an experiential level. It would be interesting to see whether making the SDB interactions more personal to them would help their work or provide other perspectives regarding smart doorbells.

RSL

RSL really liked the colouring page and its simplicity. Implementation and upscaling would be very easy.
However, as a more general reflection (which also holds for 'I spy', see chapter 7.2.4), some more concrete information is probably needed. The interventions could be great conversation starters, but then what?
An information sheet, practical tips for dialogue with the neighbours, a video or a 'routemap' of possible actions might be good additions to these concepts.

8.2.4 I spy

The final concept is called 'I spy'. In this concept, someone can play a game of I spy (ik zie ik zie wat jij niet ziet) with a smart doorbell, see Figure 8.5 for an impression. The concept aims to encourage reflection about the wide field of view of a smart doorbell in a simple and fun way.

The SDB speaks out loud and will start the game by asking for the person's name. It then picks an object and tells them the colour. The person can start guessing.
Whenever they answer, the doorbell indicates how close they are to guessing correctly. It also makes comments like "That's not it, keep looking. I can see much more than you think!" or "Ding-dong! It seems you're getting warmer, but let me give you a hint. Widen your search parameter by about 10 meters. Remember, sometimes the answer is just a little further away than you think!".

When the person guesses correctly, they will be complimented on their eye for detail and impressive ‘I spy’ skills. The doorbell continues; “You know what, I can spy too! Pick an object and let me know the colour”. The roles are now reversed.
The doorbell will guess, and when it found the object it will reply “wow, I’m good at this. Maybe it’s because I can sense so much. Shall we play again?”. If it can’t find the correct answer, it will give up; “You’re too good! I can see a lot, but you can see much better. Want to play again?”.

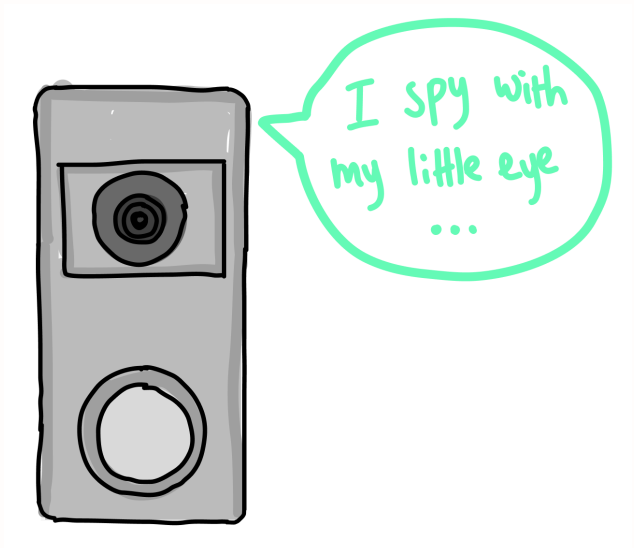


Figure 8.5. I spy

When the person guesses correctly, they will be complimented on their eye for detail and impressive ‘I spy’ skills.
The doorbell continues; “You know what, I can spy too! Pick an object and let me know the colour”. The roles are now reversed.
The doorbell will guess, and when it found the object it will reply “wow, I’m good at this. Maybe it’s because I can sense so much. Shall we play again?”. If it can’t find the correct answer, it will give up; “You’re too good! I can see a lot, but you can see much better. Want to play again?”.

The prototype for this concept was made in Voiceflow and fully interactive, although still in ‘Wizard of Oz’ style. It relies on a person to type or click the answers and guide the flow. It doesn’t really matter what answer the player gives, after a while the flow will tell them they guessed correctly. If they decide to give up before that, the flow will direct them to the ‘give up’ message. A small part of the flow is shown in Figure 8.6.

To make it appear like the doorbell actually sees the surroundings, objects in the environment that the concept was tested in were added beforehand. The outside, neighbourhood version approaches the goal of reflection best. It suggests things like “Oh, I know! It’s the front door of the neighbours across to the left” and “it must be the potted plant in the living room of the neighbours across”, to indicate how far the FoV may reach.
However, as prototypes were often presented in an office environment, an indoor version was also made. This is less representative of neighbourhood dynamics, but makes the prototype believable in its physical testing context. Some jokes or other specific details were included like “oh, I know what it is! It’s Silke’s green earrings!”, hinting towards potential intrusive data capturing.

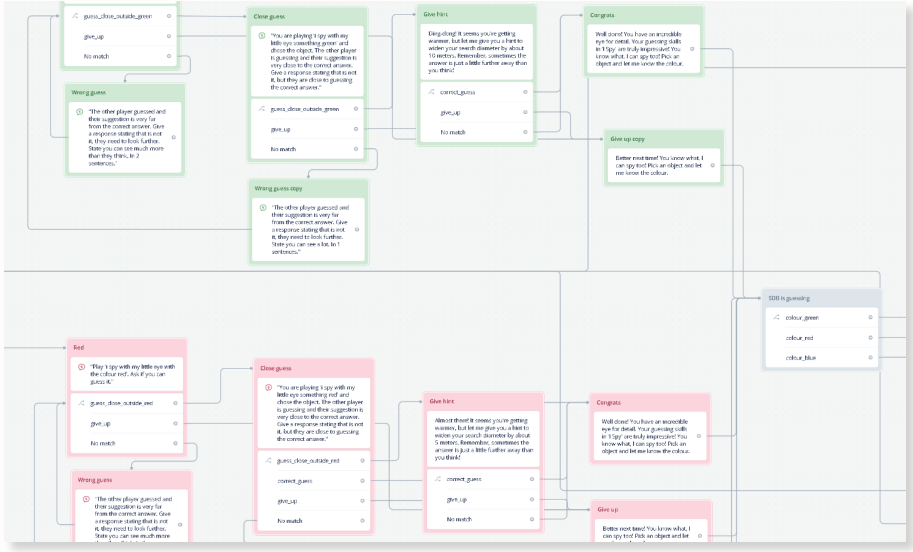


Figure 8.6. Part of VoiceFlow prototype for I spy

casual chat

This prototype was shown to a team member at RSL right after making the Voiceflow, they played the game.
They thought it was weird to be complimented by a machine (the 'well done' comments). The team member found the interaction funny, but there was no real connection to the smart doorbell yet as the sound came from my computer.
There needs to be a doorbell present and using it in a neighbourhood context would probably work better.

design students

The design students played a game of 'I spy', and mentioned it can give a good understanding of how detailed and far the smart doorbell can see.
In a neighbourhood context, visitors could play the game while waiting at the door. According to the students, an intervention like this can make the topic come alive in the neighbourhood and open conversation. The person who is playing the game interacts with it directly, but because this interaction is audible and visible, people around it might watch and also reflect.
They thought this concept could lead to easier conversations. They liked 'I spy' best out of all concepts presented (along with the colouring page), as the game element instantly leads to interaction.
We brainstormed a bit further together and concluded it would be cool to make the interactions even bigger to draw attention to it. This could 'disrupt' the normal interactions in the neighbourhood. An example was having a mega doorbell somewhere on the street that invites people to play with it.

supervisors

The supervisors thought it's fun to interact with and laughed.

RSL

Sharing this concept in the presentation brought about many smiles.
They thought it's light-hearted and might help people to reflect on field of view. The use or implementation of this concept is still very unclear. Where would people interact with it? Could this concept (also the colouring page) be part of some central neighbourhood bulletin board? The concept could be a conversation starter, but what happens after that?

Bases on the tests with this prototype, another imagined implementation of this concept was imagined, see Figure 8.7. The game could be presented in neighbourhoods on the street as a disruptive installation. It will probably attract attention when passersby and neighbours see or interact with a door in the middle of the street.

consortium

The concepts were very shortly presented during the consortium 'soft launch' event.
It was an online meeting and I could not really see the members' facial expressions or immediate reactions during my presentation. According to one of the supervisors also present, most smiles appeared when presenting I spy and the edited picture of the game on the street.
After presenting, one consortium member commented that the presented concepts lead to "think about the topic in a different way".

Figure 8.7. I spy as disruptive installation on the street *(see Image References for picture reference)*

8.3 Choosing and combining

Through iterative ideating and prototyping, a variety of (speculative) concepts has been created.

This chapter showed that the design goal can be approached from different ways. The resulting concepts can be interacted with at multiple places, by different actors and at multiple moments in time. The concepts were plotted on the barriers and drivers diagram from Cycle 2 to show some possible 'applications', see Figure 8.8.

Some decisions regarding further detailing of a final concept were made. These were based on a few loose 'requirements', that took shape during the prototyping process:

- The intervention should encourage neighbourhood dialogue
- The intervention reimagines the role of the smart doorbell
- The intervention should let the doorbell play a more active role in the neighbourhood. It might disrupt common interactions or attract attention to itself in a light-hearted way.
- The intervention should allow for rich reflection, critical awareness and dialogue about:
    - The field of view of the SDB
    - How data is collected, stored, used and shared, and by who
    - Social interactions and tensions
    - The role that the current SDB has in the neighbourhood
    - The intervention should be usable in any context and not be confined to a specific neighbourhood or front door

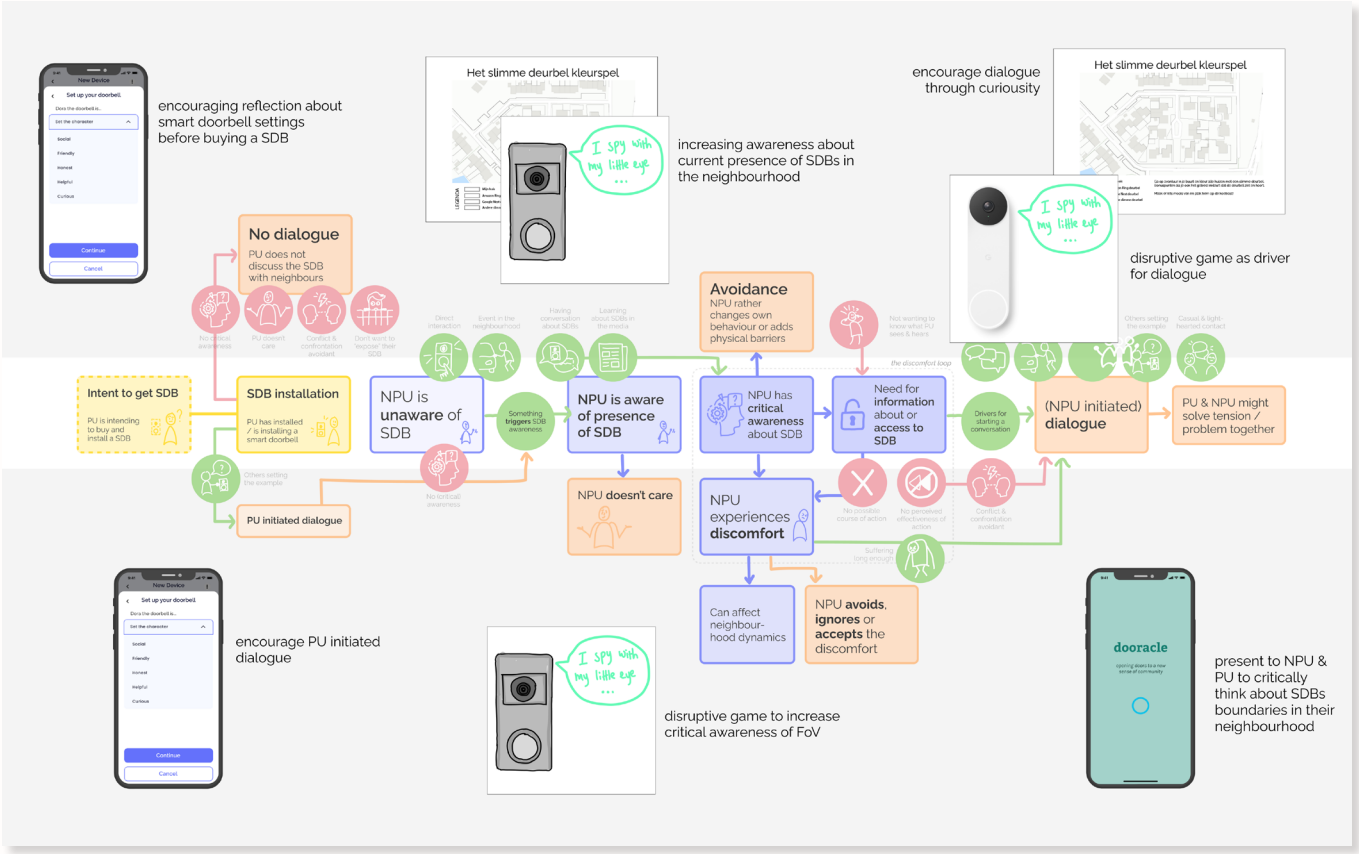


Figure 8.8. Concepts plotted on barriers and drivers diagram

Based on these requirements, the decision was made to leave 'het slimme deurbel kleurspel' and 'I spy' for now. These concepts are highly interactive and got great responses. Furthermore, the colouring page has the potential to have dialogue from a place of shared curiosity, rather than criticism. The concepts encourage dialogue and reflection, but don't cover all topics due to their simplicity. They might be interacted with on the street as is, little additional detailing to the concepts itself would be needed, although the story around them would need work. Researching the practical implementation of these concepts would be interesting, but is outside of the scope of this design goal and project.

The reflections that arose around the other two concepts were far richer. These concepts create room to reflect on multiple aspects and factors related to the smart doorbell, which I think is important as the many factors involved make it a complex topic. I want to encourage dialogue with the intervention and therefore make the topic of smart doorbells accessible to engage with, but I don't want to over-simplify the 'problem'.

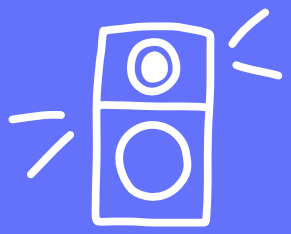
One final consideration was the way in which I wanted to present the speculation. Initially, I planned to test some disruptive prototypes on the street and was curious what the result would be over a longer period of time. It would however be very difficult to 'measure' what impact the dialogue could have, as these dynamics are not confined to one moment. This activity would have been fun to do and would likely have led to some dialogue, but the supervisors wondered what new insights this would give me. Video as a medium could be more fitting. The decision for which concept to continue with and to use video went hand in hand.

Video allowed me to imagine the interactions that people might have with the physical representations of the concept, and show the nuances of social dynamics over time.
I wanted to design physical prototypes of these doorbell characters, and was inspired by the design course Interactive Formgiving, also described in a paper by Rozendaal et al. (2018).
The doorbells could be autonomous agents that each have their own character, behaviour and purpose, which Rozendaal (2016) calls 'Objects with Intent'. Through their expressive behaviour, these objects can 'collaborate' with the humans around them and affect human interactions. According to Roozendaal (2016), the combination of low-fidelity prototypes with cinematic techniques "is a powerful means to realistically speculate on Objects with Intent". Furthermore, he stated that these prototypes could help to critically reflect on the implications the object might have on human activity.

Storytelling through video and audio would helped me to show the doorbells' expressiveness as well as the resulting human interactions in the neighbourhood, that I wanted the viewer to critically reflect on.

'The … doorbell' and 'do_oracle' were combined into a final concept as they allowed for the richest reflection and fit the video format best.

CHAPTER 9.



The ___ doorbell

This chapter shows the final speculative concept: ‘the ___ doorbell’.
This is a different type of ‘smart’ doorbell. The word smart has been removed, asking people the question what ‘smartness’ means to them.
People might attribute a lot of authority to smart products. Being smart, they can analyse all data around them, therefore whatever they say must be true and can be trusted. Of course not literally, not like the old anecdotes where drivers - blindly trusting their navigation system - drove into the water.
Smart systems are getting more and more advanced through the application of artificial intelligence. The current smart doorbell can recognise who or what is at the front door, giving the owner the idea that it’s highly intelligent.
Knowing this, it is good to realise that smart doorbells are however not objective. The roleplaying in cycle 3 showed that the fragment of information it gives might lead to skewed interpretations of reality. What happens when the doorbell provides more information?

What if the doorbell could convince you that it is truly social, honest or curious? In what way would this active doorbell interact with you and the rest of the neighbourhood?

This concept aims to guide reflection and dialogue about smart doorbells in the neighbourhood. It could show social tensions and act as a conversation starter. And perhaps, it could inform policy makers and other actors about SDBs in a creative way and inspire them to think from another perspective, or include social tensions when addressing SDBs.

9.1 The final concept

'The ___ doorbell' is a speculation that exists in an alternative present reality.

In this alternative present, people live close together in neighbourhoods but see little of each other. Most people have no clue who their neighbours are. If they need something from each other, they won't go further than texting them about it. It's common to have a whole network of connected products in and around the home, as these make life a little more convenient. There are simply too many balls to keep in the air; ever demanding work, friends, family, upkeeping physical activity, having a digital presence, and many more. There is little contact and social cohesion in the neighbourhood, people are disconnected from what is going on around them.
A smart doorbell can help them get a grip of their surroundings, experience convenience in answering the door from wherever and whenever, and make them feel safe in their neighbourhood.

The speculative product itself consists of a simple doorbell body to which three different lenses can be attached, shown in Figure 9.1.
The doorbell analyses and combines data into patterns much more extensive than current-day SDBs. The FoV and audio range of these lenses remains unchanged, but new layers of digital analytics (and leakiness) have been added depending on the lens.

Primary users of 'the ___ doorbell' can choose a lens for their doorbell through which it perceives the world. Do you care about privacy and data that might be collected? The honest doorbell is the one for you! If you struggle to connect to your neighbours, pick the social doorbell. And if you would like to regain a bit of the social control that used to be present in the neighbourhood in the past, the curious doorbell can help you to keep a little eye out for each other.
Doorbell owners set up their social, honest or curious doorbells through connecting it with an app and install it like any other smart doorbell. The settings menu shows them in which ways the character of this doorbell influences its use and behaviour.

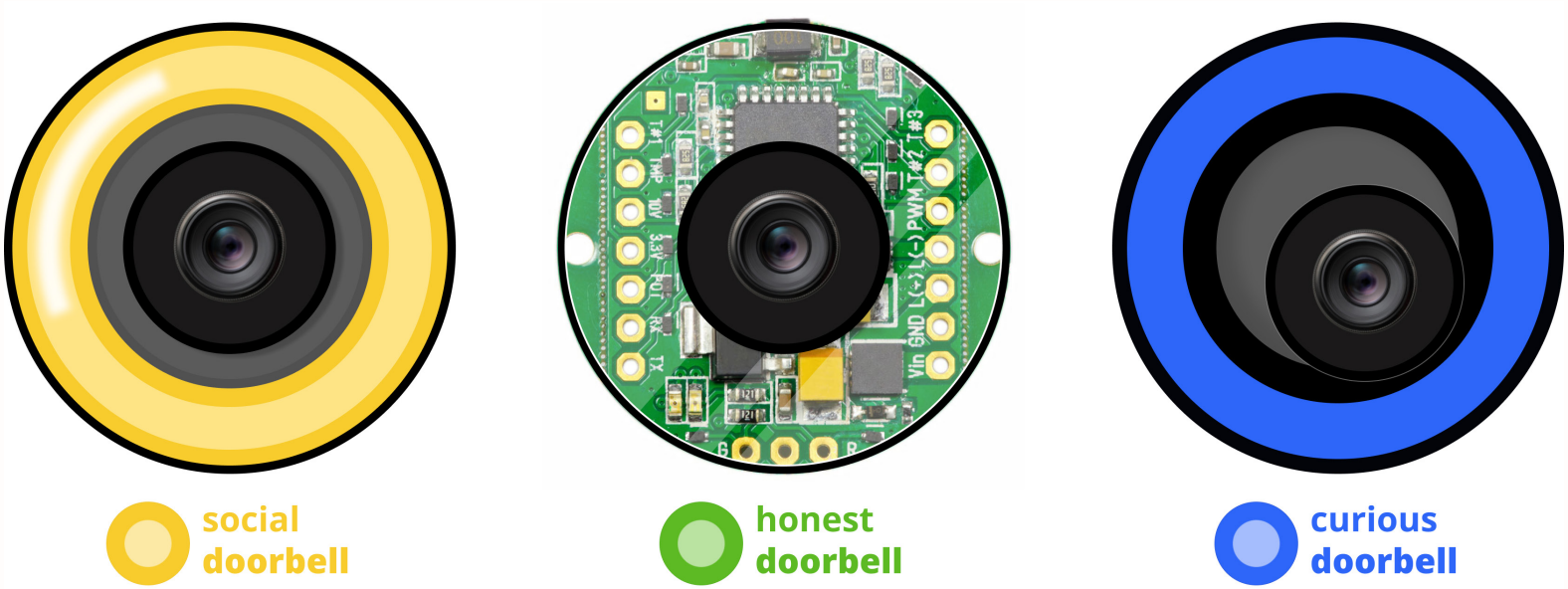


Figure 9.1. The three doorbell lenses


helping you
connect to your
neighbours
social
doorbell

9.1.1 The social doorbell

This doorbell wants to interact with people.
It makes itself seen and lights up when making contact with someone. It greets neighbours (saved in familiar faces database as ‘connections’) and asks unfamiliar but frequent faces to introduce themselves. The primary user is notified when the doorbell interacted with someone or made a new connection.
Through these interactions the doorbell helps you to get to know your neighbourhood and to increase social cohesion. And, if a connection is detected close by when the PU is home, it might even set up a spontaneous, casual neighbour meeting.

This doorbell explores what social contact in 21st century neighbourhoods means, and was inspired by the tension in Figure 9.2.
Can casual chats on the streets still occur when neighbours don’t know each other or when rarely ever home? Can neighbourly relationships exist outside of the WhatsApp groups in our phones?
In what other ways could you experience social cohesion?

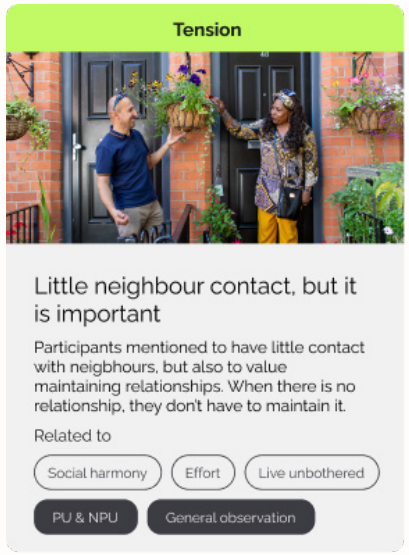
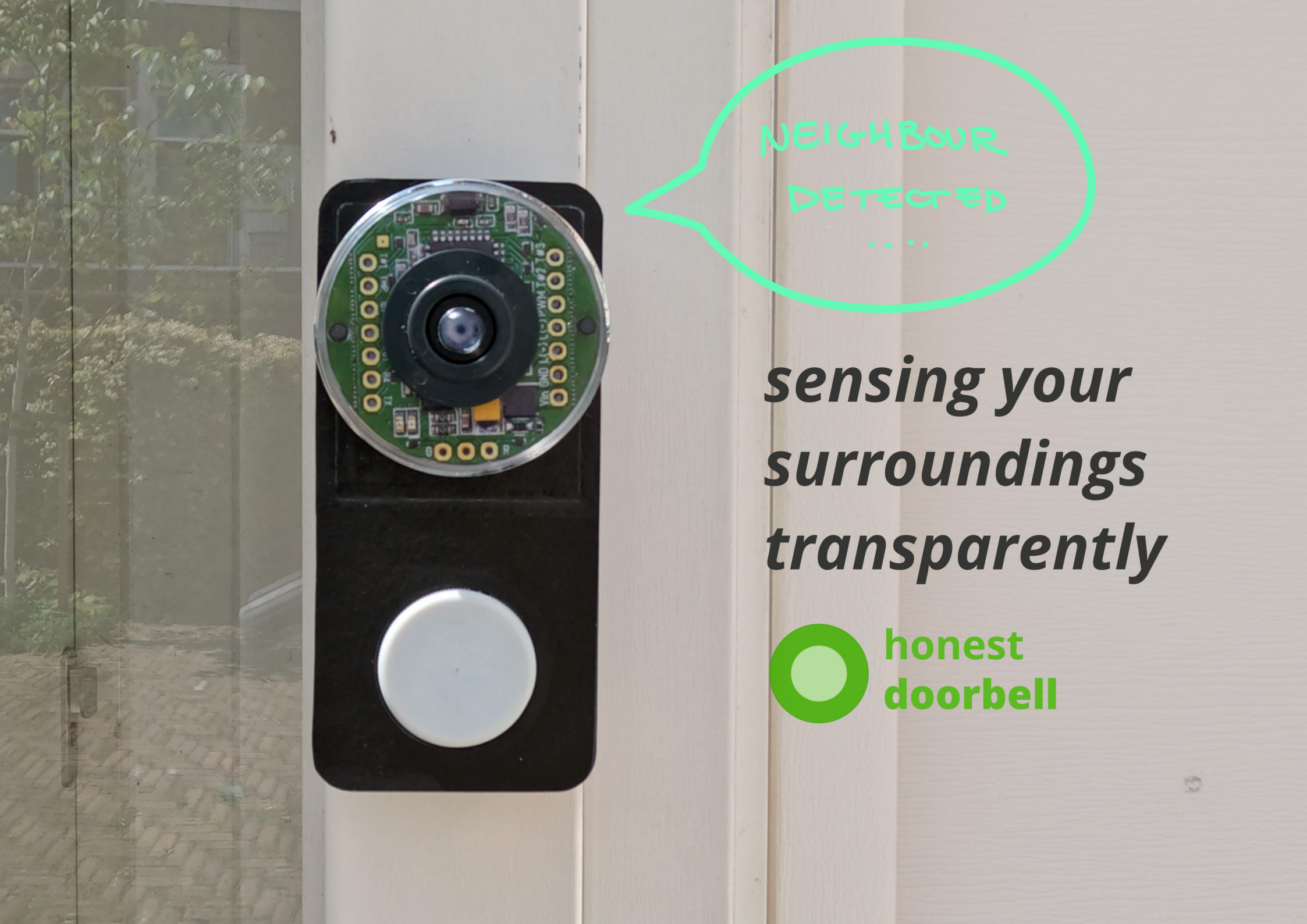


Figure 9.2. Tension (Cycle 1) related to the social doorbell



sensing your surroundings transparently

honest doorbell

9.1.2 The honest doorbell

The honest doorbell wants to be as transparent as possible. In this way, the 'black box' around its smart and connected technology opens up and clearly shows what is happening.
The honest doorbell shares everything it's doing out loud, it has no filter. It will mumble continuously, as it's always on and searching to detect something. This doorbell does not go unnoticeable easily as it keeps indicating its presence. It makes clear to NPUs when they are being recorded and what happens with that data. The lens itself is transparent as a quite literal wink to its character.
With this doorbell, what you hear is what you get. If it detects something, it will tell you. This means that it also communicates about its extensive digital analytics, which in this speculation is used to analyse and share data with marketing related third parties.
The NPU's as well as PU's data is collected and used for a certain purpose.

What would happen a smart doorbell would have extra layers of data analysis, but would communicate that transparently?

Primary users generally know little about what data smart doorbells exactly collect and (therefore) also seem to care little about the impact it might have on others around them. This doorbell was inspired by the tensions shown in Figure 9.3.
How does their attitude regarding their neighbours change when they realise the doorbell affects them (PUs) too?

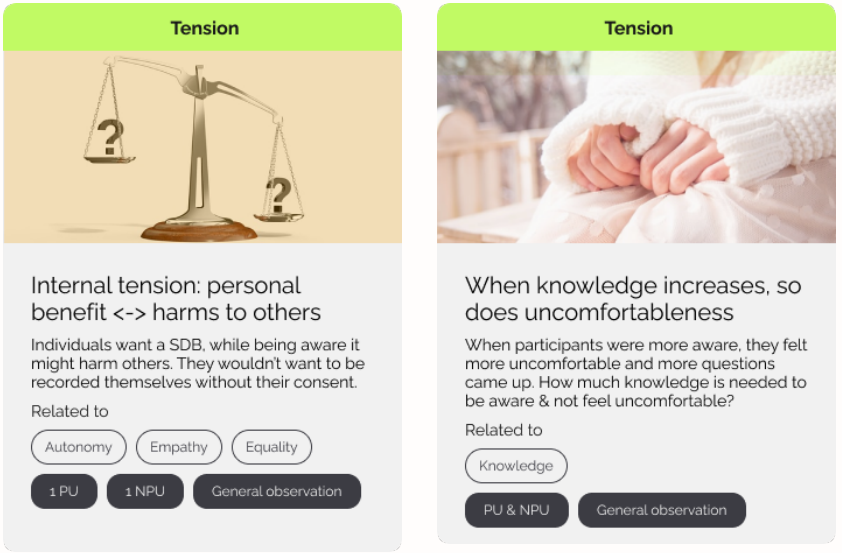
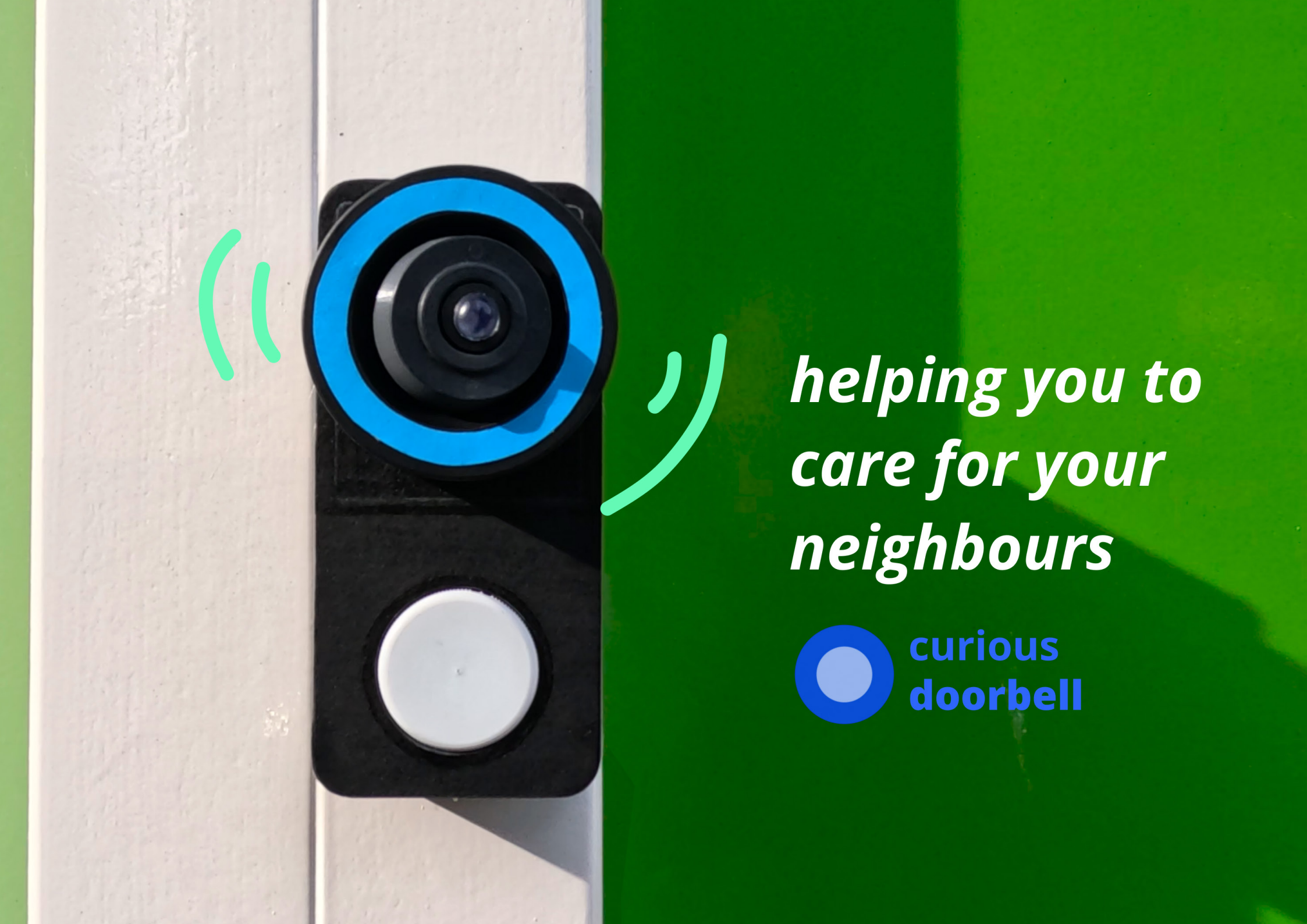


Figure 9.3. Tensions (Cycle 1) related to the honest doorbell


helping you to
care for your
neighbours
curious
doorbell

9.1.3 The curious doorbell

The final lens completes the curious doorbell. This doorbell just wants to know what is going on around it. Its lens is big and moves around to see and hear as much as possible.
All with a good intention though, it wants to keep an eye out on everyone in the neighbourhood. It is very excited about everything it knows and likes to share with its owner. It also asks for information if there are gaps to be filled. Based on all of this knowledge, it guides the primary user in caring for their neighbours.

This doorbell is an extra set of eyes and ears in the neighbourhood. It can continue to monitor when its owner is not home or is doing something else. The curious doorbell connects everything it sees and doesn't see to the familiar faces in the neighbourhood.

Are the things that the doorbell sees and reports upon always true?

If we know more about our neighbours, it might even help to care a bit more for each other. Smart doorbells can make people curious, nosy or even tempt them to 'spy' on each other. This relates to the tension in Figure 9.4.
When is curiosity and interest still about watching out for our neighbours, and when does it turn into watching over them?

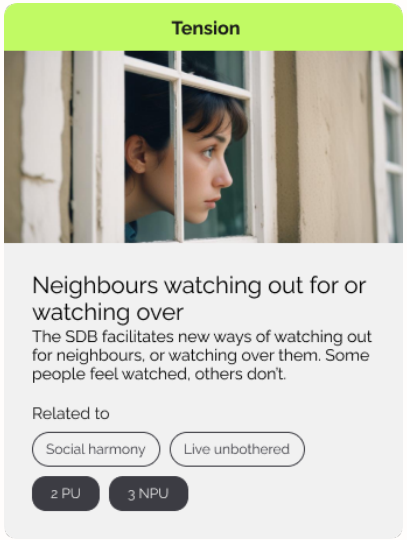


Figure 9.4. Tension (Cycle 1) related to the curious doorbell

9.2 Presenting the final concept

Chapter 8.3 already shared some considerations in choosing the final concept together with the medium of video.
Additionally, the speculation can be presented in its context without having to explain it literally through video, is accessible and easily sharable, is not restricted to a specific front door, and many people can interact with it.

The three doorbells are presented in a ‘reporter style’ final concept video, in which their owners share about their experiences and the interactions with the doorbells are shown.

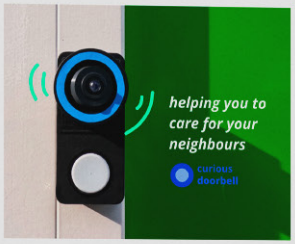
This concept video would ideally be shown together with a small booklet, or the ‘instruction manual’. This manual is imagined to come with the doorbells like any product, and is thus part of the speculation.

However, its contents don’t explain the how the product can be installed, but instead present reflection questions.
As learned from Cycle 2 and the evaluation of the colouring page, dialogue or awareness alone is not enough, there needs to be a concrete course of action too. The instruction manual ends with concrete dialogue approaches. The booklet serves as a physical handout of the video that might even help to recall this activity at a later moment.

Figure 9.5 shows some pages of this manual, the full version is shown in Appendix G.

Figure 9.5. The ‘instruction manual’

3. REFLECT: THE **CURIOUS** DOORBELL



Is the smart doorbell helping neighbours to watch out for each other?
Or is it helping to watch over them?

Should smart doorbells be able to "intervene" to create a more caring community?

What should the boundaries for the use of data and patterns collected by the smart doorbell be? How would you decide that in your neighbourhood?

4. **DIALOGUE** WITH NEIGHBOURS

Approach neighbours in a **casual** way.

Start with a simple question or comment when you run into them on the street.

Start from **curiousity, without judgement.**
Ask for information about:
- field of view?
- is it always recording, or only when pressed?
- how is data stored, for how long?
- who has access?

Reason based on your **values**.
- why is important for you to install a smart doorbell?
- why do you feel uncomfortable with the neighbours' smart doorbell?

Critical awareness takes time.
When someone has never thought about potential consequences of smart doorbells before, they might not care at first. Give them some additional information and time to think.

Make agreements about smart doorbell use together.
- is it possible to physically obstruct the field of view?
- can privacy zones be set?
- can neighbours ask to see footage?
- how will data be stored and used?

CYCLE 4

evaluating
and reflecting

chapter 10. evaluation

chapter 11. concluding & reflecting

Cycle 3 presented the speculation, based on the research in earlier cycles.

This final cycle relates the speculation to reality.
Chapter 10 presents the evaluation of the final concept, ‘the ___ doorbell’.

The last chapter of this thesis, Chapter 11, reflects on the concept, project and personal learning goals.

CHAPTER 10.

Evaluation

Cycle 3 showed the process of ideation, prototyping and creating the final concept to achieve the design goal that was formulated as:

"Design an intervention that encourages dialogue around SDBs through reimagining the role of the SDB in the neighbourhood, in a light-hearted way."

The main questions that guided the evaluation are:
- In what way does the final concept encourage dialogue?
- Is the final concept perceived as light-hearted?
- In what way does the final concept help people to critically reflect?
- What are potential applications of this concept?

'Neighbourhood dialogue around SDBs can occur in different ways, between different people and from different perspectives. Neighbours can discuss SDBs in their own neighbourhood, people can discuss SDB dynamics with other people in their network, dialogue around SDBs in the neighbourhood can be held in organisations, many more forms exist.

In evaluating this concept, the decision was made to let people interact with the speculation from a 'neighbourhood perspective' and a 'policy perspective'.
The neighbourhood perspective was not further defined, but relates to anyone who evaluates the concept and reflects on their own neighbourhood. The policy perspective relates to a more abstract level of SDB dialogue. This does not only include dialogue about the own personal neighbourhood, but also about related implications for society and what could be done about that.

10.1 Method

To find out whether the design goal has been achieved, the final concept was evaluated in two different ways. Watch parties were organised where multiple people saw and reflected on the video. The concept video was also sent out to a variety of different people together with a feedback form. Both evaluation types are explained in the next section.

10.1.1 Evaluation forms

As explained in chapter X, a reason for the decision to present the final concept in video format was the benefit of being able to easily share it with many people.

To be able to receive feedback from those viewings, an online evaluation form was created. This form mostly consists of open-ended questions in which respondents could type their answers.
Two versions were made (both in Dutch and English). One version was suitable to be filled out by 'anyone', the other was specifically meant for the consortium members and included additional questions about possible implementation from their organisation's perspective. The form (including additional questions) is shown in Appendix H.
The questionnaires were filled out by 14 different people, four of them watched the video together with one to three others. One of these respondents was a consortium member.

The questionnaire has been divided into four sections to guide respondents through the concept and evaluation.
After reading an introduction, some initial questions are asked about their current experiences with smart doorbells. The next page shows a link through which they can watch the concept video. The third section guides the respondents through the same questions in the booklet that is part of the final concept.
The final section presents the topic of smart doorbell dialogue in the neighbourhood. The questions under this section focussed on a broader evaluation of the concept and potential implementation.

10.1.2 Watch parties

From previous research activities (interviews and roleplaying), it became clear that engaging with the topic of SDBs in a group setting can lead to deeper insights regarding dialogue, compared to individual conversations. Therefore, the decision was made to include evaluation of the concept in a group setting.

Two 'watch parties' were organised, in which the final video was shown to three participants (see Table 10.1). All six participants were design students at the faculty of IDE.
Each of them received the booklet at the start and after a short introduction, the video was shown on a big screen (see Figure 10.1). The researcher had the role of facilitator and guided them through a collective reflection and discussion after watching the video, based on the contents of the booklet.

Audio was recorded from these sessions, which was used to reference the notes taken. The observation during the sessions was focussed on how they discussed the topic, not on the content of what was said.

Table 10.1. Participants in watch parties

	Masters programme	Gender
P1	DfI	M
P2	DfI	F
P3	IPD	M
P4	DfI	F
P5	IPD	F
P6	DfI	F

Figure 10.1. Location of watch parties

10.2 Insights

Through watch parties and an online questionnaire, 20 individuals evaluated the final concept. The insights shown in the next sections are colour coded as follows:

questionnaire sent to neighbours | questionnaire sent to consortium | watch parties

10.2.1 Encouraging dialogue

The most important part of the design goal was to encourage SDB dialogue. The evaluations showed that 'the___ doorbell' does so.

watch parties

Guided by the video, questions in the booklet and facilitator, it was easy for participants to have an in-depth, critical but animated dialogue about the role of SDBs in the neighbourhood.
At first, the facilitator had to specifically ask all participants to respond. After a few minutes the dialogue continued naturally and spontaneously led to many of the reflection questions. Participants responded to each other's statements and asked questions too.

Occasionally participants didn't agree with each other, but were able to explain their standpoint either based on examples shown in the video, or examples applied to their personal neighbourhoods. P5 and P6 for example thought that the SDB should not be able to intervene to create a more caring community, while P4 felt the opposite. P4 mentioned a specific application of the curious SDB to care for her isolated grandma and explained what the trade off in that scenario would be, which P5 and P6 could empathise with. They concluded that the topic is nuanced rather than black and white and strongly dependent on the context and scenario.

Near the end of the collective reflection, participants started to discuss possible solutions, guidelines or boundaries for SDB use in their neighbourhood; "What if a neutral third party would only have access to the data and allow for neighbours to see it in certain cases?" (P3). The practical dialogue tips were thought to be useful: "It feels likely that they would work" (P6).

questionnaire sent to neighbours

According to the respondents, the concept video can encourage dialogue in the neighbourhood.

Three of all questionnaire respondents watched the video together with 1-3 other people. One respondent mentioned they had a conversation together about "the future of smart doorbells", it's different applications and concerns regarding additional AI features. The others laughed about the video together but didn't really discuss it.

Most respondents stated that watching this concept video could lead to dialogue in the neighbourhood. A few mentioned it being a conversation starter, others reported to need more for that. For some participants, it should be part of a broader conversation about the topic of safety in the neighbourhood. Another respondent suggested to include discussion cards, to make the questionnaire reflection less individual. Someone mentioned that the entire neighbourhood would have to see the video in order to have dialogue.

Five respondents would not share or discuss the video as it is with their neighbours. A few people would maybe share it, or only with friends and family. Three respondents clearly stated they would watch together with neighbours or show them the video to initiate a conversation.

questionnaire sent to consortium

The consortium respondent thought that watching this concept video could lead to neighbourhood dialogue, and would possibly share it with their own neighbours.

Furthermore, they would certainly share the video with colleagues, and suggested it could be shared on the organisation's intranet.

10.2.2 Light-hearted interactions

The interaction with the concept should be light-hearted, as explained in chapter 7. The watch parties especially provided many insights about this goal as the researcher could observe the interactions.

watch parties

There was a lot of laughter while watching the video in both parties, as well as when reflecting collectively.

In both sessions, participants mentioned that the SDB characters and owners were similar.

The video and discussion seemed to inspire the participants, sparked their imagination and made them curious. The participants discussed many other characters and behaviours the doorbell could have and what interacting with that would be like. They laughed about the suggestions but also reflected critically on consequences. One participant stated that "the video made it a light conversation where you did think more about it [SDBs in the neighbourhood], instead of not really caring for it. It was nice to have the video and talk to other people directly afterwards". (P5)

questionnaire sent to neighbours

A few respondents mentioned the video was funny when sharing their first thoughts.

Most of them also indicated to experience some form of discomfort; "I especially found the video very funny but terrifying because some of these concepts are close to reality" (translated).

Others asked (critical) questions about the different characters, which could indicate the video inspired and made them curious.

questionnaire sent to consortium

The consortium member mentioned the video was fun.

10.2.3 Critical reflection

Both evaluation showed that participants were able to critically reflect about SDBs in the neighbourhood.

watch parties

The video and conversations did encourage critical reflection; "This project is provoking me for critical thinking. ... Although I don't have a smart doorbell or I don't have any experience, I start imagining certain scenarios and start seeing problem areas" (P2).

Participants were able to reflect on the **topics that were intended**. An example was a conversation about the curious doorbell owner showing the bike being stolen, included for them to reflect on the potentially skewed interpretation of reality facilitated by a SDB.
P3 mentioned "From the doorbells view, you only see a specific part. A small piece of information and you're making a conclusion based on that. It turned out to be a different story. But what if the doorbell would send it to the police? That's a massive consequence for something that's interpreted in a certain way" (P3).

The participants were able to reflect **from different perspectives**. They often mentioned scenarios shown in the video and used those to dissect the implications of that step by step. They considered how each scenario and context is different; "there are negative ways it would interfere with your life, but also ways it could enhance it" (P3), to which P2 responded "it depends on the context and the neighbourhood".
They were also able to critically reflect on **different levels of abstraction**. A comment where P1 zoomed out shows this nicely; "it [the honest doorbell] is very transparent about what it does, but it doesn't give someone more agency or ownership. … Understanding how it works doesn't really protect you from the harm it does".

Discussing **brought up tensions that were not explicitly shown** in the video or booklet. P4 noted how the smart doorbell is a grey area in legislation, surveillance is not allowed, but this doorbell does surveil through its data collection. She concluded that "it's also my responsibility then, as the owner of that type of device".

The conversation then continued about who should be responsible for ethical use of smart doorbells, many actors were discussed.

A final observation is that the video allowed participants to **reflect on an experience level**, moving it beyond a theoretical conversation.
P5 said: "I really felt the impact of the video. Sometimes [in other projects] I think like, 'oh yes, I understand what you want to convey, but I don't really feel it'. Here I thought, 'yes, this is really awkward' ".

questionnaire
sent to neighbours

Having the same questions as in the booklet, the answers of the respondents did indicate critical reflection.
Some mentioned certain conditions to SDB use: "it depends on what kind of agreements are made about it, if everyone is using it with the same intentions (or not)" and "It should also be stored locally, and a camera should never have the need for a permanent access to the internet to operate".
Furthermore, respondents reflected on scenario's shown in the video, as well as situations in their own neighbourhood. A few respondents mentioned how neighbours could benefit from the PUs SDB as their safety and property security is also increased "well I saw someone's window get smashed and he was grateful we had it on video. So we don't see it as spying".
A few times, a reflection question was answered very shortly or not at all. Some questions seemed to be interpreted in multiple ways, or about different topics than intended. When answering a question about boundaries for use of data and collected patterns by the curious doorbell, many respondents only mentioned data storage and access. This question was included to stimulate reflection regarding changing social dynamics.

Two respondents stated that the video and questions did not help them reflect. The others mentioned it triggered thinking or increased their awareness about the subject: "Before the video I only knew that they existed and what they could do. But I never really stood still about the consequences of the smart doorbell and that it is just a really sensitive and complicated subject. There isn't really a global policy for the use of smart doorbells and it's a bit concerning in my opinion".

10.2.4 Critical reflection

watch parties

The participants mentioned multiple ways in which this concept could be shown and used.
This included watching and discussing in a theatre setting, as part of an exhibition, during a home owners association meeting and internal use in organisations. The participants in the first session suggested that “maybe it’s better if it comes from a third party. … it would be more of a neutral ground” (P3).
In both sessions, participants saw potential roles for government and municipality. Not to restrict all smart doorbells, but to make concrete guidelines. P4 mentioned that “this type of thing [the video and booklet] would be a great communicator and binder between different groups in these governmental or municipality settings. To stimulate conversation that is needed for regulation”.
The participants in the second session discussed how the video could ‘humanize’ the interaction and “stimulate a bit of empathy” (P5). Showing this video could connect the often theoretical conversation in organisations to actual experiences “and the needs of people in neighbourhoods”.
They did not just see this opportunity for policy makers, the video could also bring together actors within SDB companies. P4 mentioned that the medium of video specifically is accessible to many different stakeholders, and can thus stimulate debates with the public, designers, companies or government.

questionnaire
sent to neighbours

Respondents mentioned different settings in which this concept could be presented.
Suggestions often included through social media, on an informative website, through municipality channels or as part of a neighbourhood activity or meeting. Other imagined applications of this concept were to show it at schools, teaching platforms, at a cyber security conference, or as a physical flyer in the letterbox.

10.3 Discussion

Some of the results from the evaluation of the final concept are discussed in this section.
Through both evaluations, it has become clear that interacting with the final concept can encourage neighbourhood SDB dialogue. There were many differences between the watch parties and individual reflections in the questionnaire however.

Individuals watching the video reflected on the possibility of dialogue, while actual dialogue occurred in the watch parties. It seemed as if participants in the watch parties had more similar opinions, while there was more diversity in answers in the individual reflections. Some participants in the watch sessions seemed to change their perspective when hearing arguments and examples from another participant. Coming to a shared understanding or reflection might be a result of the dialogue.

Furthermore, the reflections during the watch parties seemed to relate more to examples in the video, while reflections in the individual evaluation forms related more often to their own neighbourhoods. It is impossible to conclude the cause for this. Some factors that might have influenced this include the location of interacting with the final concept (office or neighbourhood setting), watching on a big screen that remains visible during the discussion, and owning or frequently interacting with SDBs. Perhaps, watching the concept video in the personal neighbourhood setting might relate the conversation more to that specific neighbourhood.

Respondents answering in the questionnaire seemed to interpret the speculative SDBs more as if they were ‘real products’ than in the watch parties. This could be due to the way it was presented, the facilitator was able to introduce the session and ‘instruction manual’ booklet during the watch parties. People interacting with the questionnaire had to read the information by themselves, which can give different interpretation much easier.

The facilitator could answer questions, encourage participants to engage, and steer the conversation in a certain direction if needed. This can be seen as a benefit of a watchparty.

It was observed that the respondents in the questionnaire reflected much more about data storage and use. This might be because of the lack of facilitator, but the tendency to reflect about this topic could also be due to them already being familiar with personal data being used to target personalised advertisements, from other products and services. The social and curious doorbells presented more 'novel' interactions.

The evaluation results show the delicate balance between increased critical awareness and increased discomfort, that was explained before in Chapters 3.2.2.1 and 6.2.3.
In both evaluation types, participants reflected on the light-heartedness of the concept, as well as on its creepiness ("big brother is watching", "curious or creepy", "funny but terrifying"). In the case of the smart doorbell, increased critical awareness means knowing about some uncomfortable potential consequences. Discomfort and critical awareness go hand in hand. The evaluation did show that participants engaged with the topic without immediately stating "I can't do anything about it anyways", like they did in earlier interviews and roleplaying.
It seems as though the light-hearted interaction might have created some space to think and engage with it, rather than avoiding the topic.

10.4 Limitations

This evaluation shows the impact that the final concept could have, though many limitations have probably affected the results.

First of all was the sample size for both evaluation types small, it is therefore difficult to conclude anything based on these findings.

Furthermore, the questionnaire was completely anonymous. No personal questions regarding age, living arrangements and area in the country were included so it's impossible to say anything about the diversity of the respondents and thus generalisability of the findings. Based on their answers, it is clear that positive, neutral and critical attitudes towards smart doorbells were represented. It would have been interesting to add more parameters to the analysis, this was however not relevant in the context of this evaluation.

Next, the participants in the watch parties consisted of design students only and most were critical about SDBs. This might have affected the resulting dialogue as already they shared many opinions. It would be very interesting to see how dialogue unfolds between participants with more opposing perspectives.
The most important limitation might be that these participants are designers. They are used to engage with topics in a critical way, ask questions and imagine alternative realities. Perhaps, this is what made the dialogue so lively and in-depth.

Finally, it can be assumed that the presence of the facilitator in both watch sessions impacted the dialogue and reflection, as did the lack of facilitator in the questionnaire.

10.5 Conclusion & take-aways

- The evaluation showed that the final concept does encourage dialogue around smart doorbells in the neighbourhood in a light-hearted way.
- The video can be a powerful, accessible medium to encourage dialogue and critical awareness on different levels, but the presentation of the video and reflection matters a lot.
- "The ___ doorbell" is best presented to multiple people with a facilitator present to guide the dialogue.

Many different applications and settings for engaging with 'the ___ doorbell' are possible, making it a flexible speculation. Dialogue can be encouraged between citizens or within organisations.
However, when engaging with the final concept in an individual context, additional research and a redesign of the 'instruction manual' is needed to ensure a nuanced yet specific reflection.

Finally, it is important to remain aware that "the ___ doorbell" is a speculative design, that relates to present-day SDBs at the same time. People should not get scared or believe that current SDBs apply the extensive data analysis that 'the ___ doorbell' does, as it's simply not clear whether that is the case. The purpose of the speculation is to stimulate dialogue and engage with the topic critically from the perspective of social tensions in the neighbourhood, not to spread misinformation. Watching the video without a facilitator present might be more vulnerable for the latter.

CHAPTER 11.

Concluding & reflecting

This thesis has explored experiences and social tensions related to smart doorbells in the neighbourhood. Alternative characters for the SDB and resulting interactions were imagined and used as a tool to encourage and guide dialogue in a light-hearted way. And then what?

This final chapter will zoom out again. The main research findings resulting from the graduation project will be summarised.
Multiple topics will be reflected on from a personal perspective, including speculatively encouraged dialogue as a short-term intervention, the smartness of doorbells and moving towards more responsible SDBs.
The chapter ends with a reflection on the process of this project and learning goals.

11.1 Concluding

As Chapter 1 concluded, little research about lived experiences around smart doorbells has been performed. This graduation project aimed to address this, and provides insights into concrete experiences and social dynamics around SDBs in the neighbourhood, through an interview study and scenario-based roleplaying.

Encouraging dialogue was suggested as a short-term intervention to improve social dynamics and was approached through engaging with a speculative smart doorbell. Evaluation of "the __ doorbell", which imagines alternative doorbell characters and interactions, has shown a way in which speculative design can be applied to encourage reflection, critical awareness and dialogue about smart doorbells in the neighbourhood. This might result in less discomfort, tensions or even disputes between neighbours.

The findings might complement related empirical work in the HCI field about experiences and social dynamics related to smart home cameras or consumer surveillance technology. Examples include Pierce's work on shifting lines of creepiness (Pierce, 2019) and ethical implications of smart camera's (Pierce et al., 2020), as well as the work of Tan and colleagues (2022) about everyday use of smart home cameras. Furthermore, this thesis might relate to responsible technology development. The final concept could potentially inspire creativity or invite to discuss societal implications of technology in organisations.

The focus of this project was on interactions in neighbourhoods, but potential implications on a societal level were also identified. The amount of smart doorbells is increasing rapidly in the Netherlands and findings from the interview and roleplaying studies suggested that SDBs might already be normalised in society.
This graduation project could be seen as an initial exploration. It might indicate a starting point to more research about the impact that smart doorbells can have on social dynamics and society, as well as reflection on whether that impact is desirable.

11.2 Encouraging dialogue through a speculative design

A speculation was created based on understanding of the origin, that might influence reality, as explained in the general approach.

The lack of research regarding SDB experiences did not only identify a relevant focus for this project, it also inspired me to imagine what experiences there could be.
When letting the participants engage with "the ___ doorbell", I noticed they were also inspired to think beyond current interactions with smart doorbells. This allowed a rich reflection on the desirability of these future scenarios and what should be changed, according to them. It also inspired new ways of use. P5 mentioned "If you would have asked me before if I would use a smart doorbell, I would have said no immediately. But now, I see more opportunities", referring to ways in which a smart doorbell can facilitate care in neighbourhoods. In this case, interacting with the speculation opened up possibilities for the current smart doorbell. One might wonder whether that is desirable or not.
It did show me the nuances related to specific contexts of use and how these (future) interactions with smart doorbells aren't necessarily all undesirable, or perceived as dystopian.
When deciding to apply a speculative design approach in this project, I felt tired of the dystopian narratives and decided to include 'lightheartedness'. The result is a funny video that encourages reflection and dialogue, but was still related to 'Black Mirror' and 'Big Brother' by some of the participants who interacted with it.
I think it's an interesting tension to navigate as a designer. I wanted the topic to 'come alive' and foster people's imagination while staying close to reality, but don't want to scare them away from engaging at the same time.

In the final evaluation, participants mentioned that the concept video and instruction manual could be used as a tool to connect the multiple actors around SDBs, as well as people within organisations.
This was also discussed in the interview with an an innovation team

employee at a big municipality in the Netherlands. Through showing the prototypes I had at the time, I tried to learn about his perspective on the potential role of (speculative) design in policy making. He did not have experience with speculative design in the municipality yet, but stated it could contribute in having conversations about new technologies and their use with citizens: "then you have a sort of concept what you can talk about, that makes you think". According to him, the speculative concepts could also be used within innovation teams themselves in ideation phases, to make people a bit more creative and change their mindset.
Concrete examples of speculative design in policy making do exist, such as #Blockchain4EU (European Commission, 2018) and ProtoPolicy (Design Friction, 2016). These projects indicate that interacting with or co-creating speculative artifacts can add value to policy-making.

11.3 Dialogue as a short-term intervention

The goal of the speculation was to encourage dialogue about smart doorbells in the neighbourhood, which was achieved. This project showed multiple ways in which dialogue could be stimulated, many more ways are probably possible.

Dialogue can occur on multiple levels, i.e. between friends, together with the neighbourhood or within organisations. A question that remains is how to ensure that dialogue is not a one-time thing, that the topic stays relevant. What happens when new neighbours move in or when the increased awareness becomes a distant memory over time?

Another thing that can be questioned is how this project presents dialogue as a short-term intervention or solution. While it can be a very good start to address social tensions on the short term, it might lead to the idea that the problem of smart doorbells is 'fixed' after that. Without engaging the other actors to improve the communication, guidelines, regulations and design around smart doorbells, the risk exists that dialogue is only symptom management. NPUs might feel less discomfort around the SDB, but its presence could still lead to all other potential consequences as described in chapter 1.3.

11.4 How smart should the doorbell be?

In designing "the __ doorbell", I was inspired by the adjective 'smart'. What if SDBs were not only smart, but had another adjective and corresponding character? The resulting curious, social and honest doorbells might be 'smarter' than the current SDB, due to the layers of data analysis that were added.
Does a doorbell even need to be smart? This question came up a lot in this project and many people asked me this. I think that smart doorbells can serve a purpose for people and offer them valuable benefits. The participants in this project all lived in relatively safe neighbourhoods and had little to none pre-existing issues or disputes with their neighbours. I can imagine that the situation might be completely different in for example neighbourhoods with high levels of crime or when having experienced something bad before.
The SDB benefit of convenience and wanting comfort is understandable too, living in a society that is slowly getting more hedonistic and materialistic. I can't blame people for wanting to experience a pleasurable, convenient life, or tinker around with smart, amusing gadgets, when everything around them points that way too.
And when there is little contact or social cohesion in neighbourhoods, I understand that people might not consider their neighbours immediately.

However, the smart doorbell is probably not the only way in which people can experience these benefits. Why do people feel unsafe in their neighbourhood? What are other things that can be done, individually or within the neighbourhood, to feel safer? Perhaps investing in getting to know the neighbours is equally effective.
In the case of convenience, are there other things that let you interact with a delivery worker or allow you to hear the doorbell from the backyard, without recording part of the street?
Designing and evaluating these speculative doorbells triggered some ethical reflection for me. In the case of the social and curious doorbell, does the good intention of creating a more connected, caring neighbourhood (watching out for your neighbours), weigh up against the potential harmful consequences (watching over them)? And is the imagined benefit of the

greater good (a safer/connected/caring neighbourhood) more important than the harms to an individual?
I don't think smart doorbells are necessarily bad, I just think getting one should be considered and approached carefully. The project clearly showed that the smart doorbell impacts the community around the individual, so perhaps installing SDBs should be a communal decision.

11.5 Towards more responsible SDBs

The initial design assignment of this graduation project was to "design short-term interventions to represent different interests and values, and create more responsible interactions in neighbourhoods where smart doorbells are being used". Throughout exploring this topic, the assignment changed slightly, got more concrete and ultimately focussed on social dynamics, tensions and dialogue as a way to possibly deal with some of those.
In the previous sections I brought up a lot of questions, to which I don't have the answers, nor do I need to. For me one thing is sure, if we conclude there is a need for doorbells to be smart, then I think we should use, design and regulate them responsibly.
This finally brings me back to the 'responsibility tension', previously explained in chapter 3.3. Who is responsible for correct, ethical, or 'responsible' smart doorbell use? In the current situation, the primary user is technically responsible, although the interviews suggested they are not aware of that.
Even though the smart doorbell is a privately owned product, I don't think it's ethical to hold the PU solely responsible. When smart doorbell owners don't know what's inside the technological black box of their doorbell, are not aware of potential consequences to others, know little about the regulations, do not see these products might affect their need to feel safe, and using these products is so easy, I don't think they are solely to 'blame' for potential harmful consequences. I can't expect them to make an informed decision to responsibly use this technology, when they are not informed.
A better question is maybe not who should be responsible, but in what way we can collectively care for our future with smart doorbells.
A multi-actor approach is needed, bottom-up as well as top-down. Dialogue in neighbourhoods about the smart doorbell could improve social tensions on short term, while dialogue on a policy level might change regulation and lobby for design changes to the SDB.
I think the Consortium Smart Doorbells is a great starting point towards creating more responsible smart doorbells.

11.6 Project reflection

This is the last reflection, I promise. If you read the thesis this far, thank you! I truly enjoyed this project. It was interesting, surprising, fun and surely challenging at times.
This project taught me a lot about myself as a designer. Throughout my TU Delft design education, I've been taught to apply methods, explain every decision and always have a plan. This project was completely different. It's explorative nature allowed me to experiment with a different way of designing. I could just start prototyping based on some weird ideas, and later evaluate in what ways those could contribute towards the goal.
My supervisors challenged me to try new things and trust my designer gut feeling, which I am incredibly grateful for.

Collaborating with Responsible Sensing Lab was an amazing experience. I learned so much from the team members, also unrelated to this project.

At times, the process felt like one big chaos. One of my learning goals (that has been on my reflection forms for at least 5 years) was to structure my process into smaller milestones, I can't say I achieved that the entire project. Maybe I learned to embrace it.

I'm happy and proud to end my education with a project covering all my interests, working together with RSL, amazing supervisors and being able to join Studiolab Community for half a year. Thank you all!

Oh, and please, talk to your neighbours about smart doorbells :)

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IMAGE REFERENCES

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Figure 8.7:

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Images used in concept video

Smart doorbells were photoshopped on door pictures:

- Photo by Amada MA on Unsplash: https://unsplash.com/photos/a-wooden-door-in-front-of-a-brick-building-KKXInVP4JZE
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- Photo by Thomas Bormans on Unsplash: https://unsplash.com/photos/a-red-door-and-a-blue-door-on-a-white-building-112gldbOOmI

Social media story and advertisement:

- Photo by Jakob Owens on Unsplash: https://unsplash.com/photos/person-in-white-nike-sneakers-A4579v-Lezz8
- Photo by Charbel Aoun on Unsplash: https://unsplash.com/photos/man-in-blue-helmet-riding-on-blue-and-white-parachute-ShkrJTfECRs?utm_content=creditCopyText&utm_medium=referral&utm_source=unsplash

PROTOTYPES

Some of the prototypes made in Figma were inspired by existing templates, uploaded to the Figma Community design resources. Changes were made to all.

- Denis Rojčyk: https://www.figma.com/community/file/917471841966099807/ios-notifications
- CarlUX: https://www.figma.com/community/file/963485599114971932
- Rikki: https://www.figma.com/community/file/1257010661513336009
- Filllo Design Agency: https://www.figma.com/community/file/1267700864769513997
- Nagarjuna Pulugam: https://www.figma.com/community/file/1238864174262623901
- Szabó Gergő: https://www.figma.com/community/file/1127589528000818468

The prototype ‘I spy’ was made using VoiceFlow:

- https://www.voiceflow.com/

APPENDICES

A. PROJECT BRIEF

B. INTERVIEW SETUP

C. INSIGHT CARDS

D. AUTO-ETHNOGRAPHIC ACTIVITY

E. SCENARIO-BASED ROLEPLAYING SETUP & MATERIALS

F. FIFTH CONCEPT - DOORBELL CARE

G. INSTRUCTION MANUAL

H. EVALUATION FORM

A. PROJECT BRIEF

DESIGN FOR our future

TU Delft

Personal Project Brief – IDE Master Graduation Project

Name student: Silke Snijder

Student number: 4,557,999

PROJECT TITLE, INTRODUCTION, PROBLEM DEFINITION and ASSIGNMENT
Complete all fields, keep information clear, specific and concise

Project title: Designing responsible interactions between the smart doorbell, its owners and the neighbourhood

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

Introduction

Describe the context of your project here; What is the domain in which your project takes place? Who are the main stakeholders and what interests are at stake? Describe the opportunities (and limitations) in this domain to better serve the stakeholder interests. (max 250 words)

Society is increasingly filled with sensors. From cameras on smartphones, to smart home products, to scan cars; the shift to a discrete monitoring infrastructure "allows for passive, distributed, always-on data collection" (Andrejevic and Burdon, 2014). They call this the 'sensor society'.
Sensors have made their way in public and private environments and are owned by individuals, companies or governments. Some sensors are explicitly interacted with, many go unnoticed. The smart doorbell is another application of this, it's often equipped with camera, microphone and speaker. It's connected to the owners smartphone that receives notifications when motion is detected, showing them who is at the door. Many devices offer AI features such as facial or package recognition. Common mentioned benefits are answering the door from wherever, enhancing safety, receiving packages more easily or monitoring kids playing outside (Komando, 2023). Its use in the Netherlands has grown rapidly, Multiscope (2023) reported that 1.2 million households used smart doorbells in 2023.

There are also risks to the use of smart doorbells however, many of which are not apparent to users. Such as: direct intrusion of privacy of neighbours and people walking by (Kulche, 2023), use of facial recognition (Wroclawski, 2023), law enforcement accessing camera footage ('t Hart, 2023), concentration of power with manufacturers, and more.

A collaboration is established with the Responsible Sensing Lab, part of the AMS Institute. They explore "how to integrate social values in the design of sensing systems in public space" (Responsible Sensing Lab, n.d.). They have set up a Smart Doorbell Consortium and Coaliton where different stakeholdres are connected and work together towards responsible use of smart doorbells. In-depth research about lived experiences in neighbourhoods with smart doorbells would be a good addition to the national survey and other steps in their project plan.

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introduction (continued): space for images

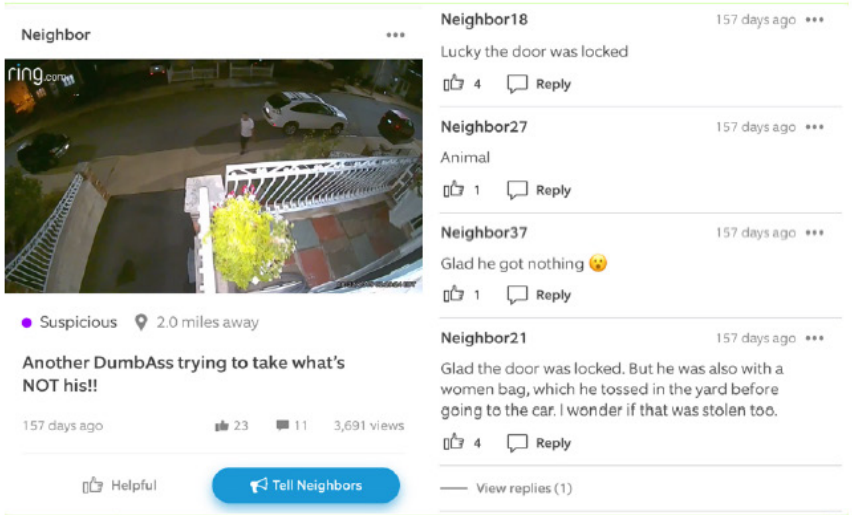


image / figure 1 Screenshot of Ring footage shared on Neighbors app in Boston, through Buell (2020)

image / figure 2 UK Court ruled Dr.Fairhurst's privacy was invaded by the neighbour's smartdoorbell (Kirby &Wright, 2021)

DESIGN FOR our future

TU Delft

Personal Project Brief – IDE Master Graduation Project

Problem Definition

What problem do you want to solve in the context described in the introduction, and within the available time frame of 100 working days? (= Master Graduation Project of 30 EC). What opportunities do you see to create added value for the described stakeholders? Substantiate your choice.
(max 200 words)

What social values actually are at play around the smart doorbell? Like stated before, it can impact people around its direct owner. Smart doorbells have the potential to change relationships and interactions in households, neighbourhoods and communities (Ur et al., 2014; Tan et al., 2022). Many neighbourhoods use security apps in which users can report on events in the neigbhourhood, often supported by smart doorbell footage. Even though objectively no real crime might be happening, the constant alerts and focus on 'suspicious' activity in the neighbourhood can increase feelings of unsafety and spread racism (Antonelli, 2019).
What other consequences are there to smart doorbells being introduced in neighbourhoods? What happens when disputes arise on placement and recording (such as the UK courtcase in image), how do people deal with potential discomfort in bringing up disagreements? What does it even mean to be a neighbour in todays (sensor) society?
In order to create more responsible smart doorbells that align with broader values of society, there first needs to be a better understanding of these values.
Some research questions:
1. What are interests and values of people living in neighbourhoods with smart doorbells?
2. In what ways do smart doorbells affect relations and interactions in neighbourhoods?
3. What are possible short term interventions to respect / represent different values within the neighbourhood?

Assignment

This is the most important part of the project brief because it will give a clear direction of what you are heading for. Formulate an assignment to yourself regarding what you expect to deliver as result at the end of your project. (1 sentence) As you graduate as an industrial design engineer, your assignment will start with a verb (Design/Investigate/Validate/Create), and you may use the green text format:

Design short-term interventions to represent different interests and values, and create more responsible interactions in neighbourhoods where smart doorbells are being used.

Then explain your project approach to carrying out your graduation project and what research and design methods you plan to use to generate your design solution (max 150 words)

The project roughly follows a research-through-design approach and is divided into 4 cycles.
Cycle 1 and 2 focus on gaining a rich understanding of the context, involved stakeholders and their interactions. In-depth knowledge about actual lived experiences with smart doorbells will be generated through ethnographic research. Other methods that will be used include (expert) interviews, observations and literature research.
Cycle 3 and 4 are about the creation and evaluation of design interventions. Generative probes based on different ethical theories (normative and more novel ethics) will be used in co-creation sessions, to invite people to engage from multiple perspectives. Prototypes will be made based on these sessions and might be speculative, conceptual or ready-to-implement scenarios or solutions. Other than these prototypes potentially being implemented to improve interactions, they could serve as a way to explain interactions and values in neighbourhoods and raise awareness, opening up the conversation around smart doorbells. The interventions will be tested and reflected upon.

Project planning and key moments

To make visible how you plan to spend your time, you must make a planning for the full project. You are advised to use a Gantt chart format to show the different phases of your project, deliverables you have in mind, meetings and in-between deadlines. Keep in mind that all activities should fit within the given run time of 100 working days. Your planning should include a kick-off meeting, mid-term evaluation meeting, green light meeting and graduation ceremony. Please indicate periods of part-time activities and/or periods of not spending time on your graduation project, if any (for instance because of holidays or parallel course activities).

Make sure to attach the full plan to this project brief.
The four key moment dates must be filled in below

Kick off meeting	29 Jan 2024
Mid-term evaluation	28 Mar 2024
Green light meeting	17 Jun 2024
Graduation ceremony	16 Jul 2024

In exceptional cases (part of) the Graduation Project may need to be scheduled part-time. Indicate here if such applies to your project

Part of project scheduled part-time	✓
For how many project weeks	23
Number of project days per week	4,5

Comments:
Part of the weeks I work 4 days, the other weeks 5 days (average 4,5 days a week). The amount of days per week are planned to fit well with the tasks for those weeks.

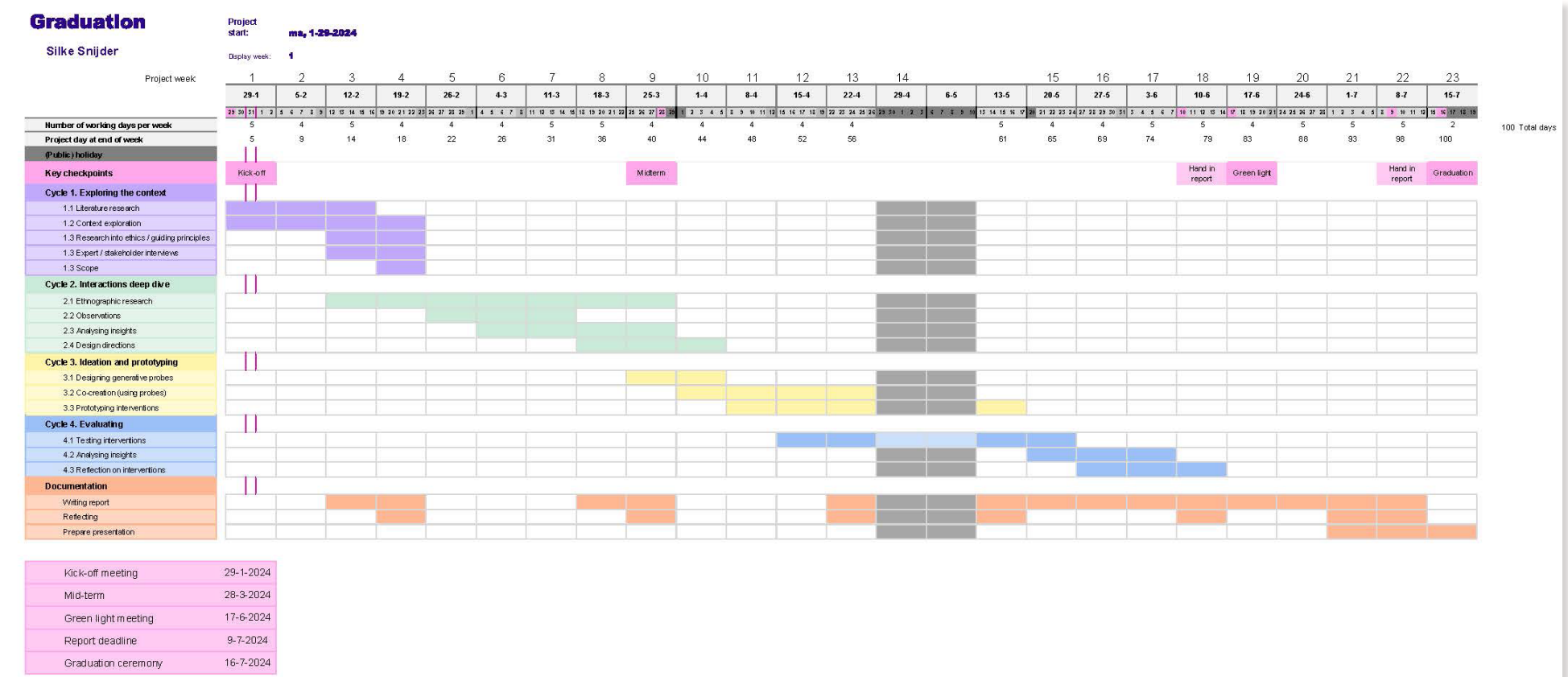
Motivation and personal ambitions

Explain why you wish to start this project, what competencies you want to prove or develop (e.g. competencies acquired in your MSc programme, electives, extra-curricular activities or other).

Optionally, describe whether you have some personal learning ambitions which you explicitly want to address in this project, on top of the learning objectives of the Graduation Project itself. You might think of e.g. acquiring in depth knowledge on a specific subject, broadening your competencies or experimenting with a specific tool or methodology. Personal learning ambitions are limited to a maximum number of five.
(200 words max)

Ever since doing a minor in Responsible Innovation, my interests have been with this topic The multidisciplinary approach and courses during that semester taught me a lot and I have kept this interest throughout the rest of my studies. I have also done many projects related to interactive technology and AI. I greatly feel the need for responsbile application of new technologies, and want to engage other people in these topics too. It's often complicated and vague, a goal of mine is to make the conversation around responsible technology use more accessible to other people than scholars.
Combining my interests in ethics, new technology applications and participatory design in a multidisciplinary setting would be the ultimate project for me. The collaboration with RSL provides many different stakeholders from who I could learn a lot.

Some competencies I wish to develop / learning ambitions are:
- Apply the research-through-design approach in a more methodical way
- Learn to conduct ethnographic research
- Further develop my speculative design (elective completed) and prototyping skills to create experiental interventions
- Learn to create a design process for myself where I don't work in extreme sprints and high pressure, but calmy work towards smaller milestones



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B. INTERVIEW SETUP

Interview / observation plan – PU

The following questions and topics were roughly used in the explorative, semi-structured conversations and interviews with primary users. They were iterated upon.

An observation part was included with P6, to interact with a SDB myself and to gain more concrete, specific insights over recent experiences. Part 2 and Part 4 were only discussed with P6.

Introduction

- goal of research -> learn about your experience with SDB
- informed consent form
- thinking out loud
- explain goal: gain insights. All answers are valuable.

Part 1: contextual input

1. General
    a. Please share about your general experience with a smart doorbell
    b. What kind do you have? Why did you get it?
    c. What do you generally use it for?

2. Doorbell specific
    a. What does your doorbell see?
    b. What are the settings?

(Part 2: actual use of SDB + app)

1. Can you describe the use of the product?
    a. Physical product
    b. App
2. Task: can you show & tell me what happened when I rang the doorbell?
3. Task: can you tell me about a use instance earlier this week?
4. Task: future scenario. How would you use the SDB when:
    a. A friend is at front door
    b. A service worker is at front door
    c. Someone is at door unexpected vs expected
    d. A neighbour is at front door
    e. The doorbells motion detection goes off when someone walks by
    f. Household member at the door

Part 3: neighbourhood + awareness

3. Neighbourhood
    a. How long have you been living here?
    b. Do you know the neighbours? What level of contact? Describe interactions in the neighbourhood?
4. Data?
    a. Do you think about the data / recordings?
    b. What do you think happens to the data? Who can access your data?
    c. Do you ever review recordings?
5. Neighbours
    a. Do you record the neighbours? Do they know about this? Do they care?

6. What if's:
    a. You ring the bell at someone else's door and they have a SDB. What do you feel / think / do?
    b. Your neighbour records your door?
    c. Would your level of contact with neighbours make a difference?
7. Values
    a. What are benefits of the smart doorbell according to you? Benefits for who?
    b. What are potential harms of the smart doorbell according to you? Harms for who?
    c. What is important to you in your living area?

(Part 4: the product itself)

Me interacting with the product.

Interview questions – NPUs

General

- Age, gender, schooling, type of house, neighbourhood

Experience with smart doorbells

- What is your general experience with / opinion about smart doorbells?
- How did you know that the neighbours use a smart doorbell?
- Did your neighbours mention it, discuss?
    - What do you think about that?
- Do you know anything about the field of view?
    - What does the doorbell see?
- Have you ever interacted with a smart doorbell explicitly?

Neighbourhood:

- What does your house look like? Homeowner or renter?
- How long have you been living here?
- Do you know the neighbours? What level of contact? Describe interactions in the neighbourhood?
- Are you in any neighbourhood apps?
- Do you feel safe in your neighbourhood?

Critical awareness

- Do you think about the data / recordings of SDBs?
- What do you think happens to the data? Who can access your data?
- Have you ever seen recordings?

What ifs:

- Would you get a smart doorbell for your own home, why?
    - What would you use it for?
- Would you record the neighbours? How would you go about that?
- How would level / type of contact with neighbours make a difference in that?
- What do you feel / think / do when you ring someone's smart doorbell?

Values / needs:

- What are benefits of the smart doorbell according to you? Benefits for who?
- What are potential harms of the smart doorbell according to you? Harms for who?
- What is important to you in your living area?

C. INSIGHT CARDS

General observation

Misuse & distrust

Participants fear that SDB can misuse data, leading to distrust. Some participants don't want to be dependent on the companies.

Related to

Honesty | Autonomy

NPU | 4/4

Theme

No consent

The SDB records non-primary users without their consent or knowledge.

Related to

Democracy | Transparency

1 NPU

General observation

Wanting to secure property in a safe neighbourhood

A benefit mentioned is that the SDB can enhance property security, while these same participants report their neighbourhood to be very safe.

Related to

Safety

PU & NPU

General observation

Mention own values

Any benefit or harm resulting from the SDB was related to PUs themselves. Their **own privacy** was mentioned, or how setting privacy zones helps **them** to receive less notifications.

Related to

Convenience | Idividualism | Empathy

3 PU

General observation

Knowledgeable & little care

One participant did know a lot about the big FoV, but had never gone through the settings before. They felt **the information recorded was not sensitive enough to care** about it.

Related to

Empathy | Knowledge

1 PU

General observation

Little critical awareness

Many PU don't think about any harms or consequences, they just install the SDB and start using it.

Related to

Convenience | Knowledge

3 PU & 1 NPU

General observation

Little SDB knowledge

Some PU & NPU have little knowledge about SDBs. This is related to the way it works, data, legislation and recognising a SDB.

Related to

Knowledge

2 PU & 1 NPU

General observation

What does the SDB capture?

NPU have no idea about what their neighbour's SDB captures, who has direct access to the data and whether it is even allowed.

Related to

Transparency | Knowlege | Control

4 NPU

General observation

Critical awareness increases over time

Participants' critical awareness about the SDB gradually increased throughout the interviews. Thinking about the topic and discussing it made them reflect more critically.

Related to

Knowledge | 1 PU & 2 NPU

General observation

Investing in neighbours is less important when the situation is temporary

Related to

Social harmony | Convenience

2 PU | Button

General observation

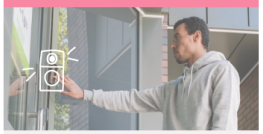
Increased self-awareness

People can experience an increased self-awareness when waiting in front of someone's SDB, because they know they could be watched. They might change their behaviour.

Related to

2 PU & 1 NPU

General observation



Not aware of SDB

Some people are not aware of the SDB in general, don't think about the fact that the owner can see them or don't mind that.

Related to

PU & NPU

General observation

What happens to the data?

Some NPU & PU know there is a lot of data, but have no idea what happens to it. Which third parties might have access? How will they use my data?

Related to

Knowledge | Control | Transparency

Interviews | 3 NPU & 1 PU

Personal factor / important

Be reachable 24/7

Primary users want to be reachable at all times, also when they are in the middle of something or are not at home.

Related to

Be reachable | Control

4 PU

Personal factor / important

Protecting belongings

Two NPU (but potential PU) mentioned protecting belongings as a valid reason to use a SDB. They call it safety, but will be referred to as 'property security'.

Related to

Property security

NPU

Personal factor / important

SDB is unneccessary

The SDB adds many advanced, smart features that are not neccessary. They don't need facial recognition, to see who is there when they're not home or to instruct a delivery person.

Related to

Be reachable | Control

3 NPU

Personal factor / important

Wanting to feel safe

People want to feel safe, or can imagine that others want that. The SDB can aid people in feeling safe.

Related to

Safety

4 PU | 2 NPU

Personal factor / important

Price-value ratio

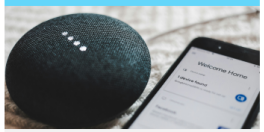
SDB's are seen as costly. The price-value ratio is a factor in deciding which doorbell to choose, especially when a monthly paid subscription is also needed.

Related to

Informed decision making

3 PU & 1 NPU

Personal factor / important



SDB as gadget

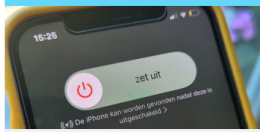
For some people, the SDB is a fun gadget as addition to their smart home system, or just because it's possible. Some would like to tinker with the system.

Related to

Fun | Autonomy

1 PU & 2 NPU

Personal factor / important



Don't want to know what is happening 24/7

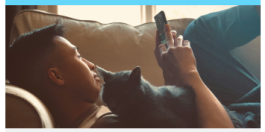
Mainly NPU don't want to always know what is happening around them. They don't always need to be reachable or don't want to hear about everything that is 'wrong'.

Related to

Knowledge | Individuality

1 PU | 3 NPU

Personal factor / important



Convenient

A SDB is convenient for receiving packages or 'peeking' through the door from a distance. People can interact with their front door at any time, from anywhere.

Related to

Convenience

4 PU | 2 NPU

Personal factor

Worrying or accepting

Many participants were concerned when reflecting critically about SDBs. Some have accepted the presence of sensors and rather accept it, as they can't do anything about it.

Related to

Knowledge | Acceptance | Power

NPU & PU | General observation

Physical / situational factor

Curiousity <-> type of living area

In really busy areas where many people walk by, people don't want to be notified of everyone. In residential areas people might be more interested in who is passing.

Related to

General observation | 2 NPU & 1 PU

Physical / situational factor

Alone or at night

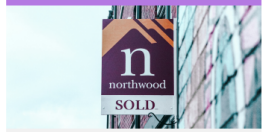
Please add your content here. Keep it short and simple. And smile :)

Related to

Safety | Tag 2 | Tag 3 | Tag 4

PU & NPU | Females

Physical / situational factor



Permanent residence

Whether people live somewhere temporarily or permanent influences the effort they are willing to put into relationships, as well as the time that they have been living there.

Related to

Social harmony | Effort

2 PU | General observation

Physical / situational factor

Physical solutions

Some participants mentioned physical solutions to ensure privacy. Like walking around it, not clicking the bell, hanging curtains, placing an object in the FoV and making an independent system themselves.

Related to

Autonomy | Power

2 PU & 1 NPU

Feeling

Powerless

Knowing that others can watch you unseen, and knowing that your data is in SDB companies' hands makes people feel powerless.

Related to

Autonomy | Control | Power symmetry

3 NPU

Feeling

Uncomfortable

Some people feel uncomfortable knowing there is footage of them out there, maybe in a facial recognition database, that could potentially harm them.

Related to

Autonomy | Knowledge | Power asymmetry

NPU

Benefit

Informed decision making

The SDB allows for informed decision making. After checking the camera, they can decide whether to open the door, putting them in charge.

Related to

Control | Convenience | Safety

Not interrupting work | 2 PU & 2 NPU

Benefit

Increases safety

The SDB can serve as deterrent if people are aware they are being filmed and can help in gathering proof of misdemeanors.

Related to

Safety | Property security

2 PU & 1 NPU

Benefit

Light-hearted interactions

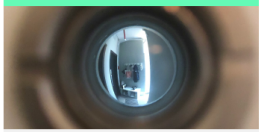
The SDB facilitates light-hearted interactions, where users have fun with the SDB. Reviewing footage can also be amusing.

Related to

Fun

4 PU

Benefit



Peeking through door

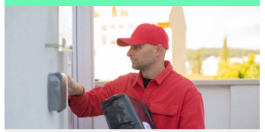
SDB allows for 'peeking' through the door. Based on this, they can make an informed decision to open the door or not.

Related to

Convenience | Safety | Autonomy

PU

Benefit



Interact with delivery workers

PUs can interact with delivery workers through the doorbell and tell them where to leave the package.

Related to

Convenience

3 PU | 1 NPU

Benefit

Answer the door from anywhere

The SDB allows PU to answer their door from anywhere. They might not hear the bell when in their garden or upstairs, or because they are not at home.

Related to

Convenience | Freedom

4 PU | 1 NPU

Social factor

Relationships in the neighbourhood are important

Maintaining (superficial) relationships with neighbours is important. People like knowing there is someone closeby they could rely on if something happens.

Related to

Social harmony | PU & NPU

Social factor

Barriers to discuss SDB

There are barriers to discuss the SDB with neighbours, from both the PU & NPU.

Related to

Social harmony | Freedom | Knowledge | PU & NPU

Barrier

Don't want to make a fuss

P7 was not concerned enough to directly approach the neighbour. They don't want to make a big thing out of it. A **casual meeting** would be better to discuss it.

Barrier

Conversation = asking permission

P9 mentioned that discussing with the neighbour would be like asking for permission indirectly. What happens when they say no?

Barrier

Moving SDB after installing is a hassle

P4 mentioned they are not sure whether it is allowed or not. If someone were to object the SDB, they'd have to move it, and that's a hassle. The interviewed export also mentioned this, PUs already made the investment of buying and installing the SDB.

Harm

Constant social control

The SDB facilitates constant monitoring, which can lead to constant social control in the neighbourhood.

Related to

Control | Live unbothered | Freedom | 2 NPU

Harm

Privacy infringed

The SDB can infringe people's privacy.

Related to

Privacy | Live unbothered | PU & NPU

Harm

Normalisation of monitoring

There are cameras everywhere nowadays. Some participants expressed they want to be on the street without always being monitored.

Related to

Dependence | Privacy | Power | 2 NPU

Harm

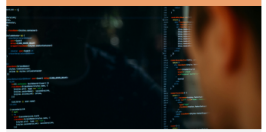
Harming neighbour relationship

Recording the neighbour, or the neighbour having recordings of things you do, could change and damage the dynamics of the relationship.

Related to

Social harmony | 2 NPU

Harm



Leaking data

Participants fear that the SDB could be hacked, and data can be leaked to malicious people who might use it against people.

Related to

Safety | Security | Control | PU & NPU

Harm

Consequences to being recorded

SDB footage might have consequences, depending on what is captured. (Sensitive) material might be used against them.

Related to

1 PU & 2 NPU

Tension

Autonomy for PU removes autonomy for NPU

By deciding to have a SDB, PUs take away the freedom to not participate and subject them to surveillance.

Related to

Autonomy | Empathy | Equality | General observation

Tension

Internal tension: personal benefit <-> harms to others

Individuals want a SDB, while being aware it might harm others. They wouldn't want to be recorded themselves without their consent.

Related to

Autonomy | Empathy | Equality | 1 PU | 1 NPU | General observation

Tension

Internal tension: happy with SDB data but also uneasy about data storage somewhere

People can be very happy with the footage the SDB provides, while uneasy feelings and insecurity about data storage can exist too.

Related to

Transparency | Power | PU

Tension

Internal tension: "it's just a video", but is it just a video?

Being more aware about the SDB led a parcipant to reflect on this. They don't want to make it too big, but wonder whether they should at the same time.

Related to

Knowledge | NPU | Button

Tension

Worrying vs. accepting

Many participants were concerned when reflecting critically about SDBs.
Some have accepted the presence of sensors and rather accept it, as they can't do anything about it.

Related to

Knowledge | Acceptance | Control | NPU & PU | General observation

Tension

Contradictory policy: privacy is important - not regarding SDB

Privacy legislation is strict for many things, while it seems to be ignored with the SDB. "You can't just take pictures of people without their consent, but you can just film them?"

Related to

Privacy | NPU

Value

Control

Having the power to influence or direct people's behaviour or the course of events.

Related to

PU & NPU

Tension

Perceived safety vs. actual safety

Participants value safety (mentioned SDB benefit), while the Netherlands is a very safe country.

Related to

Safety

PU & NPU | General observation

Tension

Neighbours watching out for or watching over

The SDB facilitates new ways of watching out for neighbours, or watching over them. Some people feel watched, others don't.

Related to

Social harmony | Live unbothered

2 PU | 3 NPU

Tension

Who is responsible for SDB privacy?

Some PU's state neighbours are responsible for their own privacy or approaching them to discuss the SDB. Others would discuss it proactively.

Related to

Social harmony | Individualism

4 PU

Tension

Little neighbour contact, but it is important

Participants mentioned to have little contact with neigbhours, but also to value maintaining relationships. When there is no relationship, they don't have to maintain it.

Related to

Social harmony | Effort | Live unbothered

PU & NPU | General observation

Tension

Living unbothered vs. social harmony

Participants mentioned to have little contact with neigbhours, but also to value maintaining relationships. When there is no relationship, they don't have to maintain it.

Related to

Social harmony | Effort | Live unbothered

PU & NPU | General observation

Value

Social harmony

Living together with neighbours peacefully.

Related to

NPU mainly

Value

Privacy

A state where someone is not observed or disturbed by other people.

Related to

NPU mainly | PU

Tension

Dialogue around SDB

Some people think the SDB should be a democratic decision (involving neighbours), others don't.

Related to

Democracy

PU & NPU

Tension

When knowledge increases, so does uncomfortableness

When participants were more aware, they felt more uncomfortable and more questions came up. How much knowledge is needed to be aware & not feel uncomfortable?

Related to

Knowledge

PU & NPU | General observation

Value

Property security

Preserve and maintaining the things that are important to you.

Related to

PU

Value

Fun

Having enjoyable, amusing or light-hearted interactions.

Related to

PU

Value

Be reachable

Be reachable for others at any time, anywhere.

Related to

PU

Value

Safety

Being protected from danger or risk.

Related to

PU

Need

Knowledge about SDB

People need a bigger understanding of the SDB does, what happens to their data and why they should care.

Related to

Transparency | Knowledge

General observation

Need

Access to footage

People want to have access to the footage that is recorded of them.

Related to

Transparency | Control

NPU | General observation

Need

Transparency over data

People want to know what happens to their data. Who has access? What do companies do with it?

Related to

Transparency | Knowledge

NPU

Need

Control over data

People want to be in charge over what happens to their data. They want to decide who can do what with it.

Related to

Control | Transparency | Power

PU & NPU

Need

Option to not participate

People want to be able to not participate in datafication of society.

Related to

Freedom | Power

NPU | General observation

Value

Live unbothered

Being able to live life the way they want to, without being bothered by others.

Related to

PU | NPU mainly

Value

Independence

Not being dependent on big companies or other people.

Related to

NPU & PU

Value

Individualism

Favouring individual benefits over collective benefits.

Related to

PU

Value

Honesty

Communicating in an honest and fair way. Absence of deception.

Related to

NPU & PU

Value

Convenience

Mentioned by primary & non-primary user, experienced by primary user.

Related to

PU & NPU | 8/8

Value

Transparency

Regarding smart doorbell companies and the black box that is the SDB.

Related to

PU & NPU

Value

Autonomy

Having the freedom and power to make informed decisions independently.

Related to

PU mainly

Insight cards picture references:

- misuse & distrust: Afbeelding van Merlin Waldhör via Pixabay
- no consent: Photo by Sollange Brenis on Unsplash
- peeking through door: Photo by Blogging Guide on Unsplash
- protecting belongings: Photo by Ilnur Kalimullin on Unsplash
- wanting to feel safe: Photo by Julian Bock on Unsplash
- Alone or at nigth: Photo by Frederico Almeida on Unsplash
- informed decision making: Photo by Kev Costello on Unsplash
- harming neighbour relationships: image generated with Freepik Image generator
- leaking data: Photo by charlesdeluvio on Unsplash
- powerless: Photo by Ethan Sykes on Unsplash
- internal tensions: Afbeelding van Arek Socha via Pixabay
- democratic decision: Photo by Antenna on Unsplash
- normalisation of monitoring: Harvey, G. (2020). Cute videos, but little evidence: Police say Amazon Ring isn't much of a crime fighter [Graphic]. https://www.nbcnews.com/news/all/cute-videos-little-evidence-police-say-amazon-ring-isn-t-n1136026
- increases safety: https://community.security.eufy.com/t/share-a-porch-pirate-video-to-win-a-all-new-smart-drop/299598
- lighthearted interactions: Photo by Karthik Balakrishnan on Unsplash
- price-value ratio: Afbeelding van Mohamed Hassan via Pixabay
- sdb as gadget: Photo by BENCE BOROS on Unsplash
- neighbour watching out for or watching over: image generated with Freepik image generator
- permanent residence: Photo by Different Resonance on Unsplash
- temporary living situation: brainbay. (2021, 13 oktober). Wat huur je in Nederland voor 1.000 euro? - brainbay. Brainbay. https://brainbay.nl/nieuwsbericht/wat-huur-je-in-nederland-voor-1-000-euro/
- convenience: Photo by Erica Marsland Huynh on Unsplash
- increased selfawareness: Image by KamranAydinov on Freepik
- not aware of doorbell: Foto door cottonbro studio: https://www.pexels.com/nl-nl/foto/huis-woning-staand-rugzak-4604651/
- dont want to know what is happening 24/7: self made picture
- wanting to secure property in safe neighbourhood: Photo by Fons Heijnsbroek on Unsplash
- mention own values: Claytor, T. (2020, 3 september). 3 Ways to Become the Centre of Attention - wikiHow. wikiHow. https://www.wikihow.com/Become-the-Centre-of-Attention
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- barriers : Image by 00luvicecream from Pixabay
- physical solutions: Photo by Wade Lambert on Unsplash
- critical awareness: Photo by Mimi Thian on Unsplash
- uncomfortable: Photo by boram kim on Unsplash
- constant social control: Image by freepik
- delivery workers: Foto door Kampus Production: https://www.pexels.com/nl-nl/foto/man-vent-kerel-iemand-6667681/
- answer from anywhere: Photo by Josh Wilburne on Unsplash
- relationships in the neighbourhood: Friar, S. (2019, 29 juli). Take Five: Inspiring stories of neighbours coming together. Nextdoor Blog UK. https://blog.nextdoor.co.uk/2019/07/25/take-five-inspiring-stories-of-neighbours-coming-together/
- SDB unneccesary: Foto door RDNE Stock project: https://www.pexels.com/nl-nl/foto/vrouw-mevrouw-vasthouden-logo-7363079/
- curiousity type of living area: Photo by VENUS MAJOR on Unsplash
- privacy infringed: Afbeelding van Chris Sansbury via Pixabay
- tension living unbothered & neighbour contact important: Friar, S. (2019, 29 juli). Take Five: Inspiring stories of neighbours coming together. Nextdoor Blog UK. https://blog.nextdoor.co.uk/2019/07/25/take-five-inspiring-stories-of-neighbours-coming-together/
- always reachable: Photo by Daria Nepriakhina on Unsplash

Value card denifitions through Oxford Languages

D. AUTO-ETHNOGRAPHIC ACTIVITY

To get a better understanding of smart doorbell from the perspective of a primary user, I planned to install a doorbell temporarily myself. Some guiding questions to this experiment were:

- How does the doorbell itself work? Is it easy / difficult to set up, change settings?
- How do I respond to doorbell notifications?
- How would my housemate interact with the smart doorbell?
- How would I discuss this with my neighbours? Or when I don't, would they mention it and approach me?

The idea was to hang the doorbell, let me and my housemate interact with it for a while and reflect on what that did to us and the at the moment non-existent relationship with our neighbours. Setting the doorbell up was not that difficult, but I couldn't find settings for privacy zones. I later found out that these are probably not available for this model.

I however felt very reluctant to install it and kept delaying the start of the auto-ethnography. It didn't feel right to install it considering everything I had learned about the SDB so far. In our type of apartment complex, I would be able to see everything the neighbours across would be doing, as there are big windows without any coverings.
The field of view reached as far as 2 floors above that. Adding the neighbours next door and anyone who would have to pass our house to get to the elevator, we would have a good view of at least 7 households.
When realising that, I played with the idea to install a dummy and interview my neighbours about that, but I also felt reluctant to that. Again, I kept on delaying this experiment and wondered why I wouldn't just talk with them about it. This is when I realised there were many barriers to discussing the smart doorbell, something that I was also able to clearly identify in the research in cycle 1.
Ultimately, I remained very uncomfortable with the smart doorbell. It won't help that I personally have no intrinsic motivation to use this doorbell, other than for research. I did not talk to my neighbours, as I had no clue what I would say to them, and what that would bring me. I don't even know them. The couple next to me moved in this time and I didn't even realise new people had moved in already. Even though my housemate and I both had absolutely no relationship with these people, it mattered to us both what they would think of my smart doorbell, if we were to install it or discuss it with them. I did not want to introduce myself for the first time, and then already cause an awkward moment due to this doorbell.
After weeks of delaying to hang the SDB, I decided to scratch the experiment.

Even though I did not do anything with my neighbours, these reflection exercises provided me with valuable insights. The barriers for dialogue can be very high, even when there is absolutely no relationship. The reflections also provided valuable inspiration for the sensitising materials used in the next research activity, the scenario-based roleplaying.

E. SCENARIO-BASED ROLEPLAYING SETUP & MATERIALS

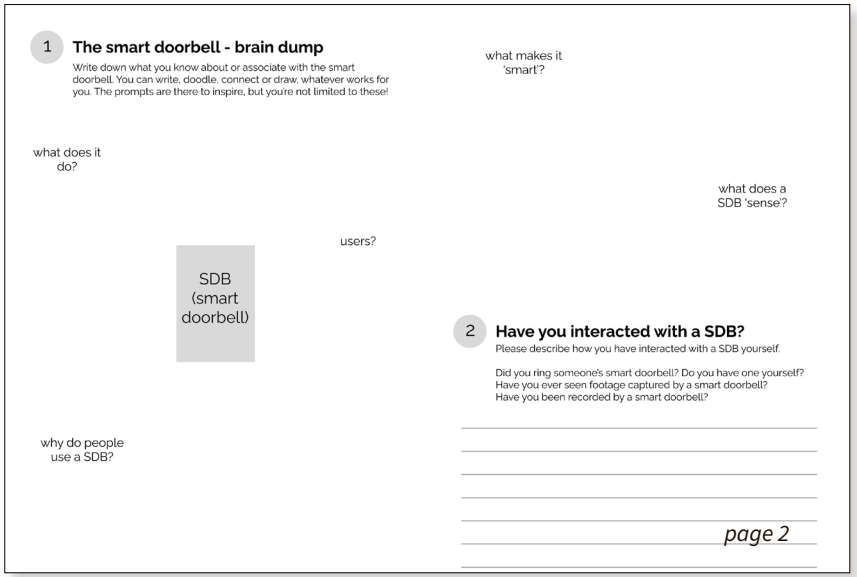
Scenario-based roleplaying setup

This appendix describes the setup of the scenario-based roleplaying study, as well as the materials used.
Some images showing field of view (in sensitising material & phone notification image) were taken from SDB video's found on Dumpert, taking care to blur all people and other identifiable information.

1. Sensitising

Each participant did a sensitising activity prior to the session. They received a booklet that they could print, fill out digitally or read when they had little time available.

They were first asked about their current understanding of and associations with the topic. Next they could read some information and watch a short video. This was followed by some reflection exercises about their own neighbourhood, their neighbours and what is important to them in their neighbourhood.



1 **The smart doorbell - brain dump**

Write down what you know about or associate with the smart doorbell. You can write, doodle, connect or draw, whatever works for you. The prompts are there to inspire, but you're not limited to these!

what makes it 'smart'?

what does it do?

what does a SDB 'sense'?

users?

SDB (smart doorbell)

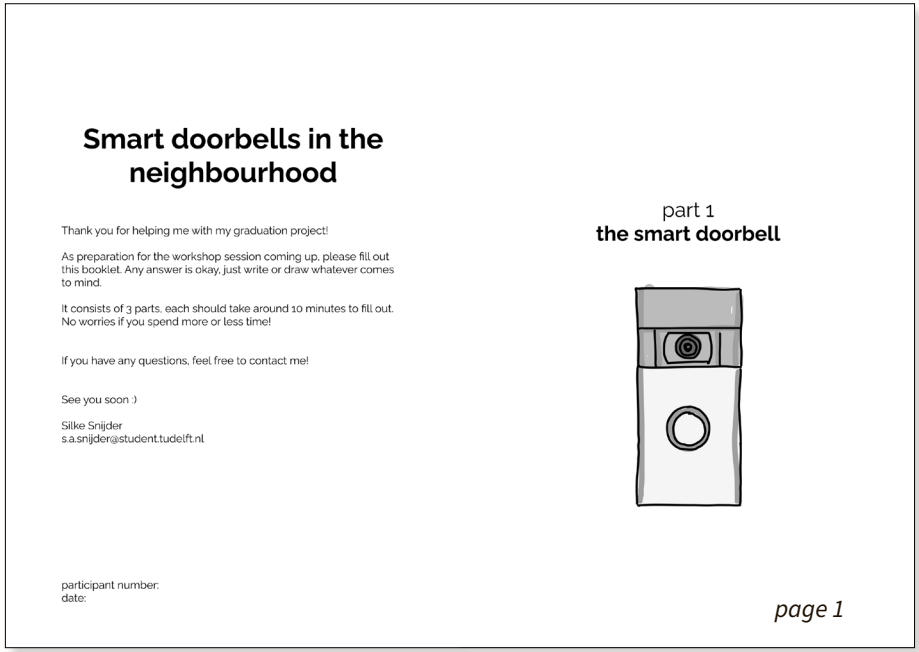
why do people use a SDB?

2 **Have you interacted with a SDB?**

Please describe how you have interacted with a SDB yourself.

Did you ring someone's smart doorbell? Do you have one yourself?
Have you ever seen footage captured by a smart doorbell?
Have you been recorded by a smart doorbell?

page 2



Smart doorbells in the neighbourhood

Thank you for helping me with my graduation project!

As preparation for the workshop session coming up, please fill out this booklet. Any answer is okay, just write or draw whatever comes to mind.

It consists of 3 parts, each should take around 10 minutes to fill out. No worries if you spend more or less time!

If you have any questions, feel free to contact me!

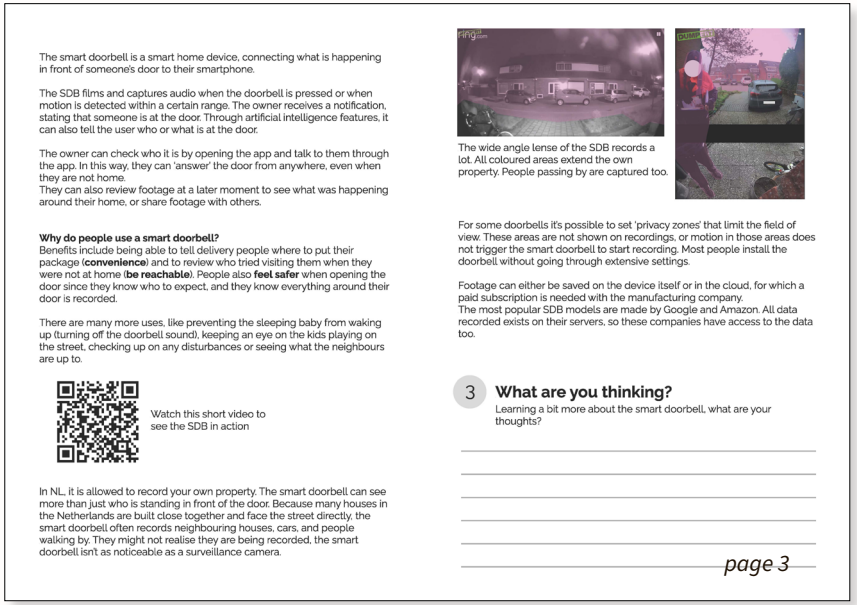
See you soon :)

Silke Snijder
s.a.snijder@student.tudelft.nl

participant number:
date:

part 1
the smart doorbell

page 1



The smart doorbell is a smart home device, connecting what is happening in front of someone's door to their smartphone.

The SDB films and captures audio when the doorbell is pressed or when motion is detected within a certain range. The owner receives a notification, stating that someone is at the door. Through artificial intelligence features, it can also tell the user who or what is at the door.

The owner can check who it is by opening the app and talk to them through the app. In this way, they can 'answer' the door from anywhere, even when they are not home.
They can also review footage at a later moment to see what was happening around their home, or share footage with others.

Why do people use a smart doorbell?
Benefits include being able to tell delivery people where to put their package (**convenience**) and to review who tried visiting them when they were not at home (**be reachable**). People also **feel safer** when opening the door since they know who to expect, and they know everything around their door is recorded.

There are many more uses, like preventing the sleeping baby from waking up (turning off the doorbell sound), keeping an eye on the kids playing on the street, checking up on any disturbances or seeing what the neighbours are up to.

Watch this short video to see the SDB in action

In NL, it is allowed to record your own property. The smart doorbell can see more than just who is standing in front of the door. Because many houses in the Netherlands are built close together and face the street directly, the smart doorbell often records neighbouring houses, cars, and people walking by. They might not realise they are being recorded, the smart doorbell isn't as noticeable as a surveillance camera.

The wide angle lense of the SDB records a lot. All coloured areas extend the own property. People passing by are captured too.

For some doorbells it's possible to set 'privacy zones' that limit the field of view. These areas are not shown on recordings, or motion in those areas does not trigger the smart doorbell to start recording. Most people install the doorbell without going through extensive settings.

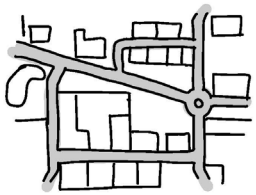
Footage can either be saved on the device itself or in the cloud, for which a paid subscription is needed with the manufacturing company.
The most popular SDB models are made by Google and Amazon. All data recorded exists on their servers, so these companies have access to the data too.

3 **What are you thinking?**

Learning a bit more about the smart doorbell, what are your thoughts?

page 3

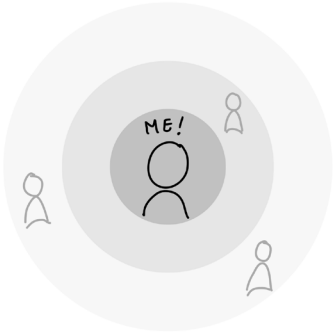
part 2
your neighbourhood



page 4

1 My neigbhours

Who lives around you? What kind relationship do you have with them? Draw yourself and your neighbours around you.



2 Communication

How do you communicate with your neighbours? Write or draw!

3 Memorable moment

Think back about a specific thing that happened in your neighbourhood. It can be anything, good, bad, neutral, what comes to mind?

page 5

part 3
what matters to you?

page 6

1 The perfect neighbour

How does the perfect neighbour behave? In what way do you have contact? Write, draw, doodle.

2 The nightmare neighbour

How does the worst neighbour ever behave? In what way do you have contact?

3 What is important to you?

Here are some sliders with opposing statements. Draw a dot on anywhere on each slider, representing which fits you better.

social contact with neighbours	———	living unbothered
making autonomous decisions	———	making democratic decisions
being reachable 24/7	———	being able to be unreachable
protecting people's privacy	———	ensuring a safe neighbourhood
watching out for the neighours	———	watching over the neighbours

3 What do you value?

Circle the values you resonate with from this word cloud. Or write other values that are important to you!

page 7

2. The roleplaying sessions

Three roleplaying sessions took place, two with 3 participants and one session with 2. The first session was the pilot and therefore consisted of other design students, but still provided valuable insights. These insights were analysed with the rest of the data.

A set of 13 different scenarios was created, which were formulated as neutral as possible to not already hint at specific action. About 8 scenarios were discussed thoroughly in each session. In discussing the scenarios, they sometimes named another one themselves and continued to discuss that.

The scenarios were inspired by the categories of monitoring as defined by Tan et al. (2022), stories heard when talking to people, examples read about online and the many smart doorbell videos seen.

The first category (1.1 – 1.3) was meant to be an easy starting point for each session. They describe different ways in which someone could become aware of the SDBs presence.
The second category was aimed more towards exploring potential reviewing of footage, when there is a very clear need to (2.2.) or not at all (2.1). Scenario 2.2 was not played out, as not a lot of tensions were expected here. Participants in the interviews had already mentioned what they would do in this scenario.
Category 3 is the biggest, there is more overlap in the types of monitoring in these scenarios. They explore some interactions that could create tension between neighbours, to provoke the participants a bit. What happens when the PU has increased knowledge about certain things because of the SDB?
Scenario 4.1 aimed to explore undirected monitoring, casually spying and peeking, to find out what kind of knowledge and behaviour is still acceptable and how participants would deal with this tension.
The two scenarios about moving (5.1 & 5.2) were used to close the session off with. These were guided by the question whether a person has 'social rights' to object or not agree with the existing SDB use when they just moved into a new neighbourhood.

The set of scenarios was broad and included many other factors (see Chapter 4), hoping to gain insights about whether and how the PU or the NPU would initiate contact, and how both would deal with the tensions that may arise.

The scenarios, 1.1 and 2.2 were not played out in the sessions.

During each session, the participants first signed their consent forms after explanation of the research. Audio was recorded and some pictures were taken.
To structure the sessions, a guideline document was made, the scenarios that thought most important to play out are marked. Notes were taken in a specific notetaking document. These two documents include the 'provocation questions', as inspired by Luria et al. (2020).

The participants were given actor role cards, that they could stick on their tshirt. These roles changed every couple of scenarios (after every scenario was too fast), and went natural after a few times.

For each scenario, the neighbourhood was explained through a map, which indicated which neighbour lives where. Other images were also used to show the type of houses (facing the road, with neighbours closeby).
A doorbell mockup was 'installed' during the sessions near a door, so participants could easily act out scenarios if they wanted.

For scenario 1.3 a paper smartphone prop was created. This was given out to the neighbours receiving the message. There was also a bigger version available of the message itself to be able to 'zoom' in on the picture if they wanted to.

Time	What	Things to say	Why	Practical notes
Before session	0. Send out sensitising materials .	0. Some context and how to fill it out.	Start their thinking and give them a little knowledge about the topic.	
		Scenario-based roleplaying session		
10-15 min	**Introduction** Introduction, welcome Consent forms Explanation Icebreaker	1. Welcome, introduce the project. 2. Present consent form, explain what will be captured and how it will be used. General questions about age, previous experience SDB. 3. Introduce goal & plan of the session: - gather insights on how social dynamics with neighbours work around SDB. No pressure, any information is useful. - session divided in roughly 3 parts. 2 parts with roleplaying, 1 for collective reflection. Each scenario starts with division of roles & scenario card, and ends with some reflection questions. 4. Questions? 5. Physical icebreaker	Informed consent & practical information. Physical icebreaker -> to start moving and do some weird stuff together.	0. Hang doorbell & setup camera 1. Give out snacks and drinks 2. Have everyone sign the consent forms.
30 min	**Part 1: Scenarios**	Explain the materials. If you are the SDB owner: imagine why you would use the SDB. Control over your surroundings, convenience, safety, casual peeking, etc. In the roleplaying, reason from this perspective.		1. Start voice recording 2. For each scenario: divide roles, show map, read out scenario card.
	1.1 Neighbour rings PU's SDB		Noticing a new sound -> is trigger to approach?	1. Present map 1. 2. Play audio sound
	1.2 Walking by SDB	Should the smart doorbell communicate with the users? How?	Relevant, maybe feels vulnerable due to bathrobe situation. Insights on if, how and what the SDB should communicate to users.	0. Divide roles. 1. Present neighbourhood map 2. Show front door image of lighting up
	1.3 SDB footage shared	Should neighbours be able to access each others' information? Through the smart doorbell? Does the access depend on the role in the neighbourhood?	Interesting because they can spot themselves, maybe the first time they have some sort of access to footage. How do they respond to having temporary access & a little more knowledge?	0. Divide roles. 1. Present neighbourhood map 2. Give neighbours the phone notification

Session guideline document

Session guideline document

	2.1 What does it record?	What is motivation to go address SDB? What are drivers? What would be barriers to address SDB?	How do people approach the neighbours without any clear trigger or reason? Just based on curiosity?	0. Divide roles. 1. Present neighbourhood map
	2.2 Stolen bike		How do they approach conversation with a clear reason? Easier?	
	3.1 Neighbour coming home	How would it feel when the neighbour unexpectedly communicates through the SDB, indicating they have been watching for a while? Should the smart doorbell initiate contact with the users?	What happens when the PU unexpectedly communicates through the SDB with the neighbour?	0. Divide roles. 1. Present neighbourhood map
	3.2 Neighbours arguing	How would it make you feel to be able to eavesdrop on your neighbour? How would that impact the way you interact with them?		0. Divide roles. 1. Present neighbourhood map
15 min	**Break**			
30 min	**Part 2: Scenarios**	**Reflection questions**		
	3.3 Strange visitors	Should the smart doorbell provide information when the owner wants to know about the neighbours' activity? Should the smart doorbell provide information when the neighbour wants to know about the owners activities?	Over time, capturing 'strange visitors'. What happens directly, and longer term?	0. Divide roles. 1. Present neighbourhood map
	3.4 Strange neighbours	What would you do when you capture your neighbour acting strange? In what way should you be allowed to use the footage?	Capturing your neighbour behaving in a 'weird' way, (how) do you approach them?	0. Divide roles. 1. Present neighbourhood map
	3.5 Kattenkwaad	Should the smart doorbell refuse to show footage in specific situations? In whose favour? SDB owner of neighbours?		0. Divide roles. 1. Present neighbourhood map
	4.1 Checking	Do you feel watched? Is it watching out for or watching over? Should the SDB be allowed to help users in watching out for / watching over people?	When is it watching out for and when is it watching over?	0. Divide roles. 1. Present neighbourhood map
	5.1 Moving – no SDB	Who decides whether SDBs are 'allowed' in the neighbourhood? Should the smart doorbell consider hierarchy and roles within the neighbourhood?		0. Divide roles. 1. Present neighbourhood map
	5.2 Moving – SDB everywhere	Do you have a right to object all the SDBs as a newcomer? Should the smart doorbell consider hierarchy and roles within the neighbourhood?		0. Divide roles. 1. Present neighbourhood map
16:30	General reflection	Provocation questions		
30 min	Discuss the scenarios and topic.	What did you think? Please share your thoughts. *Initiative & responsibility:* Who should be the one to address the smart doorbell? The user or the neighbour? Or the smart doorbell? Or another actor? Should the SDB initiate contact with the users? *Value conflicts:* What happens in case of value conflict? Should the SDB take sides in case of a conflict? Should the smart doorbell refuse to show footage in specific situations? In whose favour? SDB owner of neighbours? Should the SDB be allowed to help users in watching out for / watching over people? *SDB as 'object with intent':* What if the SDB were to have agency? Should the smart doorbell be capable of making judgements in showing users footage or not? Should the SDB have a 'moral' guideline it goes by?	Open discussion about the topic. Reflection on the roleplaying. Some more provocative questions.	0. Move back to table, take props. 1. Open conversation 2. Provocation questions

F. FIFTH CONCEPT - DOORBELL CARE

- This concept aimed to explore different ways of care for the smart doorbell, and through that care for neighbours. The PU would need to include the neighbours in different ways around their smart doorbell, to create some sense of shared decision making or care for smart systems in the neighbourhood.
- When setting up the SDB, it detects all Wi-Fi networks in range. Rather than just picking your own network, it needs access to at least 3 others too. This would force the PU to approach their neighbours and talk about why they would like to install this SDB. Resulting, NPUs would gain some control too, as they can choose to disconnect the doorbell from their network.
- The physical smart doorbell lens would deteriorate after a while, obstructing the view, rendering the doorbell 'useless'. To replace the lens, the PU could need help / permission from the connected neighbours as a way to again realign and discuss the SDB.
- The activity of cleaning something was also used as another form of maintenance. When the memory card in the device is full, it would need to be physically cleaned. This activity would let PUs reflect on the amount of data that is collected and show them that storage is not unlimited.

For this concept, I prototyped different kinds of lenses, maintenance kits, storage cleaning mechanisms, etc (see imagine below for some examples). I really wanted to make this concept work as the maintenance part would allow for continuous dialogue and reflection, rather than just once when setting a smart doorbell up.

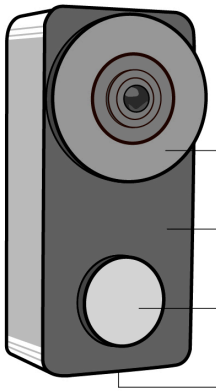
supervisors The idea of not aligning and discussing the SDB with neighbours once, but continuously is interesting about this concept. It could indeed be achieved through some different type of maintenance.

This concept didn't really work out however. I couldn't connect the different elements in a logical way, and I decided to focus on developing and prototyping the other concepts.

G. INSTRUCTION MANUAL

the___doorbell

INSTRUCTION MANUAL



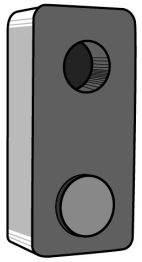
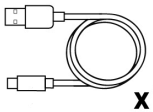
2 INTERCHANGEABLE LENS

1 DOORBELL BODY

3 DOORBELL BUTTON

4 POWER SUPPLY

LIST OF PARTS

1 DOORBELL BODY	4 POWER CABLE	2.1 SOCIAL LENS
 x1	 x1	 x1
2.2 HONEST LENS	2.3 CURIOUS LENS	
 x1	 x1	

1. WATCH **CONCEPT VIDEO**

Watch this speculative concept video to learn more about **the ___ doorbell**.

It's best to view it on a computer screen. You can watch alone or with others.

2. PAUSE & **THINK**

What is going through your mind after watching this video, showing three **fictional** smart doorbells?

Imagine yourself as a smart doorbell owner, neighbour without smart doorbell, or both.

3. REFLECT: THE **SOCIAL** DOORBELL

How would it feel to be greeted by a smart doorbell?

In what way do you have contact with your own neighbours?

Should smart doorbells be able to "intervene" to create a more connected neighbourhood?

3. REFLECT: THE **HONEST** DOORBELL

Are there any smart doorbells in your neighbourhood?
What do you think they can see and hear?

What happens to footage that is recorded by smart doorbells in your neighbourhood? Is it stored locally or in the cloud? For how long?

Who has access to the smart doorbell footage?
Who should / should not have access?

3. REFLECT: THE **CURIOUS** DOORBELL

Is the smart doorbell helping neighbours to **watch out for** each other?
Or is it helping to **watch over** them?

Should smart doorbells be able to "intervene" to create a more caring community?

What should the boundaries for the use of data and patterns collected by the smart doorbell be? How would you decide that in your neighbourhood?

3. REFLECT: **YOUR NEIGHBOURHOOD**

Would you use any of these smart doorbells? What would it be like if your neighbours did?

Would you talk to your neighbours about smart doorbells?

4. **DIALOGUE** WITH NEIGHBOURS

These three fictional doorbells can help you think about your personal and neighbourhood boundaries around the use of smart doorbells.

Being a bit more aware of potential consequences of using a smart doorbell, you might want to talk to your neighbours. Talking about this topic can be tricky though, there are all kinds of barriers in the way of a constructive conversation.

"I don't even know what the doorbell records"
"I don't want to make a fuss"
"I can't change it anyways"
They spent a lot of money on that doorbell"

"Why ask or discuss with neighbours, everyone just installs it"
"What if they think I want to spy on them? I'll just not tell them about the smart doorbell"

4. **DIALOGUE** WITH NEIGHBOURS

Approach neighbours in a **casual** way.

Start with a simple question or comment when you run into them on the street.

Start from **curiousity, without judgement.**
Ask for information about:
- field of view?
- is it always recording, or only when pressed?
- how is data stored, for how long?
- who has access?

Reason based on your **values**.

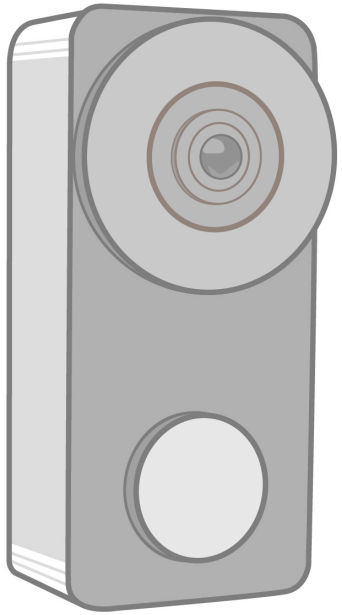
- why is important for you to install a smart doorbell?
- why do you feel uncomfortable with the neighbours' smart doorbell?

Critical awareness takes time.

When someone has never thought about potential consequences of smart doorbells before, they might not care at first. Give them some additional information and time to think.

Make agreements about smart doorbell use together.

- is it possible to physically obstruct the field of view?
- can digital privacy zones be set?
- can neighbours ask to see footage?
- how will data be stored and used?



the___doorbell

the ___ doorbell is a speculative concept and the result of my graduation project for the master Design for Interaction at Delft University of Technology.

Find my full thesis, including evaluation and reflection of this concept, from the TU Delft repository: *"How smart is your doorbell? Opening doors to dialogue in the neigbhourhood"*

SILKE SNIJDER - GRADUATION PROJECT - 2024

H. EVALUATION FORM

the ___ doorbell - EN

In this questionnaire, you will watch a concept video about three different types of smart doorbells. The video is shared in the next section of this questionnaire, it's best to watch on a computer screen. You can watch together with others. Please let me know your thoughts!

There will be some general questions, after which you can find the link for the video. After watching, some more open ended questions will be asked. Please feel free to share as much as you like, there are no wrong or right answers.

This concept video is the result of my graduation project, researching smart doorbells in the neighbourhood. By filling out this questionnaire, you consent that your answers may be used anonymously in the graduation thesis and related materials. This thesis will be published in the TU Delft open-access repository. The personal raw data collected from this questionnaire will be deleted after finalising the graduation project.

Thank you so much for taking the time to help me with my research. If there are any questions or other comments, let me know!

Silke Snijder
s.a.snijder@student.tudelft.nl

* Vereist

Before watching

Please answer these questions before watching the concept video.

1
Do you own or use a smart doorbell? *

- Yes
- No

2
Have you ever interacted with a smart doorbell? *

- Often
- A few times
- Never

3
What do you think about smart doorbells? *

4
Do you have neighbours? *

- Next door
- Next door and across
- Apartment building (all around)
- No

Concept video

Here is the link to the concept video, please watch before moving on to the next section! It's best to watch it on a computer screen.

Link: https://youtu.be/v8Gtbmg5AFI

Questions about the video

You have watched a concept video about three different types of **fictional**, smart doorbells. A few specific questions about these doorbells will be asked.
Remember, feel free to share as much as you'd like.

5
First thoughts: please tell me what is going through your mind after viewing this concept video. *

6
How would it feel to be greeted by a smart doorbell? *

7
In what way do you have contact with your own neighbours? *

8
Should smart doorbells be able to "intervene" to create a more connected neighbourhood? Why / why not? *

9
Are there any smart doorbells around you? What might they see and hear? *

10
What happens to smart doorbell footage that is recorded in your neighbourhood?
Is it stored locally, or in the cloud? For how long? *

11
Who has access to the smart doorbell footage?
Who should / should not have access? *

12
Is the smart doorbell helping neighbours to **watch out** for each other?
When might it become **watching over** them? *

13

Should smart doorbells be able to "intervene" in the neighbourhood to create a more caring community? *

14

What should be the boundaries for the use of data and patterns collected by the smart doorbell?

How would you decide that? *

15

Would you use any of these smart doorbells? Why or why not? *

16

How would you feel if your neighbours used any of these smart doorbells? *

17

Would you talk to your neighbours about smart doorbells? How? *

Dialogue in the neighbourhood

When people are a bit more aware about potential consequences of using a smart doorbell, they might decide to speak to their neighbours. Talking about this topic can be tricky for both the smart doorbell owner, as well as the neighbour without smart doorbell. There are all kinds of barriers in the way of a conversation.

Neighbour: "I don't even know what the doorbell records", "I don't want to be a nagging neighbour", "I can't change it anyways", "They spent a lot of money already"

Smart doorbell owner: "Why ask or discuss, everyone else also just installs it", "What if they think I want to spy on them? I'll just not tell them about the smart doorbell"

This speculative concept video aims to be a dialogue starter. It imagines different characters and behaviours for smart doorbells, and shows how neighbourhood dynamics could change because of it.

An important element for the presentation of "the ___ doorbell" is an information booklet that all viewers of the video will receive. It includes the questions you answered in the previous section of this form, and some practical tips to use in smart doorbell dialogue with your neighbours.
A conversation with the neighbours should be light-hearted, gives or asks for information without judgment and is based on your experience and values. It might also be possible to improve the situation together, in example by showing the neighbour what the doorbell sees, changing the field of view or adding privacy zones.

18

In what setting would you expect to view this video? (i.e. through social media, on a festival, as part of a neighbourhood activity, in a community center, through municipality channels, on an information website, etc) *

19

Did the video, combined with the questions in this form help you to reflect on smart doorbells in the neighbourhood? How? *

20

Did you watch this concept video alone or with others? *

- ◯ Alone
- ◯ With 1-3 others
- ◯ With 3+ others

21

Did you have a conversation regarding the video? What was it about? *

22

Can watching this concept video lead to dialogue in the neighbourhood? Please explain. *

23

Would you share / discuss the video itself with your neighbours? Or others around you? *

24

Any other comments / questions?

This was the final question. Thank you so much!