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# Open data work for empowered deliberative democracy: Findings from a living lab study

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## ABSTRACT

Open government data have the potential to facilitate democratic debate and collaboration between government and citizens. This assumes that citizens can effectively use data. However, not all citizens possess these skills. Building on the Empowered Deliberative Democracy Framework, this study examined how open data work - a variety of interventions and activities facilitated by intermediaries - can foster inclusive democratic processes at the local level by using a living lab methodology. Our living lab took place in a vulnerable neighborhood in a city in the Netherlands. Our findings demonstrate that open data work for empowered deliberative democracy requires enhancing the community's awareness and capacity for interpreting and using data about local problems and enabling them to engage in a process of joint learning and deliberation with data intermediaries, government, and other stakeholders.

## 1. Introduction

Cities are increasingly datafied: substantial amounts of data are collected, and even more data will be collected in the near future (Concillo, Molinari, & Morelli, 2017). Governments around the world are opening these datasets to facilitate democratic processes such as transparency, participation, and collaboration (Ruijter, Grimmelikhuijsen, & Meijer, 2017). Many citizens, however, cannot benefit from this development because they do not have the capacity to use data effectively (Perovich, Wylie, & Bongiovanni, 2020). Subsequently, open government data may empower the already empowered (Gurstein, 2011).

As interest in data-driven democratic debate grows, achieving an understanding of how open data can empower vulnerable communities as active participants in an inclusive democratic debate is necessary (Davies & Perini, 2016; Meng, DiSalvo, Tsui, & Best, 2019; Powell, 2012; Yoon & Copeland, 2020). However, to date, empirical research on the relationship between open government data and inclusion is limited (Hossain, Talukder, Hoque, & Bao, 2018; Meng et al., 2019; Puusaar, Johnson, Montague, James, & Wright, 2018; Schwoerer, 2022). Scholars have therefore recently argued that open data initiatives need to be better integrated with social equity and inclusion efforts (Chen, Gil-Garcia, & Gasco-Hernandez, 2022; Davies, Walker, Rubinstein, &

Perini, 2019; Kempin Reuter, 2019; Schwoerer, 2022; Wilson & Cong, 2021).

There are indirect and direct approaches to open data and inclusion (Davies & Perini, 2016). An indirect approach focuses on how open data can be used to plan and coordinate government services for vulnerable communities as the beneficiaries, but without promoting the voice and influence of those communities. A direct approach focuses on the direct engagement of vulnerable communities. Open data is then used to empower communities as active participants, shaping open data around their own needs, and making claims in their own right (Davies & Perini, 2016; Meng et al., 2019; Powell, 2012). In this study, we focus on the direct approach to inclusion, thereby building upon the Empowered Deliberative Democracy Framework (Fung & Wright, 2001).

This study aims to explore how open government data can foster empowered deliberative democracy. Fung and Wright (2001, 2003) identify three principles of Empowered Deliberative Democracy: focus on a practical problem, a bottom-up community approach, and deliberation. We argue that for open data to contribute to these principles, it is not enough to make data accessible (Concillo et al., 2017). A variety of interventions and actions are important, such as collecting, analyzing, interpreting, and discussing data. Based on earlier work, we have referred to this as 'open data work' (Ruijter, Grimmelikhuijsen, Van Den Berg, & Meijer, 2020). This study uses a living lab methodology, which

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fits well with the open data work approach. Living labs offer a collaborative environment for research, experimentation, and interventions in real-life settings, through community-building activities (Dekker, Franco-Contreras, & Meijer, 2020; Gasco, 2017). Our living lab took place in a vulnerable community in a large Dutch city, in which many residents struggle to make ends meet, find a job, stay healthy, or feel at home in the neighborhood (Hajer, Pelzer, van den Hurk, ten Dam, & Buitelaar, 2020).

Our contribution to academic and societal debates about the role of open data for inclusive democratic processes is threefold. First, we develop a framework that identifies conditions under which open data usage can foster empowered deliberative democracy. Second, we demonstrate that open data work for empowered deliberative democracy entails enhancing community awareness and capacity for using data about local community problems and enabling the community to engage in a process of joint learning and deliberation with data intermediaries, local government, and other stakeholders. Third, this study shows how a living lab as a form of action research and generative experimentation can be a vehicle for the contribution of scholars to a more inclusive democracy.

## 2. Theoretical framework

Open data usage is often studied from an information processing angle, while open data usage in relation to inclusive democratic processes is under conceptualized (Schwoerer, 2022). Building on the work of several scholars (Chordiya, 2022; Mor Barak & Chrin, 1998; Shore et al., 2011), we define inclusion as the degree to which communities are part of democratic processes and are represented by the extent to which they have access to information, have voice, and can participate and influence decision-making processes. Vulnerable communities have difficulty in making their voices heard in public discourse because they often lack agency, ability, knowledge, and negotiating techniques to participate or because they are ignored (Kempin Reuter, 2019; Van Twist, Ruijter, & Meijer, 2023). To conceptualize open data usage in relation to inclusive democratic processes we first build on the seminal work of Fung and Wright (2001): *Empowered Deliberative Democracy*. Fung and Wright's framework has been tested among different marginalized and vulnerable communities in different contexts (Cohen & Rogers, 2003; Isaac & Heller, 2003) and has led to a stream of publications. Their framework focuses on the inclusion of vulnerable populations in relation to democratic processes and this fits well with the direct approach to open data and inclusion aimed at empowerment (Davies & Perini, 2016). The second part of our theoretical section focuses on the identification of conditions under which open data usage can foster empowered deliberative democracy based on the work of Dervin (1994) who ties together the concepts of information and democracy. Finally, we argue that these conditions call for "open data work" (Ruijter et al. 2020); a variety of actions and interventions such as collection, analyzing, interpreting, and discussing open data facilitated by experts; data intermediaries. Our conceptualization results in a heuristic framework for analyzing open data work for empowered deliberative democracy.

### 2.1. Empowered deliberative democracy

Fung and Wright (2001, p. 7) explain their Empowered Deliberative Democracy concepts as follows: *democracy* because the processes rely "on the participation and capacities of ordinary people, *deliberative* because they institute reason-based decision making, and *empowered* since they attempt to tie action to discussion". Or as Steiner et al., (2022, p. 19) put it: "participation in democracy relies on communities being empowered to participate". Empowerment is an effort to enable communities to gain and exercise control in a collaborative process of defining problems, identifying, and applying assets, and finding solutions for their communities (Leclercq & Rijshouwer, 2022; Steiner et al.,

2022). Empowered Deliberative Democracy builds on three principles that if followed can foster inclusion (Fung & Wright, 2001).

The first distinctive principle is a focus on a *practical problem*, such as public safety. The second principle is *bottom-up participation*, which implies that these practical problems are solved with the knowledge and expertise of diverse citizens, including disadvantaged individuals who are often excluded, and officials in the field who are directly affected by these problems (Fung & Wright, 2001; Lee, Woods, & Kong, 2020). Hence, rather than speaking for vulnerable communities, an empowerment perspective seeks to develop people's abilities to deliberate and influence official decision-makers directly (Fisher, 2006). This does not mean that experts are irrelevant in an empowered deliberative democracy. Experts may still play a role in the organization and cultivation of the participatory process (Fisher, 2006), but they do not have exclusive power to make important decisions. Their task is to facilitate deliberative decision-making and to leverage synergies between citizens' and professionals' insights (Fung & Wright, 2003). For the third distinctive principle of *deliberative decision-making*, participants listen to each other's positions and generate group choices after consideration. The participants may have little in common, or they may have histories of animosity, however, the participants in these settings are focused on how best to improve the practical problem that brings them together. This according to Fung and Wright (2003), will advance equity and fairness, because the group will generate and adapt proposals that enjoy broad support.

Several scholars stress the importance of information as part of the three principles (Cohen & Rogers, 2003; Isaac & Heller, 2003). Deliberative processes assume that informed citizens can make good judgments on practical community problems through reflection, discussion, and learning (Ianniello, Lacuzzi, Fedele, & Brusati, 2019). Open government data can enhance the quality of deliberation (Frank & Waddell, 2014) and may enable the community to provide feedback and influence governance processes about relevant issues in their community (Chen et al., 2022; Fung & Wright, 2001; Fung & Wright, 2003). Furthermore, Fung and Wright (2001) stress that when information is balanced between actors (such as citizens and government) it can foster empowered deliberative democracy. By contrast, an information deficit or information asymmetry between actors might impede empowered deliberative democracy (Cohen & Rogers, 2003; Fung & Wright, 2003; Ianniello et al., 2019; Isaac & Heller, 2003). To better understand how open data can foster the principles of empowered deliberative democracy, we need to better understand the underlying assumptions that bind the concepts of open government data and democracy.

### 2.2. Open data for democracy

Over the last decade open government data, the idea that data should be available to be freely used, re-used, and distributed, has gained global momentum (Walter et al., 2021). The assumption is that the availability of data will improve citizen engagement in democratic processes (Ruijter et al., 2017; Ruijter & Martinius, 2017; Schwoerer, 2022; Walter et al., 2021). Already about three decades ago, Dervin (1994) argued that there is a widely accepted narrative, with a near-mythic cultural status that ties together the concepts of information and democracy. Although we acknowledge that open data is not the same as information, we think this line of thinking is relevant to unravel the narrative around open data and democracy. Dervin (1994) distinguishes five underlying assumptions: 1) access to "good information" is critical for a good working democracy; 2) when information is allowed to flow freely and openly in a free marketplace the best information naturally surfaces; 3) the value of good information is such that any rational person will seek it out; 4) that good information ought to be available to all citizens in a democracy; 5) where citizens have fewer resources and thus less access, a correction takes place by improving services and availability. These assumptions according to Dervin (1994, p. 370) require closer examination because otherwise, they will "not sustain their reach for the well-

meaning equities they envision". We apply these assumptions to open data and argue that the availability of data does not automatically lead to empowered deliberative democracy, but that a broad range of open data activities are essential.

First, several studies indicate that open data has the potential to foster participation, based on the assumption that access to good data empowers citizens to make informed decisions (Hansson, Belkacem, & Ekenberg, 2015; Ruijter & Martinius, 2017). However, data that is accessible is often still aggregated, decontextualized, and focused on government priorities instead of priorities, agendas and local concerns of vulnerable groups (Schwoerer, 2022; Walter et al., 2021). Hence, for empowered deliberative democracy, communities need to have access to data about local concerns.

Second, the assumption is that when governments publish open data, *the best information will naturally surface*. However, often it is difficult to identify what data is 'best' or relevant for the local problems in the community (Davies & Perini, 2016; Puusaar et al., 2018). Big open government data is abstract and its relevance to place and local issues not always apparent (Puusaar et al., 2018; Schrock & Shaffer., 2017). Identifying relevant or "best" data for empowered deliberative democracy, requires that communities can articulate problems and formulate questions that can be solved with data (Wolff, Gooch, Cavero Montaner, Rashid, & Kortuem, 2016).

Third, the open government data-democracy narrative assumes that *citizens will seek open data*. In practice, citizens often do not have the time, interest or the expert knowledge to do so (Baack, 2015; Graves & Hendler, 2013). Citizens may only have vague ideas about how data relates to their lives (Schrock & Shaffer., 2017). Hence, for empowered deliberative democracy, awareness of and an interest in data must be stimulated.

Fourth, good information ought to be available to all citizens in a democracy. This assumes that availability can potentially enable greater inclusion of vulnerable communities and their perspectives (Bentley & Chib, 2016). This requires that citizens have sufficient knowledge and skills to make effective use of open data. However, often citizens lack the skills to collect, analyze, interpret data, understand the ethics of data, critique, and make sense of data (Gurstein, 2011; Wolff et al., 2016). Thus, for data to be meaningful for empowered deliberative democracy communities need to collect, analyze and transform data into information and actionable knowledge for local public problems (Baack, 2015).

Finally, according to Dervin (1994) the narrative is based on the assumption that some citizens have fewer resources and therefore *means of access to "good information" must be provided*. Local governments are increasingly providing visualization tools on their data portals (Wilson & Cong, 2021). Visualizations can engage diverse communities by supporting sense-making, encouraging reflection and conversations (Schoffelen et al., 2015). Thus, for data to support democracy, tools (e.g. visualizations) need to be provided for vulnerable communities that facilitate participation and conversation.

Based on Dervin (1994) assumptions we can identify conditions under which open data usage can foster the principles of empowered deliberative democracy (Fung & Wright, 2003). To facilitate *bottom-up participation*, a diverse range of citizens need to be interested in working with data around a specific local problem, including those who are vulnerable and may not have access to data. To facilitate *practical orientation*, data must be relevant to the local public problem (information or data questions need to be formulated) and data must be accessible, available, and used (data needs to be transformed into information via data collection, analysis, and visualization). Finally, to facilitate *deliberation*, communities must have the capacity to interpret, contextualize, and transform data into actionable knowledge for discussion and solutions for local problems (Zhu & Xiao, 2022). Based on earlier work, we call this broad range of open data activities 'open data work' (Ruijter et al. 2020). However, vulnerable communities often do not have the capacity to do open data work themselves (Wolff et al., 2016; Yoon & Copeland, 2020). Therefore, several scholars have focused

on the role of experts; data intermediaries (Baack, 2015; Meng et al., 2019).

### 2.3. Intermediaries and their role in open data work

Intermediaries are non-state actors that are positioned in the open data ecosystem involving government actors, citizens, and companies, who can play a role in removing barriers to open data usage (Janssen & Zuiderwijk, 2014; Pilshchikova, Zuiderwijk, & Janssen, 2022; Schrock & Shaffer., 2017; Yoon, Copeland, & McNally, 2018). Scholars identify data intermediaries as essential for the inclusion and empowerment of vulnerable groups (Meng et al., 2019; Sein, 2011; Ubalidi, 2013; Yoon et al., 2018). However, while the interest in and need for data intermediaries are growing, so far little empirical research has been conducted to better understand their role in "open data work" (Frank & Waddell, 2014; Yoon et al., 2018).

Several scholars (Frank & Waddell, 2014; Pilshchikova et al., 2022; Sein, 2011; Yoon et al., 2018) identify a broad range of roles and tasks of intermediaries. Building on their work, we can identify different roles of data intermediaries in "open data work" for empowered deliberative democracy. Intermediaries can *coordinate* (Baack, 2015; Frank & Waddell, 2014) by actively involving a diverse interested group of citizens in local practical problems and *moderate* the identification of local practical problems to stimulate bottom-up participation (Frank & Waddell, 2014). To develop insights into the practical problem based on data, intermediaries can *facilitate* awareness of data (Sein, 2011; Yoon et al., 2018) and the formulation of data questions relevant to the public problem. In addition, intermediaries can be *directing* by working with relevant data on behalf of citizens (Sein, 2011). Data intermediaries can request and collect data, prepare and analyze data by cleaning, merging, and integrating data and they can present data in formats such as visualizations that fit the skills and knowledge of the community (Pilshchikova et al., 2022; Yoon et al., 2018). To facilitate deliberation based on data, intermediaries can be *enabling* (Sein, 2011), by helping communities make sense of data, contextualize data, and transform data into information for deliberation (Yoon et al., 2018). Lastly, data intermediaries can be *transforming* (Sein, 2011) by transforming data into actionable knowledge for finding solutions to local problems. Communities could then become more comfortable with data (use) and develop data literacy skills (Yoon et al., 2018).

### 2.4. Framework for analyzing open data work for empowered deliberative democracy

The previous sections presented the building blocks for the following heuristic framework for analyzing how open data work can contribute to an empowered deliberative democracy (see Fig. 1). In this framework, we propose conditions under which open data can contribute to the empowerment of communities as active participants in democratic debate (Davies & Perini, 2016; Fung & Wright, 2003). We propose that a broad range of open data work activities is needed focusing on facilitating bottom-up participation, insight into a local problem, and informed deliberation. Furthermore, we propose that data intermediaries, as experts (Fisher, 2006; Fung & Wright, 2003), can indirectly contribute to the empowerment of vulnerable communities by facilitating open data work activities.

## 3. Methodology

### 3.1. Study design

We used a living lab methodology to investigate how open data work can foster empowered deliberative democracy. Living labs are characterized by experimentation in real-world settings where citizens, grassroots organizations, government organizations, and researchers interact, collaborate, and co-create a desired outcome often over a

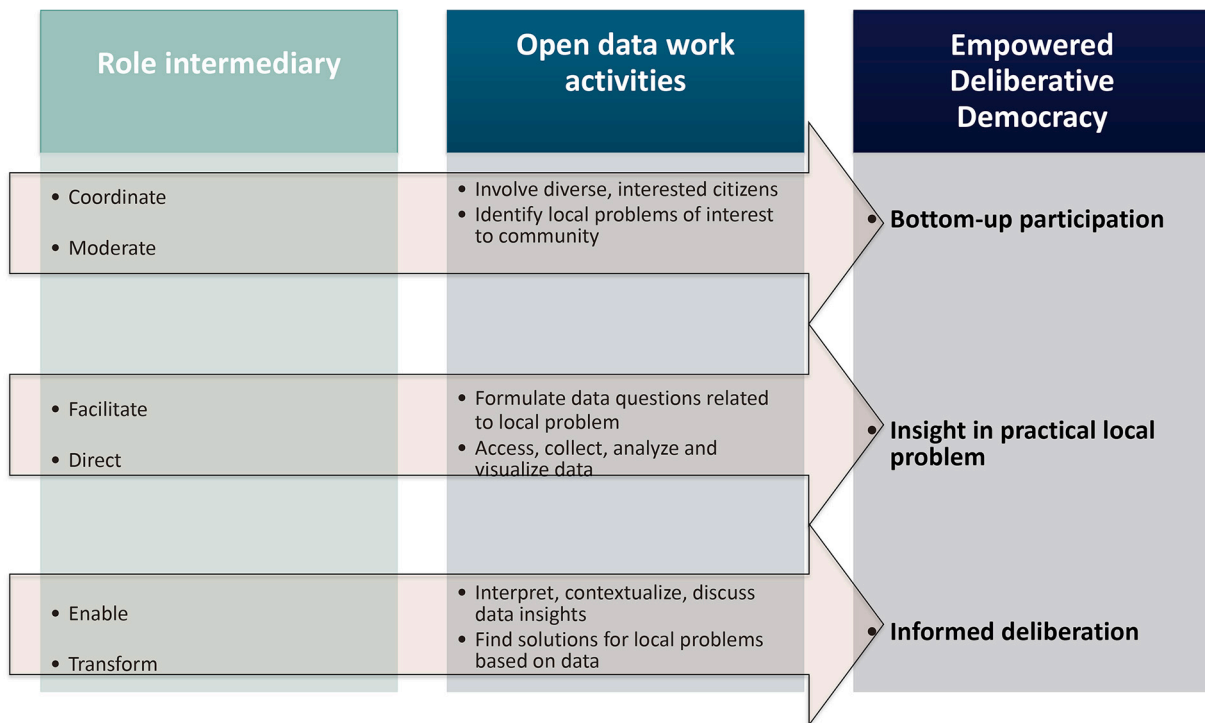


Fig. 1. Framework open data work for empowered deliberative democracy.

longer period (Gasco, 2017). A living lab methodology fits well with the aim of this study. In urban living labs of local governments, citizens and local actors are collaboratively developing innovative solutions for public problems in their neighborhoods (Voytenko, McCormick, Evans, & Schliwa, 2016). This is in line with the principles identified by Fung and Wright (2003): bottom-up participation, practical local orientation and deliberation. Moreover, living labs combine action research with generative experimentation (Ansell & Bartenberger, 2016). Generative experimentation is a process of generating and iteratively refining a solution based on continuous feedback and addressing a particular problem in “real-world contexts” (Ansell & Bartenberger, 2016). This allows for a process of continuous adaptation based on the outcomes of each open data work activity. Finally, living labs allow for rich data collection and their ecological validity is high (Dekker et al., 2020).

### 3.2. Study context

The living lab took place in a vulnerable neighborhood of a large city in the Netherlands. This case was selected based on several criteria (Ospina, Eiseve, & Lee, 2017). First, this neighborhood is identified as a vulnerable community (Hajer et al., 2020). The neighborhood is home to about 35,000 residents and was built in the 1960s as “a neighborhood of tomorrow” (Hajer et al., 2020). However, as of the early 1990s, a downward spiral became apparent (Hajer et al., 2020). Currently, the neighborhood has the highest percentage of social assistance recipients, unemployment, and low-income households in the city. Furthermore, it has the highest percentage of lower-educated residents and residents with low digital skills. 56% percent of the inhabitants have a migration background (Hoekstra, 2021). Second, the neighborhood has a strong tradition of collaboration between residents, institutionalized in neighborhood associations that defend and promote the interests of residents (Hajer et al., 2020). This fits well with Empowered Deliberative Democracy (Fung & Wright, 2001) that emphasizes the importance of bottom-up participation. Lastly, in the past three decades, the local

government has sought to improve the social conditions of the neighborhood through various programs. However, a recent study demonstrated that government tends to overlook the sensitivities of citizens and tends to forget consulting government workers that have first-hand knowledge of the neighborhood (Hajer et al., 2020). This motivated the community to start a bottom-up initiative aimed at developing a vision for the redevelopment of their neighborhood.

### 3.3. Role of participants in living lab

In our living lab, a variety of local actors participated: representatives of neighborhood associations, residents, data intermediaries (data consultancy company and data scientists), researchers, and eventually the local government. The core team of the living lab consisted of community representatives, data intermediaries, and researchers. This team organized a variety of workshops and meetings (see Appendix 1). The three representatives of neighborhood associations initiated the project, formulated the ambition of the project, and involved the researchers, data intermediaries, and residents. The data consultancy company chaired the workshops and the meetings. The data scientists facilitated the different data work activities. The role of the researchers can be characterized as partially active participating observers during meetings (Bryman, 2016). The researchers structured the workshops based on the open data work interventions described below. During the workshops, they did not participate in the activities, but they supported activities, observed, and made notes. This allowed the researchers to see through others’ eyes and be sensitive to the context of residents’ life world without going “native” (Bryman, 2016).

### 3.4. Interventions

During the time of the living lab, two iterative processes evolved. First, residents explored the possibilities of data for the development of a community-based vision aimed at the redevelopment of the

neighborhood. This phase consisted of interventions in line with the data work activities outlined in the theoretical framework and facilitated by data intermediaries:

1. *Involve citizens:* The first intervention consisted of building a community and involving a diverse range of citizens. The neighborhood associations coordinated community building by using their network to invite residents to the meetings.
2. *Explore the problem in the community:* The goal of this intervention, moderated by the data consultancy company was to identify local practical problems and themes by the residents (Fung & Wright, 2003).
3. *Formulate data questions:* During this intervention, the identified themes were discussed in subgroups of residents, moderated by data intermediaries. Residents were asked to formulate challenges, recommendations, and information questions.
4. *Access, collect, analyze and visualize data:* The information questions formulated in the workshop gave direction to the data inquiry of the data intermediaries. The data intermediaries collected, analyzed, and focused on visualizing the data (Schoffelen et al., 2015).
5. *Interpret and discuss data:* This intervention enabled by the data intermediaries focused on awareness of data, interpreting and discussing data visualization, and pairing these visualizations with the local knowledge and expertise of the residents.
6. *Insights, solutions, and actions based on data:* This intervention is focused on transformation, whereby data intermediaries facilitated the data capacity of residents aimed at making them more comfortable with using data, leading to insights, solutions and actionable knowledge for the community vision.

Following, another iteration took place when three representatives of the city (two participation experts and one field expert of the local government) joined the living lab. This iteration was aimed at exploring whether the residents and city could jointly develop an urban vision. The output of the first phase was used at the starting point of the second phase. The same interventions were repeated, however this time together with the city (see Fig. 2).

### 3.5. Data collection and analysis

Empirical data was collected for about one year thereby using the ethical guidelines for living labs (c.f. Dekker et al., 2020). A mixed-method approach was used, consisting of participant observation, interventions, and interviews. Data was collected during eight meetings with the core team, six meetings with the city, five workshops with residents, five research meetings, a presentation to the City Council, National Neighborhood Day and four interviews with five respondents. During the data collection, respondent validation (Bryman, 2016, p391) was used; the minutes of the workshops and meetings were shared with all participants to seek confirmation that the researcher’s findings and impressions are congruent with the views of those whom the research was conducted. At the end of the process, reflective interviews were conducted with three representatives of neighborhood associations and two representatives of the city. In total, our corpus consisted of 30 written transcripts based on field notes and interview transcripts. Triangulation was used (Ospina et al., 2017) during the analysis of the corpus. Two researchers, using NVivo 12 Pro, analyzed the corpus. The researchers met weekly and discussed similarities and differences between the codes. The interventions and their outcomes, and the four major themes were the starting point of the analysis: data intermediary, data activities, community empowerment, and democratic process. Using process tracing as a form of analysis that allows for both theory testing and theory development (George & Bennett, 2005). The researchers first analyzed fieldnotes and transcripts chronologically to investigate the interventions and their outcomes. Following, the researchers identified (sub) themes and patterns emerging from the data and linking them to the literature (Ospina et al., 2017). To illustrate this, different patterns of interactions with data within the community emerged from the corpus. These different patterns were coded as part of community empowerment.

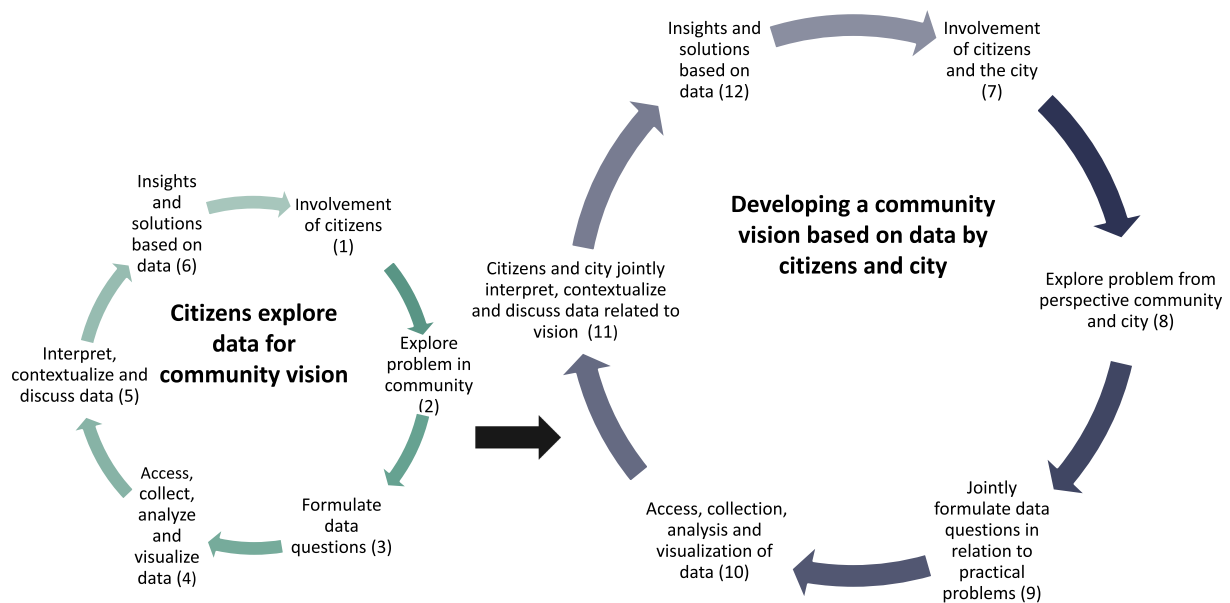


Fig. 2. Interventions living lab.

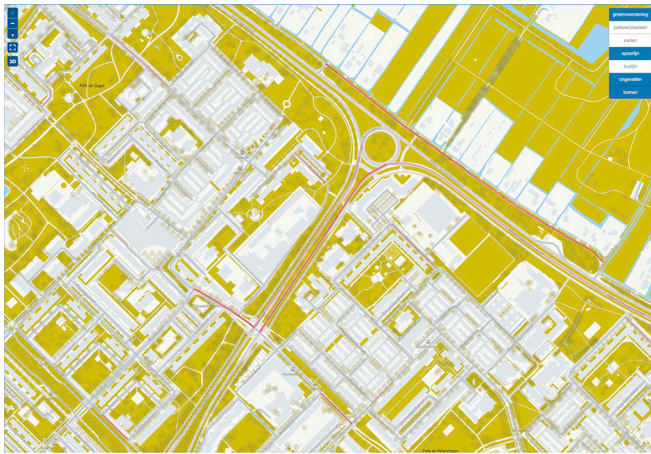


Fig. 3. Interactive map that shows greenery, public transport, and number of traffic accidents.

## 4. Results

### 4.1. Open data work: exploring the possibilities of data for a community vision

During the first meeting (*intervention 1*<sup>1</sup>) with the core team of the living lab, the representatives of the neighborhood associations explained their ambition to develop a community vision that should describe how the neighborhood could become “the place to be”. The reason behind the development of a resident’s vision was a sentiment of distrust toward the local government. Representatives were dissatisfied with how prior participation projects by the city were organized. They felt that the city did not listen to them. Therefore, they wanted to create a safe environment for open dialogue among residents in the absence of politicians or civil servants:

“It is important to start from the bottom-up so that residents can first formulate their thoughts without the presence of the city (...). It is important to not think in advance about the way things should go but to go with the flow and start a movement and go from there. (...) If residents are in the lead you will come to different results.”

(R2)

Another reason for the development of a vision mentioned by the representatives was information asymmetry between the government and residents:

“The city works on a plan for months. Then they present a complicated plan [during a town hall meeting] in half an hour and then residents have to respond. The residents do not have the same information as the city. How can they respond properly based on a short presentation? (...) The residents often nod; pretend they understand what is being said and then the city continues with their plan thinking that they provided the residents the opportunity to participate.”

(R1)

Therefore, the representatives expressed an interest in information and in data that can facilitate understanding of the neighborhood:

“We want to raise the level of understanding of residents so that they have a better understanding of issues surrounding their neighborhood. In this way, we can ‘level’ with civil servants and the city”.

(R1)

Finally, the representatives indicated already having a broad network in the community but that they aimed to involve new people to enhance diversity and representation. Following, the representatives invited residents for a first workshop.

During the first workshop with residents (24 participants), four local practical themes were identified (*Intervention 2*) that the residents considered important for their vision: *facilities*, *greenery*, *traffic*, and *miscellaneous*. Following, the residents elaborated in four subgroups on the specific themes and tried to identify issues and solutions within this theme. Next, the subgroups were asked to formulate information and data questions (*Intervention 3*). The latter was challenging for most groups. The data intermediaries facilitated the formulation of question, for example by asking the group what kind of information they needed to learn more about their theme, or they provided several examples. With the help of data intermediaries, three out of the four groups produced information questions. For example, the group that discussed the theme *facilities* indicated that currently there is a lack of cultural facilities in their neighborhood, such as a theater or cinema, where people can come together. They wondered if information is available about the number of facilities in their neighborhood compared to other neighborhoods.

Based on the results of the first workshop, the data intermediaries in their directing role, acquired open government data on behalf of the residents that related to the identified themes and information questions formulated by the residents (*Intervention 4*). For some themes, the data scientists found large open data sources matching the questions posed. For other themes, various visualization tools in the form of government dashboards are available, but the data behind those dashboards were not available and therefore this kind of “open” data could not be reused for other purposes. Thereby demonstrating that visualizations as finished artifacts do not allow insight in the data themselves. Consequently, some information questions of the residents could not be answered with open data because the data was not available. Following, the data intermediaries transformed the information questions for which data was available into concrete data questions and wrote code to answer those questions with the available data. For example, this meant producing visualizations with geographic data overlays (see Fig. 3). Hence, this demonstrates that the best data does not naturally surface but that a broad range of activities is important.

In a second workshop (*Intervention 5*), the data visualizations were presented by the data intermediaries and discussed with the residents. Approximately, two-thirds of the 22 participants during the second workshop indicated beforehand they had no experience with data or numbers at all. A few residents indicated they had some experience with “numbers” at work but not with open data. The representative of the neighborhood association explained the purpose of the meeting:

“The city uses numbers but we as residents would like to know what these numbers mean. We would like to have a substantial discussion with the city. Therefore, we must know more ourselves (...).”

(Representative 1)

At the beginning of the workshop, the data intermediaries explained what open government data is, how the government collects data (for example via surveys, sensors, and administrative data), and where open data about their community can be found (thereby showing government websites and government reports). Some residents wrote down the URL. Following, the data intermediaries presented a broad range of visualizations about the community for each theme identified in the first workshop. For example, they showed proximity for residents to the nearest cinema and hospital compared to other neighborhoods in the city and other similar neighborhoods in the Netherlands (see Fig. 4).

The presentation resulted in awareness among the residents of the possibilities of data and it raised (critical) questions and remarks by residents:

<sup>1</sup> The numbers correspond with the interventions of Figure 2.

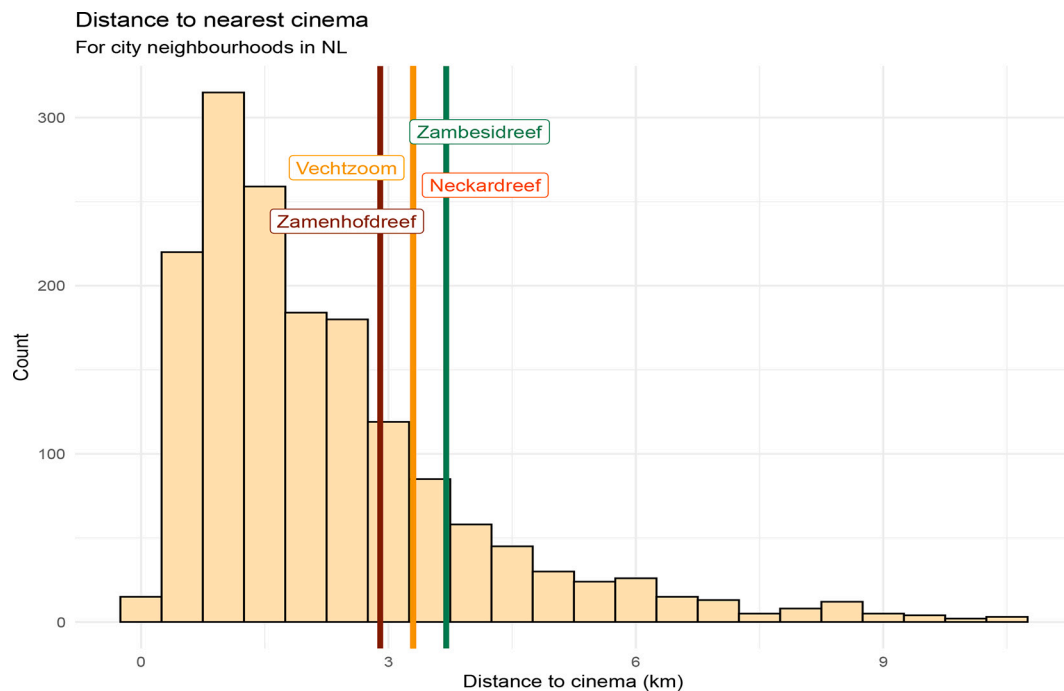


Fig. 4. Distance to cinema compared to other neighborhoods with a similar degree of urbanization.

Source: <https://www.cbs.nl/>.

“The surveys that the government uses are not representative of our community. I know that many residents do not fill in a survey.”

(R3)

It also stimulated an interest in data and the formulation of new information questions from residents:

Can you also find out from the data what factors contribute to a flourishing shopping center?

(R6)

The data intermediaries explained that these visualizations demonstrated that compared to other neighborhoods, the residents indeed must travel further for these facilities. This resulted in insights based on data and a call for action:

“So we can conclude that a cinema should be developed in our community.”

(R7)

“This helps us when we have a conversation with the city.”

(R8)

After the presentation, the residents started clapping and wanted to take the printed visualizations home. Others were taking pictures of the visualizations. This demonstrates a growing enthusiasm and interest in data by the residents but also that data can lead to actionable knowledge.

Following, the participants discussed the presented data visualizations in subgroups. In each group, a data intermediary enabled discussion, interpretations, a shared understanding, and sense-making by asking the residents questions like: *What does this visualization mean for the community? Do you have other data/information questions? What do these data imply for the development of the community vision?*

This resulted in a dialogue based on the data among the residents in each group led by a data scientist. To illustrate this, one group discussed the distance to a cinema by bus and a resident mentioned that there is no bus late at night when the movie ends (which is not shown in the data). Another mentioned that the distance in kilometers to the cinema is not correct because it is not a safe bicycle route at night due to criminal

activity. The resident mentioned taking a detour, which made the theater’s distance longer than reflected in the data. This example demonstrates the importance of the enabling role of data intermediaries. It also demonstrates the importance of a translating role by these residents; the residents made sense of the data and connected the data to their real-life experiences. Furthermore, whereas during the first workshop most residents had difficulty in formulating information questions, during this meeting, all groups formulated new questions. Groups were also asked by the data intermediaries in their transforming role, to think of solutions based on data and implications for their vision (*Intervention 6*). Two out of the three groups during this workshop were able to come up with solutions. To illustrate, one group stressed that this implied for the vision that there is a necessity for building a cinema or multifunctional facility in the center. The group who had difficulty in coming up with solutions indicated they had difficulty linking data insights to a vision. Finally, some residents stressed the importance of involving more residents in the development of the vision. The representative of the neighborhood association indicated they would reflect on this for the next meetings and indicated that now that the residents had come up with some first thoughts and ideas for their community, they would contact the city to explore financial opportunities.

#### 4.2. Open data work: developing a data-driven community vision

During a core team meeting, the representatives of the neighborhood associations indicated that they had realized that community learning and collaboration with the city are more important than the actual development of a vision.

“To me the project [vision] is less important, it is all about the process and what we can learn from each other. (...) There are people at the city who think that residents don’t understand this [redevelopment of the community], but there is so much strength and knowledge among the residents about their community.”

(R1)

The representatives realized that they also needed the city:

“At first, we were against the participation of the city, but we knew, eventually, we need the city. They have the money and resources.” (R3)

Before organizing another workshop with the larger community, the representatives organized several meetings with three representatives of the city and the living lab core team (Intervention 7). These meetings focused on building trust between the city and residents. The city acknowledged that there is a lot of distrust among residents in government in this neighborhood. For these reasons, the city wanted to organize participation differently and aimed for co-creation with residents. The city indicated they were working on an urban plan for the redevelopment of the shopping center and pointed out that there is an overlap between the two projects and opportunities for collaboration. Two more follow-up meetings were necessary to create a shared understanding and align the problem definition. Furthermore, the city indicated that they did not have a network in the community and that they aimed to involve a diverse, active group of residents for which they depended on the neighborhood associations. This demonstrates the importance of coordination in terms of involving residents by the neighborhood associations as intermediary actors.

Following, a workshop was planned with the larger community and the city with the aim of “getting to know one another and learning to understand each other” (R1). However, COVID measures prevented a meeting on location. There was reluctance to organize an online session due to a lack of digital facilities and skills among the residents. However, the neighborhood associations were allowed to discuss the vision with the City Council, and they wanted to discuss with residents what to present. Therefore, an online meeting was organized (Intervention 8a). One representative of the neighborhood association wrote down a one-pager on the community vision, which was distributed among the participants before the meeting. During the online meeting, the participants (21 in total of which 11 residents), explored similarities and differences between the community vision and the city plan. This resulted in a joint presentation by the community and city representative about the community vision to the City Council.

During the online meeting, a limited number of residents were present. Therefore, the fourth workshop, organized by the community and the city, focused again on exploring similarities and differences between the community vision and the plan of the city (Intervention 8b). The neighborhood associations made an extra effort to reach out to new residents via local soccer clubs, and schools. This led to 10 new participants (a total of 34 participants), which according to the neighborhood associations reflected a better representation of the community than the former meetings. However, a representative of the city indicated that

more young people needed to be involved. During the workshop, moderated by the data consultancy company, the residents discussed with a representative of the city in four subgroups what goes well in the neighborhood and what they experienced as problems (see Fig. 5).

The earlier identified themes of mobility, facilities, and green spaces were brought to the forefront again, but additional themes emerged too, such as criminality, housing, and youth. A group indicated that the multicultural, diverse character of the community is a strength and should be reflected in the architecture of the newly developed shopping center. The group developed the idea of a bazaar where food from diverse cultures can be bought. Based on the themes, three out of the four groups were able to formulate information questions (Intervention 9). To illustrate this, one group indicated that the reputation of their community is negative and that their neighborhood is associated with criminality, poverty, and low income. Therefore, they are interested in data about criminality but also about why residents leave the neighborhood or use facilities such as schools and sports facilities in other neighborhoods. At the end of the meeting, a city representative emphasized the importance of collaboration and co-creation and stressed that the city has the same goal: to make the community “the place to be”.

Based on the identified themes and information questions the data intermediaries in their directing role, again collected, analyzed, and visualized open government data (Intervention 10). Eventually, the data visualizations prepared by the data intermediaries on behalf of the residents covered a broad range of topics from socio-demographic information about the neighborhood, housing, mobility, safety, criminality, youth, and facilities. Remarkably, one of the residents also searched and collected open data. The resident found the dashboard pointed out by the data intermediaries earlier, made some visualizations, drew conclusions in relation to the public problems and sent the findings to the living lab’s core team. This illustrates, that this resident had taken on an expert role, like a data scientist, during the living lab.

The living lab core team indicated that the fifth workshop aimed to provide input for the community-based vision to be presented during “Neighborhood Day”, a national initiative in which neighborhoods can organize a broad range of activities. The fifth workshop (Intervention 11) consisted of 40 participants. The group was divided into 8 subgroups. The subgroups alternatively participated in three sessions: 1) designing the neighborhood of the future based on visuals and pictures, 2) thinking about conditions important for the redesign of the neighborhood and 3) data about the neighborhood. Data intermediaries led the data session. The data intermediaries had printouts of data visualizations of all identified themes in earlier workshops and had projected the open data portal website of the city on a screen. The data formed the starting point for dialogue between residents and the city about what they envisioned for the future of their neighborhood. The data intermediary in their enabling role, facilitated that residents learned to read and understand data visualizations, and learned residents the limitations of data. For several residents, it was difficult to find their community on a map. A resident pointed out that one visualization (see Fig. 6) showed that there are more dangerous drivers in their community compared to others.

The data visualization started a conversation between the residents about how their community is sometimes a “race circuit.” One resident indicated the city should act, by placing speed bumps and introducing 30 km zones. This illustrated that the dialogue about data elicited a broad range of reactions and insights and even a call to action by one resident. Several residents indicated that the numbers confirmed what they experienced in their neighborhood. Others had difficulty in understanding and reading data. One representative of the neighborhood association:

“I can’t read statistics (..) I read text. If there are a lot of numbers then I rely on others. [Name] is very good at numbers and reading maps. So I wait for what she has to say about it. If it fits my point of view then I repeat what she says. If it doesn’t fit then I will start a

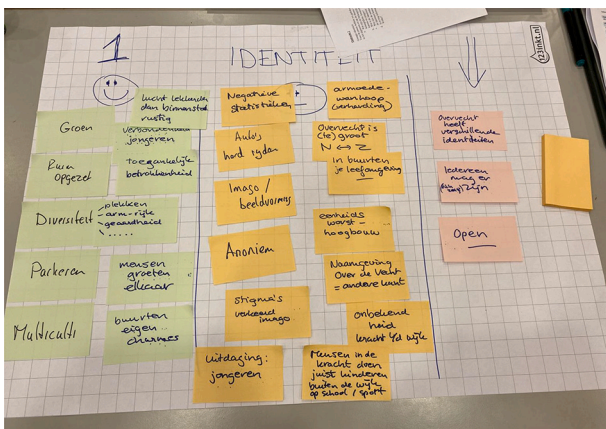


Fig. 5. Result of group discussion with the city that indicates what goes well (green) and what needs attention (yellow). (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article.)



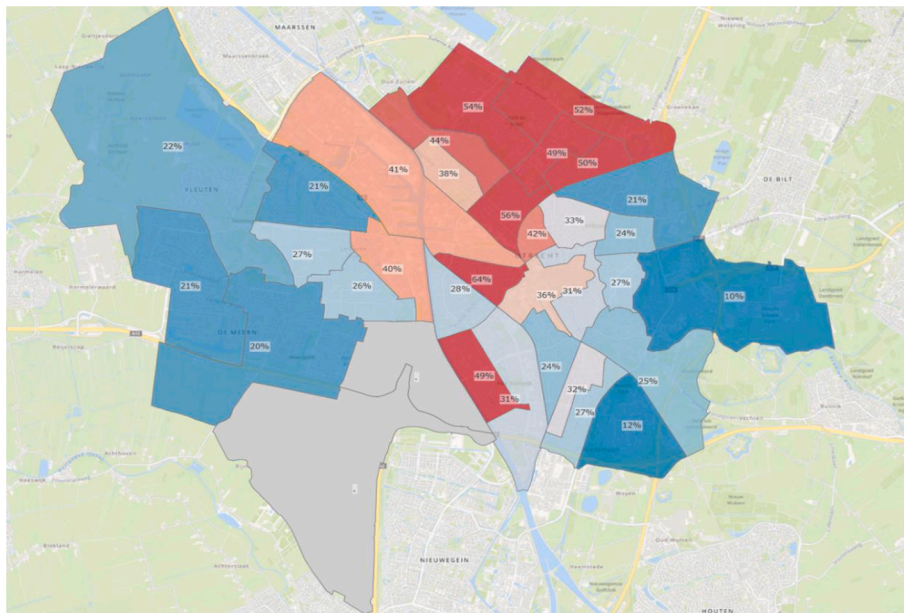


Fig. 6. Visualization that demonstrates experienced dangerous driving.

Source: <https://utrecht.incijfers.nl/>.

discussion. (...) What I did find interesting is that you can use numbers to come to insights.”

(R3)

Other residents took on a critical role and asked critical questions or indicated that visualizations are missing such as numbers about substantive crime and prostitution. A few residents were not willing to further discuss data. They were skeptical and did not trust the source (the government) or data in general or because they did not think that data could lead to added value for the community or the vision. Others indicated that they were just less interested in data because they found reading visualizations challenging.

During the reflection on the workshop in the core team of the living lab, both the representatives of the neighborhood associations and the city were struck by the energy and enthusiasm of the participants:

“It was a fun evening. That is important. You will get other deliberations if it is fun and if deliberation takes place in small groups. The data is a means to start a conversation. (...) We are doing things differently and openly and we take the time and go with the flow (...) This means that things go differently than expected.”

(R1)

In addition, the neighborhood representatives pointed out the importance of getting to know the representatives of the city and regaining trust:

“It is important that institutions [local government] become persons that residents can build a relationship with.”

(R1)

Another neighborhood representative noted:

“What I find interesting is that the participants in the subgroups reacted well to each other. That is the essence (...) to ask each other questions. The democratic process is not the same as most votes count or the loudest voice is right. It is about what are the motives, what are the interests, what are the concerns [in the community].”

(R2)

Regarding data, the neighborhood representative added:

“I do not think that residents will search for open data themselves, but they did learn that data can provide evidence for their argumentation (...) this will strengthen them.”

(R2)

The representatives of the city indicated that they had gained a better understanding of the community during the workshop. They indicated that often during participation meetings the government and residents are on opposite ends but that during these meetings and especially in the smaller groups there was room for deliberation. However, they found it challenging that the meetings did not always go as planned, which is not in line with the city’s institutional logic:

“So far, there is no definition, or a community vision written down on paper. Residents participate based on their own experience. That is great on the one hand but can also be problematic. We are part of a tightly organized system.” (Representative city 2). To which a colleague adds: “We have to deliver in one year”

(Representative city 1)

Finally, the *National Neighborhood Day* consisted of a community fair with a broad range of activities, dancing, food vending stalls, and information market. The neighborhood associations did not present a community vision as initially planned. Instead, the representatives of the neighborhood and the city organized a kick-off meeting (*intervention 12*) for the co-creation process regarding a joint vision for the redevelopment of the neighborhood. Both the city and the community representative mentioned that already several meetings took place, but that from here on, the city would take the lead in the process. The outcomes of the previous meetings were considered input for the city-led process and the content of the vision. According to a neighborhood representative, it is important to see the plan as a transformation plan:

“We are heading somewhere together but how exactly we don’t know yet” (R1).

Another neighborhood representative added that the vision they had initially planned to develop now had become something bigger, beyond what they had initially envisioned. Whereas another neighborhood representative had hoped that the vision would have been more concrete by now.

### 4.3. Analysis

#### 4.3.1. Open data work for principles of deliberative empowered democracy

Based on the results, it can be observed that for *bottom-up participation*, the coordination by the neighborhood associations was an important condition for involving a diverse group of citizens. Residents wanted to be involved because they were interested in the redevelopment of the neighborhood and the value of data was seen as means for the vision. The data intermediaries, therefore, did not coordinate community building. Next to community building by the neighborhood associations, residents themselves also stressed the importance of the involvement of a diverse range of residents and started to bring a neighbor. The living lab started with a small number of enthusiastic residents and grew over time (from 14 to 40 at the end of the project). The living lab aimed to empower communities whose voices are not heard in participation processes. Over time, residents who had not worked in participation projects of the neighborhood associations got involved in the debate about the community's future. However, as the representatives of the city and neighborhood associations said, even though the diversity of the participants grew over time, it was not a full representation of the community's diversity, thereby demonstrating the challenge of involving vulnerable groups.

Related to the *local practical problem*, it can be observed that residents gained more insight into their community based on open data work facilitated by data intermediaries. Most residents had no experience with open government data at the start of the project. Open data work activities, facilitated by data intermediaries, turned out to be important conditions for gaining insights into local problems. Data intermediaries moderated the formulation of data questions related to public problems, facilitated data awareness among the community, had a directing role in the collection and analysis of data and enabled the interpretation and sense-making of data visualizations and deliberation based on data. Hence, when open data is accessed correctly, presented fairly, tied up to a place, and contextualized, it can help residents explore issues and understand their communities (Puussaar et al., 2018). Furthermore, we found that the community added their knowledge and experience to the data regarding local problems. This demonstrates that communities are more than just the ones with local public problems, they can also become active contributors of knowledge for tackling those problems (Fung & Wright, 2003; Puussaar et al., 2018). Their local knowledge can be used to enrich data and promote collaborative exploration of data for local public problems. These insights are not only relevant for the community themselves but also for governments who are using data to make policies.

Regarding *informed deliberation*, after a bottom-up exploration phase of data for a community vision, the community realized that involving the government was important for resources. Following, the government participated in the living lab. In the beginning, distrust dominated the interactions between residents and government but over time the representatives of the city were increasingly seen as one of the participants. Fung and Wright (2001, 2003), indicate that the practical focus creates a situation in which actors accustomed to competing with one another start to cooperate and build more congenial relations. In our living lab, we noticed that the tensions between the city and residents eased over time. Fung and Wright (2003) point out that the deliberative process is likely to generate superior solutions compared to hierarchical procedures. Insights based on data started deliberative discussions and led to the solution of the development of a cinema in the neighborhood. However, the deliberations did not lead to concrete actions in the form of a community vision based on data during the time of our study. This was partly due to the differences in definitions of what a vision should entail among the various representatives of the neighborhood associations. Another possible explanation is that they lacked the capacity to develop a vision (Fung & Wright, 2003). Nevertheless, the residents did provide input for the City Council and started a co-creation project with the city. In that way, open government data can facilitate a shift in

power relationships between citizens and government away from transactional models to more relational ones (Puussaar et al., 2018).

#### 4.3.2. Various patterns of data interaction within the community

From our results, some new patterns emerged as well. Our findings demonstrate that empowered deliberative democracy through open data work does not imply that every resident in the community interacted with data in the same manner. In contrast, we found a variety of patterns of interaction with data within the community during the interventions (see Appendix 2). Based on our analysis we identify seven patterns or roles in the community that participated in the living lab:

- *Enthusiasts*: These are the residents that got enthusiastic and aware of the options of data and took an interest in data by asking follow-up questions but had difficulty in understanding and reading data.
- The *Readers* learned how to interpret data that is presented (in the form of a visualization). They were able to gain information from data visualizations but had difficulty in formulating information questions related to a practical problem.
- *Translators* learned to make sense of data during the living lab, were able to connect data to local problems and real-life experiences and were able to formulate information questions related to a local practical problem.
- The *Critical Thinkers* learned how to critically reflect on data-related arguments and understand that data reflects real-world phenomena.
- The *Activists* learned how to use data as actionable knowledge, for example as part of an argument in deliberation, solutions for local problem or as a call for action.
- The *Experts* learned where to find open data, were able to visualize data with the help of tools on a data portal, interpret data, and make sense of data about public problems.
- Finally, we can identify the *Skeptics*. These residents were skeptical about the significance and interpretation of data or the source of the data. They did not see the value of data and were unwilling to deliberate based on data.

Studies on data literacy indicate that individual citizens should acquire fundamental competencies that consist of being able to read and interpret and understand data, and that they use this knowledge to critically assess data-related arguments and make decisions (Cui, Chen, Lutsyk, Leighton, & Cutumisu, 2023; Wolff et al., 2016). Hence, this implies that citizens should at least be able to fulfill the role of reader, translator, and critical thinker. Our study demonstrates that these roles are indeed important. However, we also demonstrate that these roles were not always acquired by one individual but spread among different community members. Through deliberation and discussion in groups and pooling various levels of acquired individual expertise, the community was able to fulfill their joint needs in terms of reading, understanding data, and making decisions based on data. Hence, it highlights that for empowered deliberative democracy, it is not a requirement that all residents become data experts, but it is important that they become comfortable with data at different levels of expertise (Wolff et al., 2016; Yoon et al., 2018).

## 5. Conclusion and discussion

The question of how open government data can not only benefit the 'haves' but also contribute to the inclusion of silent voices in democratic deliberations is a key question for modern democracies. We defined inclusion as the degree to which communities are part of democratic processes and are represented by the extent to which they have access to information, have voice, and can participate and influence decision-making processes (Chordiya, 2022; Mor Barak & Chrin, 1998; Shore et al., 2011). This study focused on a direct approach to inclusion, thereby building upon the Empowered Deliberative Democracy Framework (Fung & Wright, 2001). In a direct approach, open data is

considered a means to empower vulnerable communities as active participants in democratic processes (Davies & Perini, 2016; Meng et al., 2019; Powell, 2012). The purpose of this exploratory study was to investigate how open data work can facilitate empowered deliberative democracy. We developed a conceptual framework that identified conditions under which open data work – conceptualized as activities and interventions facilitated by intermediaries – can foster empowered deliberative democracy (Fung & Wright, 2001). Using a living lab methodology, we demonstrated that open data work has the potential to empower communities and enable the inclusion of more communities in democratic processes.

Our study presents four main contributions to academic and societal debates about the role of open data for inclusive democratic processes. First, our study contributes to the debate on how open data initiatives can be better integrated with equity and inclusion efforts by demonstrating theoretically and empirically that for open data to foster democratic empowerment, a complex social and organizational process is required. Our study shows the challenge of involving a diverse and interested groups of citizens, the importance of identifying local problems, formulating data questions related to this problem, analyzing and visualizing data, and discussing data and finding solutions for local problems. We also showed that some caution regarding the role of open data for inclusive democratic processes needs to be considered. In this study, open data work had a supporting role in the deliberative democratic process. Open data work was not a goal but a means to reduce information asymmetry (Ianniello et al., 2019) and to facilitate informed debate (Ruijer et al., 2017). Albeit, as Fung and Wright (2003) indicate, when information is more balanced empowered deliberative democracy can be fostered.

Second, we demonstrated that data intermediaries have a crucial role in open data work for vulnerable communities. They are essential actors in connecting open data supply and use by decreasing usability barriers (Pilshchikova et al., 2022; Shaharudin, van Loenen, & Jansen, 2023). Shaharudin et al. (2023) point out that data intermediaries can enhance the supply, flow and use of open data, and strengthen the relationships among various open data stakeholders. Our research confirms these findings but adds that for strengthening relationships the neighborhood association as an intermediary was crucial. Furthermore, data intermediaries can consist of civil society such as non-profit organizations, activists, hackers, but also of private companies and journalists (Pilshchikova et al., 2022; Schrock & Shaffer, 2017; Sein, 2011). In our study, the data intermediaries were non-state actors (a knowledge institution and a company). In line with other research (Sein, 2011), we found that considering the lack of trust in government, it was important for the residents that the data intermediary was a non-state actor. What makes these data intermediaries distinct is that they take care of the interests of other actors (Shaharudin et al., 2023). In the living lab, the activities of the data intermediaries were aimed at serving the interests of the vulnerable community. Other data intermediaries such as nonprofit organizations might be able to fulfill a similar role. At the same time, authors also raise critical questions regarding the role of data intermediaries. Sein (2011) indicates that intermediaries add another layer and another power relationship namely between data intermediary and citizens that can lead to manipulation. Schrock and Shaffer (2017) point out that some intermediaries may be pursuing particular agendas. Furthermore, if data visualizations are presented by intermediaries as finished artifacts, they might not empower residents to explore how data was used, from where it was obtained, and how it was displayed (Graves & Hender, 2013). Further research is therefore needed into the advantages and disadvantages of the role of data intermediaries.

The third contribution concerns our understanding of the community dynamics and conditions for being able to use the potential of open data. Our study demonstrates the importance of enhancing community awareness and capacity for interpreting and using data about local problems for empowered deliberative democracy. If communities are

engaged in an extended process of mutual learning, and ongoing deliberation with data intermediaries, government, and other stakeholders, information deficits can be mitigated (Ianniello et al., 2019). We identified seven different patterns in the interactions with data by citizens in the community. Further research is needed to develop an understanding of how these patterns are distributed in communities and how this influences the internal dynamics of community empowerment. Another avenue of better understanding these patterns is by focusing on empowerment at the individual level and advancing data skills via education and training at schools and libraries (Copeland, Yoon, & Zhang, 2021; Sharma, Fantin, Prabhu, Guan, & Dattakumar, 2016).

Finally, this living lab study also contributes to the literature on action research in the public sector. Living labs allow for direct societal impact through research. Increasingly, scholars are advocating for more participatory forms of research where researchers, practitioners, and communities co-produce knowledge (Romme & Meijer, 2020; Schworer, Keppler, Mussagulvo, & Puello, 2022). This provides scholars the opportunity to observe phenomena up-close and acquire a deeper understanding of community needs (Schwoerer, Keppler, Mussagulvo, & Puello, 2022). However, the living lab methodology also has some limitations. One of the challenges of this type of research is that there is no clear endpoint of the study, only a virtual one. As Iversen (2009), points out, “getting in” the research field, receives a lot of attention but scant attention is paid to “getting out” or disengaging from a community. While there are guidelines for living labs (Dekker et al., 2020), these guidelines do not explicitly address how researchers should sensitively exit. According to Iversen (2009), getting out requires the researcher to be clear about the boundaries and endpoint of the research. Hence, researchers should not only critically consider how to implement an inclusive action-based intervention process but also be reflexive on how to get out in a way that minimizes harm to the community. This implies that not only the starting situation should be described in the research design (Dekker et al., 2020) but also the end point. Furthermore, living labs consist of iterative ways of learning-by doing, this could potentially place a disproportionate burden on vulnerable populations. According to Khanlou and Peter (2005), it is therefore important for researchers to reflect on their protocol and consider whether possible risks are proportionate to the benefits, whether the purpose of the research is directed toward empowering the vulnerable community, and whether there is evidence of the community’s commitment and interest in the issue (Khanlou & Peter, 2005). The latter implies that in the living lab, the community also has a say in the identification of the public issue, can contribute their knowledge and experience to the research and have the potential to learn. Finally, living labs have developed as a distinctive research and design methodology. Situated in a real-life context, living lab studies have a high ecological validity but often lower external validity and generalizability (Dekker et al., 2020). However, as Flyvbjerg (2006) argues, generalization based on a case is possible, if the case selection is theoretically informed. Our living lab was selected based on the principles identified by Fung and Wright (2003): bottom-up participation, practical local orientation and deliberation. Furthermore, to situate our findings and their broader relevance, we followed the guidelines by Dekker et al. (2020) to improve methodological robustness. The guidelines stress the importance of reporting the aims of the living lab, using different data collection methods, involving multiple researchers, applying process tracing to analyze the effects of each intervention and reporting on the role of the researchers. However, this living lab took place in a vulnerable community in a western country. While the results and findings of our living lab are valuable for researchers and practitioners in a similar context, future research could explore the identified conditions under which open data can foster empowered deliberative democracy in communities in other countries and regions of the globe.

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## CRediT authorship contribution statement

**Erna Ruijter:** Conceptualization, Methodology, Formal analysis, Writing – original draft, Visualization, Funding acquisition. **Carmen Dymanus:** Methodology, Resources, Formal analysis, Writing – review & editing. **Erik-Jan van Kesteren:** Investigation, Data curation, Software, Formal analysis, Methodology. **Laura Boeschoten:** Investigation, Data curation, Software, Formal analysis, Methodology. **Albert Meijer:** Conceptualization, Methodology, Writing – review & editing, Supervision, Funding acquisition.

## Declaration of Competing Interest

None.

## Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.giq.2023.101902>.

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